

Market shares and concentration measures in grey cement

Introduction and summary

1. This appendix looks at market shares of grey cement, using volumes sold, of the GB producers as well as cement importers.¹ We calculate market shares on a national (GB) basis, as well as for each region in GB. We also look at relative shares of volumes sold of the GB producers of cement. We calculate relative shares on a national basis for all grey cement, as well as separately for bulk and bagged cement, external customers of bulk cement, and independent customers of bulk cement. We also calculate shares of GB production for all grey cement. Finally, we calculate concentration ratios and the HHI based on sales volumes of all grey cement in GB.
2. We find that market shares of the GB producers, based on volumes sold across GB, remained fairly stable over the last five years, despite a significant fall in demand for cement in 2009. Cemex retained fairly stable market shares over the period 2007 to 2011, while Lafarge, and to a lesser degree Hanson, lost some share to Tarmac and cement importers.
3. We also find that relative shares of sales volumes of the four GB producers remained fairly stable over the same period, both when looking at all grey cement sales, as well as sales of bulk versus bagged cement, and sales of bulk CEM I.
4. Further, market shares of sales volume on a regional basis show more fluctuation over the period 2007 to 2011.

¹ We look at market shares mainly pre-2013, and therefore where we refer to GB producers we mean Cemex, Hanson, Lafarge and Tarmac.

5. Finally, we calculate concentration ratios and the HHI index across GB sales of all grey cement, which show that the market is highly concentrated, though the concentration has fallen slightly over the period 2007 to 2011, linked with the growth in cement importers.

National shares of production of all grey cement

6. This section looks at the shares of production of the four Majors which produce cement in GB (Cemex, Hanson, Lafarge and Tarmac) on a national basis. We first look at production volume of all grey cement (bulk and bagged), which is available on an annual basis. We then look at production volume of grey cement and GGBS.
7. Table 1 shows the volume of grey cement produced in GB by each GB cement producer, as well as the shares of GB production of grey cement of the four GB cement producers over the period 2001 to 2011. The GB cement producers' shares of production have changed over the last ten years. In particular, Cemex's share of production has increased from 16 per cent in 2001 to 24 per cent in 2011; Hanson's share has fallen from 27 to 23 per cent over the same period; Lafarge's share has fallen from 54 to 43 per cent over the period; and Tarmac's share has increased from 4 to 11 per cent over the period.
8. However, the GB cement producers' shares have remained fairly stable over the last five years, despite a significant downturn in the economy in 2009. In particular, Cemex's share remained fairly constant over the period, increasing from 23 per cent in 2007 to 24 per cent in 2011; Hanson's share remained at 23 per cent in both 2007 and 2011; Lafarge's share reduced somewhat over the period, from 46 per cent in 2007 to 43 per cent in 2011; and Tarmac's share increased over the period from 8 per cent 2007 to 11 per cent in 2011.

TABLE 1 **GB production and shares of GB production, all grey cement, 2001 to 2011**

	<i>Volume of grey cement produced in GB (tonnes)</i>				<i>Shares of GB production (%)</i>			
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
2001	[X]	[X]	[X]	[X]	16	27	54	4
2002	[X]	[X]	[X]	[X]	17	27	53	3
2003	[X]	[X]	[X]	[X]	20	27	50	3
2004	[X]	[X]	[X]	[X]	19	27	48	5
2005	[X]	[X]	[X]	[X]	21	25	46	8
2006	[X]	[X]	[X]	[X]	22	25	46	8
2007	[X]	[X]	[X]	[X]	23	23	46	8
2008	[X]	[X]	[X]	[X]	24	24	44	8
2009	[X]	[X]	[X]	[X]	26	23	40	11
2010	[X]	[X]	[X]	[X]	25	23	41	11
2011	[X]	[X]	[X]	[X]	24	23	43	11

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

9. Table 2 shows the volume of grey cement and GGBS produced in GB by each GB producer, as well as the shares of GB production of grey cement of the GB cement producers over the period 2007 to 2011. Cemex's share of production of cement and GGBS has increased from 20 per cent at the beginning of the period to 21 per cent in 2011; Hanson's share has fallen from 35 to 33 per cent; Lafarge's share has fallen from 39 per cent in 2007 to 34 per cent in 2009, before increasing to 37 per cent in 2011; and Tarmac's share has increased from 6 to 9 per cent over the period.

TABLE 2 **GB production and shares of GB production, grey cement and GGBS, 2007 to 2011**

	<i>Volume of grey cement and GGBS produced in GB</i>				<i>Shares of GB production (%)</i>			
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
2007	[X]	[X]	[X]	[X]	20	35	39	6
2008	[X]	[X]	[X]	[X]	20	35	37	7
2009	[X]	[X]	[X]	[X]	22	34	34	10
2010	[X]	[X]	[X]	[X]	22	33	36	10
2011	[X]	[X]	[X]	[X]	21	33	37	9

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

Note: There may be some double counting of GGBS volumes in these figures, as we are including both GGBS produced by Hanson, as well as CEM III produced by the GB producers which may already capture some of the GGBS produced by Hanson.

Market shares based on sales volume

10. This section looks at the market shares of sales volume of the four Majors which produce cement in GB (Cemex, Hanson, Lafarge and Tarmac), as well as cement importers. We look at total volumes sold (external and internal), of all types of grey cement (bulk and bagged), first on a national basis, and then regionally.

National market shares by volume of all cement

11. Tables 3 and 4 show the sales volume of all grey cement and the market shares based on sales volume of all grey cement sold in GB, over the period Q2 2007 to Q4 2011. [X] market share remained fairly stable, at [X] per cent, in both Q4 2007 and Q4 2011; [X] market share fell from [X] to [X] per cent over the same period; [X] market share fell from [X] to [X] per cent over the period; [X] market share increased from [X] to [X] per cent over the period; [X] market share increased from [X] to [X] per cent over the period; and the independent importers' joint market share increased from [X] to [X] per cent over the period (of which [X],[X] and [X] made up [X] per cent in Q4 2007 and [X] per cent in Q4 2011).

TABLE 3 Sales volume of all grey cement, Q2 2007 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X]; cement importers; and CC analysis.

Note: Other importers include [X]. Where data for other importers was not provided on a quarterly basis, we have estimated quarterly sales by dividing annual sales by 4. Where data for other importers is missing for some years, we have used linear interpolation to estimate observations for the missing years.

TABLE 4 Market shares based on sales volume of all grey cement, Q2 2007 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	per cent
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X]; cement importers; and CC analysis.

Regional market shares by volume of all cement

12. In this section we calculate shares of bulk and bagged volume sold by the GB producers, as well as Aggregate Industries and of three other importers who provided data to us on their regional sales ([REDACTED], [REDACTED] and [REDACTED]). Regional sales by the other importers are not available.²

13. Table 5 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the East Midlands, while Table 6 shows the market shares calculated using data in Table 5. As the tables show, [REDACTED] and [REDACTED] have grown their market shares over the period, mainly at the expense of [REDACTED], while [REDACTED] and [REDACTED] had a similar market share at the end of the period as that which each company held in Q1 2008.

TABLE 5 Sales volume of cement in the East Midlands by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
								tonnes
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

² This means that for some regions, the shares will be relative shares of those suppliers for which we have data, rather than market shares. Lafarge told us that importers have increased their share of supply of cement over the 2007–2011 period and that excluding sales volumes of some importers in the tables below may therefore be misleading, especially given that in a number of regions importers are particularly prominent.

TABLE 6 Market shares in the East Midlands based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>per cent</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

14. Table 7 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the East of England, while Table 8 shows the market shares calculated using data in Table 7. As the tables show, [REDACTED] and [REDACTED] (and [REDACTED] to a smaller degree) have grown their market shares over the period, mainly at the expense of [REDACTED] whose share [REDACTED] from around [REDACTED] per cent in 2008 to around [REDACTED] per cent in 2011. By the end of the period, [REDACTED] is the third largest seller of cement in East of England, after [REDACTED] and [REDACTED].

TABLE 7 Sales volume of cement in the East of England by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>tonnes</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

TABLE 8 Market shares in the East of England based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	[X]
								per cent
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

15. Table 9 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the North-East, while Table 10 shows the market shares calculated using data in Table 9. As the tables show, [X], [X] and [X] increased their market shares over the period, while [X] and [X] lost share (with [X] share reducing [X] was the second largest seller of cement in the North-East, after [X]).

TABLE 9 Sales volume of cement in the North-East by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	[X]
								tonnes
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

TABLE 10 Market shares in the North-East based on sales volume, all grey cement, Q1 2008 to Q4 2011

	<i>per cent</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Aggregate Industries</i>	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

16. Table 11 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the North-West, while Table 12 shows the market shares calculated using data in Table 11. As the tables show, [X] and [X] have increased their market shares of the period, while [X], [X] and [X] have reduced their share. [X] share has fallen somewhat between 2008 and 2011, while [X] maintained its share between the two years.

TABLE 11 Sales volume of cement in the North-West by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	<i>tonnes</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Aggregate Industries</i>	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

TABLE 12 Market shares in the North-West based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>per cent</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

17. Table 13 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in Scotland, while Table 14 shows the market shares calculated using data in Table 13. As the tables show, [REDACTED] is by far the largest seller of cement in Scotland, though its share has fallen somewhat over the period, while [REDACTED] and [REDACTED] have increased their share.

TABLE 13 Sales volume of cement in Scotland by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>tonnes</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

TABLE 14 Market shares in Scotland based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>per cent</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

18. Table 15 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the South-East (including London), while Table 16 shows the market shares calculated using data in Table 15. As the tables show, [REDACTED], [REDACTED] and [REDACTED] have increased their market shares over the period, mainly at the expense of [REDACTED] and [REDACTED].

TABLE 15 Sales volume of cement in the South-East by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>tonnes</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

TABLE 16 Market shares in the South-East based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>per cent</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

19. Table 17 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the South-West, while Table 18 shows the market shares calculated using data in Table 17. As the tables show, [REDACTED] has increased its share, mainly at the expense of [REDACTED]. [REDACTED] has increased its share somewhat over the period, and was the second largest seller in the South-West at the end of the period, after [REDACTED].

TABLE 17 Sales volume of cement in the South-West by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
	<i>tonnes</i>							
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

TABLE 18 Market shares in the South-West based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	per cent [X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

20. Table 19 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in Wales, while Table 20 shows the market shares calculated using data in Table 19. As the tables show, [X], [X] and [X] have increased their shares over the period, at the expense of [X] and [X].

TABLE 19 Sales volume of cement in Wales by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	tonnes [X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

TABLE 20 Market shares in Wales based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
								<i>per cent</i>
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

21. Table 21 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in the West Midlands, while Table 22 shows the market shares calculated using data in Table 21. As the tables show, [REDACTED] has increased its market share over the period, mainly at the expense of [REDACTED].

TABLE 21 Sales volume of cement in the West Midlands by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
								<i>tonnes</i>
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

TABLE 22 Market shares in the West Midlands based on sales volume, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	[X]
								per cent
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

22. Table 23 shows the sales volumes of all cement over the period Q1 2008 to Q4 2011 in Yorkshire and the Humber, while Table 24 shows the market shares calculated using data in Table 23. As the tables show, [X], [X] and [X] have increased their market shares over the period, mainly at the expense of [X] and [X].

TABLE 23 Sales volume of cement in Yorkshire & the Humber by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011

	Cemex	Hanson	Lafarge	Tarmac	Aggregate Industries	[X]	[X]	[X]
								tonnes
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [X], [X] and [X], and CC analysis.

TABLE 24 Market shares in Yorkshire & the Humber based on sales volume, all grey cement, Q1 2008 to Q4 2011

	<i>per cent</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Aggregate Industries</i>	[]]	[]]	[]]
Q1 2008	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q2 2008	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q3 2008	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q4 2008	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q1 2009	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q2 2009	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q3 2009	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q4 2009	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q1 2010	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q2 2010	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q3 2010	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q4 2010	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q1 2011	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q2 2011	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q3 2011	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]
Q4 2011	[]]	[]]	[]]	[]]	[]]	[]]	[]]	[]]

Source: Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, []], []] and []], and CC analysis.

Relative shares of volume

23. This section looks at the relative shares of sales volume of the four Majors which produce cement in GB (Cemex, Hanson, Lafarge and Tarmac) on a national basis. We first look at monthly total volumes sold (external and internal), of all types of grey cement (bulk and bagged), before presenting shares of volumes sold on a more disaggregated basis.

National shares of volume of all grey cement

24. Table 25 shows the sales volume of grey cement by GB producers, alongside the relative shares of sales volume by the four producers over the period February 2007 to December 2011. The GB cement producers' relative shares of volumes sold have remained stable over the five-year period, despite a significant downturn in the economy in 2009. In particular, []] relative share remained fairly constant over the period, at []] per cent in both February 2007 and December 2011; []] relative share reduced somewhat over the period, from []] per cent in February 2007 to []] per cent in December 2011; []] relative share reduced somewhat over the period, from []] per cent in February 2007 to []] per cent in December 2011; and

[X] relative share increased over the period from [X] per cent in February 2007 to [X] per cent in December 2011.

TABLE 25 Sales volume of grey cement by GB producers and relative shares of sales volume, all grey cement, February 2007 to December 2011

	Grey cement volume sold by GB producers				Relative shares of sales volume of GB producers (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
Feb 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

National shares of volume of bulk cement

25. Table 26 shows the sales volume of bulk cement sold by the GB cement producers, alongside the relative shares of sales volume of the GB cement producers over the period February 2007 to December 2011. [X] relative share reduced from [X] per cent in February 2007 to [X] per cent in December 2011; [X] relative share stayed fairly constant at [X] per cent in both February 2007 and December 2011; [X] relative share fell from [X] to [X] per cent over the same period; and [X] relative share increased from [X] to [X] per cent over the period.

TABLE 26 Sales volume of bulk cement by GB producers and relative shares of sales volume, bulk cement, February 2007 to December 2011

	Bulk cement volume sold by GB producers				Relative shares of sales volume of GB producers (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
Feb 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

26. Table 27 shows the sales volume of bulk CEM I sold by the GB cement producers, alongside the relative shares of sales volume of the GB cement producers, over the period February 2007 to December 2011. [X] relative share fell from [X] per cent in February 2007 to [X] per cent in December 2011; [X] relative share increased from [X] to [X] per cent over the same period; [X] relative share fell from [X] to [X] per cent over the period; and [X] relative share increased from [X] to [X] per cent over the period.

TABLE 27 Sales volume of bulk CEM I by GB producers and relative shares of sales volume, bulk CEM I, February 2007 to December 2011

	Bulk CEM I volume sold by GB producers				Relative shares of sales volume of GB producers (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
Feb 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

27. Table 28 shows the sales volume of bulk CEM I to external customers by the GB producers, alongside the relative shares of sales volume of bulk CEM I sold to external customers, by the GB cement producers over the period February 2007 to December 2011. [X] relative share increased from [X] per cent in February 2007 to [X] per cent in December 2011; [X] relative share fell from [X] to [X] per cent over the same period; [X] relative share increased from [X] to [X] per cent over the period; and [X] relative share increased from [X] to [X] per cent over the period.

TABLE 28 Sales volume of bulk CEM I to external customers by GB producers and relative shares of sales volume, bulk CEM I sold to external customers, February 2007 to December 2011

	Bulk CEM I volume sold to external customers by GB producers				Relative shares of sales volume of GB producers (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
Feb 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

28. Table 29 shows the sales volume of bulk CEM I sold to independent customers by the GB cement producers, alongside relative shares of sales volume of bulk CEM I sold to independent customers by the GB cement producers, over the period February 2007 to December 2011. [X] relative share increased from [X] per cent in February 2007 to [X] per cent in December 2011; [X] relative share fell from [X] to [X] per cent over the same period; [X] relative share fell from [X] to [X] per cent over the period; and [X] relative share stayed at [X] per cent in both February 2007 and December 2011 [X].

TABLE 29 Sales volume of bulk CEM I to independent customers by GB producers and relative shares of sales volume, bulk CEM I sold to independent customers, February 2007 to December 2011

	<i>Bulk CEM I volume sold to independent customers by GB producers</i>				<i>Relative shares of sales volume of GB producers (%)</i>			
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
Feb 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

National shares of volume of bagged cement

29. Table 30 shows the sales volume of bagged cement by the GB cement producers, alongside relative shares of sales volume by the GB cement producers, over the period February 2007 to December 2011. [X] relative share increased from [X] per cent in February 2007 to [X] per cent in December 2011; [X] relative share fell from [X] to [X] per cent over the same period; [X] relative share increased from [X] to [X] per cent over the period; and [X] relative share fell from [X] to [X] per cent over the period.
30. We also observe an increase in [X] market share from [X] per cent in December 2008 to [X] per cent in January 2009, which appears to have mainly been gained at the expense of [X], whose share dropped from [X] to [X] per cent in the same period. [X]
31. [X]

TABLE 30 Sales volume of bagged cement by GB producers and relative shares of sales volume, bagged cement, February 2007 to December 2011

	Bagged cement volume sold by GB producers				Relative shares of sales volume of GB producers (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
Feb 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jan 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Feb 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Mar 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Apr 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
May 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jun 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Jul 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aug 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Sep 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Oct 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Nov 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Dec 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

Concentration measures based on sales volume

32. This section presents two measures of market concentration: the concentration ratio and the HHI, based on total volumes sold in GB (external and internal), of all types of grey cement (bulk and bagged).

Concentration ratios based on sales volume of all cement

33. The concentration ratio measures the combined market share of the largest firms in a market. For example, the 'five firm' concentration ratio (C5) is simply the sum of the market shares of the five largest firms in the market.

34. Table 31 shows the three-firm (C3), four-firm (C4) and five-firm (C5) concentration ratios based on sales volumes of all grey cement, over the period Q2 2007 to Q4 2011. As the table shows, concentration was very high across the period, with the C3 ranging between 76 and 85 per cent, the C4 ranging between 85 and 92 per cent, and the C5 ranging between 90 and 94 per cent. Concentration has fallen somewhat over the period in question.

TABLE 31 Concentration ratios based on sales volume of all cement, Q2 2007 to Q4 2011

	Concentration ratio (%)		
	C3	C4	C5
Q2 2007	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]

Source: Cement producers' data and CC analysis.

HHI based on sales volume of all cement

35. The HHI reflects both the number of firms in the industry and their relative size, and is defined as the sum of the squares of all the market shares in the market, thus giving proportionately greater weight to the larger market shares. The HHI ranges between 0, in the case of a perfectly competitive market with infinitely many firms of the same size, and 10,000, in the case of monopoly. The Guidelines state that the CC is likely to regard any market with an HHI in excess of 2,000 as highly concentrated.³
36. A related measure is the inverse HHI (calculated by dividing 1 with the HHI which has been divided by 10,000), which gives the effective number of competitors in the industry (or in other words, the number of equal-sized firms) which would result in the same HHI as that we observe.
37. Table 32 shows the HHI, and the inverse HHI, based on sales volumes of all grey cement, over the period Q2 2007 to Q4 2011. As the table shows, the HHI was between 2,220 and 2,744 across the period, and the inverse HHI was around 4, suggesting that the market was highly concentrated. Concentration has fallen somewhat over the period in question, as shown by the HHI reducing (or the inverse HHI increasing) over time.

³ The Guidelines, [Annex A](#), paragraph 7.

TABLE 32 HHI and inverse HHI based on sales volume of all cement, Q2 2007 to Q4 2011

	<i>HHI</i>	<i>Inverse HHI</i>
Q2 2007	2,747	3.6
Q3 2007	2,730	3.7
Q4 2007	2,693	3.7
Q1 2008	2,641	3.8
Q2 2008	2,667	3.7
Q3 2008	2,620	3.8
Q4 2008	2,489	4.0
Q1 2009	2,213	4.5
Q2 2009	2,308	4.3
Q3 2009	2,338	4.3
Q4 2009	2,230	4.5
Q1 2010	2,205	4.5
Q2 2010	2,281	4.4
Q3 2010	2,304	4.3
Q4 2010	2,251	4.4
Q1 2011	2,248	4.4
Q2 2011	2,358	4.2
Q3 2011	2,394	4.2
Q4 2011	2,323	4.3

Source: Cement producers' data and CC analysis.

Capacity in cement

Introduction

1. In this appendix we set out our analysis of cement capacity in GB. We first set out some general factors affecting capacity to produce cement in GB and our general approach to measuring capacity. We then set out, for each GB cement producer, its total capacity and capacity utilization for years 2001 to 2011. We then compare the total capacity and the spare capacity of the GB cement producers, as well as how these relate to market shares.

Factors affecting capacity to produce cement in GB

2. There is no single measure of total capacity to produce cement, and we now set out our approach to estimating cement production capacity.

Cement production models

3. Production of CEM I requires first the production of clinker (in cement kilns), and second the grinding of clinker with other additives to produce cement (mills, or grinding plants).
4. Cement can be produced in GB either:
 - (a) by producing clinker in GB and then grinding the clinker into cement; or
 - (a) by importing clinker into GB and grinding the imported clinker in GB grinding plants.
5. The cost structures of these two models of producing cement will be different. We understand that, at present, virtually all of the cement which is manufactured in GB is made from GB-produced clinker. [X] All in all, imports of clinker into GB represent only [X] per cent of clinker used in GB.

6. We therefore focus in the following on capacity to produce cement in GB by producing and grinding clinker in GB. We note, however, that, if a cement producer has more grinding capacity than clinker capacity, it would theoretically be possible to increase cement production above kiln capacity by importing clinker, but that this would involve different (higher) variable costs than producing clinker in GB because of the additional transport and logistical costs incurred if clinker is imported.^{1,2,3}
7. Focusing therefore on capacity to produce cement in GB from GB-produced clinker, the total capacity will depend both on kiln and milling/grinding capacity. We explain below, from analysing the data provided by the GB cement producers, that the main constraint is likely to be kiln capacity rather than grinding capacity: [REDACTED] and [REDACTED]. For [REDACTED].
8. It is also worth noting that clinker capacity is more meaningful to compare across different plants and cement producers than cement capacity. Ideally, we would like to compare each GB cement producer's capacity to produce CEM I in GB from GB-produced clinker. However, there are some difficulties to calculate a CEM I production capacity, and the data we have related to clinker capacity and overall cement capacity. Cement capacity may therefore also depend on the amount of cementitious materials that are added (1 tonne of clinker produces about 1 tonne of CEM I, but can produce larger amounts of CEM II or III if blended with GGBS or PFA).⁴ In addition, as set out above, it would be incorrect to assume that cement capacity was

¹ [REDACTED] noted that this would not necessarily be the case and would depend on the price at which clinker could be bought.

² [REDACTED] told us that it was not the transport and logistics costs which made clinker imports more costly, but the associated costs of storage and grinding mills.

³ Lafarge told us that this was the strategy adopted by Cemex: Cemex's Tilbury facility was a grinding station established to use imported clinker. Lafarge also noted that variable costs would not necessarily be higher, because a grinding station located close to an import terminal and close to a demand centre might face lower transport costs from GB shipping point to customer compared with a GB producer. We note, however, that, at present, almost all cement produced in GB is from GB-produced clinker.

⁴ Lafarge told us that blending was another way to increase cement capacity, and that it had significantly invested in blenders to support its cement blended strategy. It said that in this context, clinker capacity became less relevant as a measure of overall capacity to produce cement. We agree that increasing the amounts of additives is a way to increase total cement capacity. However, the main constraint on cement production remains clinker production and it is also the most comparable measure across producers.

the same as milling capacity if there was insufficient clinker capacity to feed that milling capacity.

9. However, even for clinker capacity, there are measurement problems (such as the difference between nameplate versus effective capacity, how to take into account maintenance time and performance factors as well as unexpected shutdowns, and possible seasonality, though this may not affect clinker too much), which mean that the comparison of levels of capacity across different cement producers, and the measurement of spare clinker capacity available in any given year, will necessarily be imprecise and that all the calculations in this appendix should therefore be interpreted with some caution.

10. We think in general it is the absolute levels of capacity (tonnes of clinker) and percentages of capacity in relation to overall sales in GB (or overall sales by GB cement producers) which are more relevant, rather than percentages of spare capacity by plant.

Time frame for analysis of capacity

11. The ability of a cement producer to increase production above current levels will vary depending on the time frame considered: the longer the time frame, the more likely that mothballed capacity can be brought back into operation or different production models can be implemented (eg grinding cement from imported clinker rather than producing clinker in GB). We focus here mainly on the ability of companies to expand production within a relatively short time frame: the ability to expand production within three to six months seems like a reasonable starting point.

Capacity of GB cement producers

Cemex

12. Cemex currently has two cement plants in operation in GB (Rugby and South Ferriby), as well as one cement grinding plant (Tilbury). One of the kilns at South Ferriby is currently mothballed. Table 1 sets out Cemex cement facilities and their status and approximate cement capacity.

TABLE 1 **Cemex cement plants**

	<i>Type of facility</i>	<i>Status in 2012</i>	<i>Approximate annual clinker capacity in 2011</i>
Rugby	Cement plant—one kiln	Open; no kilns mothballed	[X]
South Ferriby	Cement plant—two kilns	Open. This is a plant with a total of 2 kilns, Kiln 2 and Kiln 3. Kiln 1 was sold long ago (in 1968). Kiln 2 was mothballed from Q1 2009 and reopened in Q1 2012. Kiln 3 was mothballed from Q1 2012	[X]
Barrington	Cement plant	Closed in Q4 2008	[X]
Rochester	Clinker production and then solely grinding plant	Closed in Q3 2009—replaced by Tilbury	[X]
Tilbury	Grinding plant	Opened in Q3 2009	[X]

Source: CC, based on Cemex data.

13. Cemex has downsized its cement production since 2008: it closed one cement plant in Q4 2008 (Barrington), and has mothballed one kiln at South Ferriby. Cemex's total clinker/kiln capacity in GB has therefore reduced since 2008. However, its total cement-grinding capacity has increased because it opened a large cement-grinding plant at Tilbury in 2009 to replace Rochester.
14. The rationales for closures/mothballing by Cemex were the following:
- (a) The closure of the Barrington plant was independent of the economic downturn: Cemex told us that the site was not financially viable due to its small capacity and required investment to update to meet modern environmental and regulations standards.

- (b) Similarly the closure of Rochester to replace with Tilbury was also independent of the downturn; Cemex told us that Rochester was not financially viable and that investment was made instead in a more efficient plant at Tilbury.
- (c) The mothballing of one kiln at South Ferriby was a consequence of the downturn. Cemex told us that reduced market demand due to the economic downturn meant that Cemex was not able to operate two kilns sustainably at this site, and Kiln 2 was mothballed first. In 2012, it was necessary to stop Kiln 3 for maintenance, and Kiln 2 was prepared over a number of months to operate in Kiln 3's place, and Kiln 3 was then mothballed.
15. Regarding the costs of mothballing and the speed at which Cemex could reinstate its mothballed kiln, [REDACTED]. Cemex told us that it estimated that to restart the South Ferriby kiln after it had been mothballed [REDACTED].
16. For our analysis, it is unclear whether we should take into account mothballed kiln capacity in our estimates of Cemex current cement capacity. Mothballing of Kiln 3 is relatively recent, [REDACTED]. The mothballed capacity seems more likely to be reinstated if there were a significant uplift in overall market demand for cement.
17. [Annex 1](#) sets out how we calculated total capacity for clinker and cement at Cemex's plants. Results are summarized in Table 2, where total cement capacity is based on grinding capacity. However, clinker capacity is a better measure of Cemex's ability to increase output in GB without having to import clinker.

TABLE 2 **Cemex clinker and cement capacity and utilization, 2001 to 2011***

	Total clinker capacity (tonnes)	Total clinker production (tonnes)	Amount of spare clinker capacity (tonnes)	Clinker utilization ratio %	Total cement capacity (tonnes)	Total cement production (tonnes)	Amount of spare cement capacity (tonnes)	Cement utilization ratio %
2001	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2002	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2003	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2004	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2005	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2006	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2009†‡	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC based on Cemex data.

*Total cement production in this table and all following tables includes all types of cement (bagged, bulk, CEM I/II/ III).

†For 2009 onwards, we assume that total clinker and cement capacity at South Ferriby is half of maximum theoretical capacity to take into account mothballing of one kiln.

‡We also exclude from analysis capacity at Barrington from 2009 as we understand the plant was closed from Q4 2008.

18. Table 3 shows, for 2011, the total clinker and cement capacity at each of Cemex’s plants. For South Ferriby, we show both total capacity including and excluding mothballed capacity. [X]

TABLE 3 **Cemex capacity and utilization by plant in 2011**

	Clinker capacity (tonnes)	Clinker production (tonnes)	Clinker utilization ratio %	Cement capacity (tonnes)	Cement production (tonnes)	Cement utilization ratio %
Rugby	[X]	[X]	[X]	[X]	[X]	[X]
South Ferriby*	-	-	-	-	-	-
Excluding mothballed kiln	[X]	[X]	[X]	[X]	[X]	[X]
Including mothballed kiln	[X]	[X]	[X]	[X]	[X]	[X]
Tilbury	-	-	-	[X]	[X]	[X]
Total excluding mothballed kiln	[X]	[X]	[X]	[X]	[X]	[X]
Total including mothballed kiln	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC based on Cemex data.

*For 2011, we assume that total clinker and cement capacity at South Ferriby is half of maximum theoretical capacity to take into account mothballing of one kiln.

Hanson

19. Hanson has three cement plants in GB—Ketton, Padeswood and Ribblesdale—all of which have clinker production and grinding facilities (Table 4). Hanson has not opened or closed any cement plants in the past ten years, but it closed/replaced some kilns at existing plants.

TABLE 4 Hanson cement plants

	Type of facility	Status in 2012	Approximate clinker capacity in 2011
Ketton	Cement plant—two kilns (Kilns 7 and 8)	Open; Kiln 7 mothballed in June 2008; some grinding mills mothballed	[X]
Padeswood	Cement plant—one kiln (Kiln 4—which was commissioned in 2005 replacing Kilns 1, 2 and 3 which were decommissioned in 2005)	Open—some grinding mills mothballed	[X]
Ribblesdale/ Clitheroe	Cement plant—one kiln (Kiln 7)—Kilns 5 and 6 were decommissioned in 2005	Open—some grinding mills mothballed	[X]

Source: CC, based on Hanson data.

20. Hanson mothballed one of the two cement kilns at the Ketton plant (Kiln 7) in June 2008 and has not reused it since. [X]

21. Hanson told us that there was a difference between mothballing a kiln and mothballing a grinding mill. In the case of a mothballed kiln, Hanson told us that it was costly and time consuming to restart a mothballed kiln (and consequently that it did not include mothballed kiln capacity within its effective capacity estimates). However, where a mill had been mothballed, Hanson told us that it was substantially easier to restart a mothballed mill (and that mothballed grinding/milling capacity had therefore been included in the effective capacity figures).

22. [X]

23. Hanson also told us that capacity was not fixed and could be varied even in the short term. If demand was to expand rapidly, Hanson said that it had the ability to flex its capacity in several ways. In addition to reducing the number of outages, it could also increase its effective capacity by importing clinker, running the kilns for longer and reinstating mothballed plants.

24. The detailed assumptions used by Hanson to calculate its cement and clinker capacities are presented in Annex 1, and Table 5 below sets out, for 2001 to 2011, Hanson total clinker and cement capacity. Hanson calculated total cement capacity based on grinding capacity rather than clinker capacity; in other words, in order to produce at cement capacity, Hanson would need to import clinker (or buy clinker from another GB cement producer). For this reason, we think it is more appropriate to use clinker capacity as a measure of Hanson capacity to increase cement production in GB.

TABLE 5 Hanson clinker and cement capacity and utilization, 2001 to 2011*

	<i>Clinker capacity (tonnes)</i>	<i>Clinker production (tonnes)</i>	<i>Spare clinker capacity (tonnes)</i>	<i>Clinker utilization %</i>	<i>Cement capacity (tonnes)</i>	<i>Cement production (tonnes)</i>	<i>Spare cement capacity (tonnes)</i>	<i>Cement utilization %</i>
2001	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2002	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2003	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2004	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2005	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2006	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on Hanson data.

*Total cement production in this table and all following tables includes all types of cement (bagged, bulk, CEM I/II/ III).

25. Table 6 shows a snapshot of Hanson clinker and cement capacity for each of its cement plants in 2011, as well as total utilization. We see that [REDACTED] in terms of clinker production, whereas clinker utilization at [REDACTED] ([REDACTED] per cent utilization). [REDACTED]

TABLE 6 Hanson capacity and utilization by plant in 2011

	<i>Clinker capacity (tonnes)</i>	<i>Clinker production (tonnes)</i>	<i>Clinker utilization %</i>	<i>Cement capacity (tonnes)</i>	<i>Cement production (tonnes)</i>	<i>Cement utilization %</i>
Ketton	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Padeswood	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Clitheroe	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on Hanson data.

Lafarge

26. Lafarge, pre-2013, had four cement plants (with clinker production facilities) in operation in GB, as well as two grinding plants (with no clinker facilities), as set out in Table 7.⁵ Lafarge also has a number of depots with blenders which have not been added to this table (Dewsbury, Seaham, Theale, West Thurrock),⁶ because these do not provide any additional clinker production capacity.

TABLE 7 Lafarge cement plants

Plant	Type of facility	Status in 2012	Approximate cement capacity in 2011
Aberthaw	Cement plant	Open	[REDACTED]
Cauldon	Cement plant	Open	[REDACTED]
Dunbar	Cement plant	Open	[REDACTED]
Hope	Cement plant	Open	[REDACTED]
Barnstone	Grinding/blending plant for packed cement	Open	[REDACTED]
Westbury	Depot/grinding station—clinker facilities closed: 2008: 1 of the 2 kilns mothballed April 2009: Second kiln mothballed June 2010: Full closure of clinker manufacture at Westbury	Clinker facilities closed; grinding facilities mothballed	[REDACTED]
Northfleet	Cement plant; closed in March 2008	Closed	[REDACTED]

Source: CC, based on Lafarge data.

27. Lafarge has therefore closed two cement plants in the recent years:

(a) Northfleet: Lafarge told us that Northfleet closed in March 2008, and that the closure was due to the expiry of the quarry planning permission.

(b) Westbury: as set out above, one out of the two kilns at Westbury was mothballed in 2008. The second was mothballed in April 2009, and all clinker manufacture was closed in June 2010.

28. In addition, Lafarge also closed down clinker production at Barnstone in 2006. It told us that [REDACTED]. Lafarge told us that the two mills at Barnstone [REDACTED] ran at about [REDACTED] and thus could only produce up to [REDACTED] per year combined. [REDACTED]

⁵ In January 2013, the Hope cement plant was divested to MI. We consider the impact of the Anglo–Lafarge JV and entry of MI in Appendix 7.15.

⁶ We also note that Dewsbury and Theale were divested to MI in January 2013.

29. We set out in Annex 1 the assumptions used by Lafarge to calculate clinker and cement capacity. [REDACTED] Lafarge explained to us that its cement capacity was actually higher than its clinker capacity, because of blending with GGBS, PFA or limestone.

Table 8 shows Lafarge cement and clinker capacity and utilization, for 2001 to 2011.

TABLE 8 Lafarge cement and clinker capacity and utilization, 2001 to 2011*

	Clinker capacity (tonnes)	Clinker production (tonnes)	Spare clinker capacity (tonnes)	Clinker utilization %	Cement capacity (tonnes)	Cement production (tonnes)	Spare cement capacity (tonnes)	Cement utilization %
2001	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2002	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2003	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2004	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2005	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2006	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on Lafarge data.

*Total cement production in this table and all following tables includes all types of cement (bagged, bulk, CEM I/II/ III).

30. Table 9 shows Lafarge capacity and capacity utilization for each clinker-producing plant in 2011. We see that clinker utilization is highest [REDACTED] and [REDACTED]. [REDACTED] utilization is also relatively high ([REDACTED] per cent), and [REDACTED] utilization is lowest ([REDACTED] per cent). In terms of cement utilization, the utilization rates are [REDACTED], and we see that [REDACTED] are close to full capacity in terms of cement production, though Lafarge noted that this was misleading because this did not take into account the fact that cement production could be increased through blending.

TABLE 9 Lafarge capacity and utilization by plant, 2011

	Clinker capacity (tonnes)	Clinker production (tonnes)	Clinker utilization %	Cement capacity (tonnes)	Cement production (tonnes)	Cement utilization %
Aberthaw	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cauldon	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Dunbar	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hope	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Other facilities production	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on Lafarge data.

Tarmac

31. Tarmac has only one cement plant at Tunstead. Tarmac told us that in March 2004, the existing cement plant at Tunstead was replaced by a new cement plant (K1), increasing capacity from [REDACTED] kt per year to [REDACTED] kt per year. Tarmac told us that K1 cost Tarmac £[REDACTED] million,⁷ and had a nameplate capacity of [REDACTED] tonnes per day of clinker.
32. Tarmac told us that in April 2008, £[REDACTED] million was invested to increase K1's cement capacity to [REDACTED] tonnes per year ([REDACTED] tonnes of clinker per day).
33. Tarmac did not explain how it had calculated cement capacity at Tunstead.⁸ Our understanding is that the capacity figures that were provided by Tarmac are based on a nameplate capacity for the Tunstead plant, and may not account for maintenance time and performance factors. We therefore estimated a cement capacity for Tarmac which attempts to take into account maintenance time and performance factors, to make it more comparable to the capacity estimates provided by the other GB cement producers. Table 10 sets out Tarmac data on its cement capacity, and our estimates of Tarmac cement capacity assuming [REDACTED] days maintenance time and a [REDACTED] per cent performance factor.⁹

⁷ Tarmac told us that K1 [REDACTED].

⁸ Tarmac did not provide estimates for its clinker capacity but only for total cement capacity. However, given that Tarmac has only one plant at which both clinker production and grinding takes place, its cement capacity is probably very similar to clinker capacity.

⁹ These assumptions are based on the assumptions made by Lafarge, Hanson and Cemex for calculating clinker capacity, as set out in [Annex 1](#). Given that the Tarmac plant is more recent than the others, we used the highest performance factor and lowest maintenance time assumed by the other GB cement producers.

TABLE 10 Tarmac capacity and utilization, 2001 to 2011

	Cement production (tonnes)	Annual cement capacity (tonnes)	Utilization based on nameplate capacity %	CC estimated cement capacity* (tonnes)	Spare cement capacity using CC estimated capacity (tonnes)	Utilization based on CC estimated capacity %
2001	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2002	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2003	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2004	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2005†	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2006	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2007†	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on Tarmac data.

*To derive the estimated capacity, we applied the following formula to account for [REDACTED] days' maintenance per year and [REDACTED] per cent performance factor from 2004 onwards: nameplate capacity × [REDACTED] × (365-[REDACTED])/365.

†For 2005 to 2007, the CC assumptions clearly underestimate Tarmac capacity (which results in utilization above 100 per cent).

Overall GB cement capacity, capacity shares and spare capacity

34. For the reasons set out above, we think that clinker capacity is a more comparable measure of capacity across plants and producers. We present in [Annex 1](#) the assumptions made by Lafarge, Cemex and Hanson to calculate their clinker capacity, and we discuss how comparable these appear to be. As explained in [Annex 1](#), we think that Hanson may have somewhat underestimated its clinker capacity compared with Lafarge and Cemex (by allowing substantially longer maintenance and lower performance factors), and therefore any comparisons of capacity should be treated with some caution.

Total clinker capacity and capacity shares

35. Table 11 summarizes the total clinker capacity of each of the GB producers over time. We see that Lafarge, Hanson and Cemex have all reduced clinker capacity between 2007 and 2011, whereas Tarmac has increased capacity between 2007 and 2011. Lafarge clinker capacity reduced by [REDACTED] per cent between 2007 and 2011, Hanson clinker capacity reduced by [REDACTED] per cent, Cemex clinker capacity reduced by [REDACTED] per cent, and Tarmac cement capacity increased by [REDACTED] per cent.

TABLE 11 Clinker capacity in GB, 2001 to 2011

	Lafarge	Hanson	Cemex*	Tarmac†
2001	[X]	[X]	[X]	[X]
2002	[X]	[X]	[X]	[X]
2003	[X]	[X]	[X]	[X]
2004	[X]	[X]	[X]	[X]
2005	[X]	[X]	[X]	[X]
2006	[X]	[X]	[X]	[X]
2007	[X]	[X]	[X]	[X]
2008	[X]	[X]	[X]	[X]
2009	[X]	[X]	[X]	[X]
2010	[X]	[X]	[X]	[X]
2011	[X]	[X]	[X]	[X]

Source: CC, based on GB cement producers' data.

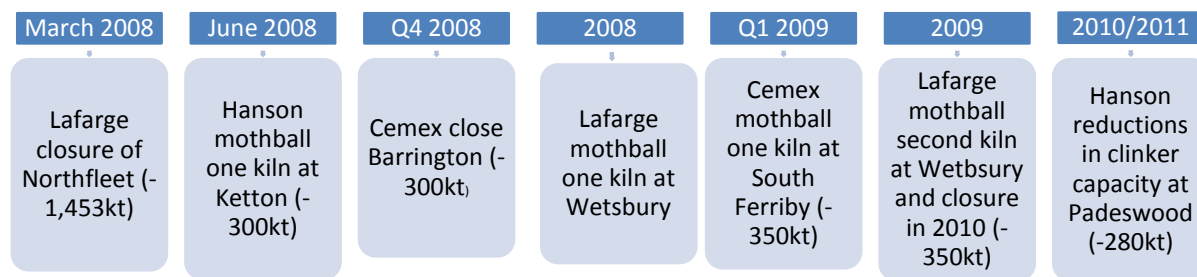
*For Cemex, excluding Barrington capacity from 2009, and excluding one kiln at South Ferriby from Q1 2009.

†Tarmac cement capacity (Tarmac did not provide clinker capacity estimates).

36. Figure 1 sets out the timing of the reductions in clinker capacity since 2007. [X]
 Lafarge, Cemex and Hanson each took steps to reduce capacity in 2008. In the case of Lafarge and [X], but the mothballing of kilns by Hanson in 2008 and the mothballing by Cemex in 2009 were, according to the companies, [X]. Regarding the Lafarge closure of Westbury, Lafarge told us that it was closed due to its high cost of production by reason of its energy-intensive wet process.

FIGURE 1

Timeline of reductions in cement capacity since 2007



Source: CC, based on GB cement producers' data.

37. Table 12 sets out the shares of overall clinker capacity in GB between 2007 and 2011. 2008, 2009 and 2010 are 'transition years' with capacity reductions occurring mid-year, which means that capacity levels may be affected by mid-year changes.¹⁰

¹⁰ The way in which GB cement producers calculated overall yearly capacity in event of mid-year closures is not always consistent.

It is therefore more meaningful to compare 2007 with 2011. We see that [X] and [X] shares of GB clinker capacity remained broadly stable, whereas [X] increased its share of capacity and [X] reduced its share from [X] to [X] per cent.

TABLE 12 Shares of clinker capacity, 2007 to 2011

	<i>per cent</i>				
	2007	2008	2009	2010	2011
Lafarge	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]

Source: CC, based on GB cement producers' data.

38. Table 13 sets out the GB producers' shares of production of cement from 2007 to 2011. If we compare the changes in shares of capacity to changes in shares of production, we see that [X] share of production is in line with its share of capacity in 2007 and 2011. [X] share of production is slightly higher than its share of capacity, and [X] share of production is also in line with its share of capacity in 2011. [X] has reduced the gap between its share of capacity and its share of production during the period, from [X] percentage points to [X] percentage points (largely, it seems, because [X] share of production was above its share of capacity in 2007, which it no longer is). This puts some context on the claim by [X] it has shed more capacity than the other cement players.

TABLE 13 Shares of GB cement production, 2007 to 2011

	<i>per cent</i>				
	2007	2008	2009	2010	2011
Lafarge	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]

Source: CC, based on GB cement producers' data.

39. If we look at shares of cement capacity rather than clinker capacity (Table 14), we see that there is even closer alignment between shares of production and shares of

cement capacity—but there are more measurement problems with cement capacity so this table may not be comparing like with like between the different manufacturers.

TABLE 14 Share of cement capacity, 2007 to 2011

	<i>per cent</i>				
	2007	2008	2009	2010	2011
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on GB cement producers' data.

Note: In this table, cement capacity shares are as recalculated by us in Annex 1, ie capacity to grind cement based on GB clinker production capacity.

40. We also note that production shares are largely proportional to capacity shares (with the exception of [REDACTED] whose share of production is below its share of capacity).

Availability of spare capacity

41. Figure 2 shows, for each GB cement producer and in each year, the total amount of spare clinker capacity available. Again, we use clinker capacity as this is more comparable across plants and cement producers. The way in which the different GB cement producers calculated yearly capacity in the event of a mid-year closure was not always consistent, and therefore 2008 and 2009 capacity figures may not be comparable across cement producers.¹¹

42. [REDACTED] Lafarge told us that the clinker capacity figures were based on a theoretical calculation of maximum performance which in practice was extremely difficult to achieve over an annualized basis; actual excess capacity may therefore be lower than shown in Figure 2.

43. [REDACTED]

¹¹ [REDACTED] told us that annual capacity was allocated evenly against the months the plant was open; [REDACTED] told us that the adjustment for mothballed kiln capacity was done based on the number of working days that the mothballed kiln was operating in the year of mothballing.

FIGURE 2

GB cement producers' spare clinker capacity, 2001 to 2011

[REDACTED]

Source: CC, based on GB cement producers' data.

Note: For Tarmac, spare cement capacity because we do not have clinker capacity data.

44. Hanson had [REDACTED], and [REDACTED] per cent of total GB clinker production).
45. Tarmac operated with [REDACTED] spare cement capacity throughout the period (except in 2004, but this may be an artefact of the data because new capacity was opened in 2004 but may not have been operational for the whole year). Current spare cement capacity is around [REDACTED] for 2011.
46. Overall, the data we analysed suggests that, after three years of large spare capacity (2008 to 2010, and in particular 2009 where there was very large spare clinker capacity), the industry has gone back, in 2011, to overall levels of 'immediately available' spare clinker capacity which are very comparable to the levels that prevailed prior to the downturn in 2006 and 2007. This appears largely the result of various closures of 'inefficient' wet process plants (Northfleet, Barrington and Westbury), as well as mothballing of kilns (Cemex at South Ferriby and Hanson at Ketton), and, in the case of Hanson, [REDACTED]. We note, however, that Figure 2 above shows only the immediately available capacity—in the event of a demand increase, Cemex and Hanson both have mothballed kilns [REDACTED], thereby substantially increasing available capacity at Cemex and Hanson plants. This would be less costly, and would take less time, for [REDACTED], because the [REDACTED] kiln [REDACTED], unlike the [REDACTED] kiln [REDACTED].
47. We also note that there is abundant spare milling capacity, and therefore in theory cement production could also be increased by importing clinker into GB and grinding in GB, [REDACTED].

Assumptions for calculations of clinker and cement capacity of Cemex, Hanson and Lafarge

Cemex

1. Cemex told us that capacity could be measured either in clinker or cement terms, and that the position was different in relation to each of Cemex’s plants: [REDACTED].

2. To calculate kiln capacity to produce clinker, Cemex made the following assumption for its clinker-producing plants (Rugby and South Ferriby, and Barrington prior to its closure): [REDACTED].

3. [REDACTED]

4. For the Tilbury plant, Cemex only calculated a cement capacity (as it has no clinker production facilities), and cement capacity was calculated in the following way: [REDACTED].

5. Using these assumptions, Table 1 sets out Cemex’s calculations of its total clinker and cement capacity, as well as utilization rates, for 2001 to 2011.

TABLE 1 **Cemex data on total clinker and cement capacity and utilization, 2001 to 2011**

	<i>Total clinker capacity (tonnes)</i>	<i>Total clinker production (tonnes)</i>	<i>Total amount of spare clinker capacity (tonnes)</i>	<i>Clinker utilization ratio %</i>	<i>Total cement capacity (tonnes)</i>	<i>Total cement production (tonnes)</i>	<i>Cement utilization %</i>
2001	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2002	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2003	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2004	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2005	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2006	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC, based on Cemex data.

6. [REDACTED] are shown in Table 2 below.

TABLE 2 CC calculations of Cemex capacity, excluding mothballed and closed capacity

	Total clinker capacity (tonnes)	Total clinker production (tonnes)	Total amount of spare clinker capacity (tonnes)	Clinker utilization ratio %	Total cement capacity (tonnes)	Total cement production (tonnes)	Cement utilization %
2001	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2002	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2003	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2004	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2005	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2006	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2009*†	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC based on Cemex data.

*For 2009 onwards, we assume that total clinker and cement capacity at South Ferriby is half of maximum theoretical capacity to take into account mothballing of one kiln.

†We also exclude from analysis capacity at Barrington from 2009 as we understand the plant was closed from Q4 2008.

7. [REDACTED] (see Table 3 below).

8. We note that the average amount of clinker required to produce 1 tonne of cement will vary depending on the type of cement produced (CEM I has very high clinker content, whereas CEM II and CEM III will have lower clinker content). Ideally, we would like to compare GB producers' capacity to produce CEM I as a more comparable measure of cement capacity. However, the GB cement producers told us that there were difficulties to estimate capacity to produce CEM I.

9. We therefore use the average amount of clinker used to produce all types of cement by Cemex in our calculations of total cement capacity. This means that the cement capacity that we calculate is Cemex's capacity to produce additional cement based on its current pattern of sales of cement (ie assuming a fixed proportion of CEM I, II and III). This means that total cement capacity could be higher if Cemex could increase sales by increasing sales of CEM II/III types relative to CEM I. The calculations of cement capacity should therefore be seen as approximate and indicative of Cemex's ability to increase cement production in the short term, rather than highly

precise. The cement capacity we derive is therefore a relatively imprecise estimate of Cemex's ability to increase cement production from GB-produced clinker.

TABLE 3 CC calculations of Cemex cement capacity based on GB clinker capacity

	Total clinker capacity (tonnes)	Total clinker production (tonnes)	Clinker utilization ratio %	Clinker/cement conversion rate	Total cement capacity (tonnes)	Total cement production (tonnes)	Cement utilization ratio %
2001	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2002	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2003	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2004	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2005	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2006	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]
2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC, based on Cemex data.

Hanson

10. Hanson told us that effective clinker capacity had been calculated on the basis of the following formula:

Kiln output (tonnes/day) × Reliability coefficient × (365 days – Planned maintenance time).

11. The reliability coefficient varies by year and by kiln. The average reliability coefficient over all Hanson kilns was between [X] and [X] per cent in every year. The average number of days of maintenance time varied a lot depending on the year and the kiln; in most years, there was about [X] to [X] days of planned maintenance time on average per kiln, but in [X] ([X] days per kiln on average).

12. Hanson told us that effective cement capacity was calculated on the basis of the following formula:

Mill output (tonnes/day) × Reliability coefficient × (365 days – Planned maintenance time).

13. The reliability coefficient is assumed to be [redacted] per cent for the mills,¹² and the planned maintenance time is [redacted] hours per year (ie [redacted] days per year).
14. We note that Hanson excluded mothballed kiln capacity from its total clinker capacity calculations, which we think is appropriate given the costs and times to re-establish a mothballed kiln. Table 4 below shows Hanson data on its clinker and cement capacity in GB for 2001 to 2011.

TABLE 4 Hanson clinker and cement capacity and utilization, 2001 to 2011

Year	Clinker capacity (tonnes)	Clinker production (tonnes)	Spare clinker capacity (tonnes)	Clinker utilization %	Cement capacity (tonnes)	Cement production (tonnes)	Spare cement (tonnes)	Cement utilization %
2001	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2002	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2003	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2004	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2005	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2006	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2007	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2008	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2009	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2010	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2011	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Source: CC, based on Hanson data.

15. We note that, as in [redacted] case, Hanson’s calculation of its cement capacity is not dependent on its clinker capacity, but only on total grinding capacity. Therefore, implicitly, there is an assumption that total clinker capacity would be sufficient to produce the total cement capacity in the grinding, or that clinker could be imported to fulfil the cement-grinding capacity (but this would be at higher cost than producing clinker locally). We think it is unlikely that, if all clinker capacity was used, Hanson would reach its cement capacity without importing cement. Indeed, this would rely on an assumption (for 2011) that, for each tonne of clinker produced, on average 2 tonnes of cement could be produced. This is very different from the actual rates of conversion of clinker into cement using Hanson data—for 2011, for each tonne of

¹² [redacted]

clinker produced, [redacted] tonnes of cement were produced (averaging over all types of cement).

16. For these reasons, we think it is more reliable to use clinker capacity as the measure of Hanson’s capacity to produce cement in GB (without having to import clinker). To derive a cement capacity from the GB-produced clinker, we multiplied the clinker capacity by the actual average conversion rate of clinker to cement. Our revised calculations of Hanson cement capacity (based on GB clinker capacity) are shown in Table 5 below.

TABLE 5 CC calculations of Hanson cement capacity based on GB clinker capacity

Year	Clinker capacity (tonnes)	Clinker production (tonnes)	Clinker utilization %	Cement production (tonnes)	Clinker to cement ratio	Cement capacity based on clinker capacity (tonnes)	Spare cement (tonnes)	Cement utilization %
2001	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2002	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2003	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2004	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2005	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2006	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2007	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2008	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2009	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2010	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2011	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Source: CC, based on Hanson data.

Lafarge

17. Lafarge told us that it had a theoretical clinker capacity which it used to benchmark plants across the Lafarge Group. It said that this raised a number of issues, since the theoretical capacity may not be achievable in practice as a result, for example, of the effect of seasonality, alternative fuels and product mix. It told us that the equation it used to calculate theoretical clinker capacity was the following:

$$\text{Rated TPD (plant's best seven-day run tonnage for clinker)} \times 365 \text{ days} \times [\text{redacted}] \% \text{ performance factor} \times [\text{redacted}] \text{ per cent utilization factor}$$

18. [redacted]

19. We note that the definitions used by Lafarge, Cemex and Hanson to calculate clinker capacity are broadly consistent. They all use a maximum proven capacity, taking into account maintenance time ([X]). Hanson also accounts for a reliability coefficient of [X] per cent on average, and Lafarge a [X] per cent performance factor. Cemex does not account for these, but its plant capacity is defined as an average over three months of the best utilization achieved so it is likely it already takes into account the performance/reliability factor used by Lafarge and Hanson.
20. However, we note that Hanson has applied [X], despite Hanson having plants which are newer than Lafarge. We think therefore that [X]. So, whereas clinker capacity is probably broadly comparable, we think that there may still be some differences in approach between Hanson and Lafarge/Cemex which means that comparisons should be interpreted with caution.

Tarmac

21. Tarmac provided data only on nameplate capacity of its plants. We therefore adjusted Tarmac capacity figures to allow for a performance factor and maintenance time. To do this, we used a [X] per cent performance factor and allowed for [X] days' maintenance per year. This is at the low end of the assumptions used by the other GB cement producers (ie would result in capacity relatively close to nameplate capacity), to reflect that fact that the Tarmac plant is more recent than other cement plants.

Product and customer characteristics and available information—cement

1. This appendix provides further evidence on characteristics of cement products and customers, as well as on the information available to GB cement producers.

Geographic areas over which cement is transported

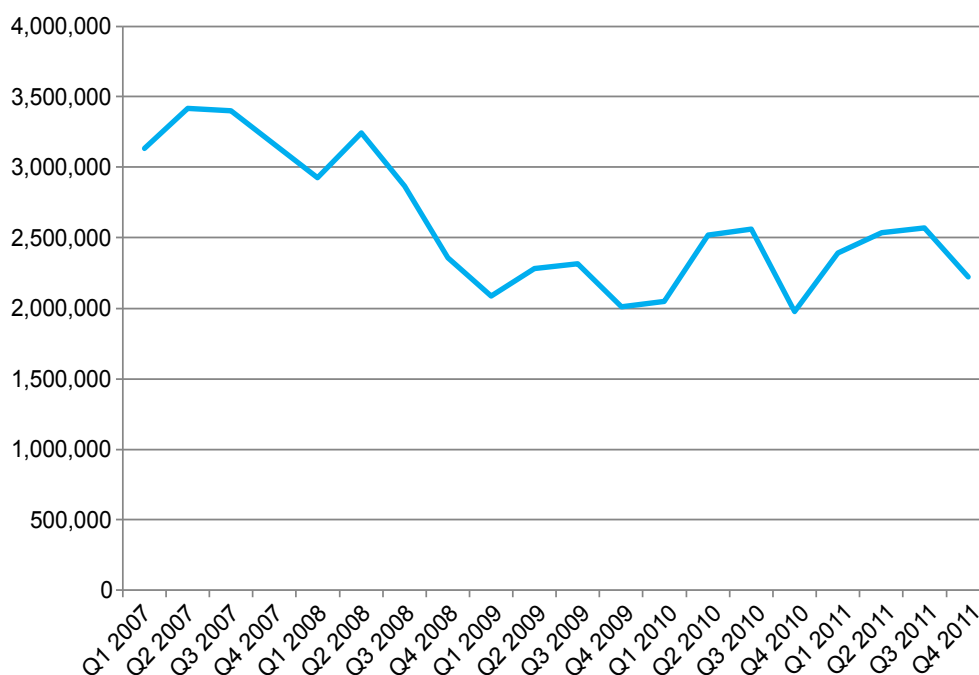
2. The geographic areas over which cement can be transported are quite large. Lafarge told us that the maximum distance over which mainstream bulk cement was delivered by it from shipping point (which could be a cement plant, depot or import terminal) to external customers was [REDACTED] radial miles in 2011 ([REDACTED]), while the maximum distance over which mainstream packed (25 kg) cement was delivered by it was [REDACTED] radial miles in the same year ([REDACTED]). Tarmac told us that the maximum distance over which bulk cement was delivered by it from shipping point to external customers was [REDACTED] radial miles in 2011 ([REDACTED]), while the maximum distance over which packed cement was delivered by it was [REDACTED] radial miles in the same year ([REDACTED]). Hanson told us that the maximum distance over which bulk and bagged cement was delivered by it from shipping point to external customers was [REDACTED]. Also, each of the four GB producers sells cement in each GB region.

Demand for cement

3. Figure 1 shows total sales volume of grey cement over the period Q1 2007 to Q4 2011, as a proxy for the demand for cement. We see from the figure that demand for cement is cyclical, with Q2 and Q3 generally seeing higher cement sales than Q1 and Q4. We also see the effect of the economic downturn in 2008/09 when cement sales reduced from 13.1 million tonnes in calendar year 2007 to 8.7 million tonnes in calendar year 2009—a total reduction of 34 per cent between 2007 and 2009.

FIGURE 1

Total sales volume of grey cement, Q1 2007 to Q4 2011



Source: Parties' data and CC analysis.

Cement customers

- Hanson told us that it split customers for grey cement into four segments: RMX, Concrete Products, Packed Cement and Others (the majority of these customers being for construction project work), with the customers in the first three segments being generally well known and established, and with each generating material demand. Further, Hanson told us that many of these customers had been purchasing cement in significant volumes for many years (for example, customers with fixed plants requiring cement, eg RMX or other concrete products customers or builders' merchants for packed products). In addition, construction project contractors, who had won (or were likely to win) work, were generally significant potential repeat customers.

Information available to GB cement producers on competitors

- Lafarge told us that [REDACTED].

6. Lafarge told us that, as part of the EU ETS in the UK, which covered all domestic UK-integrated cement plants, information was available from public documents on CO₂ allocation and emissions data for each UK cement works. [REDACTED]
7. In relation to imports, Lafarge told us that [REDACTED].
8. Hanson told us that [REDACTED].
9. Hanson also told us that [REDACTED].
10. Cemex told us that [REDACTED].
11. Tarmac told us that [REDACTED].

Barriers to entry and expansion in the supply of cement

Introduction

1. This appendix sets out some of the submissions and evidence that we received that was relevant to our consideration of barriers to entry and expansion for cement.

Cement plants: barriers to entry and expansion

Capital cost of entry

2. The GB producers provided estimates of the capital cost of building a new cement plant. The cost estimates given by individual parties are set out in Table 1:
 - (a) Hanson estimated the cost to be between £[REDACTED] million and £[REDACTED] million for a small-scale plant ([REDACTED] tonnes) and between £[REDACTED] million and £[REDACTED] million for a large-scale plant ([REDACTED] tonnes).
 - (b) Tarmac estimated the cost to be between £150 million and £180 million for a small-scale plant (750,000 tonnes) and between £230 million and £285 million for a large-scale plant (1.5 million tonnes). The cost to Tarmac in 2004 of the new plant at Tunstead, which replaced an old plant on the same site (and was therefore less expensive than new entry), was £110 million.¹ The new plant was commissioned in 2004 with an annual capacity of 825,000 tonnes a year, and following further investment now has a capacity of 1 million tonnes a year.
 - (c) Lafarge estimated the cost to be between £250 million and £360 million for a plant with an annual capacity of 1 million tonnes.
 - (d) Cemex said that it could not estimate the cost of a new cement plant because it depended on too many different factors, but noted that the RMC Group (which was acquired by Cemex in 2005) had spent approximately £[REDACTED] million on the

¹ During the Anglo/Lafarge JV inquiry, Anglo American told the CC that the cost was around £[REDACTED] million and the production capacity of the plant was initially 0.8 Mt and that this was subsequently increased to 1 Mt a year in 2008.

construction of its cement plant at Rugby, which opened in 2000 and had a capacity of [REDACTED] million tonnes.

TABLE 1 Parties' estimates of capital costs of building a new cement plant

	Small/medium/large ktpa	Plant scale			£ million
		Small scale	Medium scale	Large scale	
Aggregate Industries		N/A	N/A	N/A	
Cemex		N/A	N/A	N/A	
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	

Note: N/A = not available.

3. Leiths, which produces aggregates and RMX in Scotland, but does not produce cement,² estimated that the cost of establishing a cement plant would be in excess of £120 million and said that investments of that scale were feasible only for global players.

4. Breedon Aggregates also said that the extremely high capital cost for cement production was a barrier to entry and that uncertainty over the future demand for cement made financing difficult.

Availability of raw material

5. Hanson told us that a significant barrier to entry was the need to develop a new limestone quarry, and the associated issues with obtaining planning permission for that quarry. It explained that to justify the investment in a cement plant, sufficient limestone to support at least 25 years' cement production would be required, which would amount to approximately 50 Mt, and that a quarry capable of producing 2 Mt a year represented a large-scale operation. Hanson also noted that while it did not consider limestone to be a scarce resource in the UK, limestone occurred primarily in areas that were designated as national parks or Areas of Outstanding Natural Beauty and

² Leiths sources its cement from Hanson and [REDACTED].

that obtaining planning permission for a new quarry and cement plant in such areas would be very unlikely.

6. Breedon Aggregates also noted that lack of availability of high-quality limestone reserves was a barrier to entry.
7. A report published by the British Geological Survey notes that the highest-quality and most easily-worked deposits of carboniferous limestone—the most important type of limestone for cement production—occur in the Peak District, the northern Pennines and the fringes of the Lake District.³ The British Geological Survey also reports that 61 per cent of reserves of carboniferous limestone in the UK is in areas designated as national parks, Areas of Outstanding Natural Beauty and Sites of Special Scientific Interest.

Lead time and planning process

8. Hanson told us that time frames were difficult to estimate because there were no recent examples of a completely new cement plant being developed (ie including mineral reserves), but it would expect the following stages to be significantly time consuming:
 - (a) identification of limestone resources;
 - (b) land assembly, due to the significant land holding required to support limestone extraction for at least 25 years; and
 - (c) planning promotion, application and consent, which would be likely to be subject to objection.
9. Hanson estimated that the total lead time up to the point at which site works to install plant could commence would be 10 to 15 years. However, if a new cement plant

³ British Geological Survey factsheet on cement raw materials: www.bgs.ac.uk/mineralsuk/planning/mineralPlanningFactsheets.html.

could be based on an existing limestone reserve with suitable planning permission in place for mineral extraction (so that the land assembly and geological investigation phases were not relevant), Hanson said that the planning just for the cement plant might take three to five years.

10. Cemex estimated that site selection would take one year, planning and permissions two to three years, procurement and construction two to three years, and commissioning and start-up up to one year.
11. Lafarge estimated that the time from the start of a project and to the point at which construction could commence (including site search, land assembly, environmental assessment and the planning process) would be between 6 and 14 years. It estimated that cost of the planning process, excluding exploration and land and mineral acquisition, would be [REDACTED]. It also estimated that tendering and construction would take a further 3 to 3½ years. Lafarge noted that the timescales and costs depended on how a prospective developer managed the processes, for example more cost could be incurred earlier to save time by running some tasks in parallel. Lafarge told us that it had [REDACTED].

Emissions regulations

12. Lafarge told us that there were significant uncertainties regarding the future cost to be imposed on carbon emissions which affected the cost of new entry. The uncertainty relates particularly to the period after 2020 when, subject to carbon leakage considerations, the ETS will require all cement producers to pay for each tonne of carbon emitted. Lafarge argued that if the 2014 review of industrial sectors classified as being vulnerable to carbon leakage resulted in cement not continuing to be classified in this way, cement producers would be required to purchase CO₂ rights, which would impose an extra cost and put them at a disadvantage compared with imports

from outside the EU. Lafarge commented that these uncertainties weighed heavily against potential new cement plant projects.

Economies of scale

13. The GB producers told us that economies of scale existed as larger cement plants could be operated more efficiently than smaller plants in terms of unit costs as fixed costs were spread over a greater volume of sales. Lafarge told us that the economies of scale in cement production were illustrated by the increase in the average scale of integrated cement works and kiln capacity in the UK from 0.1 Mt of average kiln capacity in 1959, when some 130 kilns were in operation at 50 cement works, to 1.05 Mt of average kiln capacity in 2009, when 11 kilns were in operation at 11 cement works, as shown in Table 2.

TABLE 2 **Great Britain grey cement works and effect on capacity**

Year	Works	Kilns	Cement capacity Mt	Average kiln capacity Mt
1959	50	130	12.9	0.10
1970	40	117	19.5	0.17
2006	15	20	15.1	0.76
2009	11	11	11.5	1.05

Source: 'Forty years of cement manufacture 1966–2006', Dr Chris Clear, *Concrete*, July 2006; Lafarge estimates for 2009.

14. The GB producers told us that some economies of scale arose through operating more than one site, as logistics costs could be reduced if production could be matched better geographically with demand. Cemex and Tarmac also told us that economies of scale arose through operating multiple sites, as central support costs were spread across a larger volume of output, and Tarmac added that procurement savings could be achieved by being a bulk purchaser. Hanson noted that larger companies tended to have larger central functions and that smaller operators which did not have these central functions would operate with a lower cost base. Lafarge told us that because it was more efficient to operate cement kilns on a continuous 24-hour basis owing to the high kiln start-up cost, having multiple sites allowed produc-

tion to be scheduled efficiently across the plants. Lafarge said that having multiple sites made the use of rail to transfer cement between plants and depots effective, which reduced supply costs. It said that a train could transport up to approximately 1,750 tonnes in one shipment compared with approximately 30 tonnes by road tanker and the cost per tonne per kilometre (£/t/km) by rail therefore could be approximately three to four times lower on a £/t/km basis compared with road transport over long distances.

15. Cemex, Hanson and Lafarge added that being part of a larger group was a benefit in terms of access to technical expertise.

Barriers to expansion

16. Hanson and Tarmac told us that there were no significant barriers to a cement producer increasing production based on existing capacity when the current levels of capacity utilization is low. Hanson said that kilns could be run for longer, plants could operate additional shifts and mothballed capacity could be reinstated (which it estimated would cost between £[redacted] million and £[redacted] million, although Hanson also noted that the cost and availability of additional carbon allowances would have to be taken into account).

17. Table 3 shows cement capacity, production and utilization in 2011 for Lafarge, Hanson, Cemex and Tarmac.

TABLE 3 **Cement capacity, production and utilization in 2011**

	<i>Capacity tonnes</i>	<i>Production tonnes</i>	<i>Utilization %</i>	<i>Excess capacity tonnes</i>
Lafarge	[redacted]	[redacted]	[redacted]	[redacted]
Hanson	[redacted]	[redacted]	[redacted]	[redacted]
Cemex	[redacted]	[redacted]	[redacted]	[redacted]
Tarmac	[redacted]	[redacted]	[redacted]	[redacted]

Source: Lafarge, Hanson, Cemex and Tarmac.

*Tarmac told us that throughout the 2007–2011 period it had effectively operated at capacity. It said that since cement production capability was introduced at Tunstead, it had been seeking to optimize efficiency, reliability and input mix, eg by using alternative fuels with lower CO₂ emissions, and had gradually increased its production to close to its achievable capacity over

the years. It told us that therefore it did not have spare capacity over this period even though it had not been producing at nameplate capacity.

18. On the other hand, Cemex told us that, in its view, there was almost no scope for a cement producer to increase production based on existing capacity at a cement plant because once operational, a cement kiln must run continuously at 1,450°C and either at full capacity or not at all because it was not economically viable to run kilns at less than full capacity or on a stop-start basis. Cemex estimated that it would cost approximately £[REDACTED] million to reinstate the second kiln at its South Ferriby plant which was currently mothballed. Lafarge also noted that stopping and starting a cement kiln was very energy inefficient so it would always aim to maximize output.

19. The GB producers told us that the capital investment required to expand a plant (for example, by way of an additional kiln or additional grinding capacity) was a significant barrier to increasing the capacity of an existing plant. Three of the GB producers also commented that it would be necessary to secure regulatory permissions to operate an expanded plant. Hanson added that sufficient limestone reserves to service the additional capacity would have to be secured. Lafarge noted that increasing the capacity of an integrated cement plant typically involved debottlenecking the limiting step within the process, and the cost would depend on the nature of the new or improved equipment required to enable greater throughput through that part of the process. Lafarge also noted that, in the case of expanding clinker capacity, a potential barrier to expansion (as for entry via establishing a new cement plant—see paragraph 12) was uncertainty over the award of free carbon allowances under the EU ETS, without which the cost of producing clinker from the new capacity would be uncompetitive due to the need to purchase carbon allowances for 100 per cent of the additional production.

Cement grinding mill: barriers to entry and expansion

20. An alternative model for entry into the production of cement is to build a grinding mill (where clinker from a cement kiln is ground to the fine powder that is cement) and source clinker from elsewhere.
21. Cemex opened a grinding mill with an annual capacity of [REDACTED] at Tilbury in 2009 at a cost of £[REDACTED] million.⁴ Cemex told us that a new grinding mill could be developed for £[REDACTED] million. Hanson told us that a new grinding mill on a brownfield site could be developed for £15 million.
22. Cemex told us that its Tilbury mill [REDACTED], and commented that clinker was a globally traded commodity and could easily be imported from other sources. Hanson also commented that obtaining clinker should not be considered a barrier to entry as it was an internationally traded commodity.

Cement imports

23. We now consider evidence relating to possible barriers to entering the UK cement market using imported cement.

Access to an import terminal

24. The GB producers told us that access to an import terminal could easily be secured. Cemex told us that there were numerous ports and wharves that were suitable for importing cement and that it was simple to convert existing storage facilities (such as grain silos) for cement. Cemex and Hanson also noted that it was not necessary to have access to an import terminal as cement could be imported by road tankers and trucks.⁵ Lafarge also told us that there were many existing storage facilities at ports

⁴ www.cemex.co.uk/ac/ac_pr_20090922.asp.

⁵ Hanson noted that Quinn Cement (Quinn) and CRH Group imported bagged cement from the Republic of Ireland by truck and Dragon did so from Spain.

around the UK which could be used for cement imports. Hanson said that deepwater ports were not required, numerous terminals were available, terminals did not require a great deal of sophistication and could be converted from other uses, and wharves could be rented at modest cost (or established at nominal cost relative to the significant capacity they provided). Hanson also cited evidence from a European Commission investigation that stated that the capacity of existing import terminals in GB was 6 Mt, which Hanson said was equivalent to 80 per cent of the GB annual bulk grey cement market and showed that there were low barriers to importing cement.⁶

25. Titan told us that there were only a limited number of ports suitable for import terminals, particularly for larger ships requiring deepwater facilities.
26. [REDACTED]
27. Sherburn, which started importing cement in 2007, told us that it had had no difficulty finding a port.

Source of supply

28. Cemex and Hanson told us that cement was readily available for import owing to international overcapacity, particularly from Spain and the Republic of Ireland.
29. Titan told us that it thought securing a reliable source of supply might be more difficult for a new entrant than an established importer, and Sherburn said that the main barrier to entry was securing a reliable source of supply.

⁶ Heidelberg Cement/Hanson decision, case *COMP/M.4719*, paragraph 88.

30. Leiths told us that the major barrier to entry was the availability of competitively-priced cement.

Capital cost

31. Cemex told us that the cost of setting up a cement import terminal could be around £[REDACTED], while Lafarge estimated that the cost would be between £400,000 and £1 million and Hanson suggested that terminals in the UK had recently been established for significantly less than £500,000 and that relative to the scale of capacity these terminals provided, such costs were nominal. Cemex also suggested that the cost of setting up a terminal could be avoided by importing bagged cement on flatbed trucks.⁷
32. Titan estimated that the capital cost of establishing a new deepwater terminal would be between £3 million and £5.8 million.
33. Sherburn estimated that the cost of setting up an import terminal would be up to £[REDACTED] million [REDACTED] and £[REDACTED] million for other equipment.

Vertical integration of GB producers

34. Titan told us that the market available to independent cement producers/importers had reduced over the last 20 years because the GB producers had integrated vertically into RMX production and now supplied their own RMX plants with their own cement. This had made the market less attractive to new entrants because it reduced the size of the market addressable by independent cement producers/importers.
35. In 2011, approximately 50 per cent of all bulk cement purchased in the UK was purchased by the GB producers (either from their own plants or the other GB pro-

⁷ Hanson noted that Quinn, CRH Group and Dragon imported bagged cement into the UK.

ducers); the balance was purchased by non-GB producers. Hanson noted that the 50 per cent of the market still addressable by importers suggested that vertical integration was not a barrier to entry. Hanson added that, using Hanson's own figures, the proportion of the market open to importers could be as high as 60 per cent of the national market.

Access to shipping

36. Hanson told us that shipping capacity was readily available.

Incumbent reaction

37. [A cement importer] told us that the possible reaction by incumbent suppliers (which might include impugning the entrant's reputation and lowering prices) was a barrier to entry.

Customer reaction

38. Titan told us that it thought a new entrant might face reluctance from customers to change to a new supplier. Hanson noted that it had regularly experienced all sizes of customers switching away to importers and that it saw no reason to believe that customers would not be prepared to switch to a new entrant supplier given their willingness to switch to importers generally.

Cement imports

1. This appendix sets out our analysis of the competitive constraint exerted by imported cement. We look at:
 - importers, their capacities and their market shares;
 - evidence on the cost of imported cement;
 - the geographic area which can be effectively served by a cement import terminal;
 - importers', GB cement producers' and customers' views of the competitiveness of imported cement;
 - evidence from some of the GB cement producers' internal documents on imported cement (our analysis of further evidence on imported cement from the Majors' internal documents is set out in Appendices 8.2, 8.3 and 8.4);
 - evidence of customer switching between imported cement and domestically-produced cement;
 - the cement imports of Aggregate Industries, and the extent of the constraint from Aggregate Industries on GB-produced cement; and
 - the potential of the EU ETS to influence the extent of cement imports into GB.

Independent cement importers, their market shares and capacities

2. Table 1 lists the 11 independent cement importers importing cement into GB, and their terminal locations. We note that Dragon Alfa Cement and Southern Cement were both owned by the largest player in the Spanish market, CPV, until February 2013, at which point CPV sold the Southern Cement import terminal to CRH, a cement producer from the Republic of Ireland which operates Premier Cement in GB.¹ There are 14 import terminals operated by independent² cement importers

¹ www.valderrivas.es/en/cargarAplicacionNoticia.do?identificador=106. Statements attributed to Southern Cement in this appendix were made whilst it was owned by CPV.

around the GB coastline, and one in Northern Ireland. In addition, one importer (Quinn) imports by both ferry and via import terminal from the Republic of Ireland.

TABLE 1 Independent cement importers

Importer	Location	Cement type	Notes
Brett Group	[REDACTED]	GGBS	All Brett Group imports are for own use only.
Channel Cement	[REDACTED]	[REDACTED]	[REDACTED]
Premier Cement (formerly Dan Morrissey Concrete (UK) Ltd)	[REDACTED]	CEM I	Imports cement from the Republic of Ireland Owned by CRH
Dragon Alfa	[REDACTED]	CEM I	Owned by CPV
Dudman Group	[REDACTED]	[REDACTED]	[REDACTED]
Lagan Group	[REDACTED]	Unknown	Imports cement from the Republic of Ireland
Thomas Armstrong	[REDACTED]	CEM I	Imports to GB from Germany and the Republic of Ireland, predominantly for own use
Titan	[REDACTED]	CEM I	Titan is owned by Titan Cement Company SA, a Greek cement and building materials producer, and imports cement from Titan's Kamari plant in Greece
Sherburn	[REDACTED]	CEM I	
Southern Cement	[REDACTED]	CEM I	Owned by CRH. Previously owned by CPV
		CEM I	GB by ferry and via an import terminal. Imports a mixture of bagged and palletized cement.

Source: Cement importers.

3. Table 2 shows each independent importer's annual volume of imports of bulk cement for the period 2007 to 2011 inclusive, alongside imports by Aggregate Industries and GB cement producers. Table 2 also shows the estimated total annual imports by independent importers based on the data they submitted to us, as well as estimates of total annual imports by independent importers as provided by the MPA. The figures suggest that annual imports by independent importers total between [REDACTED] and [REDACTED] Mt and have remained largely flat between 2007 and 2011.

² By independent importers, we are referring to importers independent of the Majors. As already noted, some of these importers are owned by non-GB cement producers.

TABLE 2 Volume of cement imports by cement importers and GB producers, 2007 to 2011

	<i>tonnes</i>				
	2007	2008	2009	2010	2011
Aggregate Industries	[X]	[X]	[X]	[X]	[X]
Titan	[X]	[X]	[X]	[X]	[X]
Dragon Alfa	[X]	[X]	[X]	[X]	[X]
Southern Cement	[X]	[X]	[X]	[X]	[X]
Thomas Armstrong	[X]	[X]	[X]	[X]	[X]
Dudman	[X]	[X]	[X]	[X]	[X]
Sherburn	[X]	[X]*	[X]*	[X]*	[X]
Premier Cement	[X]*	[X]*	[X]*	[X]	[X]
Quinn†	[X]	[X]	[X]	[X]	[X]
Channel Cement	[X]*	[X]*	[X]*	[X]*	[X]*
Lagan	[X]	[X]	[X]	[X]	[X]
Total non-domestic importers	[X]	[X]	[X]	[X]	[X]
Total non-GB-producer importers excl Aggregate Industries	[X]	[X]	[X]	[X]	[X]
MPA estimates of imports by non-members	1,121,000	1,084,000	1,086,000	1,153,000	1,173,000
	255,000	283,000	100,000	61,000	86,000

Source: GB producers and cement importers, MPA data and CC analysis.

*Estimated by the CC based on other submitted data.

†Includes sales of bagged cement.

4. Table 3 shows total GB cement (bulk and bagged) sales, broken down between sales of cement produced in GB, cement imports by GB producers and imports by non-GB producers, over the period 2007 to 2011. Table 3 also shows imports by Aggregate Industries separately. We then calculate market shares held by independent importers collectively and by Aggregate Industries. We see that the market share of all cement held by independent importers collectively has increased over time, from [X] per cent in 2007 to [X] per cent in 2011. Aggregate Industries' share has also grown, from [X] to [X] per cent over the same period. Table 3 also shows the bulk cement market share held by independent importers collectively, which has increased from [X] per cent in 2007 to [X] per cent in 2011, alongside Aggregate Industries' share of bulk cement, which has remained at [X] per cent across the period.

TABLE 3 GB bulk and bagged cement sales by origin and importers' market share, 2007 to 2011

	'000 tonnes				
	2007	2008	2009	2010	2011
MPA estimates of its members* cement sales from GB production	11,649	9,861	7,474	7,767	8,317
MPA estimates of its members' cement imports	255	283	100	61	86
MPA estimates of imports by non-members	1,121	1,084	1,086	1,153	1,173
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
MPA estimates of total GB cement sales†	13,025	11,228	8,657	8,980	9,575
Independents' market share of all cement (excl Aggregate Industries) (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries' market share of all cement (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total GB bulk cement sales‡	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Independents' market share of bulk cement (excl Aggregate Industries)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: MPA, Aggregate Industries, Lafarge, Tarmac, Cemex, Hanson and CC analysis.

*MPA members are Lafarge, Cemex, Hanson and Tarmac.

†Figures include bagged cement, and may include other cementitious products.

‡Based on data from Cemex, Hanson, Lafarge and Tarmac for bulk cement and MPA estimates of imports by non-members.

5. The evidence we received from importers which answered our questionnaire confirmed that they had spare capacity for importing cement at their terminals. Brett Group told us that it was operating at around [REDACTED] per cent capacity at its terminal, Thomas Armstrong told us that its annual capacity utilization was around [REDACTED] per cent, while Sherburn told us that its capacity utilization was around [REDACTED] per cent at present based on current machinery and staffing. Premier Cement is operating at around [REDACTED] per cent of capacity, and Lagan at [REDACTED] per cent of capacity. Titan told us that its capacity utilization [REDACTED] in 2007 [REDACTED] in 2011. [REDACTED] Dragon Alfa and Southern told us that their terminals were restricted by capacity to hold stock, time taken to discharge vessels, quay availability in discharge ports, ability to move cement internally within terminal and tidal conditions, and estimated that the maximum volumes of cement that could be imported through the terminals were around [REDACTED] tonnes at Dragon Alfa's terminal and [REDACTED] tonnes at Southern Cement's terminal. Based on import volumes in 2011 (see Table 2 above), this implies that Dragon Alfa is operating at round [REDACTED] per cent capacity, and Southern Cement at around [REDACTED] per cent capacity.

The GB producers' submissions on imports

6. The GB producers told us that importers were significant competitors, who regularly constrained domestic producers' prices and drove consumer choice.

7. The GB producers told us that six new import terminals had been built between 2007 and 2012. They also told us that this investment in new terminals showed that barriers to entry and expansion were low. While we acknowledge that new terminals have been built, we note that only Dudman Group, and possibly Quinn, have invested after the 2008/09 downturn in the market. Dudman Group, which built or planned to build three of the cited terminals, has, at least partially, gone into administration. Quinn mainly imports bagged cement. Cemex also told us that it believed there were a number of deep-water ports in GB, that expanding the capacity of existing terminals did not require significant resources and that using tidal ports should not be a problem as long as the operator had a managed supply chain. Hanson told us that the European Commission's decision on the Heidelberg/Hanson merger³ stated that GB import terminals had a capacity of 6 million tonnes and that this capacity was equivalent to around 80 per cent of the UK grey bulk cement market. We note that this figure includes terminals held by GB cement producers. Tarmac told us that importers were not capacity constrained since there was substantial excess capacity in Europe.

8. Cemex told us that it was not necessary to have access to an import terminal to import cement into GB, since it was possible to import bulk cement via road tanker and bagged cement via flatbed trucks. Cemex also noted that it was possible to import cement in ships with capacities of as little as 3,000 tonnes which did not require deep water terminals, and that the share of market available to importers was sufficiently large to provide an incentive for imports.

³ DG Competition Case No COMP/M.4719, 7 August 2007.

9. The GB producers told us that the importers' increased market share, in addition to new import terminals being built, showed that barriers to entry and expansion were low. We noted that, in absolute terms, importers did not materially increase their sales between 2007 and 2011. The growing market share of importers over this period was due to the overall market shrinking. Under such circumstances, we consider that growing market share does not in and of itself show that barriers to entry and expansion are low.

The cost of importing cement

10. We obtained data from independent importers on the average costs to them of sourcing cement in the provenance countries (before shipment, ie FOB costs). We also obtained data from the GB cement producers on the average FOB costs to them of sourcing cement produced in other countries.⁴ The various estimates of sourcing cement from outside of GB are presented in Table 4.

⁴ Lafarge Group provided costs on a CIF basis, which we understand to be costs of cement landed in GB, including shipping costs, insurance and any other handling charges. We have calculated FOB costs for Lafarge Group by subtracting average shipping costs (provided by Lafarge Group) from the CIF costs. However, this may overestimate the FOB costs somewhat, as we were unable to subtract insurance costs, and any other costs which are included in the CIF estimate. Where costs were provided in €, we have converted these to £ using average exchange rates for the year. Where more than one cost was provided for a given country of origin and year (because the port of entry into GB differed), we have calculated a weighted average (using volume) cost for the country of origin and year.

TABLE 4 Estimated average FOB cost of cement

Source of estimate	Provenance country	Destination	Year	FOB cost (per tonne)*
Aggregate Industries†	Germany	[REDACTED]	2007	[REDACTED]
Cemex	Egypt	[REDACTED]	2007	[REDACTED]
Lafarge‡	Germany (external)	[REDACTED]	2007	[REDACTED]
Lafarge	Spain (external)	[REDACTED]	2007	[REDACTED]
Lafarge	Greece (internal)	[REDACTED]	2007	[REDACTED]
Lafarge	Greece (external)	[REDACTED]	2007	[REDACTED]
Quinn	Republic of Ireland	[REDACTED]	2007	[REDACTED]
Dragon Alfa/Southern Cement	Spain	[REDACTED]	2007	[REDACTED]
Dragon Alfa/Southern Cement	Netherlands	[REDACTED]	2007	[REDACTED]
Dragon Alfa/Southern Cement	Portugal	[REDACTED]	2007	[REDACTED]
Titan	Greece	[REDACTED]	2007	[REDACTED]
Sherburn Stone	Belgium	[REDACTED]	2007	[REDACTED]
Aggregate Industries†	Germany	[REDACTED]	2008	[REDACTED]
Hanson§	Germany	[REDACTED]	2008	[REDACTED]
Lafarge	Greece (internal)	[REDACTED]	2008	[REDACTED]
Thomas Armstrong	Germany	[REDACTED]	2008	[REDACTED]
Quinn	Republic of Ireland	[REDACTED]	2008	[REDACTED]
Dragon Alfa/Southern Cement	Spain	[REDACTED]	2008	[REDACTED]
Dragon Alfa/Southern Cement	Netherlands	[REDACTED]	2008	[REDACTED]
Dragon Alfa/Southern Cement	Portugal	[REDACTED]	2008	[REDACTED]
Titan	Greece	[REDACTED]	2008	[REDACTED]
Sherburn Stone	Belgium	[REDACTED]	2008	[REDACTED]
Aggregate Industries†	Germany	[REDACTED]	2009	[REDACTED]
Lafarge	France (internal)	[REDACTED]	2009	[REDACTED]
Lafarge	Greece (internal)	[REDACTED]	2009	[REDACTED]
Thomas Armstrong	Germany	[REDACTED]	2009	[REDACTED]
Quinn	Republic of Ireland	[REDACTED]	2009	[REDACTED]
Dragon Alfa/Southern Cement	Spain	[REDACTED]	2009	[REDACTED]
Titan	Greece	[REDACTED]	2009	[REDACTED]
Sherburn Stone	Belgium	[REDACTED]	2009	[REDACTED]
Aggregate Industries†	Germany	[REDACTED]	2010	[REDACTED]
Lafarge	France (internal)	[REDACTED]	2010	[REDACTED]
Thomas Armstrong	Germany	[REDACTED]	2010	[REDACTED]
Quinn	Republic of Ireland	[REDACTED]	2010	[REDACTED]
Dragon Alfa/Southern Cement	Spain	[REDACTED]	2010	[REDACTED]
Titan	Greece	[REDACTED]	2010	[REDACTED]
Sherburn Stone	Belgium	[REDACTED]	2010	[REDACTED]
Aggregate Industries†	Germany	[REDACTED]	2011	[REDACTED]
Lafarge	France (internal)	[REDACTED]	2011	[REDACTED]
Thomas Armstrong	Germany	[REDACTED]	2011	[REDACTED]
Thomas Armstrong	Republic of Ireland	[REDACTED]	2011	[REDACTED]
Quinn	Republic of Ireland	[REDACTED]	2011	[REDACTED]
Dragon Alfa/Southern Cement	Spain	[REDACTED]	2011	[REDACTED]
Premier Cement Limited	Republic of Ireland	[REDACTED]	2011	[REDACTED]
Titan	Greece	[REDACTED]	2011	[REDACTED]
Sherburn	Belgium	[REDACTED]	2011	[REDACTED]
Sherburn	Spain	[REDACTED]	2012	[REDACTED]
Average of the direct evidence from independent importers on their costs in 2011				[REDACTED]
Average of the direct evidence of all cement imports on their costs in 2011				[REDACTED]

Source: Data from GB producers (excluding Tarmac) and cement importers.

*Where relevant, costs have been converted from € to £ using the average exchange rate for the year in question from www.oanda.com.

†Aggregate Industries figures are weighted averages.

‡Weighted average.

§[REDACTED]

11. Shipping is a significant additional cost for importers compared with GB producers of cement. Table 5 provides estimates by the GB producers and cement importers of the cost of shipping cement to GB terminals from several locations.

TABLE 5 Estimated cost per tonne of shipping cement, provided by the GB producers and cement importers

Source of estimate	Provenance country	Destination	Year	Cost
Aggregate Industries*	Germany	[REDACTED]	2007	[REDACTED]
Sherburn	Belgium	[REDACTED]	2007	[REDACTED]
Quinn†	Republic of Ireland	[REDACTED]	2007	[REDACTED]
Titan‡	Greece	[REDACTED]	2007	[REDACTED]
Lafarge	France	[REDACTED]	2007	[REDACTED]
Lafarge	Greece	[REDACTED]	2007	[REDACTED]
Lafarge	Spain	[REDACTED]	2007	[REDACTED]
Cemex	Egypt	[REDACTED]	2007	[REDACTED]
Aggregate Industries*	Germany	[REDACTED]	2008	[REDACTED]
Sherburn	Belgium	[REDACTED]	2008	[REDACTED]
Quinn†	Republic of Ireland	[REDACTED]	2008	[REDACTED]
Titan‡	Greece	[REDACTED]	2008	[REDACTED]
Thomas Armstrong§	Germany	[REDACTED]	2008	[REDACTED]
Lafarge	Greece	[REDACTED]	2008	[REDACTED]
Hanson	Germany	[REDACTED]	2008	[REDACTED]
Aggregate Industries*	Germany	[REDACTED]	2009	[REDACTED]
Sherburn	Belgium	[REDACTED]	2009	[REDACTED]
Quinn†	Republic of Ireland	[REDACTED]	2009	[REDACTED]
Titan‡	Greece	[REDACTED]	2009	[REDACTED]
Thomas Armstrong§	Germany	[REDACTED]	2009	[REDACTED]
Lafarge	France	[REDACTED]	2009	[REDACTED]
Aggregate Industries*	Germany	[REDACTED]	2010	[REDACTED]
Sherburn	Belgium	[REDACTED]	2010	[REDACTED]
Quinn †	Republic of Ireland	[REDACTED]	2010	[REDACTED]
Titan‡	Greece	[REDACTED]	2010	[REDACTED]
Thomas Armstrong§	Germany	[REDACTED]	2010	[REDACTED]
Lafarge	France	[REDACTED]	2010	[REDACTED]
Aggregate Industries*	Germany	[REDACTED]	2011	[REDACTED]
Sherburn	Belgium	[REDACTED]	2011	[REDACTED]
Quinn †	Republic of Ireland	[REDACTED]	2011	[REDACTED]
Titan‡	Greece	[REDACTED]	2011	[REDACTED]
Thomas Armstrong§	Germany	[REDACTED]	2011	[REDACTED]
Premier Cement	Republic of Ireland	[REDACTED]	2011	[REDACTED]
Lafarge¶	Spain	[REDACTED]	2011	[REDACTED]
Lafarge	France	[REDACTED]	2011	[REDACTED]
Average estimate for 2011				[REDACTED]

Source: Data from GB producers ([REDACTED] Tarmac) and cement importers.

*Aggregate Industries figures are weighted averages.

†Figures in the table relate to bulk cement only. Quinn has also provided costs of shipping palletized cement, which are around £[REDACTED]/t across the period.

‡Titan figures are averages.

§Thomas Armstrong figures are weighted averages.

¶GGBS only.

Note: Where relevant, costs have been converted from € or \$ to £ using the average exchange rate for the year in question from www.oanda.com.

12. Dudman Group (an independent importer) told us that [REDACTED]. We note that there are variations in the FOB cost of imported cement, but find that on average, the FOB cost

of imported cement is higher than the variable cost of GB produced cement (see Table 6).⁵

13. Dudman Group told us that [REDACTED]. This appears consistent with an average shipping cost of £[REDACTED], based on Table 5. [REDACTED] told us that, in addition to shipping costs which are included in Table 5, it incurred an additional £[REDACTED]/t in ancillary costs.
14. Table 6 summarizes the various estimates of the costs of importing cement that we received, and compares the overall cost of importing cement (using these estimates) with our estimates of the variable costs to GB producers of selling cement.

TABLE 6 Cost comparison between GB and imported cement, 2011

	Cost element (£ per tonne)		
	GB cement	Imported cement (average)	Imported cement (lower case)
FOB cement cost (average)	-	[REDACTED]	[REDACTED]
Freight shipping cost (average)	-	[REDACTED]	[REDACTED]
Variable cost of production ex works	[REDACTED]*	-	-
Depot cost	[REDACTED]	N/A	N/A
Port dues	-	[REDACTED]	[REDACTED]
Estimated total (average variable costs to GB customers)	[REDACTED]	[REDACTED]	[REDACTED]

Source: GB producers' and cement importers' data, and CC calculations.

*Estimates include the following cost categories for each company: raw materials & consumables, cement purchases, process fuels, power and variable stock movement in the case of [REDACTED]; raw materials, admixtures, cost of purchased cement, cost of purchased clinker, internal freight raw materials, fuel oil, coke, gas, coal, diesel, alternate fuels, other fuels, electric power, castables, explosives, bags, other variable costs and grinding and crushing media in the case of [REDACTED]; raw materials, resale purchases, electricity, kiln fuels, consumables, other variable, packaging and inventory change in the case of [REDACTED]; and aggregate materials, lime, packaging, resale products, other materials, electricity, gas, other power, other variable costs and complaints in the case of [REDACTED].

15. Titan told us that [REDACTED].
16. Dragon Alfa and Southern Cement told us that higher costs were inherent in the operations of importers, and that importers had only been able to achieve temporary

⁵ We note that the FOB cost of imported cement will typically reflect the ex-works variable cost of producing cement in provenance countries, and is therefore likely to contain a margin paid to the originating cement producer. However, from the viewpoint of the (independent) cement importer, this is the price at which it purchases cement, and is therefore a purely variable cost.

reductions in base cost due to exchange rate movements along with internal economic factors affecting production costs in the country of manufacture.⁶

The GB producers' submissions on the cost of imported cement

17. The GB producers told us that they did not think GB cement producers had cost advantages over importers. Hanson told us that it estimated that the landed price of imported cement would be around €55 per tonne, which Hanson said was [X] below its 2011 average total cost per tonne. Hanson also told us that the difference between the costs of its GB produced cement and the landed price of cement had increased in 2012, with fixed costs increasing by more than [X] per tonne. The cost estimate cited by Hanson is lower than the costs reported in Tables 4 and 5, which are based, among other things, on actual costs to independent importers. We therefore consider that the costs reported in Tables 4 and 5 are a better estimate of the landed costs of importers. Cemex told us that it disputed the suggestion that FOB price of cement in Continental Europe is similar to, or higher than, the ex-works price of cement produced in GB.
18. The GB producers also told us that our cost comparison was not relevant for the following reasons:
- (a) The CC's analysis suggested that GB producers would be prepared not to recover long-run marginal cost in order to price importers out of the market. The GB producers told us that this would not be a practicable strategy. Cemex told us that since all, or almost all, customers sought quotes from importers, there were no customers at the margin that could be targeted.

⁶ Cemex told us that this statement was not correct, since the increase in the importation of cement into GB was not aligned with exchange rate movements.

- (b) The GB producers told us that since domestic producers had considerable fixed costs, the competitive price would not equal the average variable cost of domestically-produced cement.
- (c) There are fixed costs to producing cement everywhere. When importers source foreign cement at prices above the average variable cost of the foreign product, they were actually contributing to cover the fixed cost of producing that cement. The GB producers told us that, for this reason, the FOB price of imported cement being higher than ex-works average variable cost for domestic cement was to be expected, and that comparing a price which contributes to covering fixed costs to ex-works average variable cost was not a like-for-like comparison.
- (d) Many importers are vertically integrated. The GB producers told us that the FOB price of cement in the country of origin was not a relevant measure of cost for such importers.

19. In relation to points (a) and (b), we note that prices for cement are bilaterally negotiated on a customer-by-customer basis. This gives cement suppliers the option of lowering prices selectively. In order to undercut an importer's price, a domestic producer would therefore not have to cut prices on all its sales. Individual importers have fairly limited sales. This suggests that, in order to price an importer out of the market, a domestic producer would have to sell only a limited fraction of its sales at a discounted price. When a domestic producer makes a sale at a price above average variable cost, the sale will make a positive contribution to cover fixed costs. This, together with the observation that only a limited volume would have to be sold at a discount, suggests that undercutting an importer would not be a particularly costly strategy. We are not suggesting that prices in a competitive market would, on average, be close to the short-term average variable cost of domestic cement.

20. In relation to Cemex's suggestion that there are few customers at the margin that can be targeted, we have undertaken an analysis of data on Cemex's customers' threats to switch. This analysis can be found in paragraph 106 below. We find that the data does not support Cemex's claim. In 2009, 2010 and 2011, less than 21 per cent of Cemex's annual volume of sales to independent customers was contested by importers. Similarly, the fraction of Lafarge's sales to independent buyers that is challenged by other suppliers appears to be around 13 per cent. It follows that the fraction of Lafarge's sales to independent buyers challenged by importers is no greater than 13 per cent.
21. In relation to points (c) and (d), we note that we are comparing the costs of two different ways of supplying GB customers with cement: producing cement domestically and importing cement to GB. A non-integrated importer will have to pay the FOB price in the country of origin. This is an unavoidable part of such an importer's average variable cost. An importer's contribution to the fixed cost of producing cement is not relevant to our assessment. We consider that the FOB price is a relevant measure of cost for vertically-integrated importers, in that it measures the producer's opportunity cost of exporting cement rather than selling it domestically, at least for marginal quantities. However, even when we calculated importers' average variable costs based on a lower case FOB (which is based on the lowest FOB costs in Table 4 above) which were incurred by two integrated importers, and which may not have been contributing fully (or at all) to the fixed cost of producing cement abroad, we still find that cement importers had a cost disadvantage in competing against domestically-produced cement.
22. [REDACTED] made several comments on the feasibility of selective price cuts directed at importers' customers. It told us that such a strategy would be ineffective: since barriers to entry into cement importing are low, importers would re-enter the market

once GB cement prices returned to levels that were viable for them to do so in the medium to long term. [REDACTED] also told us that a strategy of selective price cuts directed at importers' customers would be inconsistent with coordination between GB cement producers, since coordination becomes difficult to sustain if coordinating firms can and do target customers selectively, but are unable to inform each other about these selective price decreases.

23. We believe that even if barriers to entry to cement importation are low, there is a risk that targeted pricing directed at importers' customers will deter entry through a reputation effect. We also think that, if Producer A targets customers of importers, such that Producer A's share increases, Producer B is unlikely to view this as a deviation as it will not have lost volumes to Producer A, and therefore such selective price cuts targeted at importers are unlikely to undermine coordination.

Geographic scope of imported cement

24. We also considered evidence on the geographic scope of imported cement.
25. Titan told us that a distance of up to [REDACTED] miles from the import terminal covered [REDACTED] per cent of total volumes shipped from its terminal during all quarters from Q1 2007 to Q4 2011.
26. Thomas Armstrong told us that a distance of [REDACTED] miles covered [REDACTED] per cent of its total volumes shipped from its import terminal.
27. Dragon Alfa told us that a distance of [REDACTED] miles covered [REDACTED] per cent of total volumes shipped from its import terminal, while Southern Cement told us that a distance of [REDACTED] miles covered the [REDACTED] of total sales from its terminal.

28. Dudman Group [REDACTED].
29. Premier Cement told us that its customer catchment area (covering [REDACTED] per cent of customers) was about [REDACTED] miles around [REDACTED], and that it could compete with GB producers up to a distance of about [REDACTED] miles around [REDACTED].
30. Aggregate Industries provided the quantity-weighted average of the median and 95th percentile distances across all of Aggregate Industries' cement sites, separately for external and internal customers. The data shows that the quantity-weighted average of the median is [REDACTED] miles for external customers and [REDACTED] miles for internal customers. Aggregate Industries noted that its cement sales to third party customers were limited and were not a focus for the Aggregate Industries business. [REDACTED]
31. Lafarge told us that the distances (in radial miles) from its [REDACTED] import terminal to external customers were on average [REDACTED] miles for bulk customers, with a maximum distance of [REDACTED] miles for bulk customers in 2011. The 80th percentile distance for bulk customers was [REDACTED] miles in the same year. However, we think that these distances may not be representative of the distances over which Lafarge could profitably deliver imported cement, as Lafarge has a national network of cement plants and depots, and delivery distances will be influenced by strategic decisions to optimize plant/depot usage, as well as import terminal usage.
32. Lafarge also told us that it estimated the distance between import terminals (excluding Aggregate Industries) and the customers believed to be sourcing bulk grey cement from them (based on estimates in January 2011), and found that around 80 per cent of bulk cement volumes supplied by importers were distributed within 80 (road) miles of import terminals.

33. Hanson told us that historically imports only competed on a 50-mile radius from the port, but that Hanson was increasingly witnessing imports moving large distances by road. Hanson provided an example where it recently lost a contract to an importer for a customer [REDACTED] which was supplied from a port [REDACTED].

Views on the competitiveness of imported cement

34. In this section, we consider importers', GB cement producers' and customers' views on the competitiveness of imported cement. We also consider evidence from some GB cement producers' internal documents on imported cement.

Evidence from importers on their competitiveness

35. Titan told us that [REDACTED].
36. Titan also told us that [REDACTED]. Quinn told us that it had a small presence in bulk cement in GB due to the very competitive nature of the sector which was dominated by GB producers. It also told us that it had found it difficult to compete in bulk cement with the lower prices set by competitors.⁷ It said that there was no difference in either the quality or security of supply between GB produced and imported cement.
37. Sherburn told us that it was currently competitive on prices compared with GB producers. It also told us that, as an importer, its position was vulnerable because it could not lower prices as much as the Majors in order to retain, or win new, customers.
38. Thomas Armstrong told us that its imported cement had not competed with cement produced in GB, rather the imported cement had replaced cement previously

⁷ Hanson told us that Quinn's statement that it could not compete on price in bulk cement was not borne out by Hanson's experience. In support of this, Hanson pointed to internal emails where two instances of Quinn selling at low prices were discussed.

imported from Greece. However, it also told us that it considered its prices to be competitive compared with GB producers, and that there were no differences in quality and security of supply between imported and GB-produced cement.

39. Dudman Group [REDACTED].
40. Dragon Alfa and Southern Cement told us that they had reasonable success in competing for business on the basis of quality, although they noted that they were sensitive to exchange rate fluctuations and had had to build a safety net into prices which had sometimes prevented them competing for higher-volume/lower-priced business. They also told us that there were inherent difficulties for importers competing with local producers as a result of increased logistics costs, as well as quality issues due to increased handling and the consequent exposure to atmosphere which could produce issues with lumps in the product. They further stated that many larger customers tended to take supplies from both GB producers and importers initially, fearing that tidal issues, shipping problems, storage and distribution facilities might expose them to excessive risk of supply interruption. Dragon Alfa and Southern Cement told us that GB producers were able to price at levels which would leave Dragon Alfa and Southern Cement in a loss-making position.
41. [REDACTED] noted that importing carried the risks of security of supply, foreign exchange fluctuations and exposure to increased shipping costs. [REDACTED] said that it did not import cement from elsewhere in Europe (eg Spain) because it would be too costly to do so. [REDACTED]

Evidence from internal documents by GB producers on imports

42. We consider the internal documentary evidence (including the evidence it contains relating to cement imports) further in Appendices 8.2, 8.3 and 8.4.

43. Lafarge told us that it considered that imported grey cement and domestically-produced grey cement were substitutable and competed directly with each other. It said that importers were competing strongly with Lafarge and other players with regard to the supply of cement to bulk non-major customers, and that the importers' share of external bulk sales to non-majors was estimated to have grown over recent years to be 18 per cent of external bulk sales in 2010, and even higher (ranging between 22 and 26 per cent over the period 2007 to 2010) in relation to supply to non-major RMX producers.
44. In relation to its own imports of cement and clinker, Lafarge told us that [REDACTED], but that [REDACTED].
45. Lafarge stated that in 2010, CPV, Dudman Group and Titan each supplied greater volumes of bulk cement than Tarmac externally to non-Major cement customers.
46. Lafarge monitors [REDACTED].
47. One internal document submitted by Lafarge mentions that the [REDACTED].
48. Another internal document submitted by Lafarge said: [REDACTED]. A further internal document by Lafarge from the same year stated that: [REDACTED]. Lafarge told us that [REDACTED].
49. In an internal document from 2008, Lafarge states: [REDACTED]. In another document from 2005, Lafarge [REDACTED].
50. Another Lafarge document from 2008 was [REDACTED].
51. In the process of seeking planning permission to build a new cement plant at a site in Medway, Lafarge argued that cement imports faced disadvantages compared with

domestic cement. We note that, in a 2009 document from Lafarge to Medway Council,⁸ Lafarge states in paragraph 2.6 that:

It is however wrong of the I&O Report to say, as it does at paragraph 4.254, that the UK is too expensive for cement manufacturing. Although cement is typically more expensive to manufacture in the UK (and Western Europe) than in, say, the Near or Far East, what matters to a customer and to an economy as a whole is the cost at the point of use: that is, the manufacturing and distribution costs. As cement is a high bulk, medium value, product, transport costs loom large in the overall delivered cost. Lafarge, as a world-wide cement manufacturer, certainly trades cement between countries, including importing into the UK, but such movements are – to use a parallel with electricity generation – ‘peak load’ supplies. The ‘base load’ of supply is usually better handled by local manufacturing, which also has benefits to local economies and avoids the logistic difficulties of sea-borne import.⁹

52. Paragraph 2.7 of the same document states that:

In recent years a further important consideration has come to the fore. In addition to relative economics, customers and specifiers are increasingly influenced by the carbon footprint of the cement they buy/specify. It will therefore be critical that a majority of cement is manufactured locally with imports used only to ‘top up’ to deal with fluctuating demand.

53. There are also documents suggesting that [REDACTED].

⁸ Core Strategy Issues & Options Paper, Response by Lafarge Cement UK PLC on Question 71Q, Medway Council: <http://medway-consult.limehouse.co.uk/file/947953>.

⁹ Lafarge told us that this comment was made by comparing Medway with the alternative of importing more than 1 MT of cement per year. Lafarge also told us that at the time the comment was made, the availability of a long-term single source of imports on such a scale was unclear and that since the comment was made, the collapse in demand in the construction industries in Europe (particularly in Spain and in Ireland) had led to large quantities of cement becoming available for importing.

54. Hanson told us that:

the volume of imports and number of importers has increased over the last 5 years. The import share of the UK market has increased, despite a 25% drop in market size over the last five years. ... Barriers to the expansion of imports are very low and there is currently significant excess capacity at UK important terminals. Imports thus impose a direct competitive constraint on Hanson's cement business.

Hanson also stated that: 'Historic perceptions regarding perceived quality differentials in imported cement and the resulting quality premium on domestic product price have disappeared'.

55. Hanson said that 'Cement importers now routinely compete with Hanson on a daily basis in the sales of bulk cement, winning a growing proportion of business, and putting competitive pressure on Hanson to reduce prices'.

56. In an internal document provided by Hanson, Hanson states that: [REDACTED]. Another internal document from Hanson, under the heading [REDACTED] states: [REDACTED], and then goes on to state: [REDACTED].

57. An internal document by Hanson from 2008 provided [REDACTED].

58. Another Hanson document discussed [REDACTED].

59. A further Hanson document contained [REDACTED].

60. A series of Hanson documents cover [REDACTED].

61. [REDACTED]

62. [REDACTED]

63. [REDACTED]

64. Hanson told us that as [REDACTED]. Hanson further stated that [REDACTED]. In addition, Hanson told us that [REDACTED] However, in our view, whilst [REDACTED] may have had other sources of cement supply open to it, Hanson's actions, and its relationship to [REDACTED] cement supplier, had the effect of restricting [REDACTED] cement supplies in the short term and created additional business difficulties and costs for [REDACTED].

65. Hanson highlighted instances of internal emails relating to Hanson's customers being targeted by allegedly aggressive pricing. The examples cited by Hanson pertained to importers pricing £7 to £22 below Hanson, and importers applying 2010 prices in March 2011. Hanson also highlighted two internal emails relating to how the EU ETS would change the incentives of cement producers from the Republic of Ireland and told us that these documents showed that they considered that the EU ETS was a driver of imports. One of these documents stated that in order to satisfy carbon rules, one Irish cement producer was continuing to produce an extra 400 kt of extra clinker in 2012 compared with 2011. The other email stated that an Irish cement producer had 'a market entry pricing strategy backed up by EUTS [sic] phase III'. We analyse Irish cement producers' incentives to expand or maintain output in paragraph 135 and onwards.

66. Cemex told us that:

Cement is reasonably straightforward to import and consequently actual volumes of imports have increased over the past five years despite considerable contraction of the overall British market. New entry or expansion is particularly likely by importers able to source cement from

EU locations where there is significant excess capacity and significant incentives for importers to maintain production levels above the minimum required in order to avoid losing EU Emissions Trading Scheme Credits (e.g. Spain, Portugal and Ireland after the collapse of their construction booms). In addition, excess capacity amongst existing producers can be used to compete hard for additional customer volumes wherever possible.

[REDACTED] also told us that its close monitoring of importers' activities illustrated the competitive threat posed by importers to GB producers. Moreover, [REDACTED] told us that it had no consistent strategy to recover volume only from the supplier to which it had lost volume and that this applied equally to importers to which it had lost volume.

67. A forward-looking internal document by Cemex [REDACTED]. Another internal document from late 2010 [REDACTED].
68. An internal document by Cemex from 2008 [REDACTED].
69. Several other Cemex documents [REDACTED], one document states: [REDACTED]. Another Cemex document states: [REDACTED].
70. One Cemex document [REDACTED].
71. A further Cemex document [REDACTED].
72. Another Cemex document from 2006 states: [REDACTED].
73. A further Cemex document from 2006 describes [REDACTED]. The document states: [REDACTED]. The document also states: [REDACTED].

74. Another Cemex document from 2006 states: [REDACTED]. The document also states: [REDACTED].
75. A Cemex internal document from 2003 [REDACTED].
76. Tarmac told us that imported and GB-produced cement were fully substitutable and competed directly. It said that it focused on self-supply of cement to its downstream activities, but to the extent it sold cement externally, it competed with the Majors as well as several importers.
77. We note that, in seeking permission to expand the capacity of its Tunstead cement works, Tarmac took the position that imported cement was unattractive to it. In a submission to the Derbyshire County Council in 2009, Tarmac stated that it was ‘very concerned about the medium to long term prospects of having to source an increasing amount of its cement from imports’.¹⁰ While we note that Tarmac made this statement in 2009, we do not believe that the transport cost disadvantage faced by imported cement has been materially affected by the subsequent change in demand conditions.¹¹
78. MI said that [REDACTED].

Evidence from cement customers on imported cement

79. This section outlines the evidence on imported cement we obtained from customers. These customers were mainly larger customers, along with some independent producers of RMX.

¹⁰ *Report of the Strategic Director*, Derbyshire County Council: www.derbyshire.gov.uk/images/2011.01.31%20Tunstead_tcm44-156214.pdf.

¹¹ Tarmac told us that this comment was made by comparing Medway with the alternative of importing more than 1 MT of cement per year, and that at the time the comment was made, the availability of a long term single source of imports on such a scale was unclear and that since the comment was made, the collapse in demand in the construction industries in Europe (particularly in Spain and in Ireland) has led to large quantities of cement becoming available for importing.

80. BP Mitchell told us that it had been purchasing most of its cement from [REDACTED] for several years, and that it had been purchasing smaller quantities from Hanson (alongside the GGBS which it purchased from Hanson). It also told us that it had been approached by the Majors during this time with quotes, and had found that the price it paid to [REDACTED] had been comparable to the quotes from Majors.
81. Balfour Beatty told us that it had tended to buy small quantities of cement in the past (as it tended to buy RMX directly, instead of mixing it itself), but that nonetheless, it had considered imported cement and sought quotes from independent importers whenever it needed to buy cement, in order to increase competition for its tenders.
82. Balfour Beatty also told us that it had at times had quality concerns when using imported cement.
83. Brett Group told us that one of the reasons why it had an import terminal was ‘to keep any cement supplier honest’, [REDACTED].
84. In 2010, Brett Group entered into a [REDACTED]-year agreement with Lafarge in relation to its purchases of cement. [REDACTED]
85. [REDACTED]
86. Brett Group also noted that it had a preference for domestic cement over imported cement, in part because of security of supply.
87. Breedon Aggregates told us that it did not currently buy imported cement as it found that importers were unable to match domestic producers’ prices. This was partly due to the location of Breedon Aggregates’ RMX plants, and because it considered that it received a competitive price from its GB-based suppliers.

88. BAM Nuttal told us that there were importers of bulk cement from countries like Spain and Germany. However, imported cement could be a different consistency (and possibly inferior) to GB-produced cement and also it might not be possible to switch cement supplier mid-project. BAM Nuttal would take advice from its technical team as to whether RMX made from imported cement met required specifications and would not have concerns about using imported cement as long as it did so.

Switching between GB-produced cement and imports

89. In this subsection we look at customer switching between GB producers and independent importers. We first look at the extent of switching using data provided by GB producers and some importers, and then we summarize evidence of the GB producers' reactions to customers switching to importers.

Extent of switching

90. Titan told us that [REDACTED].
91. Dragon Alfa and Southern Cement told us that they tended only to lose business to GB producers, not gain, though they had occasionally gained transient business as customers chased lower prices.
92. Lafarge told us that it competed actively with imported grey cement, and provided data on losses to these rivals each year: it said that it had lost nearly [REDACTED] per cent of non-repatriated lost volumes¹² over 2007 to 2011, and over [REDACTED] per cent of lost volumes in the year to July 2011, to importers other than Aggregate Industries. Lafarge also provided figures on the volumes of losses and gains of bulk and bagged cement from cement importers, which are shown in Table 7. We have combined

¹² By repatriated volumes, Lafarge told us that it meant instances where an integrated cement producer had a downstream operation that switched from sourcing cement from Lafarge to in-house supply, or where Lafarge's downstream units were sourcing cement from a competitor and switched to sourcing cement in-house.

these figures with Lafarge's transaction data in order to calculate volumes lost to, and gained from, importers as a proportion of Lafarge's annual sales of bulk and bagged cement, as shown in Table 7.¹³

TABLE 7 Lafarge volumes of bulk and bagged cement lost to, and gained from importers

	2007	2008	2009	2010	2011
Volumes lost to importers (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volumes gained from importers (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Annual cement sales (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volumes lost to importers as a proportion of annual sales (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volumes gained from importers as a proportion of annual sales (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge, and CC calculations.

93. Hanson provided figures on the volumes of losses and gains to cement importers, which are shown in Table 8. We have combined these figures with Hanson's transaction data in order to calculate volumes lost to, and gained from, importers as a proportion of annual sales of cement, as shown in Table 8. Hanson told us that the switching data in Table 8 only included year-end figures, and did not include mid-year wins and losses which resulted in price reductions and thus acted as pricing constraints.

TABLE 8 Hanson volumes of bulk and bagged cement lost to, and gained from importers

	2009	2010	2011
Independent customer volumes lost to importers (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]
Independent customer volumes gained from importers (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]
Hanson gains from imports as % of total gains	[REDACTED]	[REDACTED]	[REDACTED]
Market share of imports (%)	[REDACTED]	[REDACTED]	[REDACTED]
Annual cement sales (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]
Independent customer volumes lost to importers as a proportion of annual sales (%)	[REDACTED]	[REDACTED]	[REDACTED]
Independent customer volumes gained from importers as a proportion of annual sales (%)	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson, and CC calculations.

¹³ Lafarge provided additional figures showing volumes of bulk cement lost to, and won from, importers, as a proportion of annual bulk cement sales to non-Majors, showing that non-Major volumes lost to importers as a proportion of bulk sales to non-Majors varied between [REDACTED] and [REDACTED] per cent over the period 2007 to 2011, while non-Major volumes gained from importers as a proportion of bulk sales to non-Majors varied between [REDACTED] and [REDACTED] per cent over the period.

94. Hanson also told us that some [REDACTED] per cent of key customer relationships in 2011¹⁴ were adversely affected (from Hanson’s point of view) by cement importers (either by customers switching to importers a part, or all, or their business, or by Hanson having to offer price reductions in order to keep the customers), and Hanson told us that this showed that importers acted as a constraint on Hanson’s pricing.
95. Cemex gave us figures for the number of customers lost to, and gained from, importers, alongside the volumes. The information is summarized in Table 9. Cemex told us that this might not be a comprehensive data set, as in some cases Cemex did not know who a customer was lost to, or won from, but Cemex told us that it represented a large majority of customer switching to/from importers. Cemex also told us that actual switching told only one part of the competitive dynamic in the cement market, and that significant further customer volumes were contested, where a customer threatened to switch, but Cemex kept, or defended, that customer’s volume (usually by offering a further discount).¹⁵

TABLE 9 **Cemex customers and volumes of bulk and bagged cement lost to, and gained from importers**

	2008	2009	2010	2011
Number of customers lost to importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Number of customers gained from importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volume of cement lost to importers (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volume of cement gained from importers (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Annual cement sales (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volume of cement lost to importers as a proportion of annual sales (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Volume of cement gained from importers as a proportion of annual sales (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex, and CC calculations.

96. Tarmac provided a list of the customers which it had gained and lost since 2009, but without specifying who the customer was won from/lost to, because this information

¹⁴ Defined by Hanson as the top [REDACTED] RMX customers by volume and top [REDACTED] concrete products customers by volume, accounting for a significant proportion of Hanson’s business.

¹⁵ Cemex noted that volumes lost to, and gained from, importers in Table 9 were not consistent with Cemex recovering business from importers.

was not known to Tarmac. Therefore, it is not possible to produce figures for Tarmac on the number of customers, or volumes of cement won from/lost to importers.

Evidence of GB producers' reactions to customer switching

97. Titan told us that following a switch of a customer from the Majors to Titan, the Majors usually reacted by going back to the customer in question and trying to win the work back with lower prices. [REDACTED]
98. Quinn told us that, in response to (potentially) losing customers to it, the Majors tended to push back by offering cheaper pricing. It said that the Majors had on occasion leveraged their ability to provide alternative products in their portfolio in order to ensure a customer continued to purchase cement from them instead of switching to Quinn.
99. Sherburn told us of one example where it had won a customer from [REDACTED] by offering a lower price, and which was then followed by [REDACTED] reducing its price significantly in order to win the customer back. According to Sherburn, [REDACTED] sales representative had justified this aggressive pricing to the customer by saying that Hanson sales representatives had been advised to gain back customers and market share from importers.
100. Dragon Alfa and Southern Cement told us that in many cases the winning of a new customer from the GB producers had been a temporary situation, as if the customer was well established and offered good financial credentials, the incumbent supplier had tended to reduce prices in order to win the customer back.
101. Cemex told us that the behaviours outlined in this subsection illustrated conditions of normal competition in the GB cement market, rather than any retaliatory action by GB

producers. It said that its pricing policy did not give any consideration to the identity of a customer's previous supplier. Hanson told us that when the price was reduced to compete against importers, the logical conclusion was that importers were successfully developing market presence and were succeeding in constraining prices. It said that it did not distinguish between customers of importers and customers of GB cement producers in identifying potential customers.

102. We note that because there is price discrimination in the supply of cement, GB producers offering customers who have switched to importers lower prices to win them back does not generate downwards pressure on prices for all of the GB producers' customers. We also note that if, as our analysis suggests, GB producers have more flexibility on prices than the importers due to marginal cost advantages, and the GB producers attempt to win back lost business by reducing prices, then it will be difficult for importers to retain customers or grow their businesses

Analysis of defended volumes

103. This subsection contains an analysis of the extent to which GB cement producers' sales to independent cement buyers are challenged by other cement suppliers. In particular, we are interested in the extent to which GB producers are challenged by independent importers. Lafarge, Cemex and Hanson submitted information on volumes of cement they have had to defend from competitors.
104. Lafarge provided us with high-level figures on defended bulk volumes supplied to independent customers in 2010 and 2011. It reported that the simple average over price reductions offered by Lafarge in response to challenges was £[REDACTED]. According to Lafarge, its total affected volume was [REDACTED] kt in 2010 and 2011. In that period it

sold just over [REDACTED] Mt of bulk CEM I to non-Major customers.¹⁶ This implies that it had to defend just over [REDACTED] per cent of bulk cement volumes sold to independent customers. Lafarge told us that, in relation to defended volumes, Hanson and Cemex accounted for around [REDACTED] kt (ie [REDACTED] per cent) of failed approaches to Lafarge's customers, while non-Major importers accounted for around [REDACTED] per cent.

105. [REDACTED]^{17, 18}

106. Cemex provided us with detailed data on volumes it had had to defend between December 2008 and May 2012. The data is monthly and on a per-account basis. Cemex provided the resulting reduced price as well as the identity of the producer from which the volume was being defended. The data shows that importers challenged a [REDACTED] of Cemex's sales to independents. Importers' fraction of the challenged volumes ranged from [REDACTED] per cent, depending on the year considered. The Cemex data also showed that Cemex had to defend a [REDACTED] fraction of its sales in 2009 than in 2010 and 2011.

Aggregate industries' purchases of cement

107. In this section, we present data on Aggregate Industries' cement imports.

108. Aggregate Industries purchased [REDACTED] kt ([REDACTED] per cent of its purchases) of cement from its sister company Holcim Germany, and [REDACTED] kt ([REDACTED] per cent) externally. In Figures 1 to 4 below, we show Aggregate Industries' purchases of cement on a map of GB, divided into purchases from its sister company (labelled as internal purchases), purchases from each GB producer, and purchases from others.¹⁹ Each

¹⁶ If all bulk cement sales were included (ie including non-CEM I volumes), this percentage would be lower.

¹⁷ The Hanson case studies are analysed in more detail in Appendix 7.9.

¹⁸ Hanson told us that the challenged volumes were significant or represented major customers. Hanson also told us that the same patterns could be found in Hanson's full customer base in the RMX and concrete products segments.

¹⁹ Aggregate Industries told us that supply agreements with its sister company Holcim Germany [REDACTED].

circle represents an Aggregate Industries plant which purchased cement in that year, with the sizes of the circles denoting the annual value of purchases by each plant.

FIGURE 1

Aggregate Industries' purchases of cement, 2008

[✂]

Source: Aggregate Industries, and CC calculations.

FIGURE 2

Aggregate Industries' purchases of cement, 2009

[✂]

Source: Aggregate Industries, and CC calculations.

FIGURE 3

Aggregate Industries' purchases of cement, 2010

[✂]

Source: Aggregate Industries, and CC calculations.

FIGURE 4

Aggregate Industries' purchases of cement, 2011

[✂]

Source: Aggregate Industries, and CC calculations.

Constraint from Aggregate Industries on GB-produced cement

109. Based on the data provided by Aggregate Industries on the costs of importing cement into GB (see Tables 4 and 5 above), we see that Aggregate Industries [✂] £[✂]/tonne for the cement it purchased in Germany (on an FOB basis) and a further £[✂]/tonne for shipping in 2011 (ie total price of £[✂]/tonne for cement landing in GB).
110. This is [✂]. According to Lafarge transaction data, Aggregate Industries paid around £[✂]/tonne (delivered) in 2011; according to Cemex transaction data, Aggregate Industries paid around £[✂]/tonne (delivered) in 2011; according to Hanson trans-

action data, Aggregate Industries paid around £[redacted]/tonne (delivered) in 2011; and according to Tarmac transaction data, Aggregate Industries paid around £[redacted]/tonne (delivered) in 2011. We have received data from Aggregate Industries which confirms these figures.

111. This gives a differential of between £[redacted]/tonne and £[redacted]/tonne between the price at which Aggregate Industries can import cement to GB and the price which it pays to GB producers.²⁰ [redacted]²¹
112. We note that this calculation needs also to cover the costs of operating import terminals, as well as delivery charges. Aggregate Industries told us that the annual operating costs of its import terminals totalled at least £[redacted] million, which is equivalent to around £[redacted]/tonne on the volumes imported in 2011 (and would have been lower per tonne if the imported volumes had been greater).
113. Subtracting the costs of operating the import terminal from the £[redacted]/tonne differential, we are still left with a differential of £[redacted]/tonne from which the costs of delivering cement to the customer (or internally) would have to be covered [redacted].
114. Aggregate Industries provided a copy of the haulage costs that Aggregate Industries has agreed with [redacted] for the delivery of cement from each port to an Aggregate Industries site. These charges imply that, at a differential of £[redacted]/tonne, Aggregate Industries could profitably deliver imports up to [redacted] miles from its import terminals, while at a differential of £[redacted]/tonne, Aggregate Industries could profitably deliver imports up to [redacted] miles from its import terminals.

²⁰ Though we note that the price paid to other Majors includes delivery from plant to customer.

²¹ [redacted]

115. This suggests that had Aggregate Industries had capacity to do so, it could have been [redacted] for Aggregate Industries to import more cement into GB, either for [redacted] or for [redacted] customers, such as in areas close to its import terminals [redacted].
116. Aggregate Industries told us that its volume of cement imports was influenced by other factors in addition to returns, [redacted]. It said that its imports [redacted].

The effect of the EU ETS and euro area economic downturn on imports

117. In this section, we analyse how macro-economic factors and the introduction of new rules for how carbon allowances are allocated under the EU ETS may affect cement imports to GB. We also estimate incentives for additional production in the Republic of Ireland in 2013 and 2014, and assess the likelihood that Irish production will increase, as well as the likelihood that any increased production will be exported to GB.
118. The GB producers told us that changes in the EU ETS regulation would create an incentive for producers not to reduce output by too much. The parties told us that this would lead to producers in the EU producing more cement than could be consumed domestically, and that this would particularly be the case in the Republic of Ireland, Spain and Greece. In the GB producers' view, it would be natural for producers to export this surplus cement to GB. The GB producers considered that the EU ETS would ensure an abundant supply of imported cement in GB.
119. Cemex told us that if overseas producers had spare capacity it made sense to use this to supply GB at a price above average variable cost, in order to contribute to their own fixed costs. According to Cemex, it might make more sense to export cement to GB than to expand domestic sales and drive down domestic prices to a level that no longer allowed them to cover all their costs.

120. In addition, Hanson told us that macro-economic factors could give imports advantages. It argued that such factors included the euro area being in a depressed state and exchange rates being favourable. It said that with no clear growth forecasts, such factors were in a 'semi-permanent' state. Similarly, Cemex told us that the economic factors affecting production in other countries were not temporary but endemic and unlikely to change in the near future.
121. We note that for EU ETS to affect market conditions in GB cement, the following three criteria would have to be satisfied:
- (a) EU ETS Phase III would have to create incentives to produce more cement than would have been optimal in the absence of EU ETS Phase III.
 - (b) This incentive would have to lead to production in material excess of domestic demand.
 - (c) Importers would have to find it in their interests to ship a sufficient fraction of that excess production to GB.
122. Below, we analyse the incentives to produce additional cement under EU ETS Phase III. We find that there is a significant opportunity cost to producing a quantity less than 50 per cent of a plant's HAL.²² Therefore, we believe it reasonable that producers will, at least in the short to medium term, face an incentive not to reduce output to less than 50 per cent of HAL.
123. It is not clear how many extra tonnes of cement this incentive will actually generate. For any given plant, this extra output is determined by the difference between 50 per cent of HAL and a plant's output and demand. Without knowing these differences for relevant countries, ie the Republic of Ireland, Spain and Greece, it is not possible to evaluate how much excess production EU ETS will yield. We note that the larger the

²² The HAL of an installation is defined in Appendix 2.2.

demand reduction in an overseas country, the greater the excess quantity produced for a given HAL. We also note that a producer with very large excess capacity may find it profitable to shut down some capacity rather than producing cement to gain carbon allowances.

124. We also note that there are large markets, other than the GB market, to which surplus quantities could realistically be exported.
125. We have assessed the extent to which the GB cement market may be affected by increased output from cement works located in 'the island of Ireland' (which we term 'Ireland' in what follows, for simplicity). We have chosen to focus on Ireland because we have access to sufficient data and because we believe that among the countries previously mentioned, Ireland is most likely to export a significant fraction of any additional output to GB because of its geographic proximity to GB.

ETS Phases I and II

126. Under Phases I and II, cement producers in the EU were given carbon allowances free, based on their historic carbon emissions. In both phases, GB cement producers had over-allocations of carbon allowances. Under Phase I, allocations did not depend on production levels or the allocation of production between plants in each producer's portfolio. Under Phase II, there were thresholds which had to be met in order for a producer to qualify for 100 per cent of allowances. This is likely to have been the case for cement producers in the rest of the EU as well. This meant that cement producers in GB and the EU did not have incentives to overproduce cement across Phases I and II in order to 'earn' a particular allocation of carbon allowances, though there may have been incentives to rebalance production across plants in the case of multi-plant producers.

ETS Phase III

127. The third phase of the EU ETS brings changes to the rules for how carbon allowances are allocated to producers. These changes are potentially important to cement production. Changes are as follows:

- (a) In Phase III the total number of EU allowances will decrease annually in a linear manner (though we note that carbon allowances allocated to GB cement producers will remain fixed in each year of Phase III, conditional on (b) and (c) below).
- (b) Each installation will receive an annual allocation calculated by multiplying its HAL by an EU 'benchmark' of carbon efficiency for the production of clinker. The benchmark is currently set at 0.766 tonnes of CO₂ per tonne of clinker. An installation's HAL is determined from the median production during the period 2005 to 2008 or, if historical activity levels were higher, 2009 to 2010.
- (c) If a site is closed permanently, the EU allowances for that site will be lost. In order to stop a company obtaining the EU allowances for an installation, producing 1 tonne of clinker and then selling the remainder of the EU allowances, an installation will receive its full allocation in Phase III only if it is deemed not to have partially ceased. Partial cessation occurs if a sub-installation which contributes at least 30 per cent of the installations' final annual amount of emissions allowances allocated, or contributes to more than 50,000 allowances reduces its activity level by at least 50 per cent of its HAL. If activity levels are reduced by between 50 and 75 per cent of the HAL, it will receive 50 per cent of the initially-allocated allowances in the following year, and if the activity levels are reduced by between 75 and 90 per cent of the HAL, it will receive 25 per cent of the initially-allocated allowances in the following year.

Effect of partial cessation on cement producers' incentives

128. Under ETS Phase III, the number of allowances a producer receives in one year depends on the producers' production in the previous year. The relationship is not linear, and is likely to change some cement producers' incentives.
129. The effect on incentives will differ between: producers producing above the 50 per cent threshold (ie producing more than 50 per cent of their total HAL across plants), and producers producing below the 50 per cent threshold. In particular, those producers which are producing above the 50 per cent threshold for all their plants will not see a change in their incentives on the volume of cement produced between Phases II and III due to the partial cessation rule.²³
130. Table 10 shows two, purely illustrative, examples of the incentives to produce additional cement which are likely to result from the partial cessation rule in Phase III. In the first scenario, a cement producer is just below the 50 per cent threshold, and needs to produce an additional 1.4 kt of cement in order to increase their allocation of allowances from 50,000 to 100,000, while in the second scenario the cement producer is at the 25 per cent threshold and needs to double its cement production (from 35 kt to 70 kt) in order to get four times as many carbon allowances (increase from 25,000 allowances to 100,000 allowances). As the table shows, both the producer just under the 50 per cent threshold and that significantly under the 50 per cent threshold can have incentives to increase their cement production up to the 50 per cent threshold in order to obtain more carbon allowances which can then be sold. Also, in this example the profit incentive is higher for producers significantly under the 50 per cent threshold than those just under the 50 per cent threshold. However, as

²³ In this appendix we focus on incentives to increase production of cement. Depending on the price of carbon allowances, and the profitability of producing cement, some producers may have an incentive to reduce production to the 50 per cent threshold in order to maximize profits from the sale of carbon allowances. Also multi-plant producers may have an incentive to rebalance production between their plants in order to produce above the 50 per cent threshold at each individual plant, without increasing overall production.

the table also shows, the result depends on the profits which can be earned from the sale of cement, and the profits which can be earned from the sale of carbon allowances (ie the carbon allowance price).

TABLE 10 Illustration of profit incentive arising from partial cessation rule in Phase III of EU ETS

	<i>Example 1</i>		<i>Example 2</i>	
	<i>Current production</i>	<i>Production at 50% HAL</i>	<i>Current production</i>	<i>Production at 50% HAL</i>
HAL (kt)	140	140	140	140
50% HAL threshold (kt)	70	70	70	70
Current production (kt)	68.6	70	35	70
Carbon allowances obtained at current production ('000)	50	100	25	100
Carbon allowances surrendered at current production ('000)	49	50	25	50
Profits from sale of 1t of cement (£/tonne)	20	20	20	20
Price of 1 carbon allowance (£/allowance)	15	15	15	15
Profits from sale of cement (£'000)	1,372	1,400	700	1,400
Profits from sale of carbon allowances (£'000)	15	750	0	750
Total profits (£'000)	1,387	2,150	700	2,150

Source: CC analysis.

131. Although the price of carbon allowances can vary over time, it is generally expected to increase over the Phase III period (see Appendix 2.2). This would have the effect of increasing the incentive to produce additional cement for those producers under the 50 per cent threshold.
132. However, the profits from the sale of cement may vary with production of cement, and could fall as a result of increased production. This is because the additional production of cement may need to be sold at lower prices because producers may need to compete (harder) in order to sell further volumes of cement. However, from Table 10 we see that in this example, even if the additional cement was sold at zero profit (ie profit from sale of cement under current production equals the profit from sale of cement under 50 per cent of HAL), the total profits will still be higher when production is increased to 50 per cent of HAL as long as the price of carbon is positive.

133. This result may fail to hold if the additional production of cement lowers the profits earned on *all* units of cement sold, in contrast to just lowering profits earned on additional units produced to meet 50 per cent of the HAL. A producer who exports additional quantities would avoid this problem so long as the export sales did not affect prices in the exporting country. Export sales could affect prices in the exporting country if producers in the importing country sought to sell any displaced volumes in the exporters' home country. Also, if producers in the importing country reduced their prices, export sales may not materialize and the producers in the exporting countries would need to sell their cement elsewhere. The reaction of producers in the importing countries will affect the decisions taken by the producers in the exporting countries. Furthermore, additional cement will not be produced if the producers' incremental cost for increasing output to 50 per cent of the HAL is larger than the sum of additional revenue from selling carbon allowances and revenues from selling additional cement. This could be the case where the producer is operating far below 50 per cent of its HAL and the price for additional output is low.
134. We also note that in the case of multi-plant producers, increases in production at a plant need not be purely incremental to existing levels of production. Such a producer could potentially find it more profitable to rebalance production between plants which are over the 50 per cent threshold and plants which are under the 50 per cent threshold, without any change to overall production levels.

Incentives on Irish producers of cement

135. We begin by estimating output of Irish cement works (in both the Republic of Ireland and Northern Ireland) under ETS phase III. Table 11 sets out each Irish cement

works²⁴ annual carbon allowance allocation during ETS Phase III, as well as their previous annual allocations under ETS Phase II.

TABLE 11 ETS Phase III annual allocation of carbon allowances for each Irish cement works

<i>Installation name</i>	<i>Operator</i>	<i>ETS Phase III allowances*</i>	<i>ETS Phase II allowances*</i>	<i>% change</i>
Irish Cement Ltd, Limerick Works	CRH plc	703,280	931,845	-25
Irish Cement Ltd, Platin Works	CRH plc	1,276,703	1,564,060	-18
Lagan Cement Ltd	Lagan Cement Ltd	446,562	509,865	-12
Scotchtown Cement Works	Quinn Cement Ltd	934,795	1,207,344	-23
Cookstown Works†	Lafarge Cement UK Plc	302,549	353,925	-15
Quinn Cement Works†	Quinn Manufacturing Ltd	243,474	N/A	N/A

Source: Preliminary free allocations to GHG (ie greenhouse gas) permit holders in accordance with European Commission Decision 2011/278/EU.

*Each carbon allowance permits its holder to emit 1 tonne of carbon (or carbon equivalent) emissions.

†Northern Irish cement works

136. As described above, each cement works will receive its full annual allocation of carbon allowances (as set out in Table 11 above) if it produces more than 50 per cent of its HAL in the previous year. If it produces between 25 and 50 per cent of its HAL during the year, then it loses 50 per cent of its annual carbon allowance allocation in the following year.

137. In order to arrive at each cement work's HAL, we divided its carbon allowance allocation by the ETS clinker product benchmark factor of 0.766 (see also paragraph 129(b)).²⁵ Table 12 sets out the HAL for each cement works, based on its full value and also at 50 per cent of its value. It is important to note that since the HAL was determined by the European Commission based on a cement works' historic production levels over a benchmark period, it does not represent the nameplate capacity of a cement works.

²⁴ In this analysis, the term 'Irish cement works' refers to cement works located in the island of Ireland (ie including both Northern Ireland and the Republic of Ireland). Similarly, the term 'Ireland' refers to the island of Ireland (ie including both Northern Ireland and the Republic of Ireland).

²⁵ In the case of clinker production, the product benchmark was set at 0.766 tonnes of carbon emissions per tonne of grey cement clinker. The benchmark was calculated by the European Commission based on the top 10 per cent most efficient clinker kilns in the EU. Source: http://hal-polytechnique.archives-ouvertes.fr/docs/00/67/29/07/PDF/cahier_de_recherche_2012-05.pdf and European Commission Decision 2011/278/EU Annex I: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:130:FULL:EN:PDF>

TABLE 12 ETS Phase III: HAL calculations for each Irish cement works

Installation name	Operator	Clinker tonnes	
		HAL (100%)	50% of HAL
Irish Cement Ltd, Limerick Works	CRH plc	918,120	459,060
Irish Cement Ltd, Platin Works	CRH plc	1,666,714	833,357
Lagan Cement Ltd	Lagan Cement Ltd	582,979	291,490
Scotchtown Cement Works	Quinn Cement Ltd	1,220,359	610,180
Cookstown Works*	Lafarge Cement UK Plc	394,973	197,486
Quinn Cement Works*	Quinn Manufacturing Ltd	<u>317,851</u>	<u>158,926</u>
		5,100,996	2,550,498

Source: Preliminary free allocations to GHG (ie greenhouse gas) permit holders in accordance with European Commission Decision 2011/278/EU.

*Northern Irish cement works.

138. We provide an illustration of how the figures in Table 12 should be interpreted. In order for CRH's Platin works to receive 100 per cent of its annual carbon allowances (ie 1.3 million based on Table 11 above), it must produce at least 833 kt of clinker each year (ie 50 per cent of its HAL of 1,667 kt). Taking the cement market for the Republic of Ireland and Northern Ireland as a whole, if we assumed that each Irish cement works produced at 50 per cent of its respective HAL, then total clinker production would be 2.6 Mt, or around 2.8 Mt of CEM I cement.²⁶
139. In order to make a more detailed assessment of how Irish cement production and export might be affected by the introduction of the partial cessation rule, we used 2011 verified emissions data to check how far from the partial cessation thresholds cement works in Ireland are. The logic behind doing so is that if additional output cannot be sold at a high price, the incentive to increase output to bridge the gap between actual output and the partial cessation thresholds will grow weaker as the gap grows larger. In the analysis in Table 10, we assumed that additional output could be sold at the same margin as current output. In the present analysis, we drop that assumption. We used 2011 data because 2012 data werenot yet available at the time we conducted our analysis. In effect, this means that we are using 2011 trading conditions as the basis for comparing incentives with those under the ETS Phase III.

²⁶ Based on a clinker to CEM I ratio of 1:1.1 based on the consensus view of the four GB cement producers.

We first assess the extent to which output is likely to expand, and then assess whether any such additional output is likely to be exported.

140. We used verified emissions data from the EU Transaction Log.²⁷ Using the annual emissions of an installation, it is possible to estimate a cement works' annual output of clinker. The estimate is not perfect, since the amount of CO₂ each cement works emits when producing 1 tonne of clinker is not known. We have used the Europe-wide average of 0.865 tonnes of CO₂ per tonne of clinker. This figure is taken from Cembureau.²⁸ Estimated clinker output per cement works is in Table 13. We converted output of clinker to output of cement using a factor of 1.1 tonnes of cement per tonne of clinker, which is in line with data we have received from GB producers.²⁹ Using this data and this method, we estimated total output of cement from Ireland of just under 2.5 Mt in 2010 and just over 2.2 Mt in 2011. This matches estimates from the Global Cement Report³⁰ quite well. It estimated total output in the Republic of Ireland and Northern Ireland together of 2.4 and 2.1 Mt in 2010 and 2011, respectively.
141. Having translated 2011 emissions into outputs, we computed the number of free allowances each cement works would receive under two scenarios: producing only current output (ie produce 2011 output) or producing at threshold (50 per cent of HAL unless otherwise stated). (Producing above threshold in response to introduction of the partial cessation rule appears suboptimal. We have accordingly focused on these two scenarios.) The thresholds for all cement works in Ireland can be found in Table

²⁷ The EU Transaction Log is a central repository for data on installations covered by EU ETS. It contains, among other things, data on installations' verified emissions. The EU Transaction Log is operated by European Commission's Directorate-General for Climate Action. The EU Transaction Log can be accessed here: <http://ec.europa.eu/environment/ets/>.

²⁸ www.cembureau.eu/newsroom/article/eu-ets-%E2%80%93-clinker-benchmark.

²⁹ See Appendix 7.2.

³⁰ The Global Cement Report (10th edition published by Tradeship Publications Limited) is a bi-annual report published by a journal called the *International Cement Review*. It contains, among other things, data on production, consumption and export of cement for various countries. More information is available at www.cemnet.com.

13. The gaps between 2011 outputs and cessation thresholds can be found in Table 14.

142. In each scenario, the number of allowances each cement works has to surrender equals output multiplied by the amount of CO₂ emitted when producing a tonne of cement. As stated above, the quantity is assumed to be 0.865 tonnes of CO₂ per tonne of cement. Subtracting the number of surrendered allowances from the number of allocated allowances in each scenario yields the number of allowances that can be put on the market (or have to be bought in the market). We refer to these allowances as excess allowances, and these are shown in Table 14. The number of excess allowances can reasonably be compared across the two scenarios. A cement works having more excess allowances when producing above the threshold than when producing below the threshold is a necessary condition for there to be an incentive to increase output due to the partial cessation rule. Only Quinn fails this test, and only when we consider whether it would be profitable to produce at a level equal to 25 per cent of its HAL.
143. Table 14 also contains a statistic which is useful in assessing whether there is an incentive to increase output in response to the introduction of the partial cessation rule: excess allowances per excess tonne of clinker. The value of the additional excess allowances received when a threshold is met is effectively a lump sum subsidy. Splitting the value of the additional excess allowances across the excess output (ie the difference between 2011 output and threshold) yields an effective per-tonne subsidy. The size of the per-tonne subsidy is determined by the market price of carbon allowances and the number of excess allowances per tonne of excess cement. Using the number of excess allowances per tonne of clinker, the per-tonne subsidy for any putative price of carbon allowances can be calculated.

TABLE 13 Cement works in the Republic of Ireland and Northern Ireland—thresholds and estimated outputs

Operator	Installation	tonnes of clinker	
		Estimated 2011 output	Threshold
CRH plc	Limerick Works	284,421	459,060
CRH plc	Platin Works	542,464	833,357
Lagan Cement Ltd	Lagan	370,586	291,490
Quinn Cement Ltd	Scotchtown	575,238	610,180
Lafarge Cement UK Plc	Cookstown	232,471	197,486
Quinn Manufacturing Ltd	Quinn (50% threshold)	6,896	158,926
Quinn Manufacturing Ltd	Quinn (25% threshold)	6,896	79,463

Source: EUTL, CC calculations.

TABLE 14 Gaps between 2011 outputs and thresholds, excess allowances under both scenarios and excess allowances per excess tonne of clinker

Installation	Expansion	Excess allowances		Excess allowances per excess tonne of clinker*
		If producing at 2011 level	If producing at 50% of HAL threshold	
CRH Limerick Works	174,639	105,616	306,193	1.15
CRH Platin Works	290,893	169,121	555,849	1.33
Lagan		126,005	126,005	
Quinn Scotchtown	34,941	-30,184	406,990	12.51
Lafarge Cookstown		101,462	101,462	
Quinn Manufacturing Ltd (50% threshold)	152,030	54,904	106,003	0.34
Quinn Manufacturing Ltd (25% threshold)	72,567	54,904	53,002	-0.03

Source: CC calculations.

*As explained in paragraph 143.

144. Both CRH plants operated well below the threshold in 2011. However, they would gain in terms of surplus allowances if they increase outputs to the threshold. Quinn's Scotchtown cement works is just below the threshold. It would only have to increase output by 6 per cent above its 2011 level to bridge the gap. Lagan and Lafarge are operating above their respective thresholds.

145. It seems only CRH's plants have the potential to be affected much by the introduction of the partial cessation rule. If the price of allowances is £15 per allowance, CRH would receive an effective per-tonne subsidy of £17 to £20 on the additional cement which it is incentivized to produce because of the partial cessation rule. The subsidy grows in direct proportion to the price of allowances.

146. Similarly, if the price of allowances is £15 per allowance, Quinn's Scotchtown works would receive a subsidy of £188 per tonne when increasing output to meet its 50 per cent of HAL threshold. This is due to Scotchtown operating close to the threshold. For the same reason, this expansion would only result in an extra 35 kt of clinker.
147. Quinn Manufacturing works operates at 4 per cent of its 50 per cent HAL threshold. It would have to produce an additional 150 kt of clinker to meet its threshold. Due to the need for this large expansion, Quinn would receive only about a third of an excess allowance per excess tonne of clinker. The per-tonne subsidy would thus be small.
148. The magnitude of the subsidy can be used to check if increased production in Ireland can reasonably be expected to be competitive in GB. The subsidy may be used by the Irish producers effectively to lower the variable costs of exporting the additional output. In the case of CRH, we know from Table 4 above that the FOB cost of its exported cement into GB (via Premier Cement) was £40 to £45 in 2011. With a subsidy of £17 to £20 (see paragraph 145), CRH's FOB cost would reduce to £20 to £28. Adding a shipping cost of £10 (see Table 5) and average port dues of £2 (see Table 6) gives an average variable cost of £32 to £40 for CRH, which is above the average variable costs of the GB producers (£25 to £30 as shown in Table 6), leaving CRH with a cost disadvantage compared with GB producers.³¹ This cost disadvantage would disappear if the price of carbon allowances were to increase above the assumed £15 per allowance. In the case of Quinn, we know from Table 4 above that the FOB cost of its exported cement into GB was £39 in 2011. With a subsidy of £5 (see paragraph 147), Quinn's FOB cost would reduce to £34. Adding a shipping cost of £18 (see Table 5) and average port dues of £2 (see Table 6) gives an average variable cost of £54 for Quinn, which is above the average variable costs

³¹ We note that CRH has purchased the Southern Cement import terminal in February 2013 (see paragraph 2) and may therefore be expected to increase its exports into GB without the total volume of imports into GB increasing.

of the GB producers (£25 to £30 as shown in Table 6), leaving Quinn with a cost disadvantage compared with GB producers.

149. On this analysis, it therefore seems plausible that CRH will have an incentive to increase its output to bridge the gap between its 2011 output and 50 per cent of its HAL thresholds. This potential increased production corresponds to just over 500 kt of cement relative to 2011 output. However, it is unclear whether CRH would be able to sell all of that additional output in GB given the cost disadvantage it would continue to face compared with GB producers.
150. Quinn faces a strong incentive to expand output at its Scotchtown works, but this expansion would contribute only a limited amount. Quinn's incentive to expand output at its Quinn Manufacturing works is less clear cut. Given that a £5 subsidy does not seem radically to alter the economics of cement production and that Quinn Manufacturing has such a low output in the absence of the subsidy, it is questionable whether the partial cessation rule will incentivize Quinn to expand output at the Quinn Manufacturing works. If Quinn responds to this weak incentive, and other Irish producers respond to their incentives, Irish cement output could expand by 625 kt of clinker.
151. We find that the introduction of the partial cessation rule introduces incentives for Irish cement producers to increase clinker output by 500 kt relative to 2011, corresponding to about 550 kt of cement. It is possible, although not as likely, that Irish producers will face an incentive to increase output by 625 kt of clinker, corresponding to about 718 kt of cement. However, Irish producers importing cement into GB (apart from Quinn Scotchtown, whose output expansion would be modest) would continue to face a cost disadvantage when selling cement in GB compared with GB producers.

152. Significant volumes of cement were exported from Ireland in 2011. This suggests that cement producers in Ireland would find it in their interest to export, rather than sell domestically, any additional volumes above 2011 output, unless demand conditions change significantly. Given that GB is close to Ireland, it seems plausible that a significant fraction of excess output would be exported to GB. If output from cement works in Ireland was to increase by 550 kt, and all of this were exported in the form of bulk cement to GB, and this volume were to displace corresponding domestically-produced cement, then importers' shares of GB sales of bulk cement to independent customers would increase by about seven percentage points, from [X] to [Y] per cent.³² Still, importers' share of the total GB cement market is quite limited and 550 kt represents no more than 6 per cent of the approximately 9.7 Mt of cement consumed in GB in 2011.³³
153. Our analysis is based on the assumption that the price of a carbon allowance is £15 (ie for each tonne of CO₂ emitted). In early 2013, CO₂ allowances are trading at prices around €5 per tonne or less.^{34,35} This corresponds to less than £4.50 per tonne.³⁶ We therefore believe that, going forward, Irish producers will in practice face weaker incentives to expand output than suggested by our analysis.

Limitations of the analysis

154. The analysis assumes that trading conditions in 2013 and 2014 are similar to 2011. The Global Cement Report forecasts lower domestic consumption in Ireland in 2013 and 2014 than in 2011. If producers respond by producing at 50 per cent of HAL, this would mean that exports from Ireland will be higher than estimated here. On the

³² Based on 2011 volumes in Table 3 above.

³³ See Appendix 7.1, Table 3.

³⁴ Spot price at EEX (The European Energy Exchange). See:

www.eex.com/en/Market%20Data/Trading%20Data/Emission%20Rights.

³⁵ Reuters Point Carbon has commented that, in its view, carbon prices would remain below €5 for the remainder of ETS Phase III unless further political action was initiated. See Appendix 2.2, paragraphs 42–47, for further information about historic and anticipated evolution of the price of carbon allowances.

³⁶ For this calculation we used an exchange rate of €1.17 per £.

other hand, lower domestic demand means that the gap between domestic demand and 50 per cent of the HAL increases. This weakens the incentive to expand capacity to meet the 50 per cent of HAL threshold.

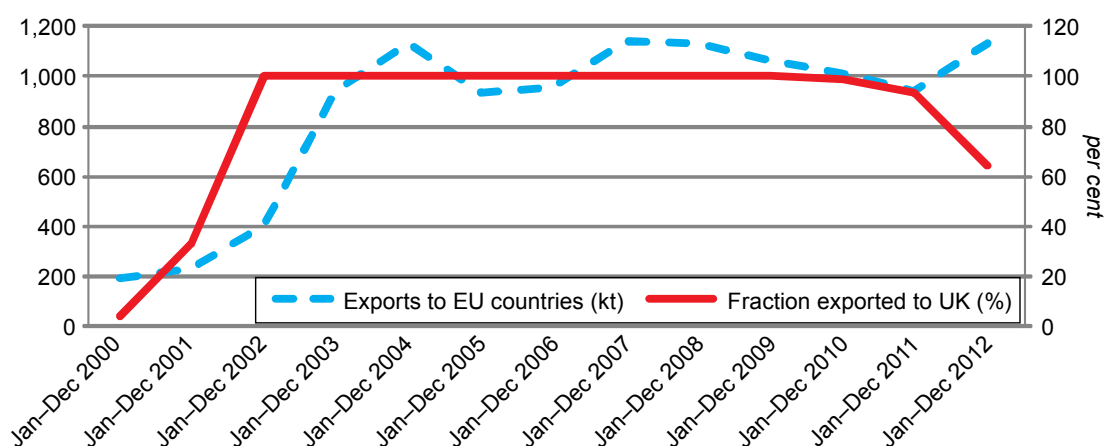
Destination of exports from Ireland

155. As previously stated, it is possible that not all excess output due to the introduction of the partial cessation rule will be exported to GB. To assess whether there may be other markets to which excess production could plausibly be exported we looked at Eurostat trade data.³⁷

156. Figure 5 shows cement and clinker exports from the Republic of Ireland to other EU member states. It also shows the fraction of total exported volume that has been exported to the UK. Historically, almost all exports from the Republic of Ireland have gone to the UK. In 2011 the fraction exported to the UK dips, and in 2012 dips further to just over 60 per cent.

FIGURE 5

Cement and clinker export from the Republic of Ireland and fraction of exports destined for the UK



Source: Eurostat trade data (EU27 trade since 1988 by HS2-HS4, product 2523, reporter IE, exports in 100 of kg, partners: EU27_EXTRA, EU27_INTRA, UNITED KINGDOM), CC calculations.

³⁷ Eurostat is the statistical office of the EU. Eurostat provides, among other things, statistics on trade between EU member states. Trade statistics can be accessed via http://epp.eurostat.ec.europa.eu/portal/page/portal/international_trade/data/database.

157. The export measure in Figure 5 includes exports from the Republic of Ireland to Northern Ireland and omits exports from Northern Ireland to GB. It is thus an imperfect measure of the relevant export flow, ie exports to GB from cement works located in the Republic of Ireland or Northern Ireland. However, our analysis suggests that the introduction of the partial cessation rule will primarily affect producers in the Republic of Ireland. Cement exports to GB from cement works in the Republic of Ireland are likely less than suggested by Figure 5, since the measure includes exports to Northern Ireland. Exports to GB therefore are likely to have accounted for less than 93 per cent and less than 63 per cent of exports from the Republic of Ireland in 2011 and 2012 respectively. This shows that increased production in the Republic of Ireland can plausibly be exported to markets other than GB.

Incentives on other European producers of cement

158. In addition to the Republic of Ireland, the GB producers told us that cement producers in Spain and Greece could be expected to increase production, or maintain production at current level, as a result of the partial cessation rule (see paragraph 118. We were not able to conduct detailed analysis of the incentives of Spanish and Greek cement producers to increase output as a result of the partial cessation rule. However, we note that these countries are further away from GB than Ireland and would therefore be likely to export a lower fraction of any additional cement production to GB and would face an even greater cost disadvantage (through higher shipping costs) than Irish producers in doing so.

Findings from our ETS Phase III analysis

159. We find that under ETS Phase III, some producers are likely to have an incentive to produce at least 50 per cent of their HAL. This may result in increased output. Output from Irish cement works could increase by 550 kt relative to 2011 due to the introduction of the partial cessation rule, if Irish producers can profitably sell the additional

cement. Any increased production in the Republic of Ireland can reasonably be expected to be exported, though the evidence indicates that a significant fraction of this additional output could plausibly be exported to markets other than GB.

Supply of GGBS and PFA in GB

1. This appendix contains additional material relevant to our analysis of the supply of GGBS and PFA in GB.

Production processes of PFA and GGBS

PFA

2. PFA is a by-product produced by coal-fired power stations. It is the residue of the combustion of pulverized coal collected from the flue gases in electrostatic precipitators. Lafarge told us that in 2010 over 4 million tonnes of raw PFA was produced at the various coal-fired power stations in operation across GB. However, Lafarge told us that only some of this material was suitable for use as a cementitious product and most PFA required further processing to be suitable for cementitious applications. This was because PFA must have a 'loss of ignition' of less than 7 per cent (indicator of low carbon content) to be used in cementitious applications. Therefore a considerable volume of PFA went into low-grade non-cementitious applications (effectively as a secondary aggregate), and Lafarge told us that only 960,000 tonnes of PFA produced in GB was used as a cementitious material.
3. The raw ash produced by one of the power stations in GB (Drax power station) is of cementitious quality and does not require further processing to make it suitable for use in cementitious applications. However, in other cases, the loss of ignition of the ash has to be reduced to below 7 per cent and the technologies to process raw PFA into cementitious PFA are the following:
 - (a) STI technology: Lafarge told us that it had an exclusive agreement with Separation Technologies LLC (ultimately owned by Titan Cement) for installation of equipment using its technology to produce PFA suitable for cementitious applications in the UK. Lafarge told us that the exclusive agreement was due to expire

in 2012 and that while [REDACTED]. The STI technology has been installed at a number of GB power stations.

(b) Another ash beneficiation technology is the Rocktron technology, which has been recently installed at Fiddlers Ferry power station in Cheshire belonging to Scottish and Southern Energy (SSE). Lafarge told us that the total investment was £30 million according to press reports. Press releases on the SSE website¹ say that the plant is designed to remove and process all fresh ash produced by the power station and much of the ash currently stored in lagoons at the site, turning it into industrial minerals which will become marketable products, with the largest volume being used as cement substitutes. Press releases from late 2008 say that the plant was expected to become operational late 2009 and would be capable of processing around 800,000 tonnes of ash a year. SSE announced in February 2012 that it had decided to mothball its plant at Fiddlers Ferry because of adverse market conditions and a difficult outlook. It went on to say that the plant would be mothballed until conditions improved sufficiently to support the business.²

4. Hanson told us that the substantial investments in ash beneficiation technology (see the preceding paragraph) demonstrated investor confidence in the future of PFA production, and that concerns regarding the prospects of coal-fire-based power generation should therefore be rejected. The investment at Fiddlers Ferry could support the idea of a degree of investor confidence but for 2008 when the investment took place.

¹ www.sse.com/News/PressReleases.

² SSE press release of 8 February 2012.

GGBS

5. GGBS is produced as a by-product of the iron manufacturing industry. The process is the following:
 - (a) The slag that comes out of the iron blast furnace can be air-cooled (in which case it has no cementitious properties and can just be used as an aggregate).
 - (b) The slag can (with considerable investment in equipment) also be water-cooled, which makes a cementitious granulate material (GBS).
 - (c) It is this water-cooled cementitious granulate material which can be ground to make GGBS. Grinding equipment is expensive, although cement producers have grinders already to grind the clinker that comes out of cement kilns.

6. In the UK, Tarmac and the GB steel producers (Tata Steel and SSI) have entered agreements whereby Tarmac currently has the exclusive rights and obligation to remove all slag produced including blast furnace slag from each of the three GB steel plants. Tarmac told us that this included steel slag that could not be used to produce GBS. Tarmac owns the equipment required to water-cool the slag so as to transform it into a cementitious granulate material (GBS). Tarmac then sells GBS to Civil & Marine (Hanson) under an exclusive long-term contract, and Hanson undertakes the grinding to transform the GBS into GGBS. We present more details on the exclusivity arrangement in a separate section below.

Summary of parties' views and internal document evidence on the substitutability between GGBS and PFA

7. Hanson told us that concrete producers could generally switch to cementitious products other than GGBS within a short period of time and with little additional cost and, hence, a European Commission investigation had concluded that the relevant market included at least all cement additives, ie GGBS and fly ash. Hanson told us that whilst GGBS could generally be used as a substitute to CEM I for up to a maximum

of approximately 80 per cent of the blended cement's volume,³ the GGBS proportion in the blend could not be 100 per cent because the rate of hydration was too slow for practical application. Hanson also told us that GGBS, when used as a substitute for CEM I, modified some characteristics of concrete, such as heat generated during hydration, and the durability of the final product and the setting time of the mix was also modified. Hanson told us that fly ash could generally be used as a substitute for CEM I up to approximately 35 per cent, as, beyond this, it became a different cement type not widely used in the UK.

8. Hanson told us that the addition rate of GGBS or fly ash was varied to produce different properties in concrete depending on the customer's end-use. Cost and environmental benefits were also considered when deciding on addition rates.
9. The BAA told us that its members used GGBS or PFA in almost all the RMX they produced, because it was cheaper than just using CEM I.
10. Breedon Aggregates (an intermediate aggregates and RMX producer) told us that it purchased both GGBS and PFA to blend with cement at its RMX plants, and that there was a degree of substitutability between PFA and slag as a cementitious alternative. It told us that the quality of PFA was highly variable, but that it was more easily available than GGBS. Breedon Aggregates also told us that it bought GGBS from Hanson, and it believed that it got a competitive price for GGBS from Hanson. An indicator of this was that the price of GGBS had come down recently, and that the difference between the price of GGBS and cement was reasonable in Breedon Aggregates' view. If there were any problems of availability of supply for GGBS, Breedon Aggregates told us that cement blended with PFA was a suitable substitute for blended cement produced using GGBS.

³ However, the percentage of substitution currently varies between 50 and 75 per cent and is typically about 50 per cent, depending on the specification given by the customer.

11. A cement importer told us that PFA had lower cementitious properties than GGBS, but was more widely available, particularly in winter.⁴
12. [REDACTED], an RMX producer in [REDACTED], told us that it did not consider PFA to be a suitable substitute for GGBS due to quality concerns about concrete made from PFA.
13. Lafarge told us that it had [REDACTED] its use of GGBS in the production of cement. It said that one of the key benefits of increasing the use of extenders such as PFA and GGBS in blended cements was that it reduced the proportion of clinker required to produce cement to the required standard. It told us that while it also used PFA to produce cement, GGBS offered a higher clinker replacement rate and therefore could provide more cost and environmental benefits than using PFA or limestone.
14. Lafarge also told us that PFA was generally produced at times which were counter-cyclical to the demand for cement. PFA was produced from coal-fired power generation, which in turn was driven by the demand for electricity which was higher in winter months than in summer months. In contrast, the demand for cement peaked in summer when the weather was more conducive to construction activities.⁵ Lafarge told us that GGBS production was more constant throughout the seasons. It said that an even more important factor which influenced availability of PFA was the long-term outlook for gas as a lower-cost source of power compared with coal-fired plants in the UK, as a result of which coal-fired power stations were used much less. We also understand that there are plans to phase out coal-fired power generation in the UK as part of the UK's climate change commitments. This would clearly have a strong impact on the availability of UK-produced PFA in the longer term, though Cemex told

⁴ Summary of hearing with a cement importer during the Anglo-Lafarge joint venture inquiry; see: www.competition-commission.org.uk/assets/competitioncommission/docs/2011/anglo-american-lafarge/summary_of_hearing_with_a_cement_importer.pdf.

⁵ Hanson told us that concerns regarding counter-cyclicity of PFA supply should be discounted, due to PFA being a pozzolanic material and as such remaining inert until activation. Hanson also told us that PFA could be stored all year long.

us that whilst some coal plants were closing, others were investing in order to meet the new IED emissions legislation that would allow them to continue in operation for the next 10 to 15 years.^{6,7,8}

15. We also find this concern regarding the counter-cyclical nature of PFA and lack of availability in a [REDACTED]
16. Internal documents from Lafarge [REDACTED].
17. Lafarge also told us that its decision to cease purchasing GGBS from Hanson in 2009 and replace it with PFA was a necessary part of Lafarge's self-supply strategy. In order to supply cement internally, Lafarge was developing a blended cement strategy based on PFA, enabling Lafarge to develop a product for which it could source inputs of cementitious materials at a more competitive price, thereby producing an alternative to GGBS blended cement at a more competitive price.
18. Aggregate Industries told us that [REDACTED].

GGBS suppliers in GB

19. As set out above, Hanson has an exclusive contract for the production of GGBS in GB. All other GGBS supplied in GB is imported.^{9,10} Our understanding is that Lafarge, Aggregate Industries, [REDACTED] and [an importer] are currently importing GGBS

⁶ Hanson told us that coal plants investing to meet new emissions standards would guarantee the continued operation of coal-fired power plants for at least another 10–15 years. We note that, with the exception of the Drax power plant, additional investments are required for a coal-fired power plant to produce PFA. Continued operation of coal-fired plants is thus not sufficient to ensure continued production of PFA.

⁷ Hanson told us that, based on the estimates in Table 7.10 of Section 7, the Drax power station could potentially supply up to 1 Mt of cementitious quality PFA per year. In Hanson's view, the Drax power station was potentially a very significant and secure source of PFA supply. Moreover, Hanson considered it likely that the Drax power station would remain in the market in the near future, and that it would rely on coal for the foreseeable future.

⁸ Hanson told us that the supply of PFA compared favourably to the uncertainties surrounding the supply of GBS given the insecurity of steel production in GB.

⁹ Hanson told us that competition could be further increased if more GBS were imported and ground into GGBS in the UK. We note that there are no such imports and that this would require investment by an importer in GBS grinding equipment. Hanson [REDACTED]. We were told by Hanson that the higher quality of imported GBS led to savings in terms of time and energy, which offset any additional transport costs. However, Hanson did not provide evidence that the [REDACTED] would offset additional transport costs.

¹⁰ Hanson told us that using imported GBS was particularly interesting in the context of HCM, since according to Hanson, Arcelor Mittal had wide and unlimited access to blast furnace slag in countries well suited for export to GB, [REDACTED].

into GB (we do not have estimates for [an importer's] imports of GGBS, but these are likely to be low). Cemex also used to import GGBS, but ceased in 2009:

(a) Lafarge told us that it imported [REDACTED].

(b) Cemex told us that it purchased quantities of GGBS from Germany until 2009.

[REDACTED]

(c) Aggregate Industries imports GGBS [REDACTED] from Holcim in Germany.

(d) [REDACTED] told us that it imported about [REDACTED] kt of GGBS per year through an import terminal located in [REDACTED]. The GGBS is sourced from [REDACTED], and [REDACTED] told us that it consumed all the GGBS it imported internally.

(e) [An importer] also told us that it imported some GGBS into GB. [REDACTED]

PFA suppliers in GB

20. We note from a Lafarge internal document that [REDACTED].

21. We also understand that Lafarge and Cemex have in some years [REDACTED].

22. We were told by the BAA that quality assurance was important for PFA to be used as a cement substitute, and that there were some sales of PFA by merchants but this was not quality assured so could not be used to produce RMX. The BAA told us that quality-assured PFA was only available to buy from the Majors.

Relative size of PFA/GGBS markets

23. The MPA produces an estimate of the total sales of cementitious products (PFA and GGBS) in GB, on a quarterly basis. This data is summarized in Table 1. According to this data, total sales of PFA and GGBS in GB were around 1.7 Mt in 2011, representing about 15.3 per cent of total sales of cement and cementitious products in GB.¹¹

¹¹ The MPA told us that the sales data for PFA and GGBS included most imported GGBS and PFA, but that there may be small-scale imports which are not included in the figures.

The MPA data also suggests that sales of GGBS and PFA as a proportion of total cement sales have reduced between 2007 and 2011, from 17.5 to 15.3 per cent.¹²

TABLE 1 MPA estimates of sales of cementitious and cement

	<i>Sales of PFA and GGBS kt</i>	<i>Total GB cement sales kt</i>	<i>Total cement + cementitious kt</i>	<i>Proportion of PFA and GGBS %</i>
2007	2,758	13,025	15,783	17.5
2008	2,433	11,228	13,661	17.8
2009	1,680	8,657	10,337	16.3
2010	1,534	8,980	10,514	14.6
2011	1,736	9,575	11,311	15.3

Source: MPA website www.mineralproducts.org/, CC calculations.

24. A Hanson strategic document provides some estimates which give an order of magnitude of how the sales of GGBS and PFA compare with each other and with total sales of cement. The data is reproduced in Figure 1, which shows, for 2005 and 2010, the breakdown of total cementitious sales between PFA, GGBS, composite cements, blast furnace cements (CEM II/III) and CEM I.¹³
25. Hanson's estimates suggest that total sales of PFA are small in comparison with sales of GGBS (about a third). However, we note that sales of composite cement would include some PFA and GGBS as inputs, and therefore total production is likely to be higher (and, if PFA is used in greater volumes in producing blended cement, this could mean that the overall balance is different). Between 2005 and 2010, the GGBS share has reduced slightly, and PFA sales have increased slightly. The share of blended cements has increased, to the detriment of sales of CEM I. Hanson commented in this document that: 'UK market remains mainly separate CEM I/GGBS/Fly ash market. Growth in composite cements mainly within vertically integrated companies, esp Lafarge, Cemex (ie their own internal concrete production).'

¹² Hanson told us that it believed the MPA data included sales of composites in cement sales, and that the data may therefore be misleading.

¹³ Hanson told us that it believed that the majority of sales of composites would be CEM II blends including PFA rather than GGBS.

FIGURE 1

Hanson estimates of sales of different types of cement, 2005 and 2010

[REDACTED]

Source: Hanson.

Hanson/Tarmac GGBS contract

26. There are three steel plants in operation in GB at present: Scunthorpe and Port Talbot (owned by Tata Steel) and Teesside (SSI Steel), which reopened in April 2012. Table 2 shows the plants and the contractual arrangements for GGBS, as well as the volumes of GGBS produced in 2010 and the price per tonne for the GBS purchased by Hanson in 2010.¹⁴

TABLE 2 Contractual arrangements for GGBS

<i>Plant</i>	<i>Plant owner</i>	<i>Source contract owner</i>	<i>Expiration</i>	<i>Sub-agreements with source contract owner</i>	<i>Volume</i>	<i>Price per tonne in 2010</i>
Scunthorpe	TATA	Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Port Talbot/ Llanwern	TATA	Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Teesside	SSI Steel Production	Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson.

27. Research from the Hanson/Heidelberg website reveals that Hanson does not grind the GBS in its existing cement works, but instead has a network of dedicated plants for the grinding of GBS, two of which are located within steelworks plants in Scunthorpe and Port Talbot, and one of which (Teesport) is located very close to the third steelworks plant. The Purfleet grinding plant is located on the River Thames and has a wharf to receive bulk deliveries of GBS. The Llanwern plant is located on the now closed Llanwern steel plant. The grinding plants are shown in Table 3.¹⁵

¹⁴ Hanson told us that despite strong competitive forces, it held a high market share in the supply of GGBS in GB due to its competitive offer and the quality of the product.

¹⁵ Hanson told us that the figures in Table 3 represent an overestimate of Hanson's grinding capacity. According to Hanson, its grinding capacity is 2.5 Mt per year, even if Hanson were to bring its two mothballed plants back on line. We were told by Hanson that its current capacity was [REDACTED] tonnes per year.

TABLE 3 **Hanson GGBS grinding plants**

<i>Hanson GGBS grinding plants</i>	<i>Location</i>	<i>Capacity (kt grinding capacity per year)</i>	<i>Notes</i>
Purfleet	Essex	1,000	
Scunthorpe (in Scunthorpe steelworks)	N Lincolnshire	560	
Port Talbot (in Port Talbot steel plant)	South Wales	500	
Teesport (very close to Teesside steel plant)	North-East	430	Plant is mothballed; so material from Teesside plant is granulated at Purfleet. Teesside steelworks only reopened in April 2012
Llanwern (in Llanwern steelworks)	South Wales	430	Plant is mothballed

Source: Hanson/Heidelberg website www.heidelbergcement.com.

28. In addition, Hanson also has a GGBS depot in Glasgow (Scotland) with a storage facility for 10 kt of GGBS, and which receives supplies from the Port Talbot works.¹⁶
29. Hanson told us that the agreements between Hanson and Tarmac were concluded by way of a vertical supply agreement and on an entirely legal basis, and had been recognized as such by relevant competition authorities. We were told by Hanson that the agreements were fully disclosed and visible to the European Commission at the time it assessed the Heidelberg/Hanson merger, and that the European Commission had no concerns and did not require remedial action or any form of undertakings. We note that since the European Commission did not identify any potential merger-specific concerns in GGBS, the absence of undertakings or remedial actions is uninformative as to the competitive assessment of the agreements. Hanson also told us that, as far as it is aware, particulars of at least one agreement relating to the supply of GBS by Tarmac to Civil & Marine were furnished to the OFT under the Restrictive Trade Practices Acts 1976 and 1997, and received section 21(2) directions from the Secretary of State. We were told that this confirmed that any restrictions in the agreements were not significant enough to warrant a reference to the Restrictive

¹⁶ Source: Hanson/ Heidelberg website: www.heidelbergcement.com/uk/en/hanson/products/cements/ggbs_and_related_products/glasgow_.htm.

Practices Court. We note that the OFT assessed the agreement in a legal framework different from ours. We also note that a significant period of time has elapsed since then.

Efficiencies

30. Any efficiencies resulting from the exclusive contract between Hanson and Tarmac are likely to be related to:
- (a) Any large-scale investment necessary for Hanson in order to install GBS grinding facilities, and how specific this investment is to grinding GGBS (or whether it can also be used to grind cement, for example). Such large-scale investment may require some form of certainty of supplies of GBS over time to be justified.
 - (b) Number of steel plants: Hanson has entered into an exclusivity agreement for each of the three steel plants in GB. This raises the question whether similar efficiencies could be realized with up to three different exclusivity contracts with different players.
 - (c) There may also be some efficiencies from Tarmac's point of view, because of the necessity for Tarmac to invest in slag-cooling technology, and therefore Tarmac may also require some form of certainty that the GBS it has produced will be purchased.
31. In relation to possible efficiencies, it is notable that any efficiencies that might arise were not sufficient to prevent authorities elsewhere in Europe taking action to bring to an end similar exclusivity arrangements for GGBS in other jurisdictions, though we note that there may be some differences between GGBS arrangements in these other jurisdictions and in GB.¹⁷

¹⁷ Hanson told us that circumstances underlying exclusive GGBS arrangements abroad might be different, and that their assessments might depend on different considerations. Hanson's view was that decisions made elsewhere in Europe were irrelevant.

32. Hanson told us that the longer-term agreement was logical and required, when it came to the very significant capital investments that the then-owner of the Civil and Marine business had needed to commit to when founding and scaling up the GGBS UK business, coupled with the unusually high levels of risk in pioneering, what was seen as a highly innovative business on such a scale. Hanson also told us that a longer-term contract was also required because of the uncertainty in the production of steel and the likelihood that the associated availability of GBS from relevant plants would cease or be suspended in time. To illustrate the uncertainty in steel production, Hanson told us that the Redcar Teesside steel plant was closed and that, at that time, it did not think it was going to reopen, so Hanson was obligated to mothball its entire GGBS plant there (namely, the grinding plant at Teesport). Hanson also told us that there had been significant changes to and uncertainty regarding the strategy of steel producers in the UK, [REDACTED].
33. Hanson told us that the exclusive agreement had allowed for the development of a cement additive, or substitute to cement, on a different scale than previously and had greatly increased choice of cement additives and cement substitutes available. Hanson considered that in addition to providing certainty in terms of supply and recovery of investments, the long exclusivity period was also necessary to create a dedicated producer of GGBS committed to, and with the capacity for, the supply and promotion of GGBS. We were told by Hanson that if the agreement had not been exclusive, other producers would have been able to free-ride on Hanson's investments, risk and associated promotion efforts and it would have faced the threat of Tarmac dumping residual GBS on the UK market at a low price. Finally, Hanson told us that the exclusive agreement was necessary to avoid hold-up, by preventing Tarmac from renegotiating the contract after Hanson had made relationship specific investments. Hanson told us that it did not have information on the exact level of investment in the GGBS plants. For an indication of a rough proxy for the cumulative

level of investment in current terms, Hanson referred to the CC's updated issues statement, which stated that the approximate cost of building a new clinker grinding plant was £50 million. Hanson said that this level of capital investment and market risk would naturally require the security of an exclusive longer-term arrangement for granulate supply to justify the cost of building and upgrading five new grinding plants, in the context of it being a new and pioneering development, to be attempting such operations on this scale in the British construction market. Hanson also told us that in 2006 it paid £245 million for the business of Civil & Marine, almost exclusively for the UK business, and that this reflected the value of the investments made and the risks taken by Civil & Marine. We note that the price paid in a merger can reflect several factors beside values of assets.

34. Hanson has separate facilities for grinding cement and for producing GGBS. It told us that with some technical modifications and additions such as limestone source and gypsum source and a method of integration, it would be possible to mill clinker to make cement from its GGBS grinding facilities. It told us that it had not used its GGBS facilities to grind cement and that it had no plans to do so in the future. Conversely, it told us that a clinker grinding plant could not produce GGBS without further modification since GGBS production involved the additional operating of drying (involving dryers/burners and associated conveyors, pipe works and filtration).
35. Hanson highlighted the clear need for efficiencies from the perspective of the steel industry, whose business was not the commercial trading of products used in the cement industry.¹⁸ In this respect, Hanson highlighted the need of the steel industry to ensure that it had in place the efficiency of a long-term solution to guarantee the offtake of what would otherwise constitute waste and represent a potential cost, were

¹⁸ Hanson told us that the needs of the British steel industry, already under considerable pressure and fundamental threats from fierce competition overseas, to put in place a solution with a dedicated buyer providing secure offtake arrangements to deal with a product that would otherwise represent waste, was a factor that contributed to making a long exclusivity period effectively necessary.

it not processed as a by-product. Hanson also told us that the exclusivity was necessary to create a GB GGBS supplier committed to GGBS production to facilitate the promotion of GGBS as an alternative to CEM I and PFA.

36. Hanson also explained that exclusivity over all three steel plants was a necessity due to (a) uncertainty in the production of steel at individual plants (meaning that access to all three plants meant that mothballing or closure of one steel plant would not destroy its business) and (b) the fact that Hanson swapped supplies for GGBS around the three plants, which Hanson frequently did depending upon its needs; whether there was high demand from customers at a particular plant, meaning that some customers might instead be supplied from an alternative plant; and the quality of the granulate produced at a particular plant, meaning that, for example, if the granulate was not of the correct quality, then supply to customers might be made from an alternative plant.

Trends in Hanson's GGBS sales, volumes and prices

37. Figure 2 shows the trend in Hanson's sales of GGBS over the period 2007 to 2011, split into internal and external sales.

FIGURE 2

Hanson's GGBS sales, 2007 to 2011

[REDACTED]

Source: CC calculations on data provided by Hanson.

38. Figure 3 shows the trend in Hanson's average selling prices of GGBS over the same period. [REDACTED] Hanson told us that increasing average selling prices was unsurprising, given the very significant price increases for fuel and energy as well as related costs during the period.

FIGURE 3

Hanson's average selling prices of GGBS, 2007 to 2011

[✂]

Source: CC calculations on data provided by Hanson.

39. Figure 4 shows Hanson's GGBS sales to each of the Majors and to the independents over the period 2009 to 2011. [✂]

FIGURE 4

Hanson sales of GGBS, 2009 to 2011

[✂]

Source: CC calculations on data provided by Hanson.

40. Figure 5 shows Hanson's average selling prices to each of the Majors and to independents over the same period. [✂]

FIGURE 5

Hanson's average selling prices of GGBS, 2009 to 2011

[✂]

Source: CC calculations on data provided by Hanson.

41. Table 4 shows that independent RMX and concrete producers account for [✂] per cent of total GGBS sales by Hanson. This compares with our estimate of about [✂] per cent of all sales of bulk cement by majors being made to independents.¹⁹

¹⁹ CC calculations based on Majors data.

TABLE 4 Hanson sales of GGBS by type of customer, 2011

	<i>tonnes</i>
Sales by Hanson	[REDACTED]
<i>Of which, sales to:</i>	
Hanson	[REDACTED]
Cemex	[REDACTED]
Lafarge	[REDACTED]
Tarmac	[REDACTED]
Aggregate Industries	[REDACTED]
Independent	[REDACTED]
Total (%)	100

Source: CC calculations on data provided by Hanson.

42. Table 5 compares Hanson’s average selling prices of GGBS with Hanson’s average selling prices for bulk cement for the period 2008 to 2011. [REDACTED]

TABLE 5 Hanson’s average selling prices for GGBS and bulk cement, 2008 to 2011

	£	
	<i>GGBS</i>	<i>Bulk</i>
2008	[REDACTED]	[REDACTED]
2009	[REDACTED]	[REDACTED]
2010	[REDACTED]	[REDACTED]
2011	[REDACTED]	[REDACTED]
Growth (%)	[REDACTED]	[REDACTED]

Source: CC calculations on data provided by Hanson.

[REDACTED]

43. Table 6 shows data from Hanson’s 2010 and 2011 business reviews on GGBS and cement profit margins. Hanson told us that these were forecast margins (not actual margins). In addition, it told us that the cement margins displayed were the forecasts for all of its cement activities (including bulk, bagged cement and white cement) and that the data excluded Hanson and Heidelberg overheads). Therefore Hanson argued that the margins shown below were not a true representation of Hanson’s cement margins. Bearing in mind that the figures below should be interpreted with caution, we note that the table [REDACTED].

TABLE 6 Hanson's profit margins for GGBS and cement, 2010 and 2011

	<i>per cent</i>	
	<i>2010</i>	<i>2011</i>
<i>GGBS</i>		
Gross variable margin	[REDACTED]	[REDACTED]
Gross variable and fixed margin	[REDACTED]	[REDACTED]
<i>Cement</i>		
Gross variable margin	[REDACTED]	[REDACTED]
Gross variable and fixed margin	[REDACTED]	[REDACTED]

Source: CC calculations on data provided by Hanson.

Note: [REDACTED].

Internal documentary evidence on GGBS

44. Hanson [REDACTED].

45. [REDACTED]²⁰

46. Hanson told us that [REDACTED] made unsafe and subjective assumptions in his email regarding the anticipated recovery of the GB economy. Hanson also told us that the email had been written in the context of an internal audit and as such constituted an internal, non-objective attempt to, without precise analysis, magnify all potential benefits. We were told by Hanson that the email could therefore not be relied on to provide an objective record. Moreover, Hanson told us that there was no detailed financial analysis behind the statement.

47. We have seen another piece of evidence [REDACTED]

48. [REDACTED]

49. This email [REDACTED].

²⁰ [REDACTED]

50. Hanson told us that it did not believe that Cemex was importing GGBS for sale in the UK, and that when Cemex's UK operation suggested it would stop buying from Hanson, Hanson merely pointed out that it was a big customer of Cemex's in Germany and that Cemex ought to respect that. In Hanson's view, this was not a strategy to prevent Cemex from importing as such, nor was it any kind of strategy to restrict imports generally. Hanson's view was that this merely constituted commercial bargaining to preserve Hanson's own customer sales.

51. [REDACTED]

52. [REDACTED]

Supply arrangements for GGBS in other jurisdictions

53. We researched regulatory measures that had been imposed on the supply of GGBS in certain other European jurisdictions, namely Germany and Bulgaria. We summarize this research in this subsection.

Germany

54. There is very little in the public domain on how the German General Cartel Office (GCO) has intervened in the supply of GGBS in Germany. In its report to parliament for 2007/08, the GCO mentioned that Thyssen Krupp Steel AG (TKS) and Huettenwerke Mannesmann GmbH (HKM), two German Steel producers which supply granulated blast furnace slag (granulate) to third parties, and Cemex Deutschland AG (Cemex Germany) had been able to avoid abuse of dominance proceedings by agreeing to change their previously exclusive supply contracts for granulate. The report neither contains any detail on the arrangements between the parties, nor does it make any mention of regulation of the supply of granulate or GGBS in Germany as such.

55. [REDACTED]

56. [REDACTED]

57. [REDACTED]²¹

58. [REDACTED]

59. [REDACTED]

Bulgaria

60. On the Bulgarian Competition Authority's website there is an English language version of a decision of July 2006²² dealing with supply arrangements for GGBS. The decision seems to be referring to an Article 101(3)-type procedure whereby the parties to an agreement, which would otherwise be viewed as anti-competitive, notify their agreement to benefit from an individual exemption under the relevant Bulgarian competition law.

61. The contract in question was between Kremikovtsi AD and Cemeko OOD, the former being a steel producer and seller of GGBS and the latter as the buyer of GGBS. There is reference throughout the decision to 'granulated blast-furnace clinker' (which we refer to as 'granulate' in what follows), which implies that Cemeko was itself grinding the granulate to produce GGBS. 'Interested parties' in this case are said to be Holcim Bulgaria AD and two other companies, which makes it likely that they must have had some sort of formal third party role in the proceedings.

²¹ [REDACTED]

²² www.cpc.bg/storage/file/Decision%20174_2006_Cemeco_indov.exemption.doc.

62. The decision states that Kremikovtsi enjoys a dominant position on the market for granulate. Imports are said to be uneconomical due to high logistics costs. The price Cemeko pays for granulate has been fixed and protected from annual or other price changes at a level lower than the price at which it is available to other customers with the price differential in the range of between 29 and 41 per cent. The decision contains a forward-looking assessment of the supply and demand for granulate in Bulgaria and concludes that it is likely that granulate would turn into an increasingly scarce commodity. It is not entirely clear from the decision how much of Kremikovtsi's granulate will remain available to Cemeko's competitors but it seems that the contract provides that most of it will be supplied to Cemeko.
63. There is a discussion in the decision about the particular characteristics of granulate that mean it cannot be substituted. It is noted that grinding a different material with cement clinker would result in the production of a different type of cement as a result. The decision states that if the quantities specified in the contract were implemented, third party customers would be completely or to a large extent deprived of access to granulate by Kremikovtsi. As a result of the contract, the oligopoly structure of the slag cement market would be replaced by a monopoly held by Cemeko. Also, any other customer for granulate in competition with Cemeko would by the terms of the contract be deprived of the opportunity individually to negotiate prices lower than those offered to Cemeko.
64. On this basis, the decision finds that the contract in question cannot benefit from individual exemption under the relevant statutory provisions. The agreement, [redacted], is therefore prohibited.

Analysis of the cement producers' profitability in the supply of cement

Introduction

1. The purpose of this appendix is to analyse the profitability of the GB cement operations in accordance with our profitability framework as set out in Appendix 4.1. This framework sets out various purposes to which we seek to put the resulting profitability analysis and the methodological approach adopted to derive our chosen measure of profitability.
2. Most facets of the framework for assessing profitability, for example our chosen measure of profitability and the overarching approach to valuing a firm's asset base, are common across all three reference products being investigated and as such are set out once in Appendix 4.1. However, where we have tailored our approach specifically for the purpose of analysing cement profitability, we set out these cement-specific methodologies in this appendix.
3. We also explain how we have modelled the adjustments we have needed to make to convert the two inputs into our chosen measure of profitability, namely returns and capital employed prepared on a (modified) HCA basis, on to a CCA basis,¹ the basis which we intended to use in our analysis.
4. We make a distinction between adjustments to the basis of preparation, the need for which can and does vary between the different reference products, and the scope² of the operating revenues, costs, assets and liabilities relevant to our analysis, which does not. Furthermore the scope of what falls within our profitability analysis remains unaltered between the HCA and CCA bases of preparation. This means that any

¹ See second footnote to paragraph 4.14 for an overview explanation of the (modified) HCA and CCA bases of preparation.

² See Appendix 4.1, paragraphs 58–61.

analysis of HCA profitability we present reflects as far as practically possible our view of what is relevant, rather than necessarily the activities the firm itself would reflect within financial information prepared for its own purposes.

5. The GB producers whose profitability we analysed did not agree with all aspects of our profitability assessment. Their concerns included (but were not limited to) how we had estimated the current value of cement assets to their businesses, and the depreciation profile we adopted. The GB producers' comments, and our response to the points they raised, are also contained within this appendix.

Structure of the appendix

6. This appendix sets out:
 - (a) the key findings from our profitability analysis;
 - (b) more details on the approach taken to determine the CCA values for cement assets beyond that set out in Appendix 4.1;
 - (c) the treatment of revenues from the sale of surplus carbon allowances allocated for free to GB cement producers by the EU; and
 - (d) the detailed results from applying the approach referred to in (b) and the specific treatment referred to in (c).

Key findings

7. We determine profitability on a ROCE basis over the period 2007 to 2011. The approach we have taken to determining capital employed is to value cement plants on an MEA basis and then reduce the 'as new' cost solely to take account of their age. In other words we value cement plants as though the only difference between them is their age.

Returns on capital employed

8. The analysis set out below assumes that one needed to invest in the order of £170 million in 1 January 2007 prices to obtain a cement production facility capable of producing 1.0 Mt of clinker per year. Furthermore it assumes that assets decline in value by 3.5 per cent per year on a reducing balance basis. It also assumes that asset price inflation is 2.5 per cent in nominal terms over the period (~13 per cent rise over the period).

9. When estimating profitability we have not adjusted asset values for the higher operating costs undoubtedly associated with some older and less well-located plants. We therefore allow individual firms' ROCE to vary as a result of some firms owning more modern efficient assets and some firms owning plants situated in superior locations and/or being rail-linked. This, however, does mean that, to the extent that these adjustments could justifiably have been made, certain firms' profits will be understated and capital employed overstated. These firms' ROCEs will therefore be understated.

Average returns analysed on a pan-producer basis

10. Below we summarize profitability across all GB cement producers averaged across the period of review, 2007 to 2011. We also distinguish between returns established on the continuing costs of supply and those elements of return during the period which are unexpected or temporary in nature. We believe that such a presentation gives the most informative analysis of profitability of GB cement producers during the period of review.³

³ This calculation of the five-year average ROCE does not allow for general inflation between 2007 and 2011. Allowing for this factor would reduce overall ROCE by approximately 0.7 percentage points, a reduction of 0.3 percentage points in continuing profits, an increase of impairment losses of 0.5 percentage points, and an increase in carbon credits of 0.1 percentage points. There is a trade-off here between transparency of calculation and technical accuracy of approach.

TABLE 1 **Calculated ROCE for GB cement producers averaged over the period 2007 to 2011**

	%
Profitability based on continuing costs of supply	13.3
<i>Arising from</i>	
Carbon credits	2.3
Impairment losses	<u>-4.0</u>
Profitability reflecting all costs incurred	11.6

Source: Table 11.

11. Income from the sale of carbon allowances which have proved excess to requirement during the period ('carbon credits') have been significant during the period, especially for Hanson which operated three plants at less than full capacity throughout the period. Whilst we consider that the GB cement producers are unlikely in future to generate profits from this source to the same extent, [X].
12. As well as presenting figures for individual cement producers' profitability, we have also summarized profitability across all GB cement producers because each of the individual cement producer's results may be influenced to a significant extent by the weighted average age of its cement plant portfolio with Lafarge at one extreme owning a portfolio of older plants and Tarmac owning a single almost brand new plant at the other extreme. Both Hanson and Cemex are in between these two extremes with Hanson tending to own older plant and Cemex newer plant. This influence on firm-specific results is because the loss in value we ascribe to a further year's use of the firm's assets, which in our modelling is solely a function of their age, may diverge from reality. However, this divergence is more likely to net out across the population of cement plants across GB.⁴ Therefore by calculating a weighted average across all four cement producers we are able to even out the impact of the precise depreciation profile adopted on our assessment of CCA asset values to some extent, and there-

⁴ See paragraphs 123 & 124 for further detail.

fore in turn even out the impact of the depreciation profile adopted on our assessment of the level of CCA profitability in this sector.

13. As well as presenting figures for each year of the review period, we have also averaged profitability across the five years of review because of the materiality and nature of the impairment losses incurred during the period. The emergence of permanent excess capacity following the slump in demand has caused these impairment losses. In practice, we would expect these losses in asset value to crystallize in one, or perhaps two, accounting periods within the period of analysis. However, the modelling approach taken to quantify assets surplus to requirements (ie spare capacity), an approach that needed to be able to be applied systematically across each of the cement producers, has meant that impairment losses as well as the reversal of impairment losses⁵ are recognized in each of the five accounting periods under review. In consequence, we believe that profitability assessed on the aggregate of these losses is more meaningful than looking at the values calculated for each year.
14. The sale of carbon allowance has proved a non-trivial source of income for all the GB cement producers: the scale back in production following the demand shock has allowed them to sell unused carbon allowances allocated for free to them by the EU based on historical production levels. [X] These revenues are unlikely to persist to the same extent in future as the EU tightens the carbon emissions scheme.
 - *Sensitivity analysis*
15. We have conducted a sensitivity analysis. For example, were we to assume that the cost of a new cement works at 1 January 2007 had been £200 million, then the calculated ROCE over the period (averaged across the GB cement producers, and

⁵ Where clinker output has in fact expanded over the period the approach taken generates net gains. [X]

across years) would have been 9.2 per cent with ROCE assessed on the continuing costs of supply at 11.4 per cent.

16. Were we to assume that the decline in asset values were not so rapid, and therefore as a result useful lives were expected to be longer, for example at 2.5 per cent rather than 3.5 per cent per year, then the calculated ROCE over the period (averaged across the GB cement producers and across years) would have been 9.3 per cent with ROCE assessed on the continuing costs of supply at 12.1 per cent.

Year by year returns assessed on a pan-producer basis

17. In Table 2, in addition to presenting year by year ROCEs, we also provide the volume of cement sold and clinker produced in each year. This volume information gives an indication of the extent of the downturn experienced in this market during the period of review. Clinker production is important in this context as it is clinker rather than cement sales volumes which have determined the current values we have put on each firm's cement assets.

TABLE 2 Volumes and calculated ROCE for GB cement producers over the period 2007 to 2011

	<i>Megatonnes sold/produced</i>				
	2007	2008	2009	2010	2011
<i>Volumes</i>					
Cement sales	12.3	10.6	7.8	8.1	8.7
Clinker production	10.2	8.7	6.4	6.6	7.1
<i>Profits/average capital employed (%)</i>					
<i>ROCE</i>					
Profitability based on continuing costs of supply	13.2	10.3	11.0	14.7	18.9
<i>Arising from</i>					
Carbon credits	0.1	2.8	2.5	3.8	2.9
Impairment losses	<u>3.3</u>	<u>-10.3</u>	<u>-18.2</u>	<u>0.2</u>	<u>6.3</u>
Profitability reflecting all costs incurred	16.6	2.7	-4.8	18.7	28.1

Source: Table 11.

18. This presentation demonstrates how profitability based on continuing costs of supply remained relatively steady through the period 2007 to 2010 even as firms readjusted to the new economic environment, and increased in 2011. However, firms incurred

extensive impairment losses in the period, in this analysis recognized in both 2008 and 2009, which meant overall returns were minimal in 2008 and negative in 2009.

19. We reflected readjustment costs other than impairment losses within profitability based on the continuing costs of supply.⁶ The inclusion of these readjustment costs would therefore be one way in which the downturn in trading conditions will have been reflected in these profitability results.⁷
20. Having set out our key findings we now set out our approach to valuing cement assets.

The modern equivalent asset is a fully integrated rail-linked dry cement plant with production capacity of at least 1 Mt of clinker per year

21. As set out in Appendix 4.1, paragraph 101, the relevant basis for valuing assets worth replacing is that of the MEA, ie what a new entrant would pay for the assets. In principle this is the cost of a brand new plant adjusted for, among other things:
 - (a) its age, ie so that its net value will reflect how many more economically productive years are expected from it; and
 - (b) any lower operating costs associated with operating a brand new plant.
22. The first step of our analysis was therefore to specify what constituted the MEA for cement supply at the beginning of the period of analysis, namely 1 January 2007. This is the plant that a new entrant could have bought had it entered the market at this date.

⁶ See paragraph 170 for our reasoning.

⁷ The Guidelines state in [paragraph 125\(a\)](#) that 'A period of low profitability may occur during the course of a downturn in trading conditions, regardless of the state of competition in the affected market'.

23. There were a number of facets to the specification of a modern cement plant which we analysed. This allowed us to specify in some detail what a modern plant would look like. We deal with these facets in turn:
- (a) type of cement plant;
 - (b) capacity of cement plant; and
 - (c) location of cement plant.

Basics of cement production

24. In Section 2 we provide some background information on the reference markets including that relating to the cement market. The purpose of this subsection is first to describe the key activities and inputs required to produce, distribute and sell cement, namely the activities to which the profitability information we present relates. A second purpose is to briefly introduce some of the factors driving commercial decision-making in this market.
25. The necessary raw materials for cement production, of which limestone comprises around 80 per cent by weight, are typically quarried locally and then ground down before being fed into the kiln plant. The horizontal rotary kiln must be heated up to more than 1,400°C, and kept at this temperature, in order that the required chemical reactions occur and the nodules of clinker are produced. Once cooled, this clinker is ground together with ~5 per cent gypsum, and possibly other cementitious material blended in, to produce cement. Cement is either supplied in bulk or bagged, the latter option requiring bagging plant. If rail links exist, cement can then be transported in cement wagons to distribution depots more local to the final customer by train. In any case the delivery to the final customer will almost always be by lorry.
26. Cement production is a very energy-intensive process, not least because the rotary kiln needs to be maintained at above 1,400°C. In addition electricity is used both to

crush and grind the raw materials prior to entry to the kiln, to drive the kiln, to grind the nodules of the clinker produced into cement and to transport the material between the process sections. In addition fuel is required to transport non-locally-sourced raw materials (usually by road) to the plant and then distribute the finished product to the customer.

27. As a consequence of needing to maintain the cement kiln at more than 1,400°C, if a firm operates a plant it will want to operate it round the clock so as to minimise unit costs. The firm will also think carefully about to which customer locations it is economic to deliver, as final leg distribution costs are a significant proportion of a firm's variable costs.
28. It is also the case that the larger the clinker producing capacity of a plant, the lower the unit cost of producing cement should be. A larger plant will cost more but the relationship will not be 1:1.

Type of cement plant: kiln technology and production process integration

29. We examined the features of new cement plants commissioned in the British Isles during or shortly before the period of our analysis. Tarmac and Irish Cement commissioned new fully-integrated⁸ rail-connected plants at Tunstead (2004) in Derbyshire's Peak District in England and at Platin⁹ (2009) near Dublin in the Republic of Ireland respectively. In the case of Padeswood the then Castle Cement (now Hanson) commissioned a new kiln (2005) to modify the original cement works.

⁸ By the term fully integrated we mean that the facilities not only produce clinker but are also able to grind/mill the clinker output and blend other cementitious materials to produce cement.

⁹ www.irishcement.ie/wp-content/uploads/2011/03/Investing-in-Our-Future-Platin.pdf. Page 6 of this brochure sets out the key features of Irish Cement's new production line at Platin.

TABLE 3 Recently commissioned cement works/kilns in the British Isles

Firm	Plant	Year	Process	Technology	Clinker production capacity		
					Cost £m	Per day tonnes	Per year Mt
Tarmac	Tunstead	2004	Dry	4-stage suspension preheater plus air-separate precalciner	[£]	2,205	0.7
Irish Cement	Platin (Ireland)	2009	Dry	Single-string 5-stage suspension preheater with air-separate precalciner	150–190	4,000	1.3
Hanson	Padeswood	2005	Dry	Single-string 5-stage suspension preheater with air-separate precalciner	[£]	2,650	0.9

Source: CC tabulation of firm-supplied information.

Notes:

1. Cost in £ of Irish Cement plant at Platin depends on €:£ exchange rate used (range 1.46:1 (2007) to 1.12:1 (2009)).
2. Nameplate capacities converted into annual Mt per year capacity assuming a 90 per cent utilization rate. Effective capacities of individual kilns/plants, however, may vary.
3. [£].
4. Since Tunstead was commissioned in 2004, [£].

30. We also looked at the investment in a new integrated cement works including two-stage precalciner kiln¹⁰ at Rugby commissioned in 2000 which cost its then owner (now Cemex) £200 million.¹¹ This represents an investment in year 2000 prices or potentially earlier if payment to suppliers were phased. Allowing for asset price inflation over seven years to cover the period of, say, 1999 to the end of 2006 based on price movements for output in the construction industry¹² of 50 per cent,¹³ then this translates to a figure of £300 million. The Rugby cement works, however, appears to be on a similar scale in terms of capacity¹⁴ to the new Platin works which cost around €200 million in 2009.

31. Having reviewed the evidence we judged the most relevant benchmark on which to value the assets which actually produced cement over the period of analysis to be that relating to a fully integrated cement works of the suspension preheater with air-separate precalciner type. The choice of a fully-integrated cement works as our benchmark means that our approach to asset valuation does not place any value on

¹⁰ We note that the plant at Rugby is not a dry process plant.

¹¹ See also www.bbc.co.uk/coventry/content/articles/2005/12/13/rugby_cement_works_ugly_building_feature.shtml.

¹² See Table 9 Output price indices, non seasonally adjusted (2005 = 100), accessible via 'references tables' hyperlinked on www.ons.gov.uk/ons/rel/construction/output-in-the-construction-industry/october-2012/sum-consout-oct-2012.html.

¹³ The index for 'private industrial excluding infrastructure' was 69.1 for 1999 and 103.7 for 2006 (and for future reference 103.5 for 2011).

¹⁴ Production capacity for both the Rugby and Platin works is 4,000 tonnes per day according to firm supplied information.

separately located facilities beyond the value they would have as part of an integrated plant.¹⁵

Type of cement plant: grinding and milling technology

32. The kiln is one part (albeit the most costly element) of a cement plant. We also understand that the technology both for grinding raw materials prior to processing within the kiln (the raw mix) and milling the clinker into cement has improved in recent years. Previously ball mills were used for both purposes which use around 30 per cent more electricity than the modern vertical roll mills and roll presses.
33. We therefore conclude that the MEA plant would feature these modern energy-efficient mills.

Capacity of cement plant

34. The capacity of any new plant in terms of clinker production is likely to be at least 1.0 Mt per year. All other things being equal we would expect higher-capacity plants to have higher overall fixed¹⁶ costs but lower overall lifetime unit production costs. This fact explains the tendency over time for individual plant capacities to have grown,¹⁷ whilst at the same time the number of plants in GB has shrunk.
35. A 1.0 or even 1.3 Mt cement works is not by international standards particularly large scale. For example, in 2006 in both Saudi Arabia and China kilns with nameplate capacities of 10,000 tonnes per day, roughly equivalent to 3.2 Mt clinker output per

¹⁵ Lafarge Tarmac interpreted the specification of a fully-integrated cement works as the MEA to mean that we would exclude assets not co-located with clinker production. We include within our MEA benchmark those assets which could be located remotely from clinker production facilities such as packing and blending facilities. However, the value we place on these assets would be that if they were all located at a single site.

¹⁶ These costs are not fixed over the long term however.

¹⁷ See Appendix 7.4. Lafarge gave us data that showed that there had been an increase in the average scale of an integrated cement works and kiln capacity from 0.1 Mt per year in 1959 to 1.05 million tonnes per year in 2009.

year, were commissioned.¹⁸ However, the size of the cement market in Saudi Arabia is roughly five times that of the UK cement market, and the Chinese cement market is more than 150 times the size of the UK cement market.

36. We therefore conclude that a plant size of at least 1.0 Mt clinker per year is a reasonable assumption for the purposes of this analysis.

Location of cement plant

37. There are three facets to bear in mind: proximity of raw materials, efficiency of getting the finished product to market and whether or not an existing site is reused.

Proximity of raw materials

38. Nearly every cement plant in GB is either on or adjacent to its primary raw materials: limestone or calcium carbonate. Not least because 44 per cent of limestone is driven off as CO₂ in the kiln, it makes sense to minimize haulage costs of this heavy raw material.
39. In the data they gave us, the GB cement producers included within their cement business assets their limestone reserves and the equipment needed to extract these reserves. Whilst technically these assets and the associated extraction activity relate to a (specialist) aggregates market, the activities of quarrying the limestone and producing cement are so closely related that we believe this treatment is understandable.

Efficiency of getting the finished product to market

40. What appears to be key is that either sources of local demand are on a sufficient scale (ie 1+ Mt per year) to make the plant economic or that the plant has the ability

¹⁸ As described in the article 'Maxi or mini?' by Dr Michael Clark published in March 2007's edition of *International Cement Review*: http://whitehopleman.com/sites/default/files/Maxi%20or%20Mini_0.pdf.

to distribute its output to local depots by rail. Cement is a high-bulk but relatively low-value product. Rail transport can be approximately three to four times lower on a £ per tonne kilometre basis compared with road transport over long distances.¹⁹ We note that Lafarge, Hanson and Tarmac have invested in their rail distribution networks during the period of review and in some cases shortly before. Access to the railway track network in the UK (but not the trains) is at regulated prices.

Reuse of existing site

41. Each of the firms mentioned in paragraphs 29 and 30 invested in new/replacement capacity on an existing ('brownfield') as opposed to a brand new ('greenfield') site. Indeed, the most recent examples of investment in greenfield sites in GB have been by Tarmac at Tunstead in 1966²⁰ and by Blue Circle (now Lafarge) at Cauldon in 1957, 50 years ago or more. When a firm reinvests in an existing site, it tends to spend less, or in some cases entirely avoid expenditure, on necessary items such as:
- (a) roads;
 - (b) connectivity to mains water;
 - (c) compressed air;²¹ and
 - (d) electricity connectivity.
42. It follows from the discussion of the proximity of raw materials in paragraph 38 that a firm is only likely to reinvest in an existing location if sufficient reserves of raw material are present.

¹⁹ See Appendix 7.4. There is also evidence of the scale of the economies potentially achievable in relation to Hanson. VTG Rail UK in a press release stated that the cement trains it had supplied could carry an average of 1,040 tonnes compared with just 29 tonnes per lorry¹⁹ (ie 35 times as much). 'TG Rail UK's pioneering cement wagons celebrate first birthday' (8 April 2009): www.vtg-rail.co.uk/v/s/content/25122/54690.

²⁰ There have been lime kilns however at Tunstead since the 1930s.

²¹ We note, however, that compressed air systems are likely to be renewed at some point.

Conclusion

43. We therefore also concluded that an MEA plant would be situated close to its key raw materials and would be rail-linked unless it could sell all its output locally. We also considered that a new plant in GB was likely to be located on or adjacent to an existing (brownfield) site.

Importation as an alternative business model to GB cement production

44. Our working assumption has been that the GB cement producers' business model is based on the production and distribution of cement in GB. Lafarge Tarmac told us that we had not included Lafarge's clinker and cement import terminals in our analysis. Lafarge had imported substantial quantities of clinker and cement into GB in 2007 and cement in 2008 reflecting the domestic shortages at the time, and these revenues, and associated costs, had been reflected in the financial information provided to us. These volumes represented about 9 and 5 per cent of Lafarge's total cement sales in 2007 and 2008.
45. Furthermore Lafarge Tarmac had invested £[redacted] million in 2008 in a new import terminal and depot at the site of its old Northfleet cement works by converting the former coal shed into a bulk cement storage facility comprising three silos and four outbound road tanker loading points/weighbridges.
46. Our MEA benchmark relates to the production and distribution of cement in GB and not a model assuming importation from outside GB as a back-up in the event of plant production problems.²² We understand that whilst some GB cement producers did import clinker/cement to a limited extent over the period of review by 2009, this had reduced significantly.

²² [redacted]

47. As described in paragraphs 73 to 75, we valued the GB cement producers' cement assets on the basis of their previous year's clinker production plus 30 per cent to allow firms to have built sufficient capacity to satisfy expected normal fluctuations in demand. We therefore consider that we have made sufficient allowance in the capital base for any import terminal assets utilized by the GB cement producers at the peak of the business cycle. Investment in depots should be considered as part of the MEA of a cement works.

We estimate the cost of a new 1.0 Mt cement production facility to have been £170 million at 1 January 2007

The overall approach we took

48. In this analysis we focused on the cost of a complete replacement cement works, ie that all the necessary assets were acquired at the same point of time. This is a simplifying assumption. We are aware that firms may need to periodically replace some elements of their asset base as individual parts wear out, and such replacement in particular is necessary to maintain the kiln. In line with standard accounting practice²³ we would only expect those parts which were originally capitalized with their own (shorter) individual asset life to be subsequently capitalized. Otherwise we would expect these costs to fall within operating costs under repairs and maintenance.

49. A number of other tangible fixed assets apart from plant and machinery were identified by the cement producers. These were included in our analysis at the values provided.

²³ FRS12, Tangible Fixed Assets, quotes the example of a furnace which requires relining every five years (paragraph 38, p24): www.frc.org.uk/Our-Work/Publications/ASB/FRS-15-Tangible-Fixed-Assets/FRS-15-Tangible-Fixed-Assets.aspx.

How we arrived at our estimate of the cost of a new cement works

50. We looked at a number of sources to inform our estimate of the costs for a 1.0 Mt MEA cement works as at 1 January 2007, the beginning of our period of analysis, and in particular:
- (a) the normalized cost of actual investments in integrated cement plant assets in the British Isles during the period of analysis and shortly before; and
 - (b) Hanson's bottom-up estimate of replacing the cement works assets at each of its three GB plants.
51. We also reviewed the estimates provided by each of the Majors in response to questions. These estimates are summarized in our analysis on cement barriers to entry.²⁴ As these estimates were wide ranging and not necessarily informed by specific cases, we have not placed as much weight on these estimates as on other evidence.

The normalized cost of actual investments in cement plant assets in the British Isles during the period of analysis and shortly before

52. We calculated the equivalent cost of a 1.0 Mt integrated cement plant at 1 January 2007 prices using the two actual examples we had for new cement works.²⁵
53. Tarmac stated that, although it had cost it only £110 million²⁶ to have its cement works built in 2004, it believed that a replacement cost now would be in the order of £[REDACTED] million. This plant currently produces just under 1.0 Mt of cement (not clinker). Tarmac reiterated that the new plant was delivered on a turnkey²⁷ basis and Tarmac understood that the actual costs of construction were some £170 million,²⁸ approxi-

²⁴Appendix 7.4, paragraph 2.

²⁵ [REDACTED]

²⁶ See also http://cement.mineralproducts.org/cement/cement_makers/tarmac_buxton_lime_and_cement.php.

²⁷ Turnkey means that the risk of cost overruns/underspends lay with the supplier(s) rather than with Tarmac.

²⁸ Tarmac explained to us that FLS, which built the plant on a fixed price, had stated in public that the plant cost it £170 million to build.

mately £60 million in excess of the contractual cash price paid by Tarmac. We note that this extra £60 million would represent over 50 per cent of the contracted purchase price.

54. So that we had a wider range of possible data points, we also included a number of estimates including Tarmac's estimate of the underlying cost of its Tunstead plant and the normalized average of Hanson's bottom-up estimates (summarized in paragraph 56 below).

55. In all instances we assumed asset price inflation of 2.5 per cent per year²⁹ covering the period 2004 to 2009.

TABLE 4 Cost estimate for a 1.0 Mt integrated dry process clinker production plant in 1 January 2007 prices

Firm	Plant	Clinker production capacity			Cost normalized for	
		Per year (Mt)	£/year	Cost (£m)	I Capacity	II £ of 1.1.07
<i>Actual examples</i>						
Irish Cement	Platin (Ireland)	1.3	2009	150–190	115–145	105–140
Tarmac	Tunstead	0.7	2004	110	148	159
<i>Estimates</i>						
Tarmac	Tunstead	[X]	[X]	[X]	[X]	[X]
Hanson	Ketton/Ribblesdale/ Padeswood	[X]	[X]	[X]	[X]	[X]

Source: CC based on information in Tables 3 and 5.

Notes:

1. Cost in £ of Irish Cement plant at Platin depends on €:£ exchange rate used (range 1.46:1 (2007) to 1.12:1 (2009)).
2. CC's calculation of average replacement cost for Hanson's three cement works (see Table 5 below) has been divided by 0.9 to allow for a 90 per cent utilization rate.

Hanson's bottom-up estimate of replacing the cement works assets at each of its three GB plants

56. Hanson attempted to estimate the cost of replacing each of its cement plants.

Hanson was able to employ Heidelberg's cement engineers to help generate its bottom-up³⁰ estimates using cost information associated with a variety of recently-developed Heidelberg cement plants in Russia, Belgium, Kazakhstan and Togo.

²⁹ We discuss our choice of the level of asset price inflation in paragraphs 131–132.

³⁰ [X]

Hanson applied a variety of uplift factors to account for differing labour and regulatory costs between GB and these other locations. The figures provided were current values, ie at 2012 prices.

TABLE 5 Hanson's estimate of the cost of replacing its existing cement plants' assets

	Value as new		Normalized value		Stipulated capacity
	£m	Capacity Mt	£m	Capacity Mt	tpd
Ketton	[X]	[X]	[X]	[X]	[X]
Ribblesdale	[X]	[X]	[X]	[X]	[X]
Padeswood	[X]	[X]	[X]	[X]	[X]
Total/average	[X]	[X]	[X]	[X]	[X]

Source: CC analysis based on Hanson-supplied information.

Notes:

1. Mt capacity calculations assume 365 days output.
2. Stipulated capacities (tonnes per day) are the starting point for Hanson's estimates.

Conclusion

57. Using the information in Table 4 we estimated that the capital investment required to have constructed a 1.0 Mt clinker capacity fully-integrated cement works operating from an existing (brownfield) site was between £150 million and £180 million at 1 January 2007 prices. We placed more weight on actual examples than estimates. However, we noted that all data points with the exception of Tarmac's estimate of the underlying cost of Tunstead fell within our range. We used the figure of £170 million in our modelling.
58. Lafarge Tarmac, Hanson and Cemex said that our range (£150–£180 million) and the value we used in our modelling (£170 million) was too low. They all challenged the use of Platin as a relevant example to inform these values. Lafarge Tarmac characterized the investment in Platin alternatively as an investment in a new kiln or in a new kiln line which, in contrast to its own Tunstead plant, did not include investment in downstream bulk-finished product storage and 'load out' capabilities such as rail. Hanson noted that Platin had been constructed during the economic crises and Cemex commented that there were significant cost differentials between GB and

Ireland. Lafarge Tarmac also reiterated that it had cost £170 million to build its new plant at Tunstead with a cement capacity of 0.825 Mt per year in 2004.

59. In the light of these comments we looked once again at our evidence. In relation to Platin, Irish Cement had provided us with a breakdown of its expenditure as set out in Table 6 and at the same time had noted that it had been built during a period of high construction activity (in Ireland) and in the current economic environment it might have been possible to have achieved more competitive prices for certain materials and services. We had also asked Irish Cement to identify any costs that it had not needed to incur because it already operated from the Platin site. In response Irish Cement had identified that, in addition to the elements of expenditure required for a greenfield development (as listed in paragraph 41), it had not needed to invest in dispatch silos and packing plant.
60. The breakdown of the expenditure at Platin as set out in Table 6 clearly indicates that Irish Cement's investment covered all the elements necessary to produce cement. We also understand that at the time the Platin plant was being constructed, ie before the financial crisis, wage costs were likely to have been comparable to those incurred in GB.
61. In relation to Tunstead we had previously asked Tarmac to provide support for the £170 million it had quoted because it was not the cost it had paid. Tarmac had explained that the £170 million cost comprised the £110 million cost to Tarmac together with FLS's³¹ claim of about £65 million. Whilst Tarmac had been aware of the claim and its approximate quantum, it had not been a party to it and therefore was not in a position to provide us with details as to the cost schedule.

³¹ The Danish supplier of the Tunstead cement works.

62. Our intention is to include within our valuation all assets included in our MEA benchmark including those relating to a rail capability. Therefore when setting our range as described in paragraph 57, we had not simply used the 1 Mt per year of clinker output equivalent costs we had calculated as set out in Table 4. We have put more weight on the Platin example as it was the investment in the British Isles closest to the start of the period of review, 1 January 2007, and the investment is properly supported by a breakdown of the costs actually incurred. We therefore decided to retain both our range (£150–£180 million at 1 January 2007 prices) and the £170 million in our modelling.

We looked at each firm’s productive capacity (including surplus capacity) as a whole

63. We evaluated a firm’s productive capacity in terms of its ability to produce clinker rather than cement. It is the production of clinker that requires the investment in a kiln, an investment of a magnitude of at least five times that required for the facilities to turn clinker into cement.³² We note that the GB cement producers blend non-clinker-based cementitious material extenders to produce both bulk and bagged cement to a different extent, so that there is not a consistent relationship across the producers between clinker and cement production. This is an additional reason for us to focus on clinker rather than cement production in our analysis.

64. As set out in Table 8, of the four GB cement producers, all but Tarmac have had at least two plants in operation at any one time over the period of review. We therefore considered whether it was more appropriate to value each plant individually and then sum these values to arrive at an estimate of the current cost, or alternatively, to work out each firm’s overall capacity and then translate that overall figure into the value of the capital invested.

³² [X]

65. We also considered whether there was surplus operating capacity in each firm's network of plants and if so, how any surplus operating capacity should be valued. Surplus operating capacity is total operating capacity less current operating capacity. Current operating capacity, however, is not necessarily the capacity that is actually being used in any one period: it includes any normal planning margin for dealing with possible fluctuations in demand over the business cycle.³³
66. A CCA approach dictates that operating capacity which is worth retaining for future use, either as demand rises or existing capacity wears out, should be valued as a separate investment.³⁴ This spare capacity should be valued at the discounted present value of the cost of the capacity which it would otherwise be necessary to build at the future date. In subsequent periods that investment would be expected to earn its cost of capital.
67. To the extent that any surplus operating capacity arising is unplanned, then this is likely to have resulted from changed expectations. At the beginning of the period of review, 1 January 2007, it would have been the reasonable expectation of all the cement producers that demand would continue for the foreseeable future roughly at the then-current levels of demand.³⁵ In 2007, a year in which there was a shortage of cement in GB, all cement plants in GB were operating close to their maximum capacity.

The GB cement producers responded differently to the slump in demand

68. With the notable exception of Tarmac, all the GB cement producers responded to the slump in demand by taking out productive capacity to a greater or lesser extent. The

³³ *Accounting for Economic Costs and Prices (1986): A Report to HM Treasury by an Advisory Group* ('the Byatt Report'), Volume II, Her Majesty's Stationery Office, paragraph 5.41.

³⁴ Paragraph 5.46 in the Byatt Report. See also Appendix 4.1, paragraph 107.

³⁵ The demand for cement is in long-term structural decline in GB. See graph on p2 of BCA Economic Briefing Note, February 2008: http://cement.mineralproducts.org/news/news_archive2008.php.

largest GB cement producer by volume, Lafarge, had coincidentally already planned to close down one of its biggest cement works at Northfleet in 2008. It then also decided to mothball and then close both its kilns at its Westbury plant in late 2008/early 2009. Each of these closures related to wet process plants, a technology which had become obsolete in the face of increases in the real cost of fuel. During the period of review Lafarge also decided not to invest for the time being in a new works at Medway (for which it had obtained planning permission) to replace Northfleet.

69. Cemex also closed its subscale wet process plant at Barrington in 2008 and then one of its kilns at South Ferriby. By way of contrast Tarmac, operating a single plant at Tunstead primarily to satisfy internal demand for cement by its RMX operations, expanded its cement-making capacity somewhat. In 2008 it invested £[redacted] million to increase the nameplate capacity of its plant from [redacted] to [redacted] Mt per year.
70. Hanson reacted differently from Lafarge and Cemex in that, while it closed one smaller-scale kiln at its Ketton plant, it decided to continue operating all three existing works, often at well below maximum capacity. It appears to have taken this approach because it calculated that this was the optimal outcome for it once it took into account the value it could realize for selling its excess carbon allowances.
71. The slump in demand coincided with an increase in real terms in fossil fuel costs. This increase in real terms led to the full abandonment of wet process plants in GB during the period of analysis. The wet process requires more energy than a dry process and therefore these plants have become technically obsolete.³⁶
72. When it becomes clear that a strategic error has been made in the determination of operating capacity, beyond the bounds of cyclical variations in demand, a reassess-

³⁶ A wet process plant has at least 50 per cent higher thermal energy costs simply to evaporate the water, and thermal energy is the single largest element of manufacturing costs.

ment of the value of capacity to the business is required. If the conclusion is that there has been a diminution in the value of assets, unlikely to be reversed by any future revival of demand, then assets should be revalued downwards. The term asset impairment is the accounting terminology used for this downward revaluation and is the terminology we use in this appendix.

We valued each firm's operating capacity in the same way

73. We took 2007 as our reference year as this was a year in which the GB cement industry was operating at close to or at full capacity. We summed the clinker production figures by plant provided to us for each of the years 2007 to 2011. To allow us to incorporate spare operating capacity within the asset valuations, we valued an additional 30 per cent of clinker production capacity. 30 per cent appears to us to be a reasonable figure to apply to allow firms to have built sufficient capacity to satisfy expected normal fluctuations in demand.
74. Cemex pointed out that we had presented no evidence for the 30 per cent assumption and that it would be plausible for larger fluctuations to be 'par for the course', not least because producers would be unable to alter productive capacity at short notice. While it would be difficult to obtain hard evidence for this assumption, it allows us to systematically calculate the extent of surplus capacity, and by factoring in an extra 30 per cent beyond the capacity needed for production in the previous year, we had sought not to over-exaggerate the impact of any impairment losses arising from this treatment on the value placed on cement plants. As GB cement producers were operating at or close to full capacity as at 1 January 2007 shortly before the peak of the business cycle, we regard this assumption as appropriate.
75. We used overall clinker production figures to calculate the gross MEA values for each firm. We used the previous years' clinker production volumes to value assets at

the beginning of the following period: as will be explained later, it is logical to value assets on the basis of reasonably held expectations for the following and subsequent periods.

76. This approach allows for the systematic write-down of asset values regardless of whether and when the individual firm chooses to reduce capacity at its plants. As a result there may not be a close relationship between the write-downs calculated as part of this profitability analysis and those, if any, which may have appeared in the individual firm's financial statements. To the extent that clinker output increases from one year to the next, then this approach would generate a reversal of impairment losses. We note that output in 2007 across the four cement producers was higher than in 2006, meaning that this calculation for some firms leads to the reporting of an impairment gain.
77. Impairment losses are much less likely to be reported in HCA than CCA financial statements because accounting asset lives are often shorter than their actual economic useful life (and therefore more likely to be largely or wholly written off) and the reported value of long-lived assets historic cost amounts will have been eroded by asset price inflation (and therefore it is less likely that HCA values compared with MEA values will fall below the asset's recoverable amount). In addition, in this analysis impairment losses are more likely to arise because the benchmark for valuing assets is the price they would fetch in a competitive market; the prices actually observed for second-hand assets may reflect the capitalization of any economic rents associated with operating in that market.
78. Hanson told us that our modelling approach of recognizing losses regardless of whether a producer had chosen to reduce capacity at its plants resulted in large and volatile impairment losses. Instead Hanson said that we should recognize losses as

and when companies actually mothballed plant. Our modelling approach can result in large and volatile impairment losses, particularly at the firm level, but our view is that these losses reflect the sharp and unexpected downturn experienced in this market over the period of review. We do not agree that changes in the value to the business of cement assets were necessarily closely correlated with when, if at all, firms chose to mothball or close facilities as other factors, not least the availability of carbon credits, influenced these decisions.

79. In summary we were able to calculate the gross MEA value of assets used by each firm (in 1 January 2007 prices) at each of the balance sheet dates for the period of review. The next step was to establish our approach to determining the net MEA values for these assets and then apply that approach to determine the net MEA values for each firm. We first set out what we mean by net MEA values and, by extension, depreciation.

Objective of depreciation and the depreciation profile for cement assets

80. The objective of depreciation in the context of this profitability analysis is to allocate the original real cost of assets through time such that the total real costs per unit of output (depreciation, running costs and normal profit) will fall in line with the prices which a potential competitor would expect to be able to charge in a competitive market.
81. As explained in Appendix 4.1, paragraphs 101 to 103, the appropriate basis on which to value plant and machinery worth replacing for the purpose in hand is the MEA basis. The MEA is the cost of replacing an old asset with a new one with the same service capability, allowing for any differences both in the quality of output and in

operating costs.³⁷ Implicit in this definition is the idea that an older asset would be worth less than a newer asset, not least because the newer asset should, absent any unforeseen shocks, be able to offer a service capability further into the future than an older asset.

82. Net asset values are gross asset values less accumulated depreciation and, if relevant, accumulated impairment losses.

Depreciation defined

83. In order to assess profitability however, we need to establish not only the net value of these assets at each of the balance dates between 2007 and 2011 but also how that value should be expensed across all future accounting periods expected to benefit from the use of that asset.
84. Viewed from the perspective of the expense charged to the profit and loss account depreciation is the measure of the amount of economic benefits of the tangible fixed asset that have been consumed during the period. Consumption includes the wearing out, using up or other reduction in the useful economic life of a tangible fixed asset whether arising from use, effluxion of time or obsolescence through either changes in technology or demand for the goods and services produced by the asset.³⁸
85. This can be contrasted with other sources of loss over time in economic value embodied in tangible fixed assets. The losses arising from these other sources are normally described as impairment losses. Impairment can occur because something has happened to the economic environment in which the fixed assets are operated

³⁷ This is the definition given in Appendix 4.1, paragraph 74.

³⁸ Definition as per FRS15, paragraph 2, p11: www.frc.org.uk/Our-Work/Publications/ASB/FRS-15-Tangible-Fixed-Assets/FRS-15-Tangible-Fixed-Assets.aspx.

such that the carrying value (here the value of the business as determined on CCA principles) falls below the recoverable amount³⁹ for that asset.⁴⁰ One example of a change of economic circumstances would be an unexpected permanent slump in demand leading to excess capacity within the industry.

86. Alternatively, and viewed more from the perspective of the balance sheet, depreciation is the expected decline in the value to the business of assets through time after excluding the impact of any acquisitions and disposals.⁴¹ Because we adopt the financial capital maintenance concept (FCM)⁴² the whole of the expected change in the value to the business of its assets (after allowing for acquisitions and disposals) must be charged to the profit and loss account to reflect the continuing costs of supply.

Expectations are critical to establishing depreciation profiles

87. Some element of depreciation charged to the profit and loss account in any one accounting period can be predicted in advance; however, a charge to the profit and loss account can sometimes arise as a result of unexpected events during the period. As determining the overall depreciation charge to the profit and loss account in any one period necessarily involves taking a view about the value of the asset at both the beginning and end of the period, depreciation can only be assessed on the basis of expectations about the future. Such expectations may well not be fulfilled precisely as envisaged, and indeed usually are not. But a view about the future is always involved in estimating depreciation.

³⁹ The recoverable amount is the higher of net realisable value ('exit' value) and value in use. See Appendix 4.1, paragraphs 68–73.

⁴⁰ Definition of impairment as per FRS11, paragraph 2, p6: www.frc.org.uk/Our-Work/Publications/ASB/FRS-11-Impairment-of-Fixed-Assets-and-Goodwill/FRS-11-Impairment-of-Fixed-Assets-and-Goodwill.aspx.

⁴¹ As a result depreciation in this context would include changes to asset values resulting from the changing price of the asset but not asset impairment charges. These latter costs relate to unexpected losses in values.

⁴² As explained in Appendix 4.1, paragraphs 76–78.

Factors determining asset life

88. In the following paragraphs, we closely follow the approach set out in the Byatt Report (see Chapter 2, Principles of Fixed Asset Valuation). Before determining the profile of depreciation (ie how that remaining value ascribed to an asset at the beginning of the period should be expensed across all future accounting periods including the next one), we first need to consider which factors, taken together, determine an asset's useful life. For those assets which are worth replacing⁴³ the economic useful life of an asset ends at the time that would keep the average costs of holding and using the asset throughout its life within the business to a minimum. In principle these costs will be influenced by:
- (a) rising real running costs resulting from any increases in repairs & maintenance costs and/or in the value of production lost through increased breakdowns;⁴⁴
 - (b) obsolescence resulting from technological progress embodied in newer assets;
 - (c) the expected levels of output; and
 - (d) the opportunity cost of capital.
89. The opportunity cost of capital, in this context the firm's cost of capital, is relevant here because a big upfront investment which will only fully pay back years into the future will, all other things being equal, encourage further use of the existing asset if at all possible.
90. In any accounting system determining the economic useful life involves taking a view of when technical progress, declining markets or rising operating costs will make continued use of the asset unprofitable. Under HCA there can be a tendency to use a deliberately short estimate of asset lives, either as a way of making profits prudently conservative, perhaps in part to deal with inflation, or as a way of dealing with rapid

⁴³ That is to say, expected revenues from use of the asset exceed economic costs, ie costs assessed on a replacement basis.

⁴⁴ We understand, however, that once any teething problems have been ironed out, and provided that a plant is properly operated and maintained, there would be no reason to expect lower output or outages from a cement plant as it ages.

technical progress. In measuring economic costs, however, it is important that asset lives for our purposes be unbiased estimates of economic lives.

91. In principle an integrated cement works will comprise a number of assets each potentially having a different economic life. The most substantial element is the kiln itself. However, this element may not be the asset with the longest expected useful asset life. For example, Irish Cement provided the summary shown in Table 6 in relation to its Platin works commissioned in 2009 with a clinker production capacity of 1.3 Mt per year.

TABLE 6 An analysis of total expenditure capitalized re the new Platin cement works

Description	£m (at €:£ rates in)		€m	%
	2007	2009		
Kiln plant	[X]	[X]	[X]	[X]
Storage facilities/silos	[X]	[X]	[X]	[X]
Raw mill & materials	[X]	[X]	[X]	[X]
Cement mill	[X]	[X]	[X]	[X]
Cement mill feed, cement transport & conveyor system	[X]	[X]	[X]	[X]
Engineering & administration buildings	[X]	[X]	[X]	[X]
Electrical rooms & high tension power	[X]	[X]	[X]	[X]
Control equipment & instrumentation + laboratory	[X]	[X]	[X]	[X]
Subtotal	[X]	[X]	[X]	[X]
Capitalized interest	[X]	[X]	[X]	[X]
Grand total including capitalized interest	[X]	[X]	[X]	[X]
1 Mt equivalent	[X]	[X]	[X]	[X]
<i>Summary by expected useful life as per Irish Cement's financial statements</i>				
40-year life			[X]	[X]
30-year life			[X]	[X]
15-year life			[X]	[X]
			[X]	[X]

Source: CC analysis based on CRH (owner of Irish Cement) supplied information.

Note: Cost in £ of Irish Cement plant at Platin depends on €:£ exchange rate used (range 1.4605:1 (2007) to 1.1222:1 (2009)).

92. Based on this analysis we considered it reasonable to simplify the analysis, at least in the first instance, by assuming a single expected useful asset life based on that of the kiln. It would appear that only a small proportion of the total investment relates to assets with a relatively short (here 15 years) life. Other assets are expected to have even longer asset lives.

Factors influencing the depreciation profile

93. When firms invest in long-lived assets, particularly specialized assets for which there are not necessarily any alternative uses, they are in effect taking a view of over what time frame, and to what extent in each period within that time frame, they expect to reap the benefits of utilizing these assets. The firms make this judgement when they initially invest in these assets, and subsequently review this judgement whenever they prepare financial statements.
94. So that an asset's depreciation profile reflects the pattern in which the asset's future economic benefits are expected to be consumed, we need to take into account, either explicitly or implicitly, the impact of:
- (a) *Rising running costs*: where running costs are expected to rise in real terms over the life of the asset, depreciation should fall as the asset gets older.
 - (b) *Technical progress*: if the real cost of capital equipment is expected to fall through time, depreciation should be accelerated ('tilted' depreciation).⁴⁵
 - (c) *The opportunity cost of capital*: compared with straight-line depreciation, introducing the opportunity cost of capital as the only extra consideration raises depreciation in later years such that, once the expected return on the falling net asset value is factored in, the total capital charge is constant through time ('annuity depreciation').⁴⁶
 - (d) *Expected output levels*: to adopt straight-line depreciation is tantamount to assuming that an asset produces a constant output throughout its life.⁴⁷ If output

⁴⁵ This is because in the typical case the real replacement cost of assets are falling as a result of technical progress in capital goods. In a competitive market this will be translated into falling costs facing a new competitor.

⁴⁶ However, in our profitability assessment we take account of this opportunity cost of capital by comparing the return on capital employed (excluding any consideration of this opportunity cost except for its impact on the depreciation profile) with the firm's cost of capital (see Appendix 4.1, paragraphs 53–57). Because we take into account one cost, depreciation, in our assessment of economic costs and the other cost, the opportunity cost of capital, in our assessment of the firm's cost of capital, the depreciation charge to the profit and loss account is not constant across time.

⁴⁷ Consistent with the footnote to paragraph 88(a), it may be reasonable to expect constant output over the life of the asset once any teething issues have been addressed. We understand that, rather than a drop-off in capacity with age, it may in fact be possible to boost output without incurring any further capital outlay.

is expected to change over the life of the asset, depreciation should be profiled over planned output levels (unit of production depreciation).

95. It is most unusual when preparing GAAP⁴⁸ financial statements to explicitly allow the time value of money, here the firm's cost of capital, to influence the depreciation profile and therefore the asset values at the end of intermediate accounting periods. There is a natural caution regarding any argument which allows costs to be deferred into the future. Nevertheless, if the opportunity cost of capital is an important factor, as it is with long-lived assets, it is strictly necessary to take this into account in profiling the depreciation through time to get an accurate estimate of the current value of the asset. Only then will accounting costs be in line with economic costs.
96. When we are in fact able to take into account all these factors outlined in paragraph 94, then the total real costs per unit of output (depreciation, running costs and normal profit) will fall in line with the prices which a potential competitor would expect to be able to charge in a competitive market. In this world the expected profitability of buying the asset at the beginning of the accounting period, using it during the period and selling it at the end will equal the normal profit rate. This will be true of any period during the life of the asset. A unique profile of the decline in asset values or depreciation will be determined. Here depreciation is a forward-looking concept and the original real investment expenditure will only be recovered through the (expected) current cost depreciation if expectations are fulfilled.
97. It is a profile such as those illustrated in Figures 1(a) and 1(b) in paragraph 109, and again in Figure 2 in paragraph 119 which we would expect to determine the recovery of capital costs, both depreciation and the cost of capital, within prices in a competitive market.

⁴⁸ GAAP = generally accepted accounting principles. For the current purpose we are not constrained by GAAP.

Review of evidence to inform selection of asset life/depreciation profile

Asset lives

98. Cement kilns, the heart of the cement-making process and most expensive and technically complex part of the cement plant, appear at least in some cases to have (had) very long operational lives. These lives can be significantly longer than 40 years, the current upper limit to the economic useful life ascribed to these assets in the GB cement producers' financial statements.

TABLE 7 **Analysis of age of GB cement kilns at the beginning of the period of analysis**

		Year	Age at 1.1.2007 (years)	
<i>Kilns still in use at January 2013</i>				
Aberthaw A5	Lafarge	1967	40	
Hope B1	Lafarge	1970	37	
Hope B2	Lafarge	1970	37	
South Ferriby A3	Cemex	1978	29	
Ribblesdale A7	Hanson	1983	24	
Cauldon B1	Lafarge	1985	22	
Dunbar B1	Lafarge	1986	21	
Ketton A8	Hanson	1986	21	
Rugby A7	Cemex	2002	5	
Tunstead A2	Tarmac	2004	3	
Padeswood A4	Hanson	2005	2	
<i>Kilns shut after 1 January 2007</i>				
Westbury A1	Lafarge	1962	45	Closed 2007 (wet process plant)
Barrington A4	Cemex	1964	43	Closed 2008 (wet process plant)
Westbury A2	Lafarge	1965	42	Closed 2008 (wet process plant)
South Ferriby A2	Cemex	1967	40	Mothballed 2008
Northfleet A2	Lafarge	1970	37	Reserves ran out/planning permission expired
Ketton A7	Hanson	1977	30	Mothballed 2008

Source: CC tabulation of firm-supplied information.

Our interpretation of the evidence on asset lives

99. The basic technology for producing and grinding clinker to produce cement is mature, with only evolutionary developments seen in new plant and machinery in the last couple of decades. However, the context for cement production has changed significantly over the same time frame. The drive to limit harmful emissions, not least carbon emissions, did not begin until the 1990s and has become an ever more important consideration. Likewise the real cost of fossil fuels, used in particular to heat the kiln and transport materials by road, has risen significantly in real terms over the past decade. As a result of the increasing complexity required to cost-effectively

address these challenges, the capital cost of new, more efficient, kiln technology has risen continually in recent years.⁴⁹

100. The payback rate on the investment can therefore be small. As a consequence the cement producer can typically continue to operate its old assets long after they have ceased to be the latest model. Only much later in the asset's life will it become the long-term cost-minimizing option to commission a new cement plant. In these circumstances, rapid technological catch-up may only be possible in an expanding market.⁵⁰
101. We also understand that firms will generally not consider investing in a new cement works unless there is something like at least 50 years' worth of limestone reserves readily available.⁵¹ This suggests that investors may aspire to returns on their investment in a cement works over a period of at least 50 years.
102. We understand that the biggest threat to the economics of older plants, and therefore their useful economic lives, is likely to be ever stricter environmental regulation. These regulations have become continually stricter over time in GB and older plant is less likely than newer plant to be able to meet any given emissions limits. It seems likely that eventually it may not be economic to modify plants to meet any stricter emissions regulations that may be imposed as the required investment in filters etc would simply be too great. Currently the economic viability of older plants does not appear to be threatened but this may change in the longer term.

⁴⁹ The greater complexity of modern plant, for example associated with more complex fan and drive systems, may also, we understand, lead to reliability issues compared to older plant.

⁵⁰ This and the preceding paragraph are our summary of the analysis of the longevity of UK cement kilns as set out in *Trends in Innovation* (www.cementkilns.co.uk/trends.html#productivity (last edit 13 October 2012)—in particular the paragraph beginning 'In the above few charts'). www.cementkilns.co.uk/ is a non-commercial independent educational site authored by Dylan Moore, an expert in the history and geography of the cement industry.

⁵¹ [⌘]

103. Given that investment in the cement kiln once incurred is a sunk cost, it appears to be the case that, so long as the technology of the kiln is not so obsolete (nor unable to be upgraded to, for example, meet new environmental standards) that current out-of-pocket operating costs are prohibitive when compared with the full costs of rival producers operating more modern kilns, operational lives can be, if not indefinite, very long indeed.
104. [X]
105. We also note that the kilns at the Hope cement works do not appear to have the precalciners that the most modern cement works (eg Rugby, Tunstead, Padeswood and Platin) now have—see Table 3. This indicates that the absence of the latest technology is not of itself a bar to profitable cement production operations.
106. For a cement plant to have such a long economic useful life it would need to be located where (a) sufficient demand for the cement within the plant's economic delivery distance endures, (b) there remains cost-effective access to the key raw material inputs such as limestone or chalk, and (c) the firm continues to have a licence to operate from that site.
107. These limitations on useful economic life hold true for all cement plants regardless of age. Even the most modern cement kiln which is distant from its key raw material inputs and in a position where, compared with other plants in the market, it is expensive to transport the finished product to centres of demand, may only operate on a marginally profitable basis. If there is then an unexpected change in input prices (eg an increase in the price of fuel for the lorries used to transport cement) not envisaged at the time of investment or an unexpected permanent drop in demand, then it is

likely that such a plant, as the producer with the highest short-run marginal costs, will exit the market.⁵²

108. We do not expect cement production to become commercially obsolete over the next 50 years. Over the 20-year period up to the sharp fall in demand in 2008 there had, however, been a generally declining trend in production. This structural decline in cement production in part arises from the (partial) switch in use of construction materials for commercial buildings from concrete (whose key input by value is cement) to steel and glass.

Implications of different depreciation profiles

109. Paragraphs 93 to 97 above have briefly set out the various considerations that are likely to be most relevant to determining an asset's depreciation profile. Some of these considerations argue for accelerated depreciation (ie a convex profile for the associated MEA values over time as shown in Figure 1(a) compared with straight line, others for delaying depreciation (ie a concave profile as shown in Figure 1(b)). Whether on balance such sophistication in the analysis is material in the light of necessarily imprecise assumptions concerning asset lives and use patterns is an empirical matter. With a fair mix of asset lives and a balance between old and new assets, straight-line or declining balance⁵³ depreciation may well prove an adequate approximation.

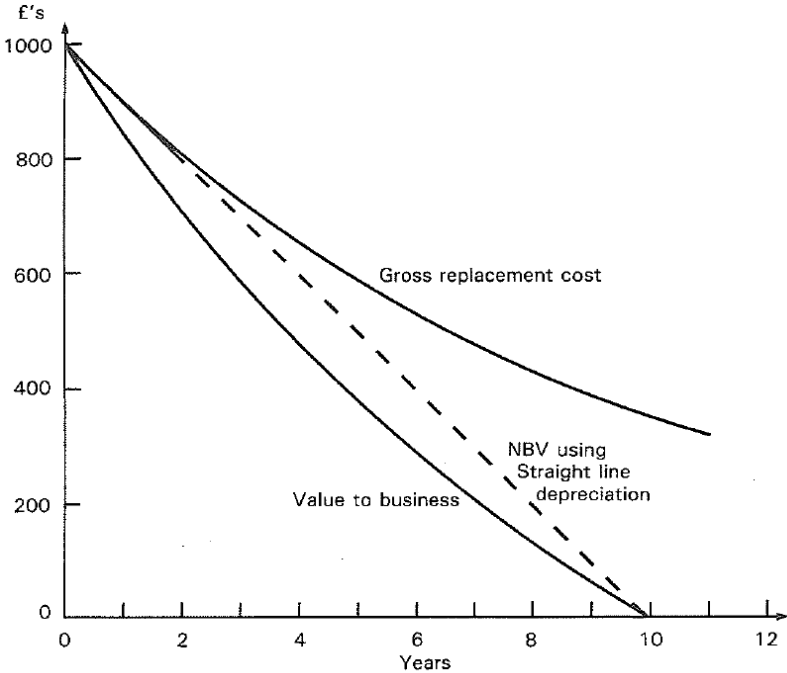
⁵² [X]

⁵³ Declining balance depreciation involves applying a set percentage against the non-depreciated balance for each period. Instead of spreading the cost of the asset evenly over its life, this system expenses the asset at a constant rate, which results in declining depreciation charges in each successive period.

FIGURE 1(a)

Loss in value over time in the MEA value: convex profile

CHART 2.3 Value to business of asset with falling replacement costs
(see paragraph 2.39)

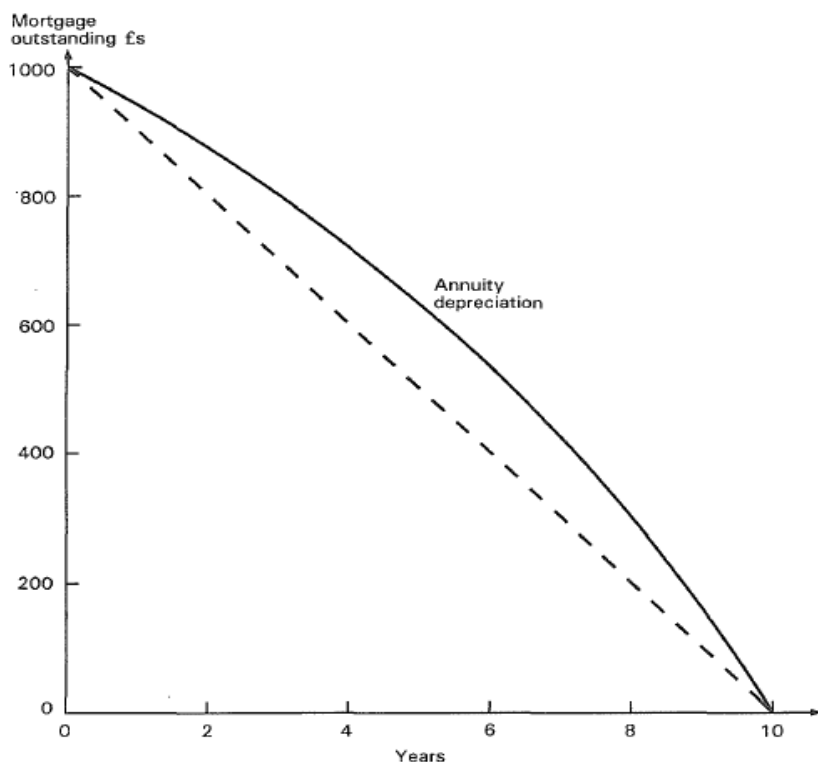


Source: Byatt Report, Volume II, p21.

FIGURE 1(b)

Loss in value over time in the MEA value: concave profile

CHART 2.6 Outstanding value of mortgage (see paragraph 2.43)



Source: Byatt Report, Volume II, p23.

110. More sophisticated techniques may, however, be needed for small numbers of individually expensive assets and where assets within a material class of assets are purchased or built unevenly over time so that a large number of them are of the same or very similar age.⁵⁴ This is exactly the situation we have with the GB cement producers' cement asset portfolios as summarized in Table 8.

⁵⁴ This point is made in *Straight Line Depreciation as an Approximation for Declines in Current Cost Values of Assets*, Annex 4 of The Byatt Report, Volume II, p133, paragraph 14 ii).

TABLE 8 Age profile of cement assets in use by cement producer across the period 2007 to 2011

	<i>Year commissioned</i>	<i>Type</i>	<i>Process</i>	<i>Withdrawn</i>	<i>Reason</i>
Lafarge					
Aberthaw A5	1967	Suspension preheater kiln	Dry		
Hope B1	1970	Suspension preheater kiln	Dry		
Hope B2	1970	Suspension preheater kiln	Dry		
Cauldon B1	1985	Precalciner kiln—4 stages	Dry		
Dunbar B1	1986	Precalciner kiln—4 stages	Dry		
Westbury A1	1962	Wet process kiln	Wet	18/9/2008	Mothballed and then closed
Westbury A2	1965	Wet process kiln	Wet	30/4/2009	Mothballed and then closed
Northfleet A2	1970	Semi-wet process kiln	Semi-wet	3/5/2008	Closed—expiry of quarry planning permission
Hanson					
Ribblesdale A7	1983	Suspension preheater with air-separate precalciner—4 stages	Dry		
Ketton A8	1986	Suspension preheater with air-separate precalciner—4 stages	Dry		
Padeswood A4	2005	Precalciner kiln - 6 stages	Dry		
Ketton A7	1977	Suspension preheater kiln—4 stages	Dry	30/6/2008	Mothballed
Cemex					
South Ferriby A3	1978	Lepol	Semi-dry		
Rugby A7	2002	Precalciner kiln—2 stages	Wet		
Barrington A4	1964	Wet process kiln	Wet	10/11/2008	Closed—size not economically viable
South Ferriby A2	1967	Lepol	Semi-dry	31/3/2009	Mothballed
Tunstead A2	2004	Precalciner kiln—4 stages	Dry		

Source: CC tabulation of firm-supplied information.

111. We do not have detailed insight into all the factors influencing decisions on economic useful lives and their associated depreciation profile for individual (groups of) cement assets. This detailed insight can only come from deep experience of commissioning and operating a portfolio of cement works including the individual cement works in question. However, we used the information and understanding we gained during the course of our investigation to seek to establish the dominant factors which appeared to be determining the behaviour in the market we observed with the regard to the use of cement assets. We then used that information to establish our best estimate of both the asset values at each period end and the associated depreciation.

We chose the 'declining balance' depreciation profile to reflect the economic benefits firms derive from using their cement assets

112. Having set out the all the factors likely to influence the depreciation profile for cement assets in paragraphs 94 to 97 above, and the impact of these factors illustrated in paragraph 109, we chose a declining balance 'convex' depreciation profile, declining at 3.5 per cent per year in perpetuity. Two of the four factors which taken together determine this profile (and asset lives), namely rising running costs and technical progress, predicate a convex profile, the third factor, expected output levels, predicates a straight-line depreciation profile and the final factor, the opportunity cost of capital, predicates a concave profile.
113. We chose the declining balance profile primarily because it is consistent with our observation that:
- (a) cement plants/kilns, so long as they have economically viable locations, can and do have very long economically useful asset lives; and
 - (b) there is no clear use-by date for a cement works—older plants/kilns can typically remain commercially viable so long as they are properly operated and maintained.
114. We selected a yearly diminution rate of 3.5 per cent because it did not appear to result in an unrealistically high MEA value for older assets and was consistent with a realistic expected useful asset of the order of 50 years but with no sharp cut-off.
115. Lafarge Tarmac, Cemex and Hanson disagreed with the expected asset life implicit within our depreciation profile and the shape of the profile. Lafarge Tarmac, on the one hand, told us that the useful life of a cement plant was dependent not on the age of the kiln, but on the available limestone reserves' remaining reserve life, which varied between 40 to 80 years for its four remaining cement plants. It argued for, if not an undepreciated MEA value, then a less aggressive depreciation profile which

better reflected the long lives of GB cement plants. It pointed to the CC's treatment of assets with very long asset lives, hospital buildings, within the profitability analysis working paper for the Private Healthcare market investigation.⁵⁵

116. Cemex and Hanson, on the other hand, suggested that a shorter expected useful life might be more appropriate. Cemex told us that other (more aggressive) diminution values, such as 8 per cent per year rather than 2.5 per cent, would be reasonable and that it ascribed lives of 30 to 40 years to these assets in its accounts. Cemex also told us that it would be an oversimplification to assume a single asset life.⁵⁶

Hanson performed a sensitivity analysis with 40 rather than 50 years. It also told us that the annuity profile (as illustrated in Figure 1(b)) rather than a declining balance profile (as illustrated in Figure 1(a)) may be more appropriate.

117. We considered there was no evidence to suggest that cement assets have anything other than a finite useful economic life. For example, the current record for the longevity of a kiln, the key and typically the most long-lived asset in a cement works, was 67 years held by the Sundon A2 kiln (1909 to 1976).⁵⁷ In addition, we sought to assess the economic life of the plant and machinery assets and not limestone reserves. The availability of reserves instead acted as a potential constraint on the length of commercially viable cement production at a particular location.

118. We acknowledged that our chosen depreciation profile was based on empirical observation rather than a mathematical synthesis of all the factors likely to influence the loss in value over time of a cement plant. In particular we considered that emphasizing only one of these factors' influence on the depreciation profile, such as the time value of money, would not necessarily take account of the best information

⁵⁵ www.competition-commission.org.uk/assets/competitioncommission/docs/2012/private-healthcare-market-investigation/130301_profitability_wp_non_confidential.pdf.

⁵⁶ We set out our response to the 'oversimplification' point in paragraph 143.

⁵⁷ See 'kilns that operated over more than 60 years' at www.cementkilns.co.uk/trends.html (last edit 13/10/12).

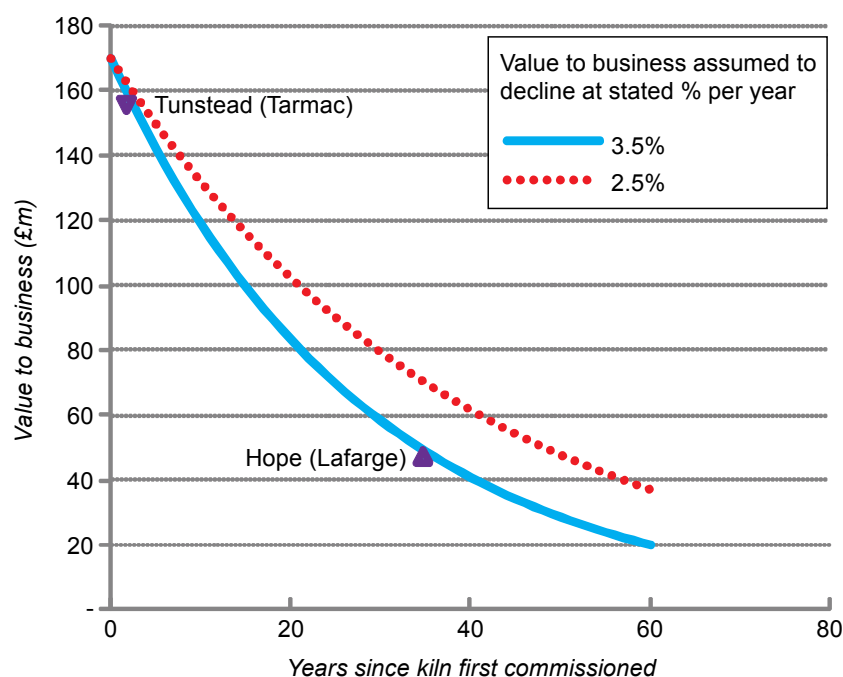
available taken all together. We are therefore considering developing a custom depreciation profile to refine our analysis of GB cement producers' profitability.

Illustration of chosen profile

119. To illustrate what this profile looks like, we graphed over time the asset valuations which are generated from the application of this profile. It assumes that a brand new MEA plant capable of producing 1.0 Mt of clinker per year would have cost £170 million at 1 January 2007. This profile of asset values over time is in real terms, ie each single data point is determined in 1 January 2007 prices.

FIGURE 2

Modelled decline in values as a function of age for reference cement plant, ie capable of producing 1.0 Mt clinker per year (all £m are real as at 1 January 2007)



Source: CC.

120. The Tunstead plant was two years old⁵⁸ as at 1 January 2007 and therefore its 'normalized' MEA value is assessed as £158 million. By way of contrast the Hope plant was 36 years old and therefore its 'normalized' MEA value is assessed at

⁵⁸ The computed ages for Tunstead and Hope have been calculated with reference to 31 December 2006.

£47 million. 'Normalized' means that these values have been generated as if the plants in each case were capable of producing 1.0 Mt per year.

121. As we established the gross value of assets on the basis of the MEA plant, the selected depreciation profile should not in principle capture any reduction in valuation between the like-for-like replacement value and the MEA value for that asset.⁵⁹ To do otherwise risks double counting this loss in value—once in valuing the assets at the outset, and secondly by an overly accelerated depreciation profile during the period of analysis.

122. Lafarge Tarmac told us that the values we had placed on Lafarge's plants were significantly less (between 45 and 60 per cent) than the fair values⁶⁰ estimated in order to value the assets contributed to the JV by each of Lafarge and Tarmac, and as a result we had underestimated the value of its assets in our analysis. Lafarge Tarmac noted that, in accordance with IFRS, fair value was the amount for which an asset could be exchanged between knowledgeable, willing parties in an arm's length transaction. As noted in Appendix 4.1, we are interested in economic costs where the costs of resources reflect the price they would be traded at in a highly competitive market where entry to and exit from the market is easy. This benchmark is different from that of the 'fair value', particularly if these values were to reflect any economic rents associated with existing cement assets. We therefore considered that fair values were unlikely to be relevant for our purposes.

Impact of chosen profile on individual firms' calculated returns

123. Our chosen depreciation profile is an approximation of the expected loss of value over time and it is not plant or firm specific. Consequently each of the individual

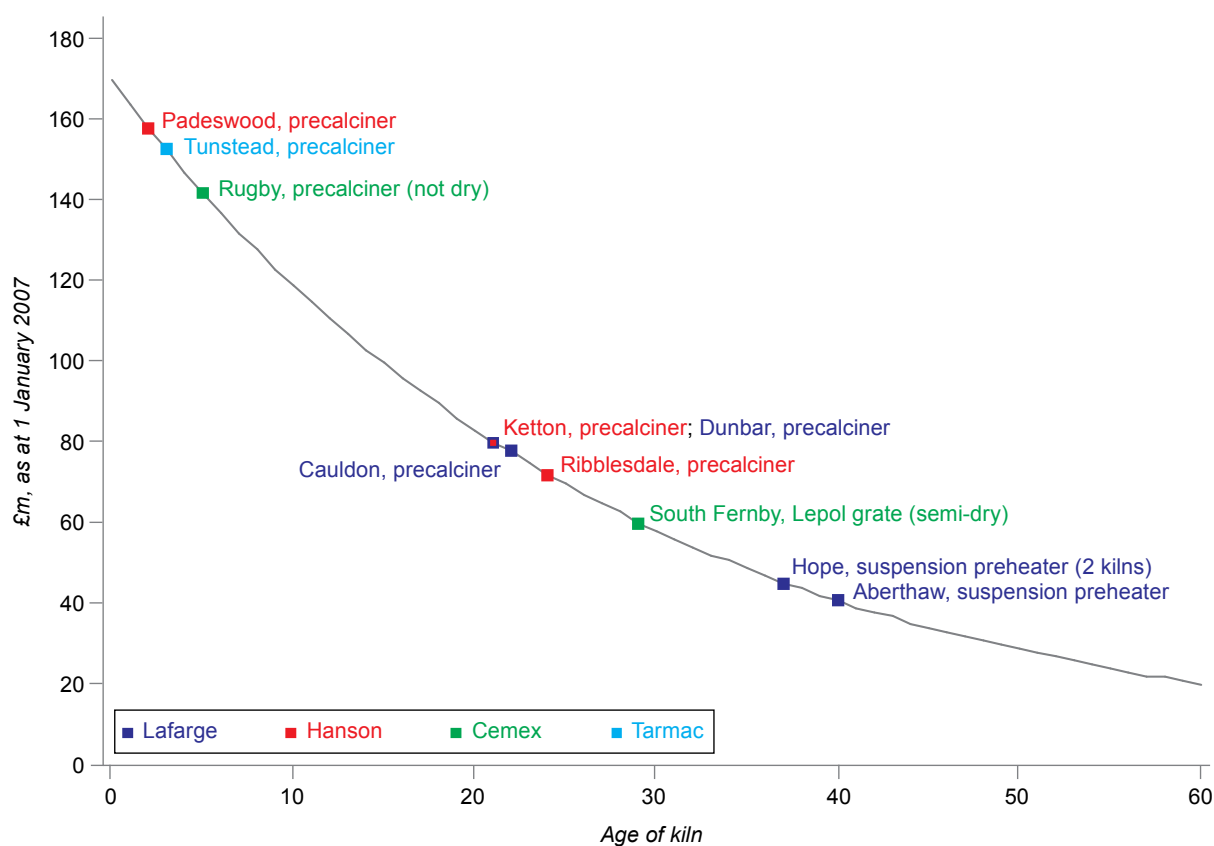
⁵⁹ We did not, however, attempt to factor into MEA values the higher operating costs associated with operating older plant.

⁶⁰ Lafarge Tarmac described these fair values as [REDACTED].

cement producers' results are influenced to a significant extent by the weighted average age of their cement plant portfolio, with Lafarge at one extreme owning a portfolio of older plants and Tarmac owning a single almost brand new plant at the other extreme. Both Hanson and Cemex are in between these two extremes, with Hanson tending to own older plant and Cemex newer plant. This distribution is illustrated in Figure 3.

FIGURE 3

Relationship between ages of cement plant' kilns and CCA asset values at 1 January 2007 (kilns in operation at 31 December 2011 only)



Source: CC based on firm-supplied information.

Notes:

1. [X].
2. [X].

124. We therefore consider that caution on this account should be exercised when interpreting individual firm ROCEs. This is because the loss in value we ascribe to a further year's use of the firm's assets, which in our modelling is solely a function of its age, may diverge from reality. However, as can be seen from Figure 3, across all

firms, there is a reasonable spread across time of investment in cement works. We consider that, by calculating a weighted average across all four GB cement producers, this divergence between modelled CCA asset values and their actual value (in a competitive market) is more likely to net out across the population of cement plants across GB, and therefore in turn net out the impact of the precise depreciation profile adopted on our assessment of the level of CCA profitability in this sector to some extent. As noted in paragraph 118, we are considering developing a custom depreciation profile to refine our analysis of GB cement producers' profitability.

125. Figure 3 also highlights the different generations of cement kilns in use. Currently there are three types of kilns in use in GB: precalciner⁶¹ (seven examples), suspension preheater⁶² (two examples) and Lepol grate (one example).

The final abandonment of the remaining wet process kilns in the period of review

126. A wet process plant has at least 50 per cent higher thermal energy costs than a dry process plant simply to evaporate the water, and thermal energy is the single largest element of manufacturing costs.⁶³
127. As evidenced by Table 8, no fully wet process kilns were commissioned after the oil price crisis in 1973: the real price of energy rose so substantially as to make them uneconomic to build. In other words, in terms of their then-current replacement cost, their value was impaired. However, these plants were still worth operating as the original investment was sunk.

⁶¹ *Precalciner*: there is a separate furnace at the base of the preheater which calcines the limestone before it enters the kiln. The precalciner uses 60 per cent of the overall fuel burnt. For a given dimension for the size of the rotary kiln one would get more than double the capacity of clinker output than with a suspension preheater kiln.

⁶² The preheater is at the back part of the rotary kiln. The rotary kiln has to do more thermal work than with the precalciner type and as a result the rotary kiln has to be longer.

⁶³ See footnote to paragraph 71.

128. This history is relevant to the calculation of impairment losses described here in that we ascribed these plants—the most notable example being Lafarge’s plant at Northfleet—asset values as though they were in fact dry plants. In reality, the true MEA values of these wet process plants would have been much lower as one would also have taken into account their substantially higher operating costs.
129. It is notable in the context of the economics of cement production that much plant whose value was substantially impaired in the wake of the 1973 oil price crises only exited commercial production in the following century.

Our estimation of the value of each firm’s cement assets

130. Having established an individual normalized value for each plant at t=0 (1 January 2007), we calculated a weighted average normalized value to take account of the actual portfolio of cement assets owned by each cement producer. Individual values were weighted by the output of each plant in the period. We also worked out how many plants, or fractions of plants, were needed to support the actual clinker output produced in the preceding year. We then applied this multiple to our weighted average normalized figure to generate a valuation for total cement plant and machinery assets. We allowed an operating capacity margin of 30 per cent, ie we increased asset values by 30 per cent. Most production-line businesses do not operate at full capacity all the time and we took this into account in our asset valuations.

We converted real asset valuations into nominal valuations

131. Finally, we converted all our figures from real into nominal pounds by applying our cement asset price inflation estimates to our 1 January 2007 values. We assumed 2.5 per cent rise in each of the five years.

132. We consider that the rising real cost of kilns should be seen, at least in part, as a trade-off between upfront capital costs and operating costs: a higher upfront investment should repay through lower operating costs over the lifetime of the asset.⁶⁴ Hence it would be wrong to point to the rising cost of replacement kilns to argue that the overall cost of producing cement has gone up to the same extent.
133. It is these modelled CCA asset value estimates in nominal terms that we substituted for the previously given HCA asset values.
134. These modelled values, however, do not allow for the fact that, in principle, these calculated MEA asset values should be reduced if the out-of-pocket costs of operating the existing plants are higher than with the MEA plant. To the extent that existing plants do have higher cement production costs, then the modelled asset values will be overstated.

Using these asset values we calculated expected depreciation and impairment losses in each period

135. Once we had obtained our estimates of the net CCA asset values at each balance sheet date, the final step was to model what changes in asset values from one period to the next arose from the consumption of economic benefits (depreciation) and what changes arose from other sources (eg impairment losses)
136. We first of all established the depreciation charge (in real terms) by comparing asset values at the beginning of the accounting period with the values for those assets expected at the beginning of the period to prevail at the end of the accounting period. As previously explained depreciation is a forward-looking concept.

⁶⁴ See paragraph 99 for the basis of this interpretation.

137. We then inflated these depreciation charges from real into nominal terms for each of the periods. This element of depreciation is sometimes referred to as operating capability maintenance (OCM⁶⁵) depreciation as it is the amount of depreciation required to maintain the operating capability of the plant.
138. We also worked out the inflationary 'holding' gains element to depreciation accruing in each period as a result of assuming that asset prices increased by 2.5 per cent a year over the period of analysis.
139. Impairment losses were the balancing difference. In this way the charges to the profit and loss account, be they labelled depreciation, holding gains or impairment losses, were consistent with the values we ascribed to the assets at every period end. Our approach assumed that any assets surplus to requirements did not have any value. As previously explained in paragraph 66, these assets are worth something if there is the prospect in the distant future (eg the economy returns to previous levels of production) that they can be used once more in cement production. To the extent that these assets are worth something (ie option value), then the numbers we generated will overstate the extent of the impairment losses.

Treatment of subsequent expenditure

140. As noted in paragraph 48 we assumed for the purposes of this exercise that all the necessary assets were acquired at the same point in time. We also explained the accounting treatment we would expect when firms needed to periodically replace some elements of their asset base.
141. Lafarge Tarmac told us that cement plants incurred regular and substantial expenditure aimed at improving efficiency and extending the plants' useful economic life. For

⁶⁵ Maintenance of the ability to supply the amount of goods and services which a business is able to supply with its existing resources in the relevant period. This definition is as set out in the glossary of the Byatt Report, Volume II, p136.

example, kilns, silos and milling facilities could be upgraded or replaced, extending the life of a cement plant. In the case of its former cement works at Hope, Lafarge had invested £[X] million over 2005 to 2012 in alternative fuels, production equipment upgrades, revamping and maintenance, rail capabilities and expanded the cement capacity of its plant. As already noted in paragraph 116 Cemex told us that we had oversimplified by assuming a single asset life.

142. In response to these points we considered all the potential types of subsequent expenditure in more detail and set out the results in Table 9.

TABLE 9 Subsequent expenditure on tangible fixed assets

<i>Type of expenditure</i>	<i>Accounting treatment</i>	<i>Treatment in our modelling</i>
<p>Repairs and maintenance Expenditure to ensure that an asset maintains its previously assessed standard of performance ('repairs and maintenance')</p>	<p>Expensed: recognized (or expensed) in the profit and loss account as it is incurred</p>	<p>These repairs and maintenance costs should be included within 'costs excluding depreciation' category as shown in Tables 11 and 13(a) to (d)</p>
<p>Component asset Where a component of the asset has been treated separately for depreciation purposes, and depreciated over its individual useful economic life, is replaced or restored</p>	<p>Capitalized: this is a replacement asset for the component which has come to the end of its useful economic life</p>	<p>We have made a simplifying assumption and adopted a single depreciation profile/asset life. As long as our assumed asset life reflects an appropriate average, then the fact that some components do not last as long (or in fact last longer than average) means that this simplifying assumption is reasonable</p>
<p>Overhaul spend Expenditure relating to a major inspection or overhaul of an asset that restores the economic benefits that have been consumed by the firm and have already been reflected in depreciation</p>	<p>Capitalized: this expenditure restores the (wider) asset to its former glory</p>	<p>This type of expenditure is similar in principle to replacement expenditure on 'component assets' as above and therefore the same considerations apply</p>
<p>Enhancement spend Expenditure which provides an enhancement to the economic benefits of the asset beyond the previously assessed standard of performance</p>	<p>Capitalized: this is a 'new' asset</p>	<p>We need to distinguish between investment to:</p> <ul style="list-style-type: none"> • increase clinker output; • upgrade plants to meet the MEA; and • extend the capability of the existing asset beyond the MEA. <p>Only the last category would be expenditure that would not in principle be captured in our modelling. We automatically reflect the impact of expenditure which boosts clinker output on asset values as a by-product of the approach to calculating impairment losses/gains as set out in paragraphs 75 and 76. As we already place a full (ie unadjusted) MEA value on existing assets, it would be double counting to also reflect expenditure in our modelling to meet the MEA.</p>

Source: FRS 15: Tangible Fixed Assets, pp22 & 23, www.frc.org.uk/Our-Work/Publications/ASB/FRS-15-Tangible-Fixed-Assets/FRS-15-Tangible-Fixed-Assets.aspx and CC analysis.

143. We concluded that, so long as our depreciation profile/implicit asset life assumptions were reasonable and we identified any investment in assets during the period of review which extended the capability of the cement works beyond the MEA as at 1 January 2007, then we would not omit expenditure which boosted the efficiency and life of assets. We considered our depreciation profile/asset life assumptions to be reasonable, particularly across the population of cement plants across GB, and that our modelling approach represented a warranted simplification. We were also not aware of any significant investment by GB cement producers which extended the capability of cement works beyond the MEA during the period.⁶⁶

We did not adjust net asset MEA values to take account of any higher operating costs

The principle of adjusting for any higher operating costs

144. In principle we should have adjusted net MEA values to take account of the lower running costs (for example, energy consumption and maintenance etc) and any higher functionality associated with more modern plant. The superior operational performance offered by more modern plant make it worthwhile to the new entrant to pay more for the modern asset than for an identical replacement of an old one.⁶⁷ In a similar way a new entrant into a competitive market would pay less for a plant sub-optimally located to its reserves and sources of demand.

145. To make these adjustments one must estimate the net present value associated with the cost disadvantage (ie both forecast the annual disadvantage and the time frame over which it is expected to persist) and deduct that from the net MEA value. The objective of such adjustments is to neutralize any cost disadvantages embedded in the commercial further use of existing plants.

⁶⁶ Lafarge Tarmac told us that since 2007 it had invested approximately £[redacted] million in developing and installing plastic packing machines to sit alongside traditional paper packers at its packing facilities across GB. Plastic provides a more resilient packing and a wider range of storage options. In our view this may be an example of a development in the MEA during the period of review.

⁶⁷ As explained in paragraph 2.7 of the Byatt Report, Volume II.

146. These adjustments would not be trivial. For example, we understand that the more modern precalciner kiln has around a 15 per cent advantage in thermal energy costs over the earlier generation of suspension preheater kilns.⁶⁸ Likewise older ball mills use around 30 per cent more electricity than the latest generation of vertical roller mills and roll presses. This 30 per cent disadvantage translates into a 20/25 per cent disadvantage in overall electricity consumption, one of the major costs of operating a cement plant. As already explained in paragraph 40, the ability to distribute cement to local depots by train is much cheaper than using road transport.
147. Lafarge Tarmac told us that older plants were no less efficient than more modern plants. The efficiency of an individual cement works depended on its technology and not its age. Higher operating costs would have been associated with, and restricted to, the older wet process plants but Lafarge had closed all these towards the beginning of the period of review. Plants with the same technology could operate just as efficiently as each other, even if they differed in age.⁶⁹ Lafarge Tarmac further explained that a combination of operational factors influenced unit costs, namely:
- (a) the availability of raw materials for clinker production at co-located quarries;
 - (b) finished cement product mix, ie the extent to which the plant produced blended cements (which contain other cementitious material inputs instead of ground clinker to a certain extent);
 - (c) plant design factors, for example the operation of two kilns rather than one kiln producing the same overall output or the operation of multiple cement grinding mills rather than one single large mill;
 - (d) use of additional ancillary processing or environmental abatement equipment;
 - (e) the extent to which the plant was operating at or near its designed capacity;

⁶⁸ See first footnote to paragraph 125 for an outline description of the two types of kilns.

⁶⁹ Lafarge Tarmac provided us with analysis which showed that of all its plants its [redacted] plant (commissioned [earlier]) had the lowest fixed and variable unit cash costs (excluding transport costs) for bulk cement for 2011, for example [redacted] per cent less than for [redacted] (commissioned [later]).

- (f) whether the plant had been recently uprated⁷⁰, upgraded⁷¹ or overhauled;
- (g) the alternative fuel capabilities of the plant; and
- (h) the operational performance of the plant such as kiln reliability and mean time between failures.

148. Cemex told us that assets of older vintage might not be less efficient than younger plant but we automatically treated older plant as less valuable. Cemex stated that any adjustments for relative inefficiency were likely to be a zero sum game.

149. We considered Lafarge Tarmac's list of operational factors which influence variations in unit costs across plants and decided that they did not detract from the central premise that newer plant, all other things being the same, was likely to be more efficient than older plant, not least as a result of the factors set out in paragraph 146. In relation to Cemex's point, older plant was less valuable than newer plant because, as explained in paragraph 84, more of the asset had been consumed. We also did not see the question of this inefficiency as being a zero sum game because we would seek to measure it against an absolute standard, the benchmark MEA plant as at 1 January 2007, and not in relation to the 'average' plant at this point. We therefore concluded that the principle of adjusting for any higher operating costs remained valid.

The practice of not adjusting for any higher operating costs

150. We decided against adjusting MEA values in this way on account of the complexity, the need for granular information and the inherent subjectivity of these calculations. We therefore allowed individual firms ROCE to vary on account of some of them owning more modern efficient assets and some of them owning plants situated in

⁷⁰ Uprating occurs when an investment effectively increases the capacity of the plant.

⁷¹ Upgrading occurs when an investment increases the efficiency or capability of a plant within its existing capacity.

superior locations and/or rail-linked. This, however, does mean that, to the extent these adjustments could justifiably have been made, that certain firms' profits will be understated and capital employed overstated. These firms' ROCEs will therefore be understated, and to the extent that these firms' profits are understated, our calculation of overall profitability will also be understated.

151. A by-product of this approach, however, allows individual firm profitability to vary on account of any locked-in operational 'inefficiencies'. Were we to adjust asset values further for this reason, then this would act to level the (expected) playing field between each of the firms.

Treatment of carbon allowances in the analysis

152. There is one other cement-specific element to the approach we have taken to calculate profitability besides how we value firms' cement assets, namely the treatment of the sale of carbon allowances allocated for free to cement producers by the EU.

Background⁷² and accounting treatment

153. As explained in Appendix 2.2, the EU has set up a scheme to incentivize heavy emitters of carbon such as cement producers to reduce their emissions. The EU now obliges such heavy emitters to deliver sufficient carbon allowances at the end of each year of the phase of the scheme to cover the carbon emitted as a by-product of their activities in the intervening period. The EU has granted free allowances to all cement producers which cover the levels of carbon they have emitted based on historical production levels.
154. The EU has set up an exchange on which of these carbon allowances are fully tradable and find their own market price. Some emitters need to purchase at least

⁷² The background description is not intended to be an authoritative description of the EU's carbon trading scheme, rather a concise summary sufficient to illuminate the associated accounting issues.

some allowances on the open market to satisfy their obligations. To the extent that cement producers have been able to outperform historical efficiency levels at historical output levels, or reduce output below the maximum level permitted by the number of allowances they held, they have been able to either sell their surplus allowances at the prevailing market price or to retain their surplus allowances for future use (subject to their use within a certain time frame, namely a given trading phase of the scheme).

155. A new entrant to cement production should not have been disadvantaged against existing producers as they would have been able to obtain as many free allowances as an existing plant of the same capacity.⁷³

156. There are two approaches to accounting for these carbon allowances. The fully articulated approach⁷⁴ recognizes the transactions shown in Table 10.

TABLE 10 **The fully articulated approach to accounting for carbon allowances**

<i>Transaction or event</i>	<i>Accounting treatment</i>
The government (in the form of the EU) grants the cement producer allowances which have a market value	The cement producer recognizes an intangible asset and an equal but opposite government grant at the price prevailing at the outset of the scheme.
The cement producer produces cement	The cement producer makes a provision to surrender allowances to cover the level of carbon it has emitted for the cement produced in the year. The cement producer also recognizes that the government has given it free allowances and amortizes an appropriate portion to the profit and loss account. (The cost of making the provision and the income from the government grant will net out to zero if the initial efficiency and output expectations of the scheme are met.) At the end of the year the cement producer revalues in line with changes in the market price of carbon allowances: <ul style="list-style-type: none"> • the value of the intangible asset; • the value of the government grant; and • the value of the provision to deliver allowances.
At the end of each year the cement producer surrenders carbon allowances to the EU to extinguish its obligation	The cement producer nets off the provision to deliver allowances relating to the year just elapsed against the intangible asset.
And so on until the end of the relevant trading phase of the scheme	By the end of the scheme the intangible asset will have been completely netted off (assuming initial expectation have been realized) against the provision to deliver allowances. In addition the government grant will have been fully expensed to the profit and loss.

Source: CC.

⁷³ This still remains the case under the current trading phase of the scheme (ie Phase III from 1 January 2013 to 31 December 2020), where new entrants would be allocated free allowances based on the efficiency and capacity of their cement works.

⁷⁴ For a detailed worked example, which includes purchases of further rights, see Emissions worked example from HM Treasury: www.hm-treasury.gov.uk/frem_guidance.htm. In this example allowances are surrendered at the end of the scheme.

157. The other approach, which is much simpler, is to recognize only the sales or purchases (or conceivably transfer charges to other group companies) of carbon allowances on the open market. The net result in terms of impact on operating profit and net assets is the same with both approaches at the end of the relevant trading phase. However, to the extent that a cement producer adopting the fully articulated approach has not sold any excess carbon allowances resulting from its outperformance, or from a reduction in its output, by the end of an intervening accounting period, then it is able to recognize the value of these excess carbon allowances on its balance sheet.⁷⁵
158. Hanson is the only GB cement producer which has adopted something approximating the former approach, whilst the other GB cement producers confirmed to us that they had adopted the latter approach. These other GB cement producers, however, do not explicitly refer to their accounting treatment in their statutory financial statements.⁷⁶
159. There is currently no definitive guidance on the proper accounting for emission allowances, with the UK Accounting Standards Board⁷⁷ noting that the achievement of the most appropriate accounting requirement was constrained by other accounting requirements relating to intangible assets and grants.

GB cement producers' views and adopted treatment

160. Hanson noted that it earned €[X] million by selling unused CO₂ allowances between 2005 and 2011 and that, as the EU ETS evolved, the amount of allowances allocated would fall and in the medium term Hanson expected that it would be required to

⁷⁵ This would represent the net balance on the following items: carbon allowances (intangible asset), government grant (funding 'liability') and provision to surrender allowances.

⁷⁶ The same set of financial statements were reviewed as set out in Appendix 4.1, Table 4 (paragraph 118).

⁷⁷ Urgent Issues Task Force Information Sheet #71, *Emissions Rights*, 3 December 2004: www.frc.org.uk/getattachment/92a51e44-df3b-45ae-9dc7-03b35085ab70/UITF-Information-Sheet-71-Accounting-for-Emissions.aspx.

purchase allowances to emit carbon dioxide. According to Hanson, this meant that this additional source of revenues was likely to be a short-term phenomenon. Hanson also argued that the intangible asset should be recognized within its capital employed.

161. In the interests of transparency and simplicity we recognized only the sales, purchases or transfers of carbon allowances in this profitability analysis. We agree with Hanson that the trading scheme introduces a dynamic to the situation and partly for this reason we identified carbon allowances as a separate element of the ROCE—see paragraphs 165 to 167 below. However, we disagree that it is necessary to factor the value of the intangible asset within capital employed. This is because this asset would be matched by an equal but opposite combination of a government grant and a provision to surrender allowances to the EU.
162. The treatment of carbon allowances we adopted for the purposes of this profitability analysis did not affect our assessment of the possible impact of the ETS on competition.

Choice of how we present the results of our analysis

We distinguish between profits based on continuing costs of supply and those of an unexpected or more temporary nature

163. In our presentation of profitability over the five-year period 2007 to 2011 we distinguish between profitability that is of a continuing nature and that which is of an unexpected or temporary nature. By continuing, we mean profitability reflecting the

values of resources used in the production of goods, when values are determined in competitive markets with no barriers to entry or exit for potential competitors.⁷⁸

164. There are two sets of costs and/or income in the time period of review which fall into the 'temporary' and 'unexpected' categories, namely income from the sale of carbon allowances and impairment losses arising from the emergence of permanent spare capacity following the demand slump.

Income from the sale of carbon allowances

165. [X] argued that any earnings from selling spare carbon allowances should be stripped out as extraordinary or exceptional items. According to [X], any assessment of the outlook for the cement business and the associated economic value could not possibly include assumptions regarding recurring carbon revenues. [X] said that, given the short-term and exceptional windfall nature of such earnings, building them into the profitability analysis would distort results. [X] argued that the only view of results that would be reflective of forward-looking profitability would be one that excluded carbon allowances.
166. Our view is that it is valid to include all the profits arising from carbon allowances (described as carbon credits in the tables) when assessing the level of profitability actually earned during the period of review. However, we agree with [X] that this income is unlikely to be reflective of forward-looking profitability (in our terminology profitability based on continuing costs), at least not nearly to the extent that would be suggested by its prevalence during the period 2007 to 2011.
167. We therefore present this source of income in our results as though carbon allowances do not form any part of continuing costs.

⁷⁸ This definition is taken from the Glossary of the Byatt Report, Volume II (p135). Continuing costs include a normal profit on capital employed. The term is used synonymously with the term economic costs.

Impairment losses arising from the emergence of permanent spare capacity

Expected depreciation in contrast to unanticipated change in the value of assets

168. The total of the charges to the profit and loss account in respect of tangible fixed asset—namely OCM⁷⁹ depreciation, holding gains and impairment charges—reflects the total change in the estimates of current cost values of assets between the beginning and end of a period, allowing for acquisitions and disposals. However, it is relevant to split these charges to the profit and loss account during the period between their currently expected and unanticipated elements, that is between (a) the charges during the current period which it is now estimated would have occurred on the basis of current expectations of rates of change in technology, markets etc and (b) the charges which occur because expectations have changed, ie the current view of the future was not anticipated in the previous period. Only costs expected to recur are relevant in measuring the continuing costs of supply.⁸⁰

Depreciation is a continuing cost whereas impairment is not

169. As a result we also concluded that asset impairment losses were not continuing losses in as much as we considered that it was unlikely that GB cement producers would incur further write-down of the value of their cement plants any time soon. We understand that what has recently happened to the demand for cement in GB is unprecedented and that the closest parallel to the severity of the current economic downturn is to be found in the wake of the 1973 oil crisis, which occurred 40 years ago.

170. There are undoubtedly other readjustment costs which the firms will have incurred during the period as they adjusted to the slump in demand. We decided to include

⁷⁹ See footnote to paragraph 137 for a definition of OCM.

⁸⁰ The Byatt Report, Volume II, paragraph 2.17. This paragraph has been modified to reflect that the Byatt Report, which was published in 1986, distinguishes between *expected* depreciation and *unanticipated* depreciation. Nowadays we refer to unanticipated depreciation as impairment. The usage of the term impairment only came into common usage after the publication in 1998 of FRS11: Impairment of Fixed Assets and Goodwill: www.frc.org.uk/Our-Work/Publications/ASB/FRS-11-Impairment-of-Fixed-Assets-and-Goodwill/FRS-11-Impairment-of-Fixed-Assets-and-Goodwill.aspx.

these costs within continuing costs for two reasons. Firstly, reorganizing a business to adapt to changes in market conditions is a normal cost of doing business and it is only the degree of readjustment which occurred during the period of review that is likely to have been exceptional. Secondly, these readjustment costs will largely be revenue expenditure items rather than involving the write-down of capitalized assets which were intended to have brought economic benefits to the firm far into the future.

171. We therefore have two measures of profitability over the period. The first one is based on the continuing costs of supply and is therefore our best current estimate of forward-looking profitability. The second one, which includes all costs incurred and income earned during the period, reflects the actual profitability experienced by the cement producers over the period.

We also present profitability in total across all firms and summarize returns across the five-year period of review

172. As already explained in paragraphs 123 and 124 above, we believe that more reliable conclusions can be deduced from the pan-firm profitability figures than firm-specific profitability. This is because individual firm profitability is heavily influenced by where their assets sit on our chosen depreciation profile.
173. The emergence of permanent excess capacity following the slump in demand has caused impairment losses. We would expect in practice these losses in asset value to crystallize in one, or perhaps two, accounting periods within the period of analysis. However the modelling approach taken to quantify assets surplus to requirements (ie spare capacity),⁸¹ an approach that needed to be able to be applied systematically across each of the cement producers, meant that impairment losses as well as the

⁸¹ The modelling approach is set out in paragraphs 73–79 above.

reversal of impairment losses⁸² were recognized in each of the five accounting periods under review.

174. Due to their significance and the nature of these losses we therefore also calculated a five-year average of profitability returns. This allowed us to derive a net impairment loss across the period, which we considered gave a much better indication of the extent of the underlying impairment losses incurred by cement producers over the period.

175. We set out in Tables 13(a) to 13(d) the impact on the profit and loss account and balance sheet of our CCA adjustments for Lafarge, Hanson, Cemex and Tarmac.

Results

176. In this section we present the results of the profitability analysis in a number of different ways: in total across firms for each year ('pan-firm'), for each cement producer for each year ('firm-specific summarized'), firm-specific results detail for each year and lastly the results of our sensitivity analysis.

⁸² Where clinker output has in fact expanded over the period, the approach taken generates net gains. [X]

Pan-firm results

TABLE 11 Total CCA profit and loss and balance sheets for GB cement producers and ROCE calculated thereon

		Five-year		% of total	Prepared on a CCA basis (£m)					
		Total	Average		2006	2007	2008	2009	2010	2011
Volumes <i>Megatonnes</i>	Cement sales	47.5	9.5		N/A	12.3	10.6	7.8	8.1	8.7
	Clinker production	39.0	7.8		10.1	10.2	8.7	6.4	6.6	7.1
CCA profit & loss	Revenues	3,631	726	100		842	790	640	647	711
	Costs excluding depreciation	-2,874	-575	-79		-667	-655	-515	-504	-533
	CCA depreciation (OCM)	-164	-33	-5		-39	-39	-34	-26	-25
	CCA depreciation ('holding gains')	112	22	3		27	27	23	18	17
	Profits based on continuing costs of supply	705	141	19		163	123	114	135	170
	Carbon credits	121	24	3		1	33	26	35	26
	Impairment losses	-213	-43	-6		41	-124	-189	2	57
	Profits reflecting all costs incurred	613	123	17		205	33	-50	172	253
CCA balance sheet	Plant & machinery/AICC		937	88	1,097	1,127	990	790	784	832
	Other fixed assets		170	16	183	183	199	144	165	146
	Net current assets		21	2	36	36	43	37	-3	-22
	Provisions		-68	-6	-92	-92	-84	-41	-38	-61
	Total net assets		1,060	100	1,224	1,254	1,149	930	907	895
	Average of opening/closing balance					1,239	1,201	1,039	918	901
		Average profits (2007–2011) / average capital employed (%)			Profits/average capital employed (%)					
ROCE	Profitability based on continuing costs of supply	13.3				13.2	10.3	11.0	14.7	18.9
<i>Arising from</i>	Carbon credits	2.3				0.1	2.8	2.5	3.8	2.9
	Impairment losses	-4.0				3.3	10.3	-18.2	0.2	6.3
	Profitability reflecting all costs incurred	11.6				16.6	2.7	-4.8	18.7	28.1

Source: CC analysis based on Tables 13(a) to 13(d).

Note: N/A = not applicable.

Firm-specific results summarized

177. In Table 12 we set out our estimates of each cement producer's ROCE from supplying cement in each of the years over the period of review, 2007 to 2011.

TABLE 12 **Calculated ROCE for each GB cement producers over the period 2007 to 2011**

			<i>Profit / (CCA average) capital employed (%)</i>				
			<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>
Lafarge	HCA	Reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
Hanson			[X]	[X]	[X]	[X]	[X]
Cemex			[X]	[X]	[X]	[X]	[X]
Tarmac			[X]	[X]	[X]	[X]	[X]
Lafarge	CCA	Based on continuing costs of supply	[X]	[X]	[X]	[X]	[X]
		Arising from carbon credits	[X]	[X]	[X]	[X]	[X]
		Arising from impairment losses	[X]	[X]	[X]	[X]	[X]
		Reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
Hanson	CCA	Based on continuing costs of supply	[X]	[X]	[X]	[X]	[X]
		Arising from carbon credits	[X]	[X]	[X]	[X]	[X]
		Arising from impairment losses	[X]	[X]	[X]	[X]	[X]
		Reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
Cemex	CCA	Based on continuing costs of supply	[X]	[X]	[X]	[X]	[X]
		Arising from carbon credits	[X]	[X]	[X]	[X]	[X]
		Arising from impairment losses	[X]	[X]	[X]	[X]	[X]
		Reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
Tarmac	CCA	Based on continuing costs of supply	[X]	[X]	[X]	[X]	[X]
		Arising from carbon credits	[X]	[X]	[X]	[X]	[X]
		Arising from impairment losses	[X]	[X]	[X]	[X]	[X]
		Reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
Total	CCA	Based on continuing costs of supply	13.2	10.3	11.0	14.7	18.9
		Arising from carbon credits	0.1	2.8	2.5	3.8	2.9
		Arising from impairment losses	<u>3.3</u>	<u>-10.3</u>	<u>-18.2</u>	<u>0.2</u>	<u>6.3</u>
		Reflecting all costs incurred	16.6	2.7	-4.8	18.7	28.1

Source: CC (Tables 13(a) to (d)).

Firm-specific results detail

178. In Tables 13(a) to (d) we set out for each cement producer at a high level its HCA and CCA profit and loss account and balance sheet relating to each year and our calculation of its ROCE based on this information.

TABLE 13(a) Lafarge: HCA and CCA summary results and ROCEs based thereon

		2006	2007	2008	2009	2010	2011
<i>Prepared on an HCA basis (all £m save volumes)</i>							
Volumes	Cement sales	[X]	[X]	[X]	[X]	[X]	[X]
<i>megatonnes</i>	Clinker production	[X]	[X]	[X]	[X]	[X]	[X]
HCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	HCA depreciation		[X]	[X]	[X]	[X]	[X]
	Subtotal		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
HCA balance sheet	Plant & machinery / AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
<i>Prepared on a CCA basis (£m)</i>							
CCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation (OCM)		[X]	[X]	[X]	[X]	[X]
	CCA depreciation ('holding gains')		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA balance sheet	Plant & machinery/AICC	[X]	[X]	[X]	[X]	[X]	[X]
	Other fixed assets	[X]	[X]	[X]	[X]	[X]	[X]
	Net current assets	[X]	[X]	[X]	[X]	[X]	[X]
	Provisions	[X]	[X]	[X]	[X]	[X]	[X]
	Total assets	[X]	[X]	[X]	[X]	[X]	[X]
	<i>Average of opening/closing balance</i>		[X]	[X]	[X]	[X]	[X]
<i>Differences between CCA & HCA basis (£m)</i>							
Δ Profit and loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
Δ Balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
ROCE							
HCA	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA	Based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Arising from carbon credits		[X]	[X]	[X]	[X]	[X]
	Arising from impairment losses		[X]	[X]	[X]	[X]	[X]
	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]

Source: CC analysis and information provided by Lafarge.

TABLE 13(b) Hanson: HCA and CCA summary results and ROCEs based thereon

		2006	2007	2008	2009	2010	2011
		<i>Prepared on an HCA basis (all £m save volumes)</i>					
Volumes	Cement sales	[X]	[X]	[X]	[X]	[X]	[X]
<i>megatonnes</i>	Clinker production	[X]	[X]	[X]	[X]	[X]	[X]
HCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	HCA depreciation		[X]	[X]	[X]	[X]	[X]
	Subtotal		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
HCA balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
		<i>Prepared on a CCA basis (£m)</i>					
CCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation (OCM)		[X]	[X]	[X]	[X]	[X]
	CCA depreciation ('holding gains')		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA balance sheet	Plant & machinery / AICC	[X]	[X]	[X]	[X]	[X]	[X]
	Other fixed assets	[X]	[X]	[X]	[X]	[X]	[X]
	Net current assets	[X]	[X]	[X]	[X]	[X]	[X]
	Provisions	[X]	[X]	[X]	[X]	[X]	[X]
	Total assets	[X]	[X]	[X]	[X]	[X]	[X]
	<i>Average of opening/closing balance</i>		[X]	[X]	[X]	[X]	[X]
		<i>Differences between CCA & HCA basis (£m)</i>					
Profit and loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
Balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
ROCE		<i>Profit / (CCA average) capital employed (%)</i>					
HCA	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA	Based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Arising from carbon credits		[X]	[X]	[X]	[X]	[X]
	Arising from impairment losses		[X]	[X]	[X]	[X]	[X]
	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]

Source: CC analysis and information provided by Hanson.

TABLE 13(c) Cemex: HCA and CCA summary results and ROCEs based thereon

		2006	2007	2008	2009	2010	2011
<i>Prepared on an HCA basis (all £m save volumes)</i>							
Volumes	Cement sales	[X]	[X]	[X]	[X]	[X]	[X]
<i>megatonnes</i>	Clinker production	[X]	[X]	[X]	[X]	[X]	[X]
HCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	HCA depreciation		[X]	[X]	[X]	[X]	[X]
	Subtotal		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
HCA balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
<i>Prepared on a CCA basis (£m)</i>							
CCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation (OCM)		[X]	[X]	[X]	[X]	[X]
	CCA depreciation ('holding gains')		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA balance sheet	Plant & machinery/AICC	[X]	[X]	[X]	[X]	[X]	[X]
	Other fixed assets	[X]	[X]	[X]	[X]	[X]	[X]
	Net current assets	[X]	[X]	[X]	[X]	[X]	[X]
	Provisions	[X]	[X]	[X]	[X]	[X]	[X]
	Total assets	[X]	[X]	[X]	[X]	[X]	[X]
	<i>Average of opening/closing balance</i>		[X]	[X]	[X]	[X]	[X]
<i>Differences between CCA & HCA basis (£m)</i>							
Profit and loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
Balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
ROCE		<i>Profit / (CCA average) capital employed (%)</i>					
HCA	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA	Based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Arising from carbon credits		[X]	[X]	[X]	[X]	[X]
	Arising from impairment losses		[X]	[X]	[X]	[X]	[X]
	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]

Source: CC analysis and information provided by Cemex.

TABLE 13(d) Tarmac: HCA and CCA summary results and ROCEs based thereon

		2006	2007	2008	2009	2010	2011
<i>Prepared on an HCA basis (all £m save volumes)</i>							
Volumes	Cement sales	[X]	[X]	[X]	[X]	[X]	[X]
<i>megatonnes</i>	Clinker production	[X]	[X]	[X]	[X]	[X]	[X]
HCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	HCA depreciation		[X]	[X]	[X]	[X]	[X]
	Subtotal		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
HCA balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
<i>Prepared on a CCA basis (£m)</i>							
CCA profit & loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation (OCM)		[X]	[X]	[X]	[X]	[X]
	CCA depreciation ('holding gains')		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA balance sheet	Plant & machinery/AICC	[X]	[X]	[X]	[X]	[X]	[X]
	Other fixed assets	[X]	[X]	[X]	[X]	[X]	[X]
	Net current assets	[X]	[X]	[X]	[X]	[X]	[X]
	Provisions	[X]	[X]	[X]	[X]	[X]	[X]
	Total assets	[X]	[X]	[X]	[X]	[X]	[X]
	<i>Average of opening/closing balance</i>		[X]	[X]	[X]	[X]	[X]
<i>Differences between CCA & HCA basis (£m)</i>							
Profit and loss	Revenues		[X]	[X]	[X]	[X]	[X]
	Costs excluding depreciation		[X]	[X]	[X]	[X]	[X]
	CCA depreciation		[X]	[X]	[X]	[X]	[X]
	Profit based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Carbon credits		[X]	[X]	[X]	[X]	[X]
	Impairment losses		[X]	[X]	[X]	[X]	[X]
	Profit reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
Balance sheet	Plant & machinery/AICC		[X]	[X]	[X]	[X]	[X]
	Other fixed assets		[X]	[X]	[X]	[X]	[X]
	Net current assets		[X]	[X]	[X]	[X]	[X]
	Provisions		[X]	[X]	[X]	[X]	[X]
	Total assets		[X]	[X]	[X]	[X]	[X]
ROCE							
<i>Profit / (CCA average) capital employed (%)</i>							
HCA	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]
CCA	Based on continuing costs of supply		[X]	[X]	[X]	[X]	[X]
	Arising from carbon credits		[X]	[X]	[X]	[X]	[X]
	Arising from impairment losses		[X]	[X]	[X]	[X]	[X]
	Reflecting all costs incurred		[X]	[X]	[X]	[X]	[X]

Source: CC analysis and information provided by Tarmac.

Sensitivity analysis

179. The analysis described in this appendix assumes that one needs to invest £170 million at 1 January 2007 prices to obtain a cement production facility capable of producing 1.0 Mt of clinker per year. Furthermore it assumes that assets decline in value by 3.5 per cent per year on a reducing balance basis. It also assumes that asset price inflation is 2.5 per cent in nominal terms over the period (~13 per cent rise over the period).

180. In order to give some indication of how sensitive the results are to changes in assumptions, the results for certain alternative scenarios are set out in Tables 14(a) and 14(b).

Results assuming £200 million rather than £170 million as at 1 January 2007 for a 1.0 Mt facility

TABLE 14(a) Volumes and calculated ROCE for GB cement producers over the period 2007 to 2011

		2007	2008	2009	2010	2011
	<i>Total</i>	<i>Megatonnes sold/produced</i>				
<i>Volumes</i>						
Cement sales	47.5	12.3	10.6	7.8	8.1	8.7
Clinker production	39.0	10.2	8.7	6.4	6.6	7.1
	<i>Average profits (2007–2011)/average capital employed (%)</i>	<i>Profits/average capital employed (%)</i>				
ROCE						
Profitability based on continuing costs of supply	11.4	11.2	8.7	9.4	12.6	16.1
<i>Arising from</i>						
Carbon credits	2.0	0.1	2.4	2.1	3.3	2.5
Impairment losses	<u>-4.1</u>	<u>3.4</u>	<u>-10.5</u>	<u>-18.6</u>	<u>0.2</u>	<u>6.4</u>
Profitability reflecting all costs incurred	9.2	14.7	0.6	-7.1	16.1	25.1

Source: CC calculations

Results assuming 2.5 per cent declining balance depreciation profile

TABLE 14(b) Volumes and calculated ROCE for GB cement producers over the period 2007 to 2011

		2007	2008	2009	2010	2011
	<i>Total</i>	<i>Megatonnes sold/produced</i>				
<i>Volumes</i>						
Cement sales	47.5	12.3	10.6	7.8	8.1	8.7
Clinker production	39.0	10.2	8.7	6.4	6.6	7.1
	<i>Average profits (2007–2011)/average capital employed (%)</i>	<i>Profits/average capital employed (%)</i>				
ROCE						
Profitability based on continuing costs of supply	12.1	11.9	9.5	10.2	13.3	16.6
<i>Arising from</i>						
Carbon credits	1.9	0.1	2.4	2.1	3.3	2.4
Impairment losses	<u>-4.7</u>	<u>2.8</u>	<u>-11.5</u>	<u>-20.6</u>	<u>0.9</u>	<u>6.5</u>
Profitability reflecting all costs incurred	9.3	14.8	0.4	-8.3	17.4	25.5

Source: CC calculations.

181. Lafarge Tarmac, Hanson and Cemex all commented on our sensitivity analysis and had performed their own extensive sensitivity analysis using models they had developed to replicate our own (CC) model, at least in relation to their own firm-specific results.
182. Lafarge Tarmac, Hanson and Cemex had all modelled the results of adopting alternative depreciation profiles including reflecting different assumptions about asset economic life. Lafarge Tarmac commented, for example, that the 3.5 per cent declining balance profile was too high for the cement industry and therefore had modelled alternatively a 2.5 per cent declining balance, a straight-line and a zero depreciation (ie indefinite useful life) profile. Hanson commented that the depreciation profile appeared to be critical and as a result had alternatively modelled a 3.5 per cent per year declining balance, a straight-line and an annuity profile all reflecting a common 50-year economic useful asset life. Hanson and Lafarge Tarmac also noted that we had only considered changes in single input variables.

183. Cemex commented that we had not conducted any sensitivities at the individual firm-level. Lafarge Tarmac noted that the very high ROCE results we had obtained for Lafarge were particularly important since Lafarge was also the largest clinker producer in GB and therefore would account for the greatest weight in overall profitability.
184. We have considered these comments and concluded that in the first instance emphasis should be placed on firming up on the evidence supporting each input⁸³ into our model rather than performing extensive, and at times contradictory, sensitivity analysis. The evidence supporting input values was likely to come only from those with expertise in the cement industry.
185. Regarding the issue of firm-specific sensitivities we comment on the robustness of firm-specific results in paragraph 124. As explained in paragraph 118, we are considering developing a custom depreciation profile to take account of the best information taken all together about the loss of value to the business over time of cement plant. Were we to do this, this should improve the robustness of firm-specific results. We also calculated profitability across all the GB cement producers, as well as for each of the GB cement producers including Lafarge. As explained in paragraph 12 and in more detail in paragraphs 123 and 124, we consider the pan-firm results to be more robust.
186. We therefore decided against performing any further sensitivity analysis at this stage.

Interpretation of results

187. We note that we have not adjusted asset values for the higher running costs associated with less modern and well-located plant as described in paragraphs 144 to 151

⁸³ In this context 'input' includes the specification of the depreciation profile.

above. This means that firms' calculated profitability will vary on account of the generation of plant assets used⁸⁴ and the situation of their individual plants.

188. Some of the GB cement producers have more grinding/milling capacity than clinker production capacity. Some of this grinding/milling capacity is not co-located with clinker production. For example, Cemex invested £49 million in 2009 in a new grinding and blending facility at Tilbury.⁸⁵ The current approach to asset valuation does not place any value on these separately located facilities beyond the value they would have as part of an integrated plant.
189. There are a number of limitations on the conclusions we can draw from comparing the results of the individual GB cement producers, not least because we have not adjusted the values ascribed to those of their assets which were not the modern equivalents nor which were sub-optimally located as at 1 January 2007.
190. As already explained in paragraphs 123 and 124 above, individual firms' results may be heavily influenced by where their portfolio of cement assets sits on the depreciation profile we adopted for this analysis.
191. There also may be differences in the way firms have attributed their costs to their cement business, particularly in relation to costs that are not incurred and/or managed at the site of production.

Firm-specific observations

192. We make a small number of firm-specific observations with respect to Hanson, Cemex and Tarmac.

⁸⁴ All other things being the same, as explained in paragraph 149.

⁸⁵ www.cemex.co.uk/cemex-opens-new-49-million-cement-plant-in-the-south-east-of-england.aspx#CEMEXopensnewand#163;49millioncementplantinthesoutheastofEngland.

193. [REDACTED]

194. [REDACTED]

195. Tarmac has attributed its central and regional costs on the basis of 2007 variable profit across its various activities—namely aggregates ([REDACTED] per cent), cement ([REDACTED] per cent), RMX ([REDACTED] per cent) and other activities falling outside of the scope of the referred markets ([REDACTED] per cent)—on the grounds that attempting a more granular-activity-based approach was not, according to Tarmac, achievable within our timescales. We noted that this approach of attributing costs on the basis of profits was circular if the purpose of the exercise was to establish underlying profitability. We did, however, use these numbers in our analysis in the absence of any other information and because the level of costs so attributed was unlikely to be material to our overall conclusions.

Cement pricing and price dispersion

1. This appendix contains further evidence and analysis on cement pricing and cement price dispersion. It contains two parts:
 - (a) The first section summarizes submissions by the GB cement producers on the way in which prices to different customers are set.
 - (b) The second section sets out data on changes in the real prices of cement between 2007 and 2011.
 - (c) The third section presents the results of our analysis of the dispersion in cement prices across customers and over time.

GB cement producers' submissions on way in which prices to different customers are set

2. Lafarge told us that [REDACTED].
3. Lafarge told us that [REDACTED]. However, large bagged cement customers, such as DIY retailers, will typically use tender processes. For such bagged cement customers, the resulting supply agreement will cover the customer's needs for a period of one, or two years.¹ [REDACTED]
4. Hanson told us that Hanson Cement did not operate a price list for grey cement, but tended to negotiate prices individually with its customers, [REDACTED]. Hanson further told us that multiple factors were relevant in the determination of the price which it would offer, including: [REDACTED]. Hanson also told us that it had participated in tender processes for bagged cement.

¹ Lafarge told us that the major retailers such as B&Q had sufficient market power that they were able to demand a change in supply terms at short notice.

5. Cemex told us that, [REDACTED].²

6. Tarmac told us that [REDACTED].

Real prices of cement over time

7. Table 1 shows annual average prices, in real terms, of bulk CEM I sold to independents of each GB producer, as well as total average price, for the period 2007 to 2011. Average prices of bulk CEM I sold to independents increased by 4 per cent in real terms between 2007 and 2011.

TABLE 1 Annual average prices of bulk CEM I to independents, in real terms

	£/ tonne				
	2007	2008	2009	2010	2011
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Weighted average all GB cement producers	77.0	82.4	88.0	82.2	79.8

Source: CC, based on GB producers' transaction data.

Note: Nominal average prices were calculated by dividing total revenues in a year by total volumes in the same year, for sales of bulk CEM I to independent customers. They were converted to real prices using the CPI index (based to 100 for December 2011). The weighted average prices are calculated by weighting each GB producer's prices in proportion to its volume sales.

8. Table 2 shows annual average prices, in real terms, of bagged cement sold to independents of each GB producer, as well as total average price, for the period 2007 to 2011. Average prices of bagged cement increased by 7 per cent between 2007 and 2011, in real terms.

² [REDACTED]

TABLE 2 Annual average prices of bagged cement to independents, in real terms

	£/ tonne				
	2007	2008	2009	2010	2011
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac*	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Weighted average all GB cement producers	85.9	89.9	97.7	92.9	91.7

Source: CC, based on GB producers' transaction data.

*Rebates to some customers were not netted off in the calculation of Tarmac annual average prices of bagged cement. Therefore, the figures for Tarmac may over-estimate the average annual prices charged by Tarmac to bagged cement customers on a net basis.

Note: Nominal average prices were calculated by dividing total revenues in a year by total volumes in the same year, for sales of bagged cement to independent customers. They were converted to real prices using the CPI index (based to 100 for December 2011). The weighted average price are calculated by weighting each GB producer's prices in proportion to its volume sales.

Analysis of price dispersion

9. We have undertaken analysis of the amount of dispersion between the prices to different customers charged by each GB producer, based on their transaction data. We first present our methodology for this analysis, and then present results of the analysis for each GB cement producer.

Methodology

10. We have calculated the delivered price for each transaction for each GB producer, by dividing revenues net of rebates with quantities. For Hanson, Lafarge and Tarmac we have also calculated ex-shipping point prices for each transaction, by subtracting the haulage cost from the shipping point (which could be a cement plant or a depot) to end-customer from revenue net of rebates, before dividing with quantities. [REDACTED]
11. We then dropped any transactions where delivered prices were missing, zero or negative. In relation to bulk cement, this meant that we dropped [REDACTED] observations in the case of [REDACTED], [REDACTED] observations in the case of [REDACTED], and [REDACTED] observations in the case of [REDACTED]. [REDACTED] data did not contain any observations with zero or negative delivered prices. In relation to bagged cement, we dropped [REDACTED] observations in the

case of [REDACTED], [REDACTED] observations in the case of [REDACTED], and [REDACTED] observations in the case of [REDACTED].

12. Next we dropped any transactions where ex-shipping point prices were zero or negative: [REDACTED] observations for [REDACTED], [REDACTED] observations for Lafarge, and [REDACTED] observations for Tarmac in the case of bulk cement; and [REDACTED] observations for Hanson, [REDACTED] observations for [REDACTED], and [REDACTED] observations for [REDACTED] in the case of bagged cement.
13. We then dropped all transactions which had zero or negative quantities, as these may be related to rebates, or returns (or errors in the data), and which are therefore not sales of cement. This meant that we dropped a further [REDACTED] observations for [REDACTED], [REDACTED] observations for [REDACTED], and [REDACTED] observations for [REDACTED] in the case of bulk cement; and [REDACTED] observations for [REDACTED], [REDACTED] observations for [REDACTED] and [REDACTED] observations for [REDACTED] in the case of bagged cement. [REDACTED] data did not contain any observations with zero or negative quantities. Once these transactions were removed, there were no further transactions with negative net revenues.
14. In relation to bulk cement, we have done the analysis for bulk CEM I only, in order to remove price dispersion arising from product mix. This was not possible in the case of bagged cement, due to data limitations. We have calculated both dispersion of delivered prices, and of ex-shipping point prices (as defined in paragraph 10) where data was available, in order to control for the impact of delivery distances from shipping point to the customer.
15. We have analysed dispersion on a quarterly basis for sales to all external customers, independent customers only and other Majors only in relation to bulk CEM I, while we present results for sales to independent customers only in the case of bagged

cement, as sales of bagged cement to other Majors are very low, or non-existent.

The results are presented below, separately for each GB producer.

Cemex

Bulk CEM I sold to all external customers

16. Table 3 shows some quarterly statistics for delivered prices paid by Cemex's external customers of bulk CEM I, including the mean and standard deviation.³ [X]

TABLE 3 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Note: [X].

17. In addition to the standard deviation shown in Table 3, we have calculated four additional statistical measures of dispersion, as shown in Table 4. [X]

³ Standard deviation shows how much variation or dispersion exists from the mean. A low standard deviation indicates that the data points tend to be very close to the mean; high standard deviation indicates that the data points are spread out over a large range of values.

TABLE 4 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex data and CC analysis.

Note: [REDACTED] The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to independent customers

18. Table 5 shows some quarterly statistics for delivered prices paid by Cemex’s independent customers of bulk CEM I, including the mean and standard deviation.

[REDACTED]

TABLE 5 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex data and CC analysis.

Note: [REDACTED]

19. Table 6 shows four additional measures of price dispersion. [REDACTED]

TABLE 6 Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Inter-percentile ranges			Coefficient of variation
	P75-P25 (£/t)	P95-P5 (£/t)	P99-P1 (£/t)	
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex data and CC analysis.

Note: [REDACTED] The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to other Majors

20. Table 7 shows some quarterly statistics for delivered prices paid by Cemex’s other Major customers of bulk CEM I, including the mean and standard deviation. [X]

TABLE 7 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	Number of observations
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Note: [X]

21. Table 8 shows four additional measures of price dispersion. [X]

TABLE 8 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex data and CC analysis.

Note: [REDACTED] The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bagged cement sold to independent customers

22. Table 9 shows some quarterly statistics for delivered prices paid by Cemex’s independent customers of bagged cement, including the mean and standard deviation. [REDACTED]

TABLE 9 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex data and CC analysis.

Note: [REDACTED]

23. Table 10 shows four additional measures of price dispersion. [REDACTED]

TABLE 10 Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Cemex data and CC analysis.

Note: [REDACTED] The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Hanson

Bulk CEM I sold to all external customers

24. Table 11 shows some quarterly statistics for delivered prices paid by Hanson's external customers of bulk CEM I, including the mean and standard deviation.⁴ [X]

TABLE 11 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

25. In addition to the standard deviation shown in Table 11, we have calculated four additional statistical measures of dispersion, as shown in Table 12. [X]

⁴ Standard deviation shows how much variation or dispersion exists from the mean. A low standard deviation indicates that the data points tend to be very close to the mean; high standard deviation indicates that the data points are spread out over a large range of values.

TABLE 12 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

26. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 13 shows that [REDACTED].

27. Similarly, Table 14 shows that [REDACTED].

TABLE 13 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

TABLE 14 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to independent customers

28. Table 15 shows some quarterly statistics for delivered prices paid by Hanson's independent customers of bulk CEM I, including the mean and standard deviation.

[REDACTED]

TABLE 15 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

29. Table 16 shows four additional measures of price dispersion, based on the statistics in Table 15. [REDACTED]

TABLE 16 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

30. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 17 shows that [REDACTED].

31. Similarly, Table 18 shows that [REDACTED].

TABLE 17 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

TABLE 18 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to other Majors

32. Table 19 shows some quarterly statistics for delivered prices paid by Hanson's other Major customers of bulk CEM I, including the mean and standard deviation. [REDACTED]

TABLE 19 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

33. Table 20 shows four additional measures of price dispersion, based on the statistics in Table 19. [REDACTED]

34. The table also shows that [REDACTED].

TABLE 20 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

35. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with similar results. Table 21 shows that [REDACTED].

36. Similarly, Table 22 shows that [REDACTED].

TABLE 21 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

TABLE 22 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bagged cement sold to independent customers

37. Table 23 shows some quarterly statistics for delivered prices paid by Hanson’s independent customers of bagged cement, including the mean and standard deviation.

[REDACTED]

TABLE 23 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

38. Table 24 shows four additional measures of price dispersion, based on the statistics in Table 23. [REDACTED]

TABLE 24 **Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

39. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 25 shows [REDACTED], while Table 26 shows [REDACTED].

TABLE 25 **Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

	<i>Mean (£/t)</i>	<i>Standard deviation (£/t)</i>	<i>P1 (£/t)</i>	<i>P5 (£/t)</i>	<i>P25 (£/t)</i>	<i>P50 (£/t)</i>	<i>P75 (£/t)</i>	<i>P95 (£/t)</i>	<i>P99 (£/t)</i>	<i>Number of observations</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

TABLE 26 **Statistical measures of dispersion, ex-shipping point prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Hanson data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Lafarge

Bulk CEM I sold to all external customers

40. Table 27 shows some quarterly statistics for delivered prices paid by Lafarge's external customers of bulk CEM I, including the mean and standard deviation.⁵ [REDACTED]

⁵ Standard deviation shows how much variation or dispersion exists from the mean. A low standard deviation indicates that the data points tend to be very close to the mean; high standard deviation indicates that the data points are spread out over a large range of values.

TABLE 27 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

41. In addition to the standard deviation shown in Table 27, we have calculated four additional statistical measures of dispersion, as shown in Table 28. [X]

TABLE 28 Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Inter-percentile ranges			Coefficient of variation
	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	
Q1 07	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

42. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 29 shows that [REDACTED].

43. Similarly, Table 30 shows that [REDACTED].

TABLE 29 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

TABLE 30 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Inter-percentile ranges			Coefficient of variation
	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to independent customers

44. Table 31 shows some quarterly statistics for delivered prices paid by Lafarge’s independent customers of bulk CEM I, including the mean and standard deviation.

[REDACTED]

TABLE 31 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

45. Table 32 shows four additional measures of price dispersion, based on the statistics in Table 31. [REDACTED]

TABLE 32 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

46. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 33 shows that [REDACTED].

47. Similarly, Table 34 shows that [REDACTED].

48. [REDACTED]

TABLE 33 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

TABLE 34 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to other Majors

49. Table 35 shows some quarterly statistics for delivered prices paid by Lafarge's other Major customers of bulk CEM I, including the mean and standard deviation. [REDACTED]

TABLE 35 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

50. Table 36 shows four additional measures of price dispersion, based on the statistics in Table 35. [REDACTED]
51. The table also shows that [REDACTED].

TABLE 36 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

52. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with similar results. Table 37 shows that [REDACTED].

53. Similarly, Table 38 shows that [REDACTED].

TABLE 37 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

TABLE 38 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bagged cement sold to independent customers

54. Table 39 shows some quarterly statistics for delivered prices paid by Lafarge's independent customers of bagged cement, including the mean and standard deviation.

[REDACTED]

TABLE 39 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

55. Table 40 shows four additional measures of price dispersion, based on the statistics in Table 39. [REDACTED]

TABLE 40 Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

56. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 41 shows the standard deviation, while Table 42 shows the inter-percentile ranges and the coefficient of variation.

TABLE 41 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	<i>Mean (£/t)</i>	<i>Standard deviation (£/t)</i>	<i>P1 (£/t)</i>	<i>P5 (£/t)</i>	<i>P25 (£/t)</i>	<i>P50 (£/t)</i>	<i>P75 (£/t)</i>	<i>P95 (£/t)</i>	<i>P99 (£/t)</i>	<i>Number of observations</i>
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

TABLE 42 **Statistical measures of dispersion, ex-shipping point prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Tarmac

Bulk CEM I sold to all external customers

57. Table 43 shows some quarterly statistics for delivered prices paid by Tarmac’s external customers of bulk CEM I, including the mean and standard deviation.⁶ [REDACTED]⁷

⁶ Standard deviation shows how much variation or dispersion exists from the mean. A low standard deviation indicates that the data points tend to be very close to the mean; high standard deviation indicates that the data points are spread out over a large range of values.

⁷ Tarmac told us that the data contained six observations which were mistakes and should be removed from the calculations to derive price dispersion measures. We were not able to rerun the calculations in time for publication of this appendix; however, we would not expect the removal of six observations significantly to change most of these results.

TABLE 43 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

58. In addition to the standard deviation shown in Table 43, we have calculated four additional statistical measures of dispersion, as shown in Table 44. [REDACTED]

TABLE 44 Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Inter-percentile ranges			Coefficient of variation
	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

59. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 45 shows that [REDACTED].

60. Similarly, Table 46 shows that [REDACTED].

TABLE 45 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

TABLE 46 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	Inter-percentile ranges			Coefficient of variation
	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to independent customers

61. Table 47 shows some quarterly statistics for delivered prices paid by Tarmac's independent customers of bulk CEM I, including the mean and standard deviation.

[REDACTED]

TABLE 47 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

62. Table 48 shows four additional measures of price dispersion, based on the statistics in Table 47. [REDACTED]

TABLE 48 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

63. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 49 shows that [REDACTED].
64. Similarly, Table 50 shows that [REDACTED].

TABLE 49 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

TABLE 50 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bulk CEM I sold to other Majors

65. Table 51 shows some quarterly statistics for delivered prices paid by Tarmac's other Major customers of bulk CEM I, including the mean and standard deviation. [REDACTED]

TABLE 51 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

66. Table 52 shows four additional measures of price dispersion, based on the statistics in Table 51. [REDACTED]
67. The table also shows that [REDACTED].

TABLE 52 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

68. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), and have obtained different results. Table 53 shows that [REDACTED].

69. Similarly, Table 54 shows that [REDACTED].

TABLE 53 Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

TABLE 54 Statistical measures of dispersion, ex-shipping point prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

Inter-percentile ranges

	P75–P25 (£/t)	P95–P5 (£/t)	P99–P1 (£/t)	Coefficient of variation
Q1 07	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Bagged cement sold to independent customers

70. Table 55 shows some quarterly statistics for delivered prices paid by Tarmac's independent customers of bagged cement, including the mean and standard deviation. [REDACTED]

TABLE 55 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	Mean (£/t)	Standard deviation (£/t)	P1 (£/t)	P5 (£/t)	P25 (£/t)	P50 (£/t)	P75 (£/t)	P95 (£/t)	P99 (£/t)	Number of observations
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

71. Table 56 shows four additional measures of price dispersion, based on the statistics in Table 55. [REDACTED]

TABLE 56 **Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

72. We have repeated the same analysis for ex-shipping point prices (as defined in paragraph 10), with the same results. Table 57 shows [REDACTED] Table 58 shows [REDACTED].

TABLE 57 **Mean, standard deviation, percentiles and number of observations, ex-shipping point prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

	<i>Mean (£/t)</i>	<i>Standard deviation (£/t)</i>	<i>P1 (£/t)</i>	<i>P5 (£/t)</i>	<i>P25 (£/t)</i>	<i>P50 (£/t)</i>	<i>P75 (£/t)</i>	<i>P95 (£/t)</i>	<i>P99 (£/t)</i>	<i>Number of observations</i>
Q1 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 07	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 08	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 09	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

TABLE 58 **Statistical measures of dispersion, ex-shipping point prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

Inter-percentile ranges

	<i>P75–P25 (£/t)</i>	<i>P95–P5 (£/t)</i>	<i>P99–P1 (£/t)</i>	<i>Coefficient of variation</i>
Q1 07	[X]	[X]	[X]	[X]
Q2 07	[X]	[X]	[X]	[X]
Q3 07	[X]	[X]	[X]	[X]
Q4 07	[X]	[X]	[X]	[X]
Q1 08	[X]	[X]	[X]	[X]
Q2 08	[X]	[X]	[X]	[X]
Q3 08	[X]	[X]	[X]	[X]
Q4 08	[X]	[X]	[X]	[X]
Q1 09	[X]	[X]	[X]	[X]
Q2 09	[X]	[X]	[X]	[X]
Q3 09	[X]	[X]	[X]	[X]
Q4 09	[X]	[X]	[X]	[X]
Q1 10	[X]	[X]	[X]	[X]
Q2 10	[X]	[X]	[X]	[X]
Q3 10	[X]	[X]	[X]	[X]
Q4 10	[X]	[X]	[X]	[X]
Q1 11	[X]	[X]	[X]	[X]
Q2 11	[X]	[X]	[X]	[X]
Q3 11	[X]	[X]	[X]	[X]
Q4 11	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

Note: The coefficient of variation is a normalized measure of dispersion, and is calculated by dividing the standard deviation with the mean.

Cement customer switching

1. This appendix contains evidence and supporting material regarding our cement customer switching analysis as described in Section 7.

Our approach

2. We used a number of key cement suppliers' transaction data in order to construct a comprehensive data set at the customer and job-site level with details on how and from where customers and job sites source cement. Using this data set we looked first at general descriptive evidence on customer and job-site characteristics and purchasing behaviour and general levels of switching across time and suppliers. We then examined patterns in switching over time and across suppliers, patterns in the relationship between switching and market shares and patterns in the relationship between switching and prices. We also analysed data on cement customer switching submitted to us by Lafarge, Hanson and Cemex.

Data and methodology

Data

3. Our raw data source is the transaction data provided by the four domestic cement producers (Lafarge, Cemex, Hanson and Tarmac) and four cement importers (Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED]). We restricted our analysis only to sales of bulk cement.¹

¹ Here and in the remainder of this appendix and annexes, unless stated otherwise, we refer only to sales of bulk cement by the four GB cement producers (Cemex, Hanson, Lafarge and Tarmac) and the four importers of cement for which we had data available to conduct the analysis (Aggregate Industries, [REDACTED]). When we refer to total cement sales, this refers to total bulk cement sales.

4. The data sets include internal and external transactions. They record the price and volume of the cement sales made by each company in every period and the name and address details of each respective customer.
5. For the majority of suppliers we have monthly transaction data covering the period 2007 to 2011. However, we are missing some transaction data:
 - (a) we do not have [REDACTED] data for 2007 and Cemex's data for January 2007;
 - (b) [REDACTED] provided quarterly data only; and
 - (c) we do not have any transaction-level information for other importers so our analysis will not capture any switching events to or from these suppliers.

Matching methodology

6. We prepared a consolidated data set at the customer level in order to calculate total cement purchases of each customer from the eight cement suppliers and to identify switching events. A key challenge with this exercise is to match customer records across the different data sets provided by the cement suppliers, ie to identify instances where the same customer and job site appear in different suppliers' data sets.
7. This has been achieved in two steps. First, we standardized customer names across companies. Second, we used these standardized customer names and details of the customer delivery address to link together records from different data sets that related to the same customer job site.
8. In order to standardize customer names across the cement suppliers' data sets, we used a number of different techniques. Specifically, we:
 - (a) reviewed an alphabetical list of all customers, looking for alternate spellings of the same customer name;

- (b) reviewed information provided by [X] on the wider group to which each customer in their database belongs;
 - (c) reviewed customers located close to other customers with similar names, checking for alternate spellings;
 - (d) reviewed any additional customer details contained in the transactions data sets; and
 - (e) tidied any instances where customer names were recorded in different formats.
9. In order to group customer delivery sites together, we began by searching for all instances in any of the suppliers' data sets where customers with the same name were located within a short distance of each other. We used a tolerance of 2.5 miles in order to allow for some variation in how the location of each customer had been geocoded by each supplier. In order to avoid different delivery sites being erroneously labelled as the same entity, we manually reviewed all groupings containing more than one customer record in a single supplier's database.
10. A small number of observations were missing geographic information. For these customers we used any delivery details that had been provided in order to attempt to match these to any job sites existing in our database (if such job sites existed).
11. As a final step, internal transactions were added to the database. For these customers there was no requirement to standardize names; these delivery addresses were assigned to groupings using the same method as for external customers.
12. Using a matched database of this type raises a number of difficulties. In particular, our data set may be incomplete to the extent that (a) some customer names remain unmatched, (b) there may be errors in how transactions have been recorded or geocoded by the cement suppliers, (c) there may be transactions missing from the

suppliers' databases, and (d) some job sites may have been wrongly matched or may have remained unmatched. We note that a failure to match customer names and/or job sites is likely to introduce systematic error in our analysis, ie it will reduce the number of switching events that we observe.

Switching definition

13. We used the matched data set to identify customer switching at job-site level between the eight cement suppliers. Some discretion was required in order to define customer wins and losses, because purchasing and switching patterns differ across customers. Switching can vary with respect to the following characteristics:
 - (a) completeness—this relates to whether the winner captures all of the customer's demand;
 - (b) longevity—this relates to whether the win is permanent, or whether the customer switches again at a later stage (eg whether a customer switches to a different supplier only for a very short time); and
 - (c) immediacy—this relates to whether a win is observed in the period immediately after the rival stops supplying, or whether there is a gap or an overlap in supply.

14. In our analysis we focus on switches with the following characteristics:
 - (a) The supply periods before and after the event are three months or more. One implication of this is that we do not include the first three months of 2007 and the last three months of 2011 in our analysis.
 - (b) The supply periods before and after the event do not have to be continuous but we allow for gaps that last up to two months (ie we also allow for 'patchy' switches).
 - (c) The switches involved 25 per cent or more of the job site's demand—this means we are able to capture partial switches (eg instances where a customer keeps

sourcing some cement from its previous supplier after it switches to a new supplier).

15. Thus, our switching data may underestimate the degree of switching as it may not capture all customer switching for bulk cement, because we do not observe switches to importers not included in our database, switches to collected (as opposed to delivered) cement, or short switches (that last less than three months).
16. In [Annex A](#) we describe the checks we conducted in order to test the sensitivity of our results to alternative (less strict) switching definitions. We ‘relaxed’ our criteria for identifying wins and losses, ie we identified as switches more of the short-term switches (eg switches for less than three months) and more ‘patchy’ switches. With these criteria, we identified about 18 per cent more wins and losses than before, although this varied slightly across suppliers. In terms of value, we identified at most 13 per cent more switching, although again, this varied across suppliers.
17. We also cross-checked our switching data with the switching data submitted by the three largest GB cement producers. We found that our data matched to a large extent their data on wins and losses (around 72 per cent overlap). The only exception to this was Cemex, [X].

Cement customer purchasing behaviour

Number and size of cement customers

18. In total for the period 2007 to 2011, we identified a total of 900 buyers of delivered bulk cement for the cement suppliers included in our analysis, and a total of 3,859 delivery sites (this may be an overestimate because of difficulties associated with the matching of data sets, as explained in paragraphs 6 to 12). In any given year, there are approximately 600 cement customers active in GB, and approximately 2,000

delivery sites. Around 45 per cent of cement delivery sites are owned by the five Majors. Six hundred and five customers have only a single job site and 44 customers have ten or more job sites. Table 1 summarizes the average number of customers supplied by supplier and the average number of job sites per customer.²

TABLE 1 Number of customers and number of jobsites per customer by supplier

Supplier	Average number of customers supplied in a year	Average number of job sites per customer
Lafarge	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]

Source: CC analysis of parties' transaction data.

19. The 20 largest customers in terms of share of total cement volumes over the entire period 2007 to 2011 (including internal sales) are shown in Table 2. We note that the top 20 customers accounted for 77 per cent of total sales volumes in 2007 to 2011 and that the top five customers (which were the five Majors) accounted for 61 per cent of total sales.³

TABLE 2 Top 20 customers in terms of purchases and share of total sales

Rank	Customer	Total purchases kt	Share %	Rank	Customer	Total purchases kt	Share %
1	[REDACTED]	[REDACTED]	[REDACTED]	11	[REDACTED]	[REDACTED]	[REDACTED]
2	[REDACTED]	[REDACTED]	[REDACTED]	12	[REDACTED]	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]	[REDACTED]	13	[REDACTED]	[REDACTED]	[REDACTED]
4	[REDACTED]	[REDACTED]	[REDACTED]	14	[REDACTED]	[REDACTED]	[REDACTED]
5	[REDACTED]	[REDACTED]	[REDACTED]	15	[REDACTED]	[REDACTED]	[REDACTED]
6	[REDACTED]	[REDACTED]	[REDACTED]	16	[REDACTED]	[REDACTED]	[REDACTED]
7	[REDACTED]	[REDACTED]	[REDACTED]	17	[REDACTED]	[REDACTED]	[REDACTED]
8	[REDACTED]	[REDACTED]	[REDACTED]	18	[REDACTED]	[REDACTED]	[REDACTED]
9	[REDACTED]	[REDACTED]	[REDACTED]	19	[REDACTED]	[REDACTED]	[REDACTED]
10	[REDACTED]	[REDACTED]	[REDACTED]	20	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of parties' transaction data.

² Lafarge Tarmac told us that it has not been able to reconcile the figures presented in this table. Lafarge Tarmac told us it obtained similar figures for the average number of customers supplied in a year and average number of jobsites per customer, but noted that its figures were higher on both counts.

³ Lafarge Tarmac told us that it has not been able to reconcile all of the figures in this table, though noted that the figures were very similar or identical in many instances and that the ranking was also similar in many instances.

20. Table 3 shows bulk cement sales by customer type and customer size category (based on annual sales of bulk cement to these customers in GB). The table shows that the Majors accounted for around 61 per cent of all cement purchases in the period 2007 to 2011 (delivered bulk cement, including internal sales).

TABLE 3 **Number and size of bulk cement customers**

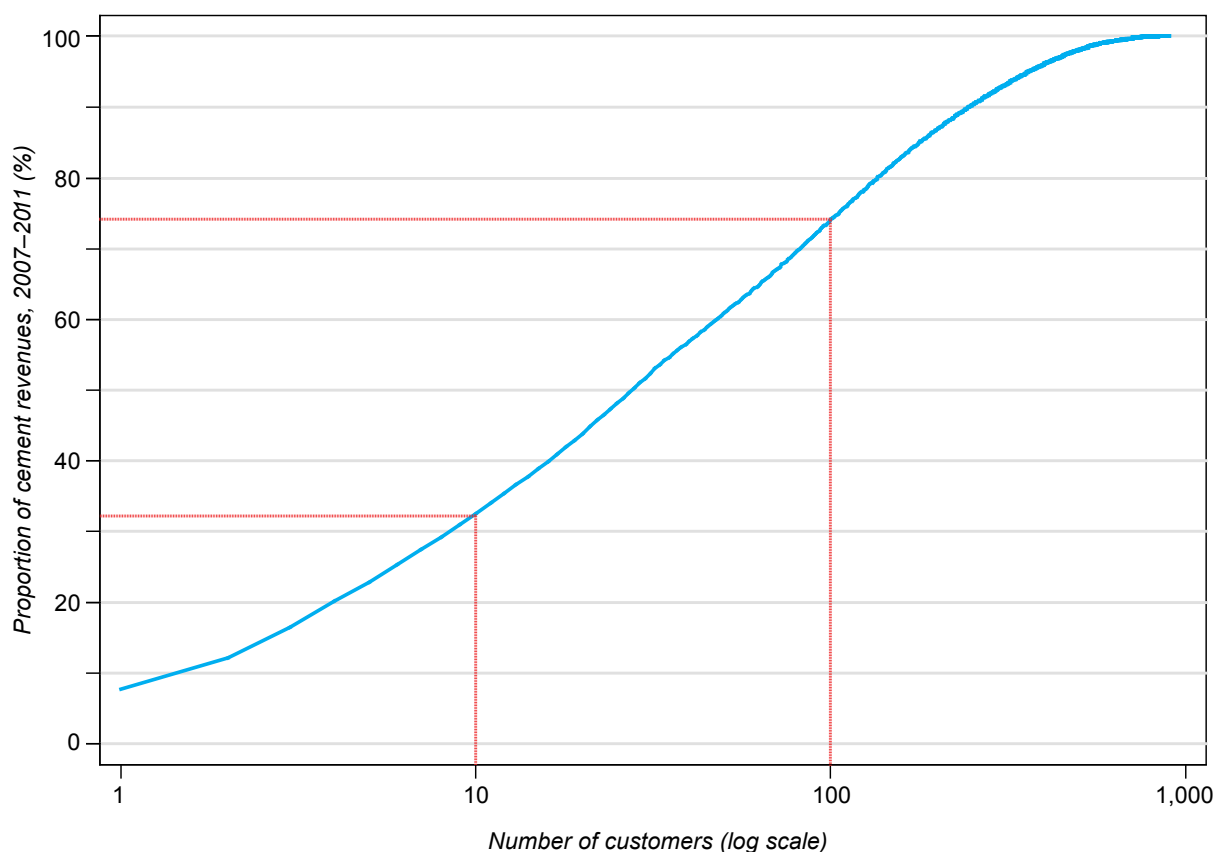
<i>Category</i>	<i>Number of customers</i>	<i>Total purchases kt</i>	<i>Share of all purchases %</i>
Major	5	[REDACTED]	60.7
Big (20+ kt per year)	50	[REDACTED]	24.1
Medium (5–20 kt per year)	151	[REDACTED]	10.0
Small (<5 kt per year)	695	[REDACTED]	5.2

Source: CC analysis of parties' transaction data.

21. Figure 1 shows the proportion of revenue of the eight cement suppliers accounted for by customers ranked by their size. Excluding purchases by the Majors, the largest ten customers accounted for around a third of all bulk cement sales, while the largest 100 customers accounted for around three-quarters of all sales.

FIGURE 1

Top customers and proportion of cement revenue



Source: CC analysis of cement suppliers' transaction data.

Longevity and frequency of cement demand

22. We looked at how long-lasting and how frequent demand for cement is. Specifically, we calculated how long customers in our data have been purchasing cement for in general and how long customers as well as job sites have been purchasing from a given supplier over the entire period. We also calculated how frequently job sites purchased cement over the entire period. This evidence is summarized below.

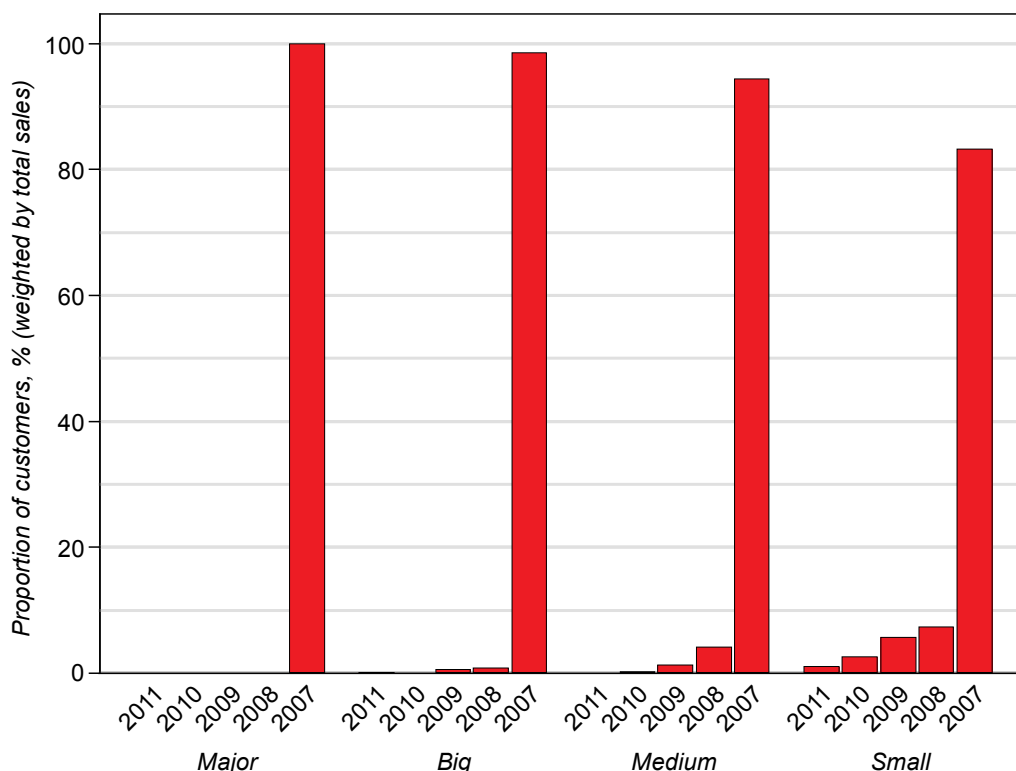
Longevity of cement demand

23. In order to assess longevity of demand for cement, we took all customers active in December 2011 and looked at the year in which sales were first observed for those customers (irrespective of whether they or their sites switched suppliers or multi-

sourced). Figure 2 shows the longevity of purchases by customer category. Across all customer categories the vast majority of cement customers have been purchasing cement since at least 2007 (and may have been purchasing since before 2007). Overall we can see that demand is long term—that is, most customers have been purchasing cement for the last five years at least.

FIGURE 2

Longevity of purchases by customer category



Source: CC analysis of parties' transaction data.

24. We examined customer longevity with a given cement supplier. Table 4 shows the average number of months customers purchase from a given supplier, by customer size category; the lower part of the table shows the average number of months job sites stay with a given supplier. We observe that customers tend to purchase from a single supplier for at least one year, but mostly for longer (two or more years): for example, the largest customers have purchased from Lafarge on average for 41 months, from Hanson 32 months, from Cemex 30 months and from the three independent cement importers in excess of 30 months. Longevity of smaller cus-

tomers tends to be lower, but still in excess of two years. At the job-site level, average longevity with a given supplier is lower, but still significant—for example, large and medium customer job sites stay with a given supplier for one to two years (considering purchases from the largest three cement producers and the three independent cement importers). We note that these figures may underestimate longevity as some customers or job sites (particularly the smaller ones) may have gaps in their purchases of cement (ie there are months where they do not make any cement purchases).

TABLE 4 Average customer longevity by customer size category and cement supplier

Customer size category	months							
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]
<i>Customer longevity</i>								
Cement Major	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Big (20+ kt per year)	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Medium (5–20 kt per year)	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Small (<5 kt per year)	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
<i>Job-site longevity</i>								
Cement Major	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Big (20+ kt per year)	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Medium (5–20 kt per year)	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Small (<5 kt per year)	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of parties' transaction data.

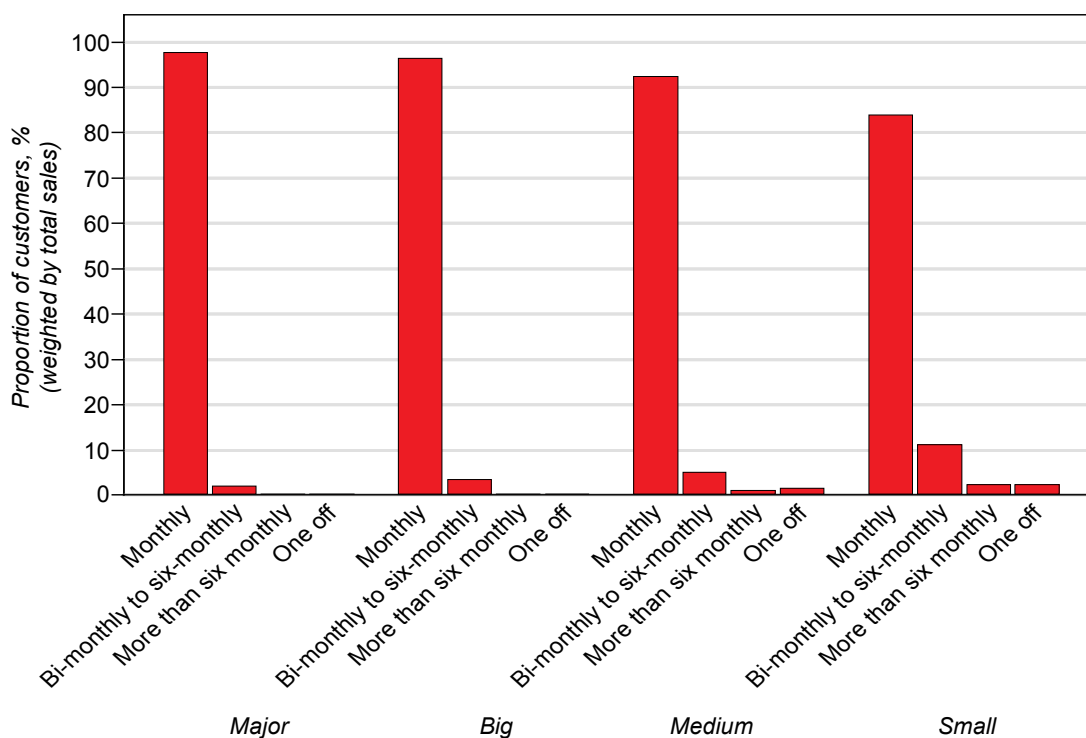
Note: Customer longevity is calculated by first calculating the total number of months that a customer has purchased cement from a given supplier over the entire period, and then averaged across customers. The same approach was used for calculating job-site level longevity. Our data contained 60 months of data for all suppliers but [X], which had 48 months of data (2008 to 2011), and [X] (which did not have data for January 2007).

Frequency of cement demand

25. We also examined the frequency of purchases of individual job sites. Figure 3 summarizes the frequency of purchases by customer type. We see that across all sizes of customer, the vast majority of cement is purchased monthly (or more frequently) by cement job sites (although this may vary across job sites). Some of the smaller customers purchase cement less frequently than the larger customers.

FIGURE 3

Frequency of purchases by customer category



Source: Cement suppliers' transaction data.

Multi-sourcing

26. We looked to see whether and how customers and job sites multi-source cement. As shown in Table 5, most customers (over 90 per cent) have sourced cement from at least two suppliers in the period from 2007 to 2011. A large proportion of job sites (about 60 per cent) have purchased cement from at least two suppliers in the period from 2007 to 2011 which could be due to (simultaneous) multi-sourcing or due to switching.

TABLE 5 **Multi-sourcing over time**

<i>Number of suppliers 2007–2011</i>	<i>Number of job sites</i>	<i>Proportion of sales %</i>	<i>Number of customers</i>	<i>Proportion of sales %</i>
1	2,742	41.3	517	7.2
2	863	39.9	246	11.3
3	225	15.9	105	18.9
4	27	2.8	26	22.2
5	2	0.1	5	15.6
6	0	0.0	0	0.0
7	0	0.0	2	24.8
Total	3,859		901	

Source: CC analysis of cement suppliers' transaction data.

27. Table 6 also shows that most job sites (representing 82 per cent of all volumes) do not simultaneously source from more than one supplier, although a non-trivial proportion does. On the other hand, almost all of the largest customers purchased cement from more than one supplier at the same time between 2007 and 2011.

TABLE 6 **Simultaneous multi-sourcing**

<i>Number of suppliers 2007–2011</i>	<i>Number of job sites</i>	<i>Proportion of sales %</i>	<i>Number of customers</i>	<i>Proportion of sales %</i>
Source from only one supplier at any one time	3,618	82.0	763	15.0
Source simultaneously from more than one supplier, but for less than half of the period 2007–2011	185	11.7	90	5.3
Source simultaneously from more than one supplier for more than half of the period 2007–2011	56	6.3	48	79.8

Source: CC analysis of cement suppliers' transaction data.

Characteristics of bagged cement customers

28. As a separate analysis (ie not based on the bulk cement customer data we use in all the other parts of this appendix), we also looked at the characteristics of bagged cement customers, and found that [redacted].^{4,5}

29. This shows that, as for bulk cement, the bagged cement customer base is fairly concentrated, but not concentrated enough that the loss of a single customer would have

⁴ [redacted]

⁵ Lafarge told us that it could not replicate these figures exactly, although it did obtain similar figures. As it did not provide alternative figures, we present the figures we calculated, noting that we used these figures simply to describe the characteristics of bagged cement customers and slightly different figures would not have altered our arguments based on this description.

a severe impact on profits (apart from a very few of the largest customers), and purchases tend to be frequent.

Analysis of switching

Measuring switching

30. To measure switching, we examined customer switching at a job-site level—that is, we examined changes of cement suppliers by customer job sites. Thus, in the remainder of this appendix, ‘customer switching’ means customer job sites changing their suppliers of bulk cement. We used the value of wins and, for some results, the value of losses as a measure of switching in the market. This is likely to be a better measure of the extent of switching than the number of events, since it takes into account the different size of customers.
31. For monthly analysis, we calculated the value of the switch as the average monthly purchase volume of the customer after the switch (or, for loss events, before the loss). For annual analysis, we defined the value of the switch as the estimated annual purchases (in tonnes) by the customer. In order to do this, we multiplied the estimated monthly volume switched by 12 in order to estimate the annualized value of the switch. The value of the switch was attributed to the year in which the month of the switch falls.⁶ This approach could lead to an overestimation of the extent of switching, since a non-negligible proportion of switches in our data last less than 12 months (see paragraph 37 and Tables 9 and 10 below on the length of switches) and since some switches are ‘patchy’ (eg because not all customer job sites purchase cement every month).

⁶ Thus, for example, if a customer switched in December 2008 (ie it was purchasing cement from one supplier until the end of 2008 and then purchased cement from another supplier from January 2009), the value of the switch would be attributed to 2008 and not 2009.

32. For both monthly and annual analysis, we examined the value of wins (or losses) relative to the winning (or losing) supplier's total (external and internal) sales volume of bulk cement over the relevant period. This accounts for different sizes of suppliers as well as for varying volumes of sales over time. For reference, we show total sales volumes used as the denominator in [Annex B](#). We observed a similar pattern of wins and losses over time and across suppliers when we used absolute values of wins and losses.
33. We examined switching of all external customers and for independent customers and other Majors (ie cross-sales) separately in some instances. We note that switches by other Majors include any internalization events and that the value of the switch is attributed to the year in which the month of the switch falls. In a number of instances we focused on switching for the three largest GB cement producers ('Top 3'), ie Lafarge, Hanson and Cemex, in order to see how switching compared between them and importers and whether there were any patterns in switching among the Top 3 that could be indicative of tit-for-tat strategies.
34. We measured switching over the following periods and frequencies: monthly switching from April 2007 to September 2011, annual switching from 2007 to 2011 (although we did not capture all the switching in 2007 and 2011 as our data did not include switching in the first three months of 2007 and the last three months of 2011) and overall switching in the period from 2008 to 2010 (this was in order to exclude years for which we did not have full data on switching).

Average levels and length of switching

Average monthly levels of switching

35. Table 7 presents data on the average monthly levels of wins. On average, we see that each of the Top 3 suppliers wins two to three external (independent and Major)

customers a month, accounting for around [X] per cent of total revenue. The Top 3 have around 1.5 to 2 wins of independent customers per month, but they account for less than [X] per cent of sales volumes (indicating that wins of other Majors tend to be larger by volume than wins of independents).⁷

TABLE 7 Average monthly levels of switching: wins

Company	Average job-site wins per month		Average customer wins per month		Wins as a proportion of total sales volume (%)	
	All external	Excluding majors	All external	Excluding majors	All external	Excluding majors
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

36. Table 8 presents data on the average monthly levels of losses. Average monthly losses tend to be higher than average monthly wins for the Top 3, but it is the other way round for importers (except for [X]), which on average have more wins than losses (this is consistent with an increasing market share of importers over time).

TABLE 8 Average monthly levels of switching: losses

Company	Average job-site wins per month		Average customer wins per month		Wins as a proportion of total sales volume (%)	
	All external	Excluding majors	All external	Excluding majors	All external	Excluding majors
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

⁷ Lafarge Tarmac told us that these percentages were lower than in its own database of wins and losses, and that the lower figures obtained in Table 7 were likely to be a consequence of our methodology of defining wins and losses, which will not necessarily capture correctly all wins and losses.

Length of switches

37. We also calculated some statistics describing the length of switches. Tables 9 and 10 show the results. We see that switches are in general long term, although a non-negligible proportion of switches appear to last less than one year. If we exclude 2011 for wins and 2007 for losses we get a more accurate picture on the length of switches lasting less than a year. Around one-third of switches in our data last less than a year, although average length of switches is nearly two years.

TABLE 9 **Length of switches**

	<i>Supply periods after a win</i>	<i>Supply periods before a loss</i>
Average number of months	20	18
% of switches lasting <6 months	22	22
% of switches lasting <12 months	40	37

Source: CC analysis of cement suppliers' transaction data.

TABLE 10 **Length of switches excluding 2007 for losses and 2011 for wins**

	<i>Supply periods after a win</i>	<i>Supply periods before a loss</i>
Average number of months	20	22
% of switches lasting <6 months	20	22
% of switches lasting <12 months	33	41

Source: CC analysis of cement suppliers' transaction data.

Patterns of switching over time

Annual levels of switching over time

38. [Annex B](#), Tables 12 to 15, show annual levels of switching by supplier. They present the volume of external customer (either all external customer or independent only) wins and losses as a proportion of each supplier's total annual sales volume.

39. We see from this analysis that 2008 and 2009 stand out as years with relatively high levels of switching, largely due to Hanson internalization of purchases from Lafarge and all the switching of cross-sales and independent customers that followed. For example, Tables 12 and 13 of Annex B show that in 2008 and 2009 there were

relatively high losses of customers and that most of the Top 3's losses in 2008 and 2009 were losses of Majors (ie cross-sales).⁸ [Annex B](#), Table 14, shows that wins of all external customers by the Top 3 in 2009 were at least double of what they were in 2007/08 and wins then fell back to relatively low levels in 2011. From Table 15 of [Annex B](#), we see that wins of independent customers by Lafarge and Hanson more than tripled in 2009 when compared with 2008.

40. Wins of independent customers account for less than [X] per cent of the Top 3's sales (except for 2009), and for generally higher levels (in the region of [X] to [X] per cent) of the non-Major importers' sales. In this analysis losses will appear to be higher than wins because losses of external customers include losses due to internalization which will not show up as wins. We also see that importers appear to win more independent customers than the Top 3 or [X] or [X] (in terms of volumes won as a proportion of total sales volume).
41. [Annex B](#), Table 16, shows the wins of Major customers. Except [X], there are no switches of Majors to importers. [X]
42. [Annex B](#), Tables 17 and 18, show the internalization levels (wins of own sites) by the five Majors in terms of volume levels and volumes as a proportion of total sales respectively. We see that 2009 stands out as the year with the highest level of internalization. The year with the lowest level of internalization was 2007, while 2008, 2010 and 2011 lie somewhere in between.

Monthly levels of switching over time

43. We conducted a similar analysis on monthly data. [Annex B](#), Figures 1 to 5, present graphs with the monthly wins and losses by supplier for Lafarge, Hanson, Cemex

⁸ Lafarge's losses in 2008 reflect Hanson's internalization (as it appears as a switch in our data in December 2008).

and Tarmac. The graphs show the volume of external customer wins and external customer losses as a proportion of total monthly sales volumes.

44. Lafarge's data (Annex B, Figure 1) shows a very large spike in its losses at the end of 2008 (amounting to around [X] per cent of its total sales of cement in that month), which represents Hanson's internalization.⁹ When we do the same analysis excluding Hanson's internalization (Annex B, Figure 2), we observe that there is a relatively high level of switching activity in 2009 and then again at the end of 2010/beginning of 2011 (in the range of [X] per cent of Lafarge's total sales of cement in those months). Lafarge's losses at the end of 2010 were largely due to [X].
45. Hanson's data (Annex B, Figure 3) shows that Hanson incurred large losses at the beginning of 2009 (around [X] per cent of its total sales for that month) which were associated with losses to Lafarge. We also observe a relatively higher level of losses (around [X] per cent of its total sales) at the end of 2010/beginning of 2011. These losses were largely due to [X].
46. Cemex's data (Annex B, Figure 4) shows a relatively higher level of switching (and especially losses) around 2009 and at the end of 2010. These losses represented around [X] per cent of Cemex's total sales in the affected month in 2009 and around [X] per cent at the end of 2010. Cemex's losses at the end of 2010 were due to [X].
47. Tarmac's data (Annex B, Figure 5) shows relatively higher levels of wins in 2009 (around [X] per cent of its total sales) and at the end of 2010/beginning 2011 (slightly less than [X] per cent of its total sales).

⁹ In our data set, Hanson's internalization appears in December 2008.

48. Overall we see that the trends in the monthly data are consistent with the trends in the annual data. The highest levels of switching activity were observed in 2009 and were related to Hanson's internalization. In the monthly data we were also able to observe a relatively high switching activity (although smaller in magnitude than that of 2009) around the end of 2010/beginning of 2011 which seems to have been associated with the Majors switching away from each other and increasing self-supply.

Patterns of switching among suppliers

Overall patterns

49. [Annex B](#), Tables 1 to 4, show the total number of wins and losses between every pair of suppliers from 2007 to 2011 for either all external customers (Majors and independents) or independent customers only.¹⁰ We see that the highest level of switching activity (wins and losses) is between the Top 3 cement producers both in terms of all external customers and independent customers. The importers have won a number of independent customers from the Top 3 (especially [REDACTED] from [REDACTED]) but have also lost a number of independent customers to the Majors (especially [REDACTED] and [REDACTED] who lost to [REDACTED]).
50. [Annex B](#), Tables 6, 7, 9 and 10, show wins and losses between every pair of suppliers in terms of volumes won/lost as a proportion of total (external and internal) bulk cement sales ([Annex B](#), Tables 5 and 8, also show the levels) from 2008 to 2010. Again, we distinguish between all external customers and independent customers only.¹¹ Wins of all external customers among the Top 3 ranged from 1.9 to 7.5 per cent of their total sales volumes. Wins of independent customers among the Top 3 ranged from 1.1 to 3.3 per cent of their total sales volumes. Wins by Hanson

¹⁰ Aggregate Industries told us that the figures in [Annex B](#), Tables 1–18, appeared to be based on Aggregate Industries' original cement transaction data rather than on an updated version subsequently submitted to the CC. We do not think this would materially affect our results.

¹¹ Lafarge Tarmac told us that total sales would be an appropriate benchmark in the context of switching of all customers (ie wins and losses together).

from Lafarge and vice versa represent the largest proportion of wins for these two suppliers. Wins by importers of independent customers from the Top 3 ranged from 0.4 to 7.9 per cent of their total sales in that period. The wins (as a proportion of total sales) were highest for [REDACTED] which won volumes from [REDACTED].

51. Losses are also high among the Top 3. Losses of all external customers among the Top 3 ranged from 2.4 to 13.4 per cent of their total sales volumes for the period and losses of independent customers among the Top 3 ranged from 0.9 to 3.2 per cent of their total sales volumes. Losses by Hanson to Lafarge and vice versa represent the largest proportion of losses for these two suppliers, especially in relation to all external customers, showing that the high levels of switching between them were related to [REDACTED]. Importers have sustained relatively high losses of independent customers to the Top 3. Their losses to the Top 3 ranged from 0.4 to 7.1 per cent of their total sales volumes. The losses (as a proportion of total sales) were highest for [REDACTED] which lost volumes to [REDACTED].

Switches and market shares

52. One possible benchmark for assessing whether switching between a given pair of suppliers is 'high' or 'low' is diversion ratios, calculated based on suppliers' market shares. The reasoning behind this is as follows. Suppose there are three suppliers, A, B and C, and their market shares are 50, 30 and 20 per cent respectively. When A's customers switch, they can go to Supplier B or Supplier C. In this 'residual market' consisting of B and C, their respective shares are 60 and 40 per cent (this is what we call 'residual market shares'). If we observe that 60 per cent of A's ex-customers switch to B and 40 per cent switch to C, switching, or diversion ratios, would be in line with residual market shares. So, for instance, if we observed that 40 per cent of A's ex-customers switch to B and 60 per cent switch to C (ie diversion not in line with residual market shares), this could indicate that A and C are particu-

larly close competitors and/or that rivalry for customers between A and C is stronger than it is between A and B.

53. Therefore we compared overall levels of switching between the suppliers with their residual market shares. First, we calculated diversion ratios based on our switching data. We defined diversion from A to B as follows: of all the wins from Supplier A, what proportion was won by Supplier B. We measured diversion in terms of total volumes switched between 2008 and 2010 (such that our switching data covers full years). Tables 11 to 13 show diversion ratios for different groups of customers, where 'losing' suppliers are listed in the first column and the 'winning' suppliers are listed in the column headings.

TABLE 11 Switching of all external customers (diversion ratios), 2008 to 2010

Diversion from	Diversion to:								per cent
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	

Source: CC analysis of cement suppliers' transaction data.

Note: Each row adds up to 100 per cent and estimates based on fewer than five switching events are marked with *.

TABLE 12 Switching of independent customers (diversion ratios), 2008 to 2010

Diversion from:	Diversion to:								per cent
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	

Source: CC analysis of cement suppliers' transaction data.

Note: Each row adds up to 100 per cent and estimates based on fewer than five switching events are marked with *.

TABLE 13 Switching of Majors (diversion ratios), 2008 to 2010

Diversion from	Diversion to:				per cent
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries
Lafarge	-	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-

Source: CC analysis of cement suppliers' transaction data.

Note: Each row adds up to 100 per cent and estimates based on fewer than five switching events are marked with *.

54. We then estimated residual market shares by taking out the supplier in question (ie from which diversion is measured) and calculating shares among all the other suppliers. Market shares are measured in terms of sales volume (in tonnes) to external customers (ie exclude internal sales) of delivered bulk cement (we use 2008 to 2010 total to be comparable to our figures of diversion patterns). Table 14 shows residual market shares based on excluding the supplier listed in the column heading from the calculation of market shares.

TABLE 14 Residual market shares*

Diversion from	Residual market shares of:								per cent
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Hanson	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Cemex	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
[Importer X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	

Source: Cement suppliers' transaction data.

*Each row adds up to 100 per cent; market share calculated in terms of external sales, 2008 to 2010 average.

55. In order to understand whether diversion is in line with market shares, we compare each cell of the residual market share table with the respective cell in the switching tables. We summarize our main observations below.

- (a) Diversion from Lafarge: we observe more diversion (by some margin) to Hanson and less to Cemex than their residual market shares would suggest (this applies to diversion switching by the independents as well as the Majors).
- (b) Diversion from Hanson to other Majors is largely in line with their residual market shares.¹²
- (c) Diversion from Cemex: there is less diversion to Lafarge and more diversion to Hanson and Tarmac than their market shares would suggest; diversion to Tarmac is particularly high relative to Tarmac's residual market share, and this diversion is mainly accounted for by switching of the Majors.
- (d) Diversion from Tarmac and from [Importer X]: there is less diversion to Lafarge and more diversion to Hanson and Cemex than their residual market shares would suggest.
- (e) It is difficult to make observations on diversions to/from other importers due to the low number of switching events.

56. Thus, we find that although switching (diversion) is not always in line with market shares, there is no consistent pattern to this.¹³ We note that some of the observations we made could be explained by internalisations of cement supplies.

Patterns over time

Wins from the Top 3 and wins from Tarmac and the importers

57. We examined switching patterns over time among the suppliers of cement in our data set. Table 15 shows the wins of independent customers from the Top 3 (ie Lafarge,

¹² Hanson told us that its market share had reduced in the last decade, which would suggest that diversion was unlikely to be in line with market shares. We noted that our analysis covered the past five years, and related only to diversion to other Majors: Hanson's share relative to other Majors had stayed broadly stable in the past five years, which is consistent with the findings in paragraph 55(b). Hanson also queried whether this result was in line with the growth in the share of importers. We noted that the statement above only related to diversion from Hanson to other Majors. As noted in paragraph 55, it was difficult to make observations on diversions to and from importers due to the low number of switching events in the data.

¹³ Some cement suppliers commented that our analysis of switching and market shares showed that switching patterns did not consistently accord with the preservation of market shares. This is not correct; as explained in paragraph 52 above, our analysis here examines whether patterns of switching among cement suppliers appear to be consistent with what one might expect based on suppliers' residual market shares, and no conclusions can be drawn from this analysis as regards the preservation of market shares.

Hanson and Cemex) as a proportion of total sales volumes. Importers' wins from the Top 3 seem to be relatively high in relation to their overall sales of cement and in relation to wins by the Top 3 among themselves.

TABLE 15 Wins of independent customers from the Top 3 (Lafarge, Hanson, Cemex) as a proportion of total sales volume

Wins by	<i>per cent</i>						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
AI	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All	1.0	2.7	5.7	2.0	1.5	3.4	2.6

Source: CC analysis of cement suppliers' transaction data.

58. Table 16 below shows the wins of independent customers from Tarmac and importers as a proportion of total sales volumes. The wins by the Top 3 of independent customers appear to have remained constant or increased since 2007 while there appears to be no clear trend in the wins by the importers.

59. Importers' wins are mainly from the Top 3, which is consistent both with the Top 3 being the largest suppliers and with importers' terminals being located in different parts of GB. The Top 3 are losing customers to the importers, but they are also winning customers from the importers, [REDACTED].

TABLE 16 Wins of independent customers from Tarmac and the four importers in our dataset, as a proportion of total sales volume

Wins by	<i>per cent</i>						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All	0.4	0.5	1.0	0.9	1.4	0.8	0.8

Source: CC analysis of cement suppliers' transaction data.

Patterns of switching among the Top 3

60. We examined patterns of switching over time between cement suppliers in order to see whether there are any systematic patterns in the switching of customers between the suppliers. In particular, we examined whether the data on switching suggested any matching of wins and losses between pairs of suppliers. Estimates of annual customer switching between the suppliers are shown in Figures 4 to 6.
61. With respect to switches between the Top 3, we do not observe an obvious systematic pattern, such as matching of wins and losses between two suppliers, when examining annual data. However, for each year it may also be necessary to look at wins and losses in the previous and subsequent years—this is because wins at the end of one year may be related to losses in the next year. An example of this is the Hanson internalization, which appears as a loss in Lafarge’s data in December 2008, but any subsequent wins from Hanson are recorded in 2009. Similar issues may apply to 2010/2011, where [REDACTED], [REDACTED] and [REDACTED] internalized some volumes at the end of 2010.
62. We therefore examine patterns in relationships between wins and losses at a more disaggregated (monthly) level next.

FIGURE 4

[REDACTED] wins and losses of all external customers from/to other suppliers

[REDACTED]

Source: Cement suppliers’ transactions data.

FIGURE 5

[REDACTED] wins and losses of all external customers from/to other suppliers

[REDACTED]

Source: Cement suppliers’ transactions data.

FIGURE 6

[✂] wins and losses of all external customers from/to other suppliers



Source: Cement suppliers' transactions data.

Correlation of wins and losses

Our approach

63. We wanted to analyse the extent to which losses by one supplier to another were related to previous wins by that supplier from the other supplier, where these wins and losses occurred within relatively short time periods of each other (eg one to two months). For example, if time periods of relatively high volumes of wins by Supplier A from Supplier B coincided with time periods of relatively high losses by Supplier A to Supplier B, this could be indicative of tit-for-tat behaviour. Therefore we examined patterns of wins and losses over time between pairs of cement suppliers using a correlation analysis, whereby we calculated correlation coefficients for monthly volumes won and lost between pairs of cement suppliers.¹⁴ If wins and losses between any two suppliers were positively correlated (and statistically significant¹⁵), this could indicate that there was a degree of matching of wins and losses between these two suppliers and could be indicative of tit-for-tat behaviour.
64. Matching of wins and losses could be contemporaneous (eg in the same month), or there could be a lag (eg A wins from B in month T-1, and A loses to B next month, at T). We do not know how instantaneous one would expect any competitor reaction to a loss of customer(s) to be, and we do not know which supplier, or what, initiated the customer switch. Therefore we also calculated correlations between current losses

¹⁴ A correlation coefficient is a single number that describes the degree of relationship between two variables; in the context of time series, it indicates the extent to which two time series move in a similar direction. Correlation coefficients range between -1 and 1. The closer the correlation coefficient is to 1, the more changes in one variable are associated with changes of the same sign in the other variable. The closer the correlation coefficient is to -1, then the more changes in one variable are associated with opposite changes in the other variable. A correlation coefficient of 0 indicates changes in one variable are not in any way related to changes in the other variable.

¹⁵ A statistically significant correlation coefficient is a correlation coefficient that is different from zero. That is, statistical significance indicates that the estimated non-zero correlation result is 'real' and has does not occur purely by chance.

and *lagged wins* (and between current wins and *lagged losses*), and examined the contemporaneous and the lagged win/loss correlation results as a whole. Correlation coefficients for a given pair of suppliers do not have to be symmetric for there to be evidence consistent with matching of wins and losses. This is because of the way we have measured wins and losses. In particular, internalization by A from B will appear as B's loss in our data but not as A's win (since we focus on all external customers only). Staggering of wins and losses would be another reason why we would not necessarily expect symmetry in correlation coefficients (eg volumes won over several months could be related to losses in a single month). Neither one would require correlation coefficients equal or close to one in order to conclude that there is evidence consistent with matching of wins and losses, as volumes lost and volumes won do not have to be exactly equal (eg because our analysis of wins and losses does not include bagged cement). For this correlation analysis, we also included wins and losses of internal volumes, ie we included both 'internalization' and 'outsourcing' events.

Win and loss correlation results

65. Tables 17 to 19 below show correlation coefficients and their statistical significance levels for monthly volumes won and lost between pairs of cement suppliers. We report both correlations of contemporaneous wins and losses and correlations of lagged wins and losses.
66. We observe the following in terms of win and loss correlations between pairs of cement suppliers.
- (a) *Lafarge and Hanson*. There are some relatively high positive and statistically significant¹⁶ correlation coefficients between Hanson's wins from Lafarge at T and

¹⁶ Unless stated otherwise, where we say 'statistically significant correlation coefficient', we refer to a standard two-tailed significance at the 5 per cent level.

Hanson's losses to Lafarge at T ([§]), between Hanson's wins from Lafarge at T and Hanson's losses to Lafarge at T-1 ([§]), and between Lafarge's wins from Hanson at T and Lafarge's losses to Hanson at T-1 ([§]).

- (b) *Lafarge and Cemex*. There is a positive and statistically significant correlation coefficient between Lafarge's wins from Cemex at T-1 and Lafarge's losses to Cemex at T ([§]). We note that there are also other positive but statistically insignificant correlation coefficients for lagged wins and losses between Lafarge and Cemex.
- (c) *Hanson and Cemex*. There are positive and statistically significant correlation coefficients between Cemex's wins from Hanson at T and Cemex's losses to Hanson at T ([§]), and between Hanson's wins from Cemex at T-1 and Hanson's losses to Cemex at T ([§]).
- (d) *Lafarge and Tarmac*. There are a number of positive statistically significant correlation coefficients between contemporaneous and lagged wins and losses between Lafarge and Tarmac (ranging from [§]).
- (e) *Lafarge and Aggregate Industries*. There are positive and statistically significant correlation coefficients between Lafarge's wins from Aggregate Industries at T-1 and Lafarge's losses to Aggregate Industries at T ([§]), and between Aggregate Industries' wins from Lafarge at T and Aggregate Industries' losses to Lafarge at T-1 ([§]).¹⁷
- (f) *Cemex and Tarmac*. There are a number of positive statistically significant correlation coefficients between contemporaneous and lagged wins and losses between Cemex and Tarmac (ranging from [§] to [§]).
- (g) *Independent importers*. There are practically no statistically significant correlations between wins and losses between the five Majors and the independent cement importers. The only exception is a positive and statistically significant correlation coefficient between losses by [Importer Y] to Cemex at T-1

¹⁷ Aggregate Industries told us that it was unable to confirm the correlation calculations contained in Tables 17-19.

and wins from Cemex at T. We observe that most correlation coefficients of the independent importers are negative.

TABLE 17 Correlation between wins at T and losses at T (contemporaneous correlation)

Wins/losses of:	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-

Source: CC analysis of cement suppliers' transaction data.

Note: Throughout the tables in this appendix, * denotes statistical significance at the 10 per cent level, ** denotes significance at the 5 per cent level and *** denotes significance at the 1 per cent level.

TABLE 18 Correlation between wins at T-1 and losses at T (one-month lag)

Wins/losses of:	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-

Source: CC analysis of cement suppliers' transaction data.

TABLE 19 Correlation between wins at T and losses at T-1 (one-month lag)

Wins/losses of:	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-

Source: CC analysis of cement suppliers' transaction data.

67. Taken together, contemporaneous and/or one-month lag correlation coefficients are positive and statistically significant for wins and losses between Lafarge, Cemex and Hanson, and there are also some statistically significant positive correlation coefficients for wins and losses between the Top 3 and Tarmac and Aggregate Industries. Positive correlation coefficients indicate that wins and losses between two

suppliers tend to move together over time, with periods of higher wins being associated with periods of higher losses.

68. We note that the high correlation coefficients for wins and losses between Hanson and Lafarge are likely to reflect Hanson's significant internalization and subsequent customer switching. Our analysis of this internalization event, and parties' comments on this analysis, are set out in Appendix 7.14.
69. Our results for independent importers' correlation coefficients indicate that wins and losses are not strongly correlated (with one exception). Coefficients that are not significantly different from zero indicate that the pattern of wins and losses between a pair of suppliers is likely to be random. We do, however, see some instances of positive correlations when examining wins and losses at longer lags. Negative coefficients, if statistically significant, could be consistent with competition as higher wins are associated with lower losses (eg this could be due to competitive pricing to win/retain customers).
70. We received a number of comments from the parties in relation to the initial results from our correlation analysis. Where we could address these comments by providing further explanation of our methodology and results, we have done so in this appendix (including adding the results on statistical significance of the correlation coefficients). Where appropriate, we provide responses to other comments below:
 - (a) Cemex noted that some correlation between wins and losses was to be expected in a market with only four large suppliers, since, when a supplier sought to recover lost volumes, it would occasionally get those volumes from the Major to which it had lost volumes. We agree that this could be the case in theory; however, if the recovery of lost volumes were random, we would expect to see no consistent relationship between the timing of wins and losses of a pair of sup-

pliers (ie we would expect correlation coefficients not to be statistically different from zero).

- (b) [REDACTED] was concerned that our win and loss correlation analysis for [REDACTED] was based on a small number of win events from Lafarge, and that the volumes involved were negligible ([REDACTED] kt over the entire period covered by the analysis).¹⁸ From a technical point of view, it is not necessary to have a great number of switching events to find that wins and losses are correlated in time (eg switching events between two suppliers appearing in only one month and no other months would yield a correlation coefficient of one). Furthermore, the [REDACTED] kt volumes to which [REDACTED] refers relate to estimated annual volumes won from Lafarge between 2008 and 2010. We note that the positive correlation coefficients between Lafarge and [REDACTED] are most likely to be driven by switching events at the beginning of 2011, when [REDACTED] internalized a significant volume of purchases from Lafarge (around [REDACTED] kt per month), and [REDACTED] also lost volumes to Lafarge (around [REDACTED] kt per month).
- (c) [REDACTED] noted that we had not controlled for other factors that could result in correlation but not be related to tit-for-tat behaviour, such as plant closures, operational issues at plants and import terminals, technical issues or differences between customer types. As explained in paragraph 63 above, the purpose of this analysis is to examine the association of wins and losses between pairs of suppliers over time; we have not attempted to explain the drivers of these wins and losses.
- (d) Lafarge Tarmac raised concerns regarding our interpretation of some correlation coefficients as 'high', and referred to the R-squared statistic. The R-squared statistic is equal to the squared correlation coefficient. Lafarge Tarmac noted that, for example, a correlation coefficient of 0.5 is equal to an R-squared of 0.25, which meant that only 25 per cent of the variation of one series was associated with variation in the other. We disagree that R-squared would be a relevant

¹⁸ [REDACTED] also told us that it had not been able to confirm the accuracy of this analysis of correlations.

statistic in this case. R-squared is typically used when one or more variables are used to model or predict another variable. Through our win and loss correlation analysis, we are not seeking to model or predict wins from losses, or vice versa, therefore R-squared is not a relevant statistic for this analysis.

Switching and prices

71. The Majors told us that customers used switching and threats to switch to achieve better prices. Therefore we examined the relationship between switching and prices in order to understand whether customers that switched achieved lower prices on average. We also sought to understand whether there were any differences by type of customer (eg independents versus Majors) and/or type of supplier (eg Top 3 versus [REDACTED]/importers).
72. We examined changes in average prices for customer job sites that switched supplier during the period covered by our data set. We focused on 'win' events and for each customer we looked at the change in average price paid before and after the switch (we used three-month averages). Where we present results for 'average change in prices', this is an average of changes in prices. We included all external customers in our analysis; however, this implies that, where a customer switch was an internalization or an outsourcing event, prices after or before the switch might refer to internal prices.
73. Table 20 below shows the average price changes after switching, by supplier. Across all suppliers, on average [REDACTED] of all external customers who switch pay lower prices after the switch, and the average reduction in prices is around [REDACTED] per cent (or £[REDACTED] per tonne). [REDACTED]
74. [REDACTED]

TABLE 20 Average price changes after switching

<i>Wins to</i>	<i>Proportion of switches with lower prices</i> %	<i>Average price change</i> %	<i>Average price change</i> £/tonne
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]
Total	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

75. Table 21 shows the average price changes by type of customer. [REDACTED]

TABLE 21 Average price changes after switching by type of customer

<i>Wins to</i>	<i>Independent customers</i>			<i>Major customers</i>		
	<i>Proportion of switches with lower prices</i> %	<i>Average price change</i> %	<i>Average price change</i> £/tonne	<i>Proportion of switches with lower prices</i> %	<i>Average price change</i> %	<i>Average price change</i> £/tonne
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

76. Table 22 shows the average percentage price changes for all external customer switches, by pairs of suppliers involved in the switching event. [REDACTED] We do not see any evidence from Table 22 suggesting that there are differences in how prices change after a customer changes from a Major to another Major, from a Major to an importer or from an importer to a Major.

TABLE 22 Average percentage price changes for all external customers by pairs of suppliers

Win from:	Winner								per cent
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]

Source: CC analysis of cement suppliers' transaction data.

Note: Table does not show results based on fewer than five switching events.

77. Tables 23 and 24 show the average percentage price changes for independents' switches and Majors' switches. From the tables below, [X].

TABLE 23 Average percentage price changes for independents' switches

Win from	Winner								per cent
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]

Source: CC analysis of cement suppliers' transaction data.

Note: Table does not show results based on fewer than five switching events.

TABLE 24 Average percentage price changes for Majors' switches*

Win from	Winner				per cent
	Lafarge	Hanson	Cemex	Tarmac	
Lafarge	-	[X]	[X]	[X]	
Hanson	[X]	-	[X]	[X]	
Cemex	[X]	[X]	-	[X]	
Tarmac	[X]	[X]	[X]	-	

Source: CC analysis of cement suppliers' transaction data.

Note: Table does not show results based on fewer than five switching events.

78. Table 25 shows the average percentage price changes following switches by supplier and year. [X]

TABLE 25 Average percentage price changes following independents' switches by supplier and year

Switches to	per cent				
	2007	2008	2009	2010	2011
Lafarge	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]
All	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Note: Table does not show results based on fewer than five switching events.

TABLE 26 Average percentage price changes following Majors' switches by supplier and year

Switches to	per cent				
	2007	2008	2009	2010	2011
Lafarge	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]
All	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Note: Table does not show results based on fewer than five switching events.

79. We note that this analysis will not capture some cases where a supplier is trying to implement a price increase and customers switch away to secure a lower price increase than they would have paid, had they been subject to the full price increase. In those cases, the data will show the customers paying the same (or even a higher) price than what they paid previously even though they have in fact secured a better price through switching.

80. Hanson told us that the customers might obtain better terms (other than simply a reduction in price) by switching, such as better credit terms. This would not be reflected in the data as a customer paying lower prices, but would still involve the customer securing better terms by switching. Although we acknowledge that this is a possibility, we think it will be relatively rare as, in the majority of the cases, suppliers compete on price in order to defend or win customers. This is shown in Hanson's

own submission that we analyse in [Annex D](#) where Hanson seems to have employed price-related mechanisms in order to defend its customers.

81. Cemex told us that historical price information from five to six years ago (ie 2007/08) was of limited relevance to the analysis and that the focus must be on present conditions of competition in the market, in which customers, operating in a challenging economic environment, are incentivized by price reductions to switch suppliers. Cemex also told us that switching behaviour which results in lower prices was inconsistent with a coordinated market.

Analysis of win/loss records submitted by the parties

82. Some parties have submitted to us their own win/loss records. We have data from [REDACTED].
83. [REDACTED]
84. We used the parties' win/loss records to calculate total volumes won and lost each year and what percentage of these volumes was won/lost from/to each of the other competitors. We only used their records on bulk cement so that we could compare them later with our own switching data on bulk cement. The results from this analysis are shown in [Annex C](#), Tables 1 to 10. Based on the parties' own win and loss records for bulk cement, we made a number of observations for each of these parties.
85. [REDACTED]
86. [REDACTED]

87. [REDACTED]

88. [REDACTED]

89. [REDACTED]

90. Our analysis of [REDACTED], [REDACTED] and [REDACTED] win and loss data also provides an indication of diversion to other GB importers for which we do not have transaction data (eg [REDACTED] etc).

Comparison with our switching data

91. We calculated wins and losses of bulk cement for [REDACTED], [REDACTED] and [REDACTED] using the customer switching data set that we created. These are shown in [Annex C](#), Tables 11 to 22. We then compared these results with the results from the analysis of parties' win/loss records presented in the previous section and [Annex C](#).

92. We would not necessarily expect the volume numbers (either absolute or relative splits) to be the same for the following reasons. Parties' win/loss records may be incomplete or erroneous. Parties have not provided an explanation of how they measure volumes won/lost, and their definitions of volumes won/lost could well be different from our definition (we measure win/loss as an estimated annual sales volume won/lost). There might also be differences in the definition of wins and losses. Parties attempt to record wins/losses to all the importers in GB, whereas we have data only on three importers ([REDACTED]), so our analysis will not capture switches to importers other than the three in our data. In addition, there might have been errors in the parties' transactions data, or, as we have acknowledged, the difficulty of the matching exercise might have resulted in errors in our collated data set.

93. However, our sensitivity checks in [Annex A](#) show that there is a quite substantial overlap between our data set and the parties' win/loss records. We are able to match the switching events and the identity of the competitor successfully between the two data sets on average 72 per cent of the time.¹⁹ The volumes associated with the switching events were not always matched, probably for the reasons outlined in the previous paragraph.
94. Hanson told us that the CC identified only around 72 per cent overlap while the fact that the parties' win/loss records were recognized to have significant shortcomings indicated that the level of transparency necessary for coordination was absent. We note that an overlap of 72 per cent is high, given the possible errors and omissions in both data sets. As we note in our sensitivity analysis in [Annex A](#), out of all Hanson's unmatched records, 5 per cent of them were due to differences in the switching definition, 6 per cent of them were related to collected sales and 4 per cent of them were not found in the transaction data. It is only the remaining unmatched records that are likely to be due either to errors in our data creation process or to errors in Hanson's win/loss records. Overall, all this evidence in combination suggests that the level of transparency is in fact high.
95. When we compare the parties' win/loss records ([Annex C](#), Tables 1 to 10) with the wins and losses in our data ([Annex C](#), Tables 11 to 21), we indeed observe differences between the volume numbers provided by the parties and the numbers we obtained from our data set (both absolute and relative splits). Nevertheless, we can compare the trends that emerge from the two data sets. In what follows we outline the trends we observe comparing the two data sets.

96. [REDACTED]

¹⁹ The only exception to this was Cemex, where only [REDACTED] per cent of Cemex's win/loss records were matched to our collated switching data. However, [REDACTED].

97. [REDACTED]

98. [REDACTED]

99. Overall, we see that although the parties' win/loss records and our switching data do not give the same switching volumes either in absolute values or percentages (due to the reasons outlined earlier), both data sets give similar patterns. When we compare the relative switching across competitors between the two data sets we see that the two data sets pick up similar trends in the switching behaviour of [REDACTED], [REDACTED] and [REDACTED].

Sensitivity to definition of switching

1. We carried out a sensitivity analysis with respect to our approach to identifying wins and losses in the matched transaction data in the following way:
 - (a) The original criteria required at least three months of supply before and after the event—we reduced this to two months.
 - (b) In the original criteria, periods of supply before and after the event were allowed to have gaps of up to two months—we increased this to three months.
 - (c) Thus we ‘relax’ our criteria for identifying wins and loss—we identify as switches more of the short-term switches (eg switches for less than three months) and more ‘patchy’ switches.

2. Table 1 below summarizes the increase in the number of win/loss events identified, and an estimate of additional win/loss value (in terms of volumes) identified. The value of additional switches identified is likely to be an overestimation, because the additional wins/losses we identify are short-term and/or patchy therefore annual estimated value of the customer is likely to be overstated (as we multiplied the average monthly volumes by 12 to arrive at the estimates of annualized values of switches).

3. We identify about 18 per cent more wins and losses than before, although this varies slightly across suppliers. In terms of value, we identify at most 13 per cent more switching—again, this varies across suppliers. This indicates that the additional switches we identify are likely to be smaller than the ones we identified using our original criteria.

TABLE 1 Additional wins and losses identified

Win from	Value of the additional wins/losses identified				Number of additional events identified			
	Wins kt	Wins %	Losses kt	Losses %	Wins kt	Wins %	Losses kt	Losses %
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Switching definition—cross-checking with cement suppliers' win/loss data

4. We used the parties' win/loss records submitted to us to cross-check our data. We examined whether the switching events identified by our collated data set match those recorded by the parties. For the cross-checks, we selected one year of data from each supplier. We used [REDACTED], [REDACTED] and [REDACTED]. In so far as possible, we considered only switches of delivered bulk cement customers in order to ensure comparability to our data set.

5. [REDACTED]

6. [REDACTED]

Tables and charts for the customer switching analysis

Monthly wins and losses by supplier

- Figures 1 to 6 show monthly wins and losses by supplier (for GB cement producers), as a proportion of total sales. Lafarge Tarmac told us that some of the figures and tables below did not use an appropriate benchmark when comparing switching levels to sales levels, because some of the figures compared external bulk customer wins with total (ie internal and external) bulk cement sales, and also because some of the tables compared wins of bulk cement independent customers with total cement bulk sales (including both internal and external sales). We chose as a benchmark total bulk cement sales because this will provide an indication of the amount of wins and losses relative to the total sales of GB producers, and also because this enables comparison of the levels across different types of customers and different producers.

FIGURE 1

Monthly wins and losses of all external customers as a proportion of total monthly sales volumes: Lafarge

[✂]

Source: [✂].

Note: [✂].

FIGURE 2

Monthly wins and losses of all external customers (excluding Hanson internalization) as a proportion of total monthly sales volumes: Lafarge

[✂]

Source: [✂].

Note: [✂].

FIGURE 3

Monthly wins and losses of all external customers as a proportion of total monthly sales volumes: Hanson

[✂]

Source: [✂].

Note: [✂].

FIGURE 4

Monthly wins and losses of all external customers as a proportion of total monthly sales volumes: Cemex

[REDACTED]

Source: [REDACTED].

Note: [REDACTED].

FIGURE 5

Monthly wins and losses of all external customers as a proportion of total monthly sales volumes: Tarmac

[REDACTED]

Source: [REDACTED].

Switching across the entire period

- Tables 1 to 10 summarize the data on the overall levels of switching for the entire period 2007 to 2011 both in terms of number of switching events and in terms of volumes of switching as a proportion of total sales.

Total number of win events

TABLE 1 Wins of all external customers (majors and independents) from 2007 to 2011

Win from	Winner								
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	Total
Lafarge	-	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	-	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	-	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	-	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	-	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	-	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	-	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	-	[REDACTED]
All wins	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

TABLE 2 Wins of independent customers from 2007 to 2011

Win from	Winner								
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	Total
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All wins	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Total number of loss events

TABLE 3 Losses of all external customers (majors and independents) from 2007 to 2011

Switch to	Loss by								
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	Total
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All losses	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

TABLE 4 Losses of independent customers from 2007 to 2011

Switch to	Loss by								
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	Total
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All losses	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Overall levels of switching—volumes won

3. Table 5 shows volumes won in absolute levels, and Tables 6 and 7 show wins relative to total sales.

TABLE 5 Wins of all external customers from 2008 to 2010, absolute levels

kt

Win from	Winner							
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-
All wins	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

TABLE 6 Wins of all external customers (majors and independents) from 2007 to 2011 as a proportion of total cement sales volumes (external and internal)

Win from	Winner								Total
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All wins	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

TABLE 7 Wins of independent customers from 2007 to 2011 as a proportion of total cement sales volumes (external and internal)

Win from	Winner								Total
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All wins	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Overall levels of switching—volumes lost

- Table 8 shows volumes lost in absolute levels, and Tables x to y show losses relative to total sales.

TABLE 8 Losses of all external customers from 2008 to 2010, absolute levels

kt

Switch to	Loss by							
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-
All losses	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

TABLE 9 Losses of all external customers (majors and independents) from 2007 to 2011 as a proportion of total cement sales volumes (external and internal)

Switch to	Loss by								
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	Total
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All losses	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Note: Lafarge's losses include volumes repatriated by Hanson.

TABLE 10 Losses of independent customers from 2007 to 2011 as a proportion of total cement sales volumes (external and internal)

Switch to	Loss by								
	Lafarge	Hanson	Cemex	Tarmac	Aggregate Industries	[Importer X]	[Importer Y]	[Importer Z]	Total
Lafarge	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	-	[X]
All losses	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Annual levels of switching

5. Table 11 shows total (external and internal) sales volumes of delivered bulk cement for each supplier in our data. We have used these figures in our calculations of relative win/loss volumes.

TABLE 11 Total sales volumes (external and internal) of delivered bulk cement by supplier and year

	<i>kt</i>						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

6. Tables 12 to 18 summarize the overall levels of switching by year.

TABLE 12 Losses of all external customers (majors and independents) as a proportion of total cement sales volumes

	<i>per cent</i>						
Losses by	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All	4.7	20.9	17.0	5.6	5.1	15.0	11.2

Source: CC analysis of cement suppliers' transaction data.

Note: Lafarge's losses in 2008 reflect Hanson internalization (as it appears as a switch in our data in December 2008).

TABLE 13 Losses of independent customers as a proportion of total cement sales volumes

	<i>per cent</i>						
Losses by	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer X]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Y]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[Importer Z]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All	1.2	3.4	6.7	2.4	2.8	4.1	3.3

Source: CC analysis of cement suppliers' transaction data.

TABLE 14 Wins of all external customers (majors and independents) as a proportion of total cement sales volumes

Winner	per cent						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
All	4.1	6.6	13.7	5.8	4.3	8.5	6.9

Source: CC analysis of cement suppliers' transaction data.

Note: Losses of external customers include losses due to internalization but they will not show up as wins

TABLE 15 Wins of independent customers as a proportion of total cement sales volumes

Winner	per cent						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
All	1.4	3.2	6.6	2.7	2.9	4.0	3.3

Source: CC analysis of cement suppliers' transaction data.

TABLE 16 Wins of Majors (Lafarge, Hanson, Cemex, Tarmac, Aggregate Industries) as a proportion of total cement sales volumes

Wins by	per cent						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Y]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
[Importer Z]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
All	2.7	3.4	7.2	3.1	1.4	4.4	3.6

Source: CC analysis of cement suppliers' transaction data.

Note: There is no switching of Majors to importers (except [X]).

TABLE 17 Internalizations by the five Majors (wins of own sites), volume

Wins by	kt						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

TABLE 18 Internalizations by the five Majors (wins of own sites), volumes as a proportion of total sales volume

Wins by	per cent						
	2007	2008	2009	2010	2011	2008–2010	2007–2011
Lafarge	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Aggregate Industries	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC analysis of cement suppliers' transaction data.

Analysis of certain cement suppliers' win and loss records

Cement suppliers' win and loss records

1. Tables 1 to 10 summarize the win/loss records data we received from certain cement suppliers.

[REDACTED]

TABLE 1 [REDACTED] wins in win/loss records, all external customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 2 [REDACTED] wins in win/loss records, independent customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 3 [REDACTED] losses in win/loss records, all external customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 4 [REDACTED] losses in win/loss records, independent customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

[REDACTED]

TABLE 5 [REDACTED] wins in win/loss records, all external customers

	2009	2010	2011	2012	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 6 [REDACTED] wins in win/loss records, independent customers

	2009	2010	2011	2012	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 7 [REDACTED] losses in win/loss records, all external customers

	2009	2010	2011	2012	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 8 [REDACTED] losses in win/loss records, independent customers

	2009	2010	2011	2012	2007-2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which other	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: [REDACTED] win/loss records

[REDACTED]

TABLE 9 [REDACTED] wins in win/loss records for 2007, all external customers

	2007
Wins (tonnes)	[REDACTED]
Of which Lafarge	[REDACTED]
Of which Hanson	[REDACTED]
Of which Tarmac	[REDACTED]
Of which Aggregate Industries	[REDACTED]
Of which importers	[REDACTED]
Of which other	[REDACTED]

Source: [REDACTED] win/loss records.

TABLE 10 [REDACTED] wins in win/loss records for 2007, independent customers

	2007
Losses (tonnes)	[REDACTED]
Of which Lafarge	[REDACTED]
Of which Hanson	[REDACTED]
Of which Tarmac	[REDACTED]
Of which Aggregate Industries	[REDACTED]
Of which importers	[REDACTED]
Of which other	[REDACTED]

Source: [REDACTED] win/loss records

Cement suppliers' wins and losses in our data set

- Tables 11 to 22 summarize the wins and losses in our data set for those cement suppliers which also provided us with their own win/loss data.



TABLE 11 [REDACTED] wins in our data set, all external customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 12 [REDACTED] wins in our data set, independent customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 13 [REDACTED] losses in our data set, all external customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 14 [REDACTED] losses in our dataset, independent customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].



TABLE 15 [REDACTED] wins in our data set, all external customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 16 [REDACTED] wins in our data set, independent customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 17 [REDACTED] losses in our data set, all external customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 18 [REDACTED] losses in our data set, independent customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Cemex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].



TABLE 19 [REDACTED] wins in our data set, all external customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 20 [REDACTED] wins in our data set, independent customers

	2007	2008	2009	2010	2011	2007–2011
Wins (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 21 [REDACTED] losses in our data set, all external customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data.

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

TABLE 22 [REDACTED] losses in our data set, independent customers

	2007	2008	2009	2010	2011	2007–2011
Losses (tonnes)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Lafarge	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Hanson	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Tarmac	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which Aggregate Industries	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which the 3 importers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: CC analysis of cement suppliers' transaction data

Note: The '3 importers' refers to the three importers for which we have data, ie [REDACTED].

Analysis of Hanson's submission on defended volumes

1. Hanson submitted to us information on threats to switch by its cement customers. In this annex we describe and analyse this information.
2. Our analysis of Hanson's information on threats to switch shows that the Majors seem to have been more successful in challenging Hanson's top customers than importers over the last two years. [REDACTED] appears to be the main challenger among Majors, while [REDACTED] appears to be the main challenger among importers. In order to defend volumes over the last two years, Hanson told us that it had to reduce prices, fix prices for longer periods and/or defer announced price increases. Our analysis of the extent to which prices reduced in order to defend volumes showed that the price impact was not very large, although this analysis is limited by lack of data. Our analysis is also limited by the fact that Hanson's information on threats to switch covers only its top customers who are more likely to be challenged by Majors as opposed to importers due to capacity issues and thus any observed pattern cannot be easily generalized. In addition, we expect that the information collected by sales staff may overestimate the degree of pressure exercised on customers.

Hanson's information

3. Hanson told us that threats of switching by customers represented a very significant demonstration of competition and the exercise of bargaining power by customers. It told us that customers used the threat of switching to resist proposed price increases, secure lower prices and/or to secure better deals generally (eg better credit terms, guarantees of no future price increases for a specified period) and that this was driven by the availability of competing offers to customers.

4. Hanson provided us with information on the threats to switch by its cement customers. This information consisted of case studies of threats to switch for its top ten customers in the RMX and concrete products segments for 2011, ranked by volumes sold. Hanson said that these cases represented some of the principal instances of recent competitor threats to these customers.
5. Hanson told us that this information had been prepared on the basis of interviews with Hanson Cement's sales staff which covered recent (2011/12) competitor threats Hanson had faced in respect of its top ten customers in each category and Hanson's response to the threats.
6. Hanson said that it had focused this exercise on the top ten customers by two key segments for the purposes of easing the administration burden and that the same picture would emerge if the exercise were extended to medium-sized and smaller customers. According to Hanson, the sales people involved in this exercise said that they had faced significant competitor pressure for small and medium customers as well. By way of example, [REDACTED] (classified as medium customers) were noted as customers where Hanson had faced competition from [REDACTED] leading to Hanson having to reduce its prices by between £[REDACTED] and £[REDACTED] per tonne (which took Hanson back to [REDACTED] prices).²⁰

Hanson's case studies

7. Hanson collected information on the most recent cases of threats to switch by its top ten cement customers both in the RMX segment and the concrete products segment. These case studies covered the period 2011/12. For every case where its customers were challenged by a competitor over the last two years, Hanson provided infor-

²⁰ Hanson noted that it would be happy to extend the exercise across all or any customer size segments and provide further details on the precise tonnages involved and specific financial impacts by customer.

mation on which competitor challenged its customers and which methods Hanson employed to defend its volumes. In what follows we summarize this information.

8. Hanson's top ten customers in the RMX segment ranked by volumes sold in 2011 were [REDACTED]. Its top ten customers in the concrete products segment ranked by volumes sold in 2011 were [REDACTED]. These customers represent 27 per cent of Hanson's total sales for 2011.²¹

Challengers

9. Over the last few years Hanson has lost some of the business of its top customers both in the RMX and concrete products sectors to both importers and Majors.²²
10. Hanson explained that it lost approximately one-quarter to one-third of its business with [REDACTED] (Hanson's top customer in the RMX sector) in 2012 to [REDACTED]. Hanson also told us that in 2010 it lost 25 per cent of its business with [REDACTED] (Hanson's second biggest customer in the concrete products sector) to [REDACTED].
11. During the same period Hanson also lost volumes (either the entire business with a customer or part of its business) to Majors. Table 1 below summarizes these instances. We see that in most cases Hanson lost customers (or part of its business with these customers) to [REDACTED], in fewer cases to [REDACTED] and then in fewer cases again to [REDACTED].

²¹ Calculation made using Hanson's transactions data.

²² Although Hanson's analysis focused on cases during the last two years, it also referred sometimes to instances in which it lost customers before 2011 in order to explain its attempts to win back these customers in subsequent years.

TABLE 1 Hanson's losses of top customers to Majors, 2009 to 2012

Year	Customer	Lost to	Sector	Loss
2011	[REDACTED]	[REDACTED]	RMX	All of this business for four months
2012	[REDACTED]	[REDACTED]	RMX	A significant proportion of this business (2012 to date)
2012	[REDACTED]	[REDACTED]	RMX	One of this customer's key RMX sites
2011/12	[REDACTED]	[REDACTED]	RMX	Approximately 40% of this business
2009	[REDACTED]	[REDACTED]	RMX	All of this account
2010	[REDACTED]	[REDACTED]	CP*	All of this account
2012	[REDACTED]	[REDACTED]	CP	All of this account

Source: Hanson.

*Concrete products.

12. On other occasions during the same period, Hanson succeeded in defending volumes that were challenged by both importers and Majors.

13. Hanson's analysis shows that the importers which challenged its top customers over the period 2011/12 were [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED] and [REDACTED]. Hanson noted that on three occasions, [REDACTED] import terminal in [REDACTED] and its [REDACTED] were a new source of threat. Hanson said that [REDACTED] was able to challenge customers due to its ability to [REDACTED]. Table 2 summarizes the number of challenges each importer attempted against Hanson's customers. The same customer might have been approached by more than one importer at a time and in some cases Hanson was not sure about the identity of the importer. Overall, it seems that, among importers, [REDACTED] has been the main challenger during 2011/12. [REDACTED] and [REDACTED] also appear to have challenged Hanson's top customers relatively frequently.

TABLE 2 Number of challenges to Hanson's top customers by importer, 2011/12

Importer	Number of challenges	
	RMX sector	CP sector
[REDACTED]	6	3
[REDACTED]	1	-
[REDACTED]	2	2
[REDACTED]	3	-
[REDACTED]	2	-
[REDACTED]	1	1
[REDACTED]	-	1

Source: Hanson.

14. Hanson's customers were also challenged by Lafarge, Cemex and Tarmac during the same period. Table 3 summarizes the number of challenges each Major attempted against Hanson's customers. Although in the RMX sector [REDACTED] appears to have challenged Hanson's customers fewer times than [REDACTED], if the number of challenges in the concrete products sector as well as the losses Hanson incurred to [REDACTED] that were described earlier are also taken into account, it seems that [REDACTED] has been the main challenger of Hanson's customers among the Majors. [REDACTED] follows immediately after in terms of frequency of challenges and [REDACTED] appears to have challenged Hanson's top customers the least frequently.

TABLE 3 Number of challenges to Hanson's top customers by Major, 2010 to 2012

Major	Number of challenges	
	RMX sector	CP sector
[REDACTED]	1	4
[REDACTED]	2	2
[REDACTED]	1	-

Source: Hanson.

Hanson's response to challenges

15. Hanson also described the ways in which it tried to defend these volumes, although it did not provide an explanation for every case of threat to switch that it had recorded. The main ways Hanson defended volumes from both importers and Majors were by decreasing prices, fixing prices for long periods and/or deferring announced price increases.
16. Table 4 summarizes the different ways in which Hanson defended its customers from importers, for those cases where Hanson provided some information.

TABLE 4 Price reductions to defend customers from importers' threats, 2011/12

Customer	Importer(s)	Sector	Price-related defence mechanism
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]

Source: Hanson.

*Hanson expects to be obliged to implement further reductions.

17. Table 5 summarizes the ways in which Hanson defended its customers from the Majors for the cases where Hanson provided some information.

TABLE 5 Price reductions to defend customers from Majors' threats, 2011/12

Customer	Major	Sector	Price-related defence mechanism
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	RMX	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]
[REDACTED]	[REDACTED]	CP	[REDACTED]

Source: Hanson.

Comparison between challenges from importers and Majors

18. From the above analysis we see that the Majors have been more successful in challenging Hanson's top customers in that more challenges by Majors resulted in a loss than by importers. Among the importers, [REDACTED] appears to be the main challenger followed by [REDACTED] and [REDACTED], while among Majors the main challenger was [REDACTED] followed by [REDACTED] and [REDACTED].

19. Regarding the price reductions, from Tables 4 and 5 above we see that in general Hanson has used similar ways to defend volumes that were challenged by either importers or Majors. We do not have information on the exact price reductions for

every single case of challenge so we cannot directly compare the price reductions offered to customers challenged by importers and the price reductions offered to customers challenged by Majors. In addition, on some occasions (eg [REDACTED]) the same customer was challenged by both importers and Majors and so a price reduction was offered to address collectively the threats to those customers. Based on the price reductions that are recorded in Hanson's analysis, we see that the price reductions vary between £[REDACTED]/t and £[REDACTED]/t for importers and between £[REDACTED]/t and £[REDACTED]/t for Majors. So there is some overlap in the price reductions offered to customers after a challenge from either an importer or a Major but for some customers that were challenged by a Major the price reduction has been higher on some occasions.

20. Our analysis is, however, restricted by the fact that we only have information on switching events for Hanson's top customers in the RMX and concrete products segments. These customers are more likely to be challenged by the Majors than by importers since the Majors have more capacity to serve larger customers. In addition, the information on switching events was collected by interviewing sales staff that covered the relevant period. Thus, it is possible that the data collected are subject to bias whereby sales staff would tend to exaggerate any pressure exercised on customers.

Average price reductions in the data

21. We tried to test the extent to which Hanson prices reduced after a threat to switch using Hanson's transaction data and comparing this to the reported price reduction in Hanson's information on threats to switch. Since we only have transaction data up to 2011 we could not do this for customers that threatened to switch in 2011. In addition, from Hanson's analysis, it is not always clear which was the exact point in the year that Hanson had to reduce prices in order to defend volumes. Given these

limitations, we compared the 2010 price average to the 2011 price average for the customers that were challenged in 2011. There were four such customers.

22. Table 6 shows the results of this analysis. We see that in the case of one customer, the average price to this customer was higher by £[redacted]/t in the year after the challenge. In the case of the another customer there was almost no price change from one year to the other, while for [redacted] and [redacted] we see that prices reduced after the threat to switch, but this reduction was by £[redacted]/tonne, smaller than the price Hanson reported in either case. Overall we see that the impact on prices was not very large, although we acknowledge the limitations of this exercise.

TABLE 6 **Average prices by customer**

<i>Customer</i>	[redacted]	[redacted]	[redacted]	[redacted]
Average price in 2010 (£/t)	[redacted]	[redacted]	[redacted]	[redacted]
Average price in 2011 (£/t)	[redacted]	[redacted]	[redacted]	[redacted]
Difference in price (2011–2010) (£/t)	[redacted]	[redacted]	[redacted]	[redacted]

Source: Hanson transaction data.

Analysis of month-by-month changes in shares of sales of cement made by GB producers

1. Figures 1 to 4 show the changes in monthly share of sales of cement of Lafarge, Cemex, Hanson and Tarmac out of total sales of cement by the GB producers. The first observation is that changes in monthly share of sales are usually small, within plus or minus [X] percentage point [X], [X] and [X] shares of sales in most months, and within plus or minus [X] percentage points for [X] share of sales in most months.

2. We also observe that it is often the case that a month with an increase in share of sales is followed by a month with a reduction in share of sales, and vice versa. We also see that, in instances where there was a particularly large increase or decrease in share of sales in one month, the following month is also characterized by a particularly large change in share of sales in the opposite direction. This could be indicative of periods of deviations with subsequent retaliation.

3. Two time periods are particularly noticeable because of the larger changes in shares of sales observed:
 - (a) December 2010/January 2011. In December 2010, [X] share of sales made by the GB producers increases by [X] percentage points, while [X] share of sales reduces by [X] percentage points and [X] share of sales reduces by [X] percentage points. A month later, in January 2011, we see [X] share of sales increasing by [X] percentage points, [X] share of sales reducing by [X] percentage points and [X] share of sales remaining fairly stable ([X] per cent reduction). This suggests to us that [X] may have won large volumes from [X] in December 2010, only for [X] to then win back equivalent volumes from [X] the following months.

(b) The first half of 2009, where we see again the impact of the 2009 internalization.

[X] loses a large amount of share of sales in January 2009 ([X] percentage points); it then takes several months for [X] to recover part of its share of sales ([X] percentage points over February to April 2009). Then, in May 2009, we see [X] regaining share of sales ([X] percentage points), both from [X] and [X] ([X] share of sales reduces by [X] percentage point in May 2009 and [X] share of sales reduces by [X] in May 2009), and in June 2009 we see the reverse ([X] and [X] each increase share of sales by [X] percentage point in June 2009 and [X] loses [X] percentage points share of sales in June 2009).

4. We also note that both of these time periods (first half of 2009, and Q1 2011) are generally characterized by high levels in price dispersion for [X], [X] and [X] on prices to external customers (see Appendix 7.8). This is consistent with these periods being possible periods of instability in any possible coordination. Indeed, because prices are individually negotiated, we expect that periods of punishment and deviations will have an impact mainly on shares of sales made by GB producers and on the degree of price dispersion. Any changes in average prices may be less noticeable because only the targeted customers may benefit from lower prices.

FIGURE 1

Lafarge: monthly changes in share of sales of cement made by GB producers

[X]

Source: CC based on Lafarge, Hanson, Tarmac and Cemex transaction data.

FIGURE 2

Cemex changes in share of sales of cement made by GB producers

[X]

Source: CC based on Lafarge, Hanson, Tarmac and Cemex data.

FIGURE 3

Hanson changes in share of sales of cement made by GB producers



Source: CC based on Lafarge, Hanson, Tarmac and Cemex data.

FIGURE 4

Tarmac changes in share of sales of cement made by GB producers



Source: CC based on Lafarge, Hanson, Tarmac and Cemex data.

5. Hanson told us that its analysis of its own market share estimates showed that there was significant volatility in Hanson's market share and an absence of punishing behaviour. In particular, Hanson highlighted two examples from 2011:
 - (a) Hanson suggested that its market share jumped between January and February 2011, and that there had been no competitor reaction to reverse this increase in March. We note that Figure 3 shows that there was a marked drop in Hanson's market share between December 2010 and January 2011; therefore the jump in share between January and February 2011 could be related to the reduction in Hanson's share in the previous month.
 - (b) Hanson told us that between May and June 2011 its market share jumped by as much as 2 per cent of the entire national cement market, and that if one looks at market shares right through until the end of 2011 there is no market correction whatsoever. We note that the increase in market share highlighted by Hanson was preceded by a dip in Hanson's market share.

6. Moreover, Hanson provided several examples of changes in its market shares between 2005 and 2010. We do not have data to evaluate submissions regarding how Hanson's market shares evolved prior to 2007. Hanson's examples of changes in market shares between 2007 and 2010 included the following:

- (a) Hanson told us that it increased its market share from April to May 2010, yet looking at the next five months of trading there was no reversal of this gain and Hanson argued that therefore there had been no punishment action to reverse the April gain. We note that the increase in market share highlighted by Hanson was actually preceded by a dip in Hanson's market share, in other words the increase in its market share from April to May 2010 could be a consequence of the reduction in the previous months.
- (b) Hanson told us that it lost 1 per cent of the national market between January and February 2009, and that if one looks at a full year of trading to the end of 2009 the figures do not show any kind of win back by Hanson or reversal of loss. This, Hanson told us, was not consistent with a punishment to win back and correct shares. We note that Figure 3 shows that Hanson had gained considerable market share between December 2008 and January 2009.
- (c) Hanson told us that it gained market share in excess of 1 per cent between August and September 2008, and that October and November did not show a reversal of this gain. We note that Hanson's market share had, except for one month, been declining in the months prior to the increase between August and September 2008.
- (d) Hanson told us that it lost nearly 1 per cent of market share between January and February 2008, and that it did not regain share until September the same year. Hanson suggested that this contradicted a mode of competition based on monitoring of monthly market shares and quick punishment actions occurring to re-balance shares. We note that Figure 3 shows that in the two months leading up to the loss in market share highlighted by Hanson, Hanson had been gaining market share.
- (e) Hanson told us that it gained nearly 2 per cent of the market between September and October 2008, yet in January 2008 its market share was still the same as after the October gain. In Hanson's view, there had thus been no punishment

reaction by competitors. We note that Figure 3 shows that Hanson's share had dipped considerably in the two months leading up to the increase in market share highlighted by Hanson.

(f) Hanson told us that it had lost almost 2 per cent of market share between February and March 2007, yet three months later its market share was exactly the same. Hanson told us this showed that it had not swiftly reacted to regain market share and that this was inconsistent with monthly monitoring of market shares and swift actions to regain market share. We note that three months after the event highlighted by Hanson, ie in June 2007, its market was rising, and that the June market share represented an increase relative to Hanson's market share in May.

7. In the light of the above, we consider that Hanson's observations are consistent with a continuous rebalancing of market shares between the GB cement producers.
8. Hanson provided two examples of changes in its market share in 2012.. We do not have data on 2012 market shares at present, and will pursue this following publication of these provisional findings.
9. We also calculated the own correlation in share of sales changes of each GB cement producer. So, for instance, for [X], we calculated the correlation between changes in [X] share of sales made by the GB producers in Month t, and changes in [X] share of sales made by the GB producers in the following month, over the period January 2007 to December 2011. If there is coordination on share of sales made by the GB cement producers, we expect these correlation coefficients to be negative (indicating that an increase in share in one month is followed by a reduction in the following month). Coefficients close to -1 would indicate that recovery is full and takes place in the month immediately following any loss or increase in share of sales; however, we

would not necessarily expect this to be the case as we would expect that it may take more than one month for a cement producer fully to recover share of sales following a deviation. Therefore, we also calculated the correlation between change in share of sales in a given month and the total change in the following two months. Moreover, there are some underlying trends in shares of sales made by the GB producers over time ([~~3~~] reduction and [~~3~~] increase) which will influence the correlation coefficients.

10. The results are summarized in Table 1. We have also checked whether the results are statistically significant at the 95 and 99 per cent level, and have marked the results accordingly.¹

TABLE 1 **Auto-correlation in changes of shares of sales made by GB producers—monthly basis**

	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
Correlation between change in share of sale in Month t and change in following month	[3]*	[3]*	[3]	[3]
Correlation between change in share of sales in Month t and sum of change in share of sales in two months following	[3]*	[3]*	[3]*	[3]

Source: GB cement producers and CC analysis.

*Significant at 99 per cent level.

Notes:

1. Based on share of sales of all cement by GB producers in GB (ie not including imports). Monthly shares from January 2007 to December 2011 (58 observations for the lagged correlation coefficients).
2. n=59, df=57 in the case of correlation between change in share of sales in Month t and change in following month; n=58, df=56 in the case of correlation between change in share of sale in month t and sum of change in share of sale in two following months.

¹ We looked up the significance thresholds in a standard statistics book (G M Clarke and D Cooke, *A Basic Course in Statistics*, p359). We calculated the significance levels for 57 and 56 degrees of freedom by linearly interpolating between the results for 50 and 60 degrees of freedom. We obtained thresholds of -25.7 and -33.4 per cent at 95 and 99 per cent significance levels respectively where there are 57 degrees of freedom, and -25.9 and -33.7 per cent at 95 and 99 per cent significance levels respectively where there are 56 degrees of freedom.

Analysis of cement price announcements

1. This appendix sets out our analysis of the GB producers' price announcement letters. We look at when letters were sent, how large the announced increases were and to what extent announced increases have translated into actual increases.

Price announcements letters

2. We received the following data on price announcements letters for grey cement from the four GB cement producers:

<i>Company</i>	<i>Data</i>	<i>Dates covered</i>	<i>Product coverage</i>
Lafarge	Date of letter, date of increase and magnitude of increase	From Mar 2003	Bagged and bulk cement
Tarmac	Date of letter, date of increase and magnitude of increase	From Jan 2006	Bagged and bulk cement
Hanson	Date of letter, date of increase and magnitude of increase	From Jan 2006	Bagged and bulk cement
Cemex	Date of letter, date of increase and magnitude of increase	From Jan 2006	Bagged and bulk cement

3. Table 1 shows when letters were sent, when price increases became effective and the announced price increases.

TABLE 1 Bulk CEM I price increase announcements

<i>Date of price increase</i>	<i>Date of announcement</i>	<i>Supplier</i>	<i>Price increase</i>
1 Jan 06	23 Sep 05	Lafarge	£6.45
	18 Oct 05	Cemex	£6.45
	24 Oct 05	Tarmac	£6.50
	1 Nov 05	Hanson	£6.50
1 Jan 07	25 Aug 06	Lafarge	£8.35 or 8.75 depending on product
	21 Sep 06	Hanson	£8.50 or £9.40 depending on product
	16 Oct 06	Tarmac	£8.50
	16 Oct 06	Cemex	£8.15 or £9.25 depending on product
1 Jan 08	7 Sep 07	Lafarge	£7.20 or £7.60 depending on product
	12 Sep 07	Hanson	£7.35 or £8.00 depending on product
	24 Oct 07	Tarmac	£7.45
	26 Oct 07	Cemex	£8.85 or £9.95 depending on product
1 Aug 08	25 Jun 08	Hanson	£3.40
	25 Jun 08	Cemex	£3.75 or £4.00 depending on product
	26 Jun 08	Lafarge	£3.53 or £3.91 depending on product
	30 Jun 08	Tarmac	£3.70
1 Oct 08	21 Aug 08	Cemex	£3.50 or £3.75 depending on product
1 Jan 09	1 Oct 08	Lafarge	£16.00
	23 Oct 08	Hanson	£17.20
	31 Oct 08	Cemex	£16.40 or £18.40 depending on product
	13 Nov 08	Tarmac	£15.75
1 Jan 10	27 Oct 09	Tarmac	£5.20
	27 Oct 09	Hanson	£5.80 or £6.20 depending on product
1 Mar 10	28 Oct 09	Cemex	£5.75 or £6.75 depending on product
	1 Dec 09	Lafarge	£4.75 or £5.50 depending on product
1 Jan 11	23 Sep 10	Lafarge	£6.75 or £7.50 depending on product
	7 Oct 10	Hanson	£7.10
	8 Oct 10	Cemex	£7.25 or £7.75 depending on product
	1 Nov 10	Tarmac	£7.00
1 Jan 12	30 Sep 11	Cemex	£8.75 or £9.25 depending on product
	18 Oct 11	Lafarge	£7.73 or £8.05 depending on product
	6 Nov 11	Hanson	£9.60 or £10.60 depending on product
	1 Dec 11	Tarmac	£8.15
1 Sep 12	17 Aug 12	Cemex	Number of supplementary charges introduced
1 Jan 13	19 Sep 12	Cemex	Introduction of a gross price list for all customers; rebates netted off gross price to arrive at a net-net price; plan for two price increases in 2013 (1 Apr and 1 Oct); fuel surcharge mechanism introduced

Source: Lafarge, Hanson, Cemex and Tarmac.

4. In terms of the rationale for sending out price increase letters, we were told by Hanson that it sent general price increase notifications to customers in order to attempt to recover cost increases (eg energy costs which had risen substantially in recent years). It also told us that the sending of price increase letters was a practice required by customers, since such letters allowed customers to prepare for their own budget considerations.

5. Lafarge told us that price announcement letters had typically been sent three months ahead of the date of the application of the increase because customers required this much advance notice in order to be able to plan for the price increases within their own businesses.
6. Tarmac told us that to the extent that there had been any correlation between the timing and the amounts of the price letters sent by the different cement producers, this could be explained by the need to respond to customer requests for their own budgeting/costing purposes and to address increased input costs (which were common to all producers) annually or, in more exceptional circumstances, as they could no longer continue to be absorbed.
7. We have found some internal documents that discuss price announcement letters and the related strategy. Cemex, [REDACTED].¹ In a different document, Cemex [REDACTED].
8. We also found some references to price increase announcements for cement in a Lafarge internal document. [REDACTED]
9. [REDACTED]²
10. Going forwards, Cemex has introduced a number of significant changes to its pricing strategy from 1 January 2013. [REDACTED] Cemex told us that [REDACTED]. We note that the proposed change was very recent, and therefore at present it is not clear whether this change will be implemented in full, nor what effect it might have on the price

¹ [REDACTED] See also paragraph 10.

² Lafarge noted that the 1 August 2008 price increase announcement followed a large and unexpected increase in the price of coal, and increases in oil and sea freight costs. Lafarge stated that, as these were common costs to all UK cement producers, they would have affected all UK cement producers to a similar degree. Moreover, Lafarge told us that given the visible nature of the cost shocks over such a small time frame Lafarge's decision to introduce a price increase was not a surprise to Lafarge's cement customers, and consequently Lafarge considered that it was more successful in achieving price increases following its August 2008 increase than it was with other price increases.

announcement strategies of the other GB cement producers. Nonetheless, [✂]. As such, it is not clear which of the following outcomes might result in the market:

- (a) Cemex makes the proposed changes, and other GB cement producers do not make similar changes;
- (b) Cemex makes the proposed changes, and other GB cement producers follow suit; or
- (c) Cemex does not end up following through with its plans, as its customers threaten to switch, or actually do switch, to competitors, making changes unprofitable for Cemex.

11. Figures 1 and 2 illustrate GB cement producers' nominal and cumulative announced increases. If price increases were a little bit different on one particular date, the series in Figure 2 would not be aligned at all following dates, even if the increase was exactly the same thereafter. However, in that case, the series would be parallel to each other.

FIGURE 1

Announced increases in price of bulk CEM I (nominal)

[✂]

Source: CC's calculations using the parties' price increase announcement letters.

FIGURE 2

Announced increases in price of bulk CEM I (cumulative)

[✂]

Source: CC calculations using the parties' price increase announcement letters.

Submissions from the GB cement producers on the comparison between announced price increases and actual price increases for cement

12. Lafarge told us that price increases detailed in letters were aspirational only and did not reflect actual prices implemented to individual customers. According to Lafarge, the eventual price agreed depended on the negotiations which followed the price

increase announcement, with customers carrying out market testing to secure other offers and using these to optimize their outcome. The final agreement might include a delayed date of application, adjustments to the product supplied, price, volume, rebates, discounts, promotional assistance, delivery modes, credit terms, service level, etc.

13. Tarmac told us that announced price increases sometimes did not translate into actual price changes at all and, in some cases, the outcome of price negotiation after a price announcement letter had been reduction in prices.
14. Hanson told us that [REDACTED]. Hanson also told us that customers used the threat of switching to negotiate lower (or no) price increases.
15. In Cemex told us that the actual price agreed with a customer following a price increase announcement depended on a variety of factors, [REDACTED].
16. Cemex told us that there had been significant variation in the price increases that had been announced by the suppliers (for some types of cement more than for others). It also said that [REDACTED].

Analysis of announced versus realized prices

17. We analyse Lafarge's price increase announcements over the period 2007 to 2011. We requested that Lafarge's submitted transaction data be split into broad CEM I, CEM II, CEM III and CEM IV categories. We therefore compare the transaction data

for CEM I with the price increase announcements for products CEM I 42,5N/52,5N, as these are predominantly the standard products (as opposed to rapid setting).³

18. Figure 3 shows the weighted average price for CEM I from Lafarge's transaction data alongside the implied price based on price increase letters for products 42,5N/52,5N for the three months immediately following each announced price increase. The figure shows that Lafarge [✂].⁴

FIGURE 3

Announced and realized increases in price of bulk CEM I

[✂]

Source: CC calculations using Lafarge's price increase announcement letters and transaction data.

19. In order to calculate the realized average price change, we take as a base period the month just before the increase was planned to become effective (eg December in the case of January price increases) and compare the average price in that month with the one in the month in which the announced price increase became effective. Given that we expect that the price increases might not show immediately, we do the same analysis comparing the base month with each of the subsequent three months in turn (eg January, February and March in the case of January price increases). This allows us to see also how average prices across all sales change over time. The results are shown in Table 2.

³ Lafarge told us that the CEM I category did not necessarily exclude all rapid-setting cements. If this is the case, our results on realized price increases may be biased upwards somewhat, as they may include price increases of some rapid-setting cements, which may have been subject to greater announced price increases. However, this need not be the case, as a greater announced price increase does not automatically imply a greater realized price increase.

⁴ Lafarge pointed out to us that its bulk cement prices for CEM I and CEM II fell in real terms between 2009 and 2011.

TABLE 2 Lafarge price increase announcements—bulk CEM I

Month of announced price increase	Month of realized price increase	Announced price increase CEM I 42,5N/52,5N £/tonne	Average realized change CEM I £/tonne	Deviation from announced price £/tonne	Realized price increase %
Jan 08	Jan 08	7.20	[X]	[X]	[X]
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.53	[X]	[X]	[X]
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
Jan 09	Jan 09	16.00	[X]	[X]	[X]
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Mar 10	Mar 10	4.75	[X]	[X]	[X]
	Apr 10		[X]	[X]	[X]
	May 10		[X]	[X]	[X]
Jan 11	Jan 11	6.75	[X]	[X]	[X]
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Lafarge data.

20. The data shows that Lafarge was able to increase the average price paid by customers following the 1 January 2008, 1 August 2008 and 1 January 2009 price increase announcements. Although Lafarge was not able to realize the full price increase, it did pass on between [X] and [X] within three months of the date from which the announced price increase applied. Lafarge was not able to pass on the 1 March 2010 price increase announcement, while it did pass on a low proportion of the 1 January 2011 price increase announcement.

Tarmac

21. We analyse Tarmac's price increase announcements over the period 2007 to 2011. Tarmac's transaction data is split into broad CEM I and CEM II categories. We compare the transaction data for CEM I with the price increase announcements, which apply to all bulk cement as this is the comparable product.

22. Figure 4 shows the weighted average price for CEM I from Tarmac's transaction data alongside the implied price based on price increase letters for the three months immediately following each announced price increase. The figure shows that Tarmac

was able to realize significant proportions of the announced price increases in January 2008 and August 2008, while it was not able to realize a high proportion of the announced price increases in January 2009, January 2010 and January 2011. This pattern is broadly similar to that of Lafarge.

FIGURE 4

Announced and realized increases in price of bulk CEM I

[✂]

Source: CC calculations using Tarmac's price increase announcement letters and transaction data.

Note: Rebates submitted by Tarmac separately have been incorporated into the transaction data.

23. In order to calculate the realized average price change, we take as a base period the month just before the increase was planned to become effective (eg December in the case of January price increases) and compare the average price in that month with the one in the month in which the announced price increase became effective. Given that we expect that the price increases might not show immediately, we do the same analysis comparing the base month with each of the subsequent three months in turn (eg January, February and March in the case of January price increases). This allows us to see also how prices change over time. The results are shown in Table 3.

TABLE 3 Tarmac price increase announcements—bulk CEM I

<i>Month of announced price increase</i>	<i>Month of realized price increase</i>	<i>Announced price increase bulk cement £/tonne</i>	<i>Average realized change CEM I £/tonne</i>	<i>Deviation from announced price £/tonne</i>	<i>Realized price increase %</i>
Jan 08	Jan 08	7.45	[✂]	[✂]	[✂]
	Feb 08		[✂]	[✂]	[✂]
	Mar 08		[✂]	[✂]	[✂]
Aug 08	Aug 08	3.70	[✂]	[✂]	[✂]
	Sep 08		[✂]	[✂]	[✂]
	Oct 08		[✂]	[✂]	[✂]
Jan 09	Jan 09	15.75	[✂]	[✂]	[✂]
	Feb 09		[✂]	[✂]	[✂]
	Mar 09		[✂]	[✂]	[✂]
Jan 10	Jan 10	5.20	[✂]	[✂]	[✂]
	Feb 10		[✂]	[✂]	[✂]
	Mar 10		[✂]	[✂]	[✂]
Jan 11	Jan 11	7.00	[✂]	[✂]	[✂]
	Feb 11		[✂]	[✂]	[✂]
	Mar 11		[✂]	[✂]	[✂]

Source: CC calculations using Tarmac data.

Note: These figures may need to be updated as Tarmac has not been able to verify the accuracy.

24. The data shows that Tarmac was able to increase the average price paid by customers following the 1 January 2008 and 1 August 2008 price increase announcements, passing on [X] of the price increase in both cases within three months of the date from which the price increase applied. Tarmac was also able to increase the average price following the 1 January 2009, 1 January 2010 and 1 January 2011 price increase announcements, although the price increases were less than [X] per cent of the announcement in each case.

Hanson

25. We analyse Hanson's price increase announcements over the period 2007 to 2011.⁵ Hanson's transaction data is split into broad CEM I and Other bulk cement categories, but is not split into further subcategories. We therefore compare the transaction data for CEM I to the price increase announcements for product CEM I 52,5N, which was the standard product (as opposed to rapid setting) in 2010/11.⁶

26. Figure 5 shows the weighted average price for CEM I from Hanson's transaction data alongside the implied price based on price increase letters for product 52,5N for the three months immediately following each announced price increase. The figure shows that Hanson was able to realize [X] proportions of the announced price increases in [X] but [X]. The pattern for Hanson is broadly similar to that for Lafarge and Tarmac up to early 2009 but [X].

FIGURE 5

Announced and realized increases in price of bulk CEM I

[X]

Source: CC calculations using Hanson's price increase announcement letters and transaction data.

⁵ We have treated all cement sales to Hanson's downstream operations as internal sales, even where those sales occurred before the HeidelbergCement acquisition. This affects sales to Hanson Concrete Products, Hanson UK SSC, Hanson Premis JV (Lond Con) and Hanson Redbank.

⁶ In 2008/09 the standard product was 42.5R. We note that the announced price increases for 42.5R were the same as those for 52.5N for all but one announcement (1 January 2008) across the period 2008/09.

27. In order to calculate the realized average price change, we take as a base period the month just before the increase was planned to become effective (eg December in the case of January price increases) and compare the average price in that month with the one in the month in which the announced price increase became effective. Given that we expect that the price increases might not show immediately, we do the same analysis comparing the base month with each of the subsequent three months in turn (eg January, February and March in the case of January price increases). This allows us to see also how prices change over time. The results are shown in Table 4.

TABLE 4 Hanson's price increase announcements—bulk CEM I

Month of announced price increase	Month of realized price increase	Announced price increase CEM I 52,5N £/tonne	Average realized change CEM I £/tonne	Deviation from announced price £/tonne	Realized price increase %
Jan 08	Jan 08	8.00	[X]	[X]	[X]
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.40	[X]	[X]	[X]
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
Jan 09	Jan 09	17.20	[X]	[X]	[X]
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Jan 10	Jan 10	6.20	[X]	[X]	[X]
	Feb 10		[X]	[X]	[X]
	Mar 10		[X]	[X]	[X]
Jan 11	Jan 11	7.10	[X]	[X]	[X]
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Hanson data.

Note: Hanson was not able to replicate our results for the 2008 and 2009 price increase announcements. We believe this may be due to the treatment of sales to Hanson's downstream operations outlined in the first footnote to paragraph 25.

28. The results show that, following all the price increase announcements, Hanson was able to increase the average price paid by customers within three months following an announced increase becoming effective. [X] three months after an announced increase becoming effective, [X].⁷

⁷ Hanson told us that price negotiations took place throughout the year, and that a customer who initially accepted a price increase might subsequently negotiate prices down. It said that any such price reductions happening outside the three months window used in our analysis would not be reflected in the results of the analysis, and that the figures and overall trends changed radically if the end of year average selling prices were considered Hanson noted that, for external sales, the year-on-year price had decreased between December 2008 and December 2009 and between December 2009 and December 2010. Hanson also told us that there had been a modest year-on-year increase in prices between December 2010 and December 2011. We consider year-on-year changes in average prices of cement in Appendix 7.8.

Cemex

29. We analyse Cemex's price increase announcements over the period 2007 to 2011. Cemex's transaction data is split into subcategories, of which we analyse Portland Bulk and Rapid Bulk, which Cemex has confirmed match the price increase announcements, which are available for CEM I and CEM I Rapid.
30. Figure 6 shows the weighted average price for Portland cement from Cemex's transaction data alongside the implied price based on price increase letters for Portland cement for the three months immediately following each announced price increase.⁸ Figure 7 shows the same data for Rapid cement. The figures show that [REDACTED].⁹

FIGURE 6

Announced and realized increases in price of bulk CEM I (Portland)

[REDACTED]

Source: [REDACTED].

FIGURE 7

Announced and realized increases in price of bulk CEM I (Rapid)

[REDACTED]

Source: [REDACTED].

31. In order to calculate the realized average price change, we take as a base period the month just before the increase was planned to become effective (eg December in the case of January price increases) and compare the average price in that month with the one in the month in which the announced price increase became effective. Given that we expect that the price increases might not show immediately, we do the same

⁸ In August 2008, October 2008 and January 2009, where the announced price increases follow each other quite closely, we show the implied price based on the price increase letters for the one (in the case of August 2008) and two (in the case of October 2008) months immediately following the price increase in order for the following implied price increase to start from the prevailing price level in the month immediately preceding the month in which the announced price increase applied.

⁹ Cemex pointed out to us that Figures 6 and 7 showed that its average price for CEM I to independents [REDACTED] between March 2009 and December 2011.

analysis comparing the base month with each of the subsequent three months in turn (eg January, February and March in the case of January price increases). This allows us to see also how prices change over time. The results are shown in Tables 5 and 6.

TABLE 5 **Cemex's price increase announcements—bulk CEM I (Portland)**

<i>Month of announced price increase</i>	<i>Month of realized price increase</i>	<i>Announced price increase Portland £/tonne</i>	<i>Average realized change Portland £/tonne</i>	<i>Deviation from announced price £/tonne</i>	<i>Realized price increase %</i>
Jan 08	Jan 08	8.85	[X]	[X]	[X]
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.75	[X]	[X]	[X]
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
Oct 08	Oct 08	3.50	[X]	[X]	[X]
	Nov 08		[X]	[X]	[X]
	Dec 08		[X]	[X]	[X]
Jan 09	Jan 09	16.40	[X]	[X]	[X]
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Mar 10	Mar 10	5.75	[X]	[X]	[X]
	Apr 10		[X]	[X]	[X]
	May 10		[X]	[X]	[X]
Jan 11	Jan 11	7.25	[X]	[X]	[X]
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Cemex data.

TABLE 6 **Cemex's price increase announcements—bulk CEM I (Rapid)**

<i>Month of announced price increase</i>	<i>Month of realized price increase</i>	<i>Announced price increase Rapid £/tonne</i>	<i>Average realized change Rapid £/tonne</i>	<i>Deviation from announced price £/tonne</i>	<i>Realized price increase %</i>
Jan 08	Jan 08	9.85	[X]	[X]	[X]
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	4.00	[X]	[X]	[X]
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
Oct 08	Oct 08	3.75	[X]	[X]	[X]
	Nov 08		[X]	[X]	[X]
	Dec 08		[X]	[X]	[X]
Jan 09	Jan 09	18.40	[X]	[X]	[X]
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Mar 10	Mar 10	6.75	[X]	[X]	[X]
	Apr 10		[X]	[X]	[X]
	May 10		[X]	[X]	[X]
Jan 11	Jan 11	7.75	[X]	[X]	[X]
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Cemex data.

32. Tables 5 and 6 show that Cemex was able to realize a proportion of each price increase in relation to both Portland and Rapid cement. [REDACTED]
33. [REDACTED]
34. There are some limitations to this analysis:¹⁰
- (a) With the exception of [REDACTED], the transaction data submitted by all other GB cement producers is aggregated across product categories (eg CEM I, non-CEM I) and we are not able to conduct the analysis at the more disaggregated level at which some of the price increases are announced. Therefore, we had to calculate averages across gross product categories which might not reflect precisely the real price changes. This means that actual price increases may potentially be subject to volume effects. In other words, if, within a category, customers purchase more of the cheaper cement and less of the more expensive cement in proportion, this would have the effect of reducing the average price paid even if the actual price of each product did not vary.
- (b) We calculated changes with reference to delivered prices. Average delivered prices could change over time because of changes in the average distances travelled rather than because of negotiated price increases, and this could therefore affect the results in some cases.

Announced versus realized prices using all external sales

35. In this section, we present realized average prices based on all external sales rather than external sales to independents. We do this as a matter of completeness.
- Results are presented in Figures 8 to 12 and Tables 7 to 11. Using all external sales,

¹⁰ Tarmac told us that in addition to the limitations listed below, the introduction of new customers or the conclusion of an existing contract might affect the realized average price through a change in customer mix.

rather than external sales to independents, does not alter our conclusions. Data is averaged across product and period.

Lafarge

FIGURE 8

Announced and realized increases in price of bulk CEM I—all external sales



Source: CC calculations using Lafarge's price increase announcement letters and transaction data.

TABLE 7 Lafarge price increase announcements—bulk CEM I—all external sales

Month of announced price increase	Month of realized price increase	Announced price increase CEM I 42,5N/52,5N £/tonne	Average realized change CEM I £/tonne	Deviation from announced price £/tonne	Realized price increase %
Jan 08	Jan 08	7.20	[X]	[X]	[X]
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.53	[X]	[X]	[X]
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
Jan 09	Jan 09	16.00	[X]	[X]	[X]
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Mar 10	Mar 10	4.75	[X]	[X]	[X]
	Apr 10		[X]	[X]	[X]
	May 10		[X]	[X]	[X]
Jan 11	Jan 11	6.75	[X]	[X]	[X]
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Lafarge's data.

Tarmac

FIGURE 9

Announced and realized increases in price of bulk CEM I—all external sales



Source: CC calculations using Tarmac's price increase announcement letters and transaction data.

Note: Rebates submitted by Tarmac separately have been incorporated into the transaction data.

TABLE 8 Tarmac price increase announcements—bulk CEM I—all external sales

Month of announced price increase	Month of realized price increase	Announced price increase bulk cement £/tonne	Average realized change CEM I £/tonne	Deviation from announced price £/tonne	Realized price increase %
Jan 08	Jan 08	7.45			
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.70			
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
	Jan 09		[X]	[X]	[X]
Jan 09	Jan 09	15.75			
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Jan 10	Jan 10	5.20			
	Feb 10		[X]	[X]	[X]
	Mar 10		[X]	[X]	[X]
Jan 11	Jan 11	7.00			
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Tarmac's data.

Note: These figures may need to be updated as Tarmac has not been able to verify the accuracy.

Hanson

FIGURE 10

Announced and realized increases in price of bulk CEM I—all external sales

[X]

Source: CC calculations using Hanson's price increase announcement letters and transaction data.

TABLE 9 Hanson's price increase announcements—bulk CEM I—all external sales

Month of announced price increase	Month of realized price increase	Announced price increase CEM I 52,5N £/tonne	Average realized change CEM I £/tonne	Deviation from announced price £/tonne	Realized price increase %
Jan 08	Jan 08	8.00			
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.40			
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
	Jan 09		[X]	[X]	[X]
Jan 09	Jan 09	17.20			
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Jan 10	Jan 10	6.20			
	Feb 10		[X]	[X]	[X]
	Mar 10		[X]	[X]	[X]
Jan 11	Jan 11	7.10			
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Hanson's data.

Note: Hanson was not able to replicate our results for the 2008 and 2009 price increase announcements. We believe this may be due to the treatment of sales to Hanson's downstream operations outlined in the first footnote to paragraph 25.

FIGURE 11

**Announced and realized increases in price of bulk CEM I (Portland)—
all external sales**

[✂]

Source: CC calculations using Cemex's price increase announcement letters and transaction data.

FIGURE 12

**Announced and realized increases in price of bulk CEM I (Rapid)—
all external sales**

[✂]

Source: CC calculations using Cemex's price increase announcement letters and transaction data.

TABLE 10 **Cemex's price increase announcements—bulk CEM I (Portland)—all external sales**

<i>Month of announced price increase</i>	<i>Month of realized price increase</i>	<i>Announced price increase Portland £/tonne</i>	<i>Average realized change Portland £/tonne</i>	<i>Deviation from announced price £/tonne</i>	<i>Realized price increase %</i>
Jan 08	Jan 08	8.85	[✂]	[✂]	[✂]
	Feb 08		[✂]	[✂]	[✂]
	Mar 08		[✂]	[✂]	[✂]
Aug 08	Aug 08	3.75	[✂]	[✂]	[✂]
	Sep 08		[✂]	[✂]	[✂]
	Oct 08		[✂]	[✂]	[✂]
Oct 08	Oct 08	3.50	[✂]	[✂]	[✂]
	Nov 08		[✂]	[✂]	[✂]
	Dec 08		[✂]	[✂]	[✂]
Jan 09	Jan 09	16.40	[✂]	[✂]	[✂]
	Feb 09		[✂]	[✂]	[✂]
	Mar 09		[✂]	[✂]	[✂]
Mar 10	Mar 10	5.75	[✂]	[✂]	[✂]
	Apr 10		[✂]	[✂]	[✂]
	May 10		[✂]	[✂]	[✂]
Jan 11	Jan 11	7.25	[✂]	[✂]	[✂]
	Feb 11		[✂]	[✂]	[✂]
	Mar 11		[✂]	[✂]	[✂]

Source: CC calculations using Cemex's data.

TABLE 11 **Cemex's price increase announcements—bulk CEM I (Rapid)—all external sales**

<i>Month of announced price increase</i>	<i>Month of realized price increase</i>	<i>Announced price increase Rapid £/tonne</i>	<i>Average realized change Rapid £/tonne</i>	<i>Deviation from announced price £/tonne</i>	<i>Realized price increase %</i>
Jan 08	Jan 08	8.85	[X]	[X]	[X]
	Feb 08		[X]	[X]	[X]
	Mar 08		[X]	[X]	[X]
Aug 08	Aug 08	3.75	[X]	[X]	[X]
	Sep 08		[X]	[X]	[X]
	Oct 08		[X]	[X]	[X]
Oct 08	Oct 08	3.50	[X]	[X]	[X]
	Nov 08		[X]	[X]	[X]
	Dec 08		[X]	[X]	[X]
Jan 09	Jan 09	16.40	[X]	[X]	[X]
	Feb 09		[X]	[X]	[X]
	Mar 09		[X]	[X]	[X]
Mar 10	Mar 10	5.75	[X]	[X]	[X]
	Apr 10		[X]	[X]	[X]
	May 10		[X]	[X]	[X]
Jan 11	Jan 11	7.25	[X]	[X]	[X]
	Feb 11		[X]	[X]	[X]
	Mar 11		[X]	[X]	[X]

Source: CC calculations using Cemex's data.

Dispersion in price increases

36. The GB cement producers told us that, because prices were negotiated individually with customers, there was dispersion in realized price increases. As a consequence, the GB cement producers told us that an announced increase was not informative about individual customers' increases, and that dispersion would undermine any coordinating function price increase letters might otherwise have served. In this section, we analyse the extent of dispersion on realized price increases.

37. We find that the degree of dispersion varies between announcement rounds. On some occasions, most price increases are close to the announced price increase. On other occasions, customers face a range of price increases. On other occasions yet, there is little dispersion but increases do not cluster around the announced increase. This suggests that announced price increases do not, in general, provide clear information about an individual customer's price increase. We also find that announcements made by a single GB cement producer, or a subset of GB cement producers, appear to be less successful than when all companies make announcements that

become effective in the same month. This suggests that, when all GB cement producers announce price increases that become effective at the same time, this facilitates price increases.

38. We note that price changes can potentially be explained by factors other than price announcements, including changes to individual producers' customer composition and changes in customers' needs.
39. We first describe the data used in the analysis and the measures of dispersion we used. We then describe our results.

Data and prices

40. We used the same data as in our analysis of announced versus realized prices. However, for the dispersion analysis the data was aggregated in a different way. Since dispersion is a result of different customers facing different price increases, we calculated the volume weighted average delivered cement price per customer¹¹ per month.
41. We computed increases by taking first differences of each customer's monthly price. We looked at sales of bulk CEM I to independent customers. In the case of Cemex, we restricted our attention to Portland bulk cement. This is consistent with the data used in the main analysis of price announcements.
42. Finally, we dropped outliers. Some price changes represented changes by ten times announced increases, or even more. We dropped changes that occurred in months where price increases became effective and represented a change of five times the

¹¹ To calculate the weighted average price, we aggregated invoiced amounts and volumes of cement bought each month by customer identity, and then divided each customer's invoiced amount by volume. The average price was not calculated on a per-job-site basis.

announced increase or more. As the number of discarded outliers is small, in most cases no observations are dropped.

Measures of dispersion

43. We measured dispersion by calculating the 25th and 75th percentiles¹² of the distribution of realized price increases relative to announced increases. We did this for each month and for each supplier. We also drew histograms of realized price increases relative to announced increases in the months where price increases become effective. The width of the bins in all histograms is 0.25.

Robustness checks

44. The degree of dispersion may depend on customer characteristics, such as size of purchases. If this were the case, some categories of customers would display less dispersion than other categories of customers. We have attempted to control for this by considering small customers and large customers separately. A majority of independent customers buy less than 1,000 tonnes of bulk cement per year from any given GB cement producers. We therefore chose this as a cut-off volume for robustness checks. For each of the GB cement producers, we calculated measures of dispersion for customers buying less than 1,000 tonnes of bulk cement per year. We also calculated measures of dispersion for customers buying more than 1,000 tonnes of bulk cement per year. Restricting attention to small customers did not alter our conclusions and therefore we do not report the results of this analysis.

¹² A 25th percentile is a price such that 25 per cent of observations have a price less than, or equal to, that price. A 75th percentile is a price such that 75 per cent of observations have a price less than, or equal to, that price. It follows that 25 per cent of observations have a price greater than, or equal to, a 75th percentile.

Results

Cemex

45. Figure 13 shows histograms of realized price increases relative to announced increases in the months announced price increases become effective. It is apparent that the degree of dispersion varies across the different price announcement rounds. In general, only very few customers' prices increase by more than the announced increase.
46. January 2008 increases were quite concentrated slightly below the announced increase. August 2008 increases were quite concentrated around the announced increase albeit with a considerable proportion of customers facing no or small increases in price. The October 2008 increases were concentrated around zero, with very little dispersion. This increase was unique to Cemex. The March 2010 increase appears to have had mixed effects. Many customers saw no increase in March 2010. At the same time, a large fraction of customers saw increases of over 50 per cent of the announced increase. Only Cemex and Lafarge had price increases becoming effective in March 2010. The January 2009 and January 2011 increases show most customers' prices increasing by at least approximately 50 per cent of the announced increase.

FIGURE 13

Cemex's price increases relative to announced increases



Source: CC calculations using Cemex's price increase announcement letters and transaction data.

47. Table 12 shows the 25th and 75th percentiles for realized increases in delivered prices relative to announced increases in each month where a price increase becomes effective.

TABLE 12 Percentiles for relative increase in Cemex's delivered prices

Date at which announced price increase became effective	Percentiles of realized price increases relative to announced increases for the month in which the price increase became effective* (%)	
	25 th	75 th
Jan 08	[✂]	[✂]
Aug 08	[✂]	[✂]
Oct 08	[✂]	[✂]
Jan 09	[✂]	[✂]
Mar 10	[✂]	[✂]
Jan 11	[✂]	[✂]

Source: CC calculations using Cemex data.

*A 25th percentile is a price such that 25% of observations have a price less than, or equal to, that price. A 75th percentile is a price such that 75% of observations have a price less than, or equal to, that price. It follows that 25 % of observations have a price greater than, or equal to, a 75th percentile.

Hanson

48. Figure 14 shows histograms of realized increases in delivered price relative to announced increases in the months announced price increases become effective. It is apparent that the degree of dispersion varies across the different price announcement rounds. January 2008 and August 2008 increases were quite concentrated around the announced increase. In January 2009 and January 2011, most customers' prices increased by at approximately 50 per cent or more of the announced increase. January 2010 increases were concentrated around zero, meaning that most customers did not experience a price increase in January 2010, with very little dispersion. Only Hanson and Tarmac had price increases becoming effective in January 2010.

FIGURE 14

Hanson's price increases relative to announced increases

[✂]

Source: CC calculations using Hanson's price increase announcement letters and transaction data.

49. Table 13 shows the 25th and 75th percentiles for realized increases in delivered prices relative to announced increases in each month where a price increase becomes effective.

TABLE 13 Percentiles for relative increase in Hanson’s delivered prices

Date at which announced price increase became effective	Percentiles of realized price increases relative to announced increase for the month in which the price increase became effective* (%)	
	25 th	75 th
Jan 08	[✂]	[✂]
Aug 08	[✂]	[✂]
Jan 09	[✂]	[✂]
Jan 10	[✂]	[✂]
Jan 11	[✂]	[✂]

Source: CC calculations using Hanson data.

*A 25th percentile is a price such that 25 per cent of observations have a price less than, or equal to, that price. A 75th percentile is a price such that 75 per cent of observations have a price less than, or equal to, that price. It follows that 25 per cent of observations have a price greater than, or equal to, a 75th percentile.

Lafarge

50. Figure 15 shows histograms of realized increases in delivered price relative to announced increases in the months in which announced price increases become effective. It is apparent that the degree of dispersion varies across different price announcement rounds. January 2008 increases were quite concentrated around the announced increase, albeit with a significant proportion of customers facing no or small increases in price. August 2008 increases were quite concentrated around the announced increase. In January 2009, over half of customers experienced an increase in price amounting to more than 50 per cent of the announced increase. January 2010 increases were concentrated just below zero (indicating a small price reduction), with little dispersion.

FIGURE 15

Lafarge’s price increases relative to announced increases



Source: CC calculations using Lafarge’s price increase announcement letters and transaction data.

51. Table 14 shows the 25th and 75th percentiles for realized increases in delivered prices relative to announced increases in each month where a price increase becomes effective.

TABLE 14 Percentiles for relative increase in Lafarge's delivered prices

Date at which announced price increase became effective	Percentiles of realized price increases relative to announced increase for the month in which the price increase became effective* (%)	
	25 th	75 th
Jan 08	[✂]	[✂]
Aug 08	[✂]	[✂]
Jan 09	[✂]	[✂]
Mar 10	[✂]	[✂]
Jan 11	[✂]	[✂]

Source: CC calculations using Lafarge data.

*A 25th percentile is a price such that 25 per cent of observations have a price less than, or equal to, that price. A 75th percentile is a price such that 75 per cent of observations have a price less than, or equal to, that price. It follows that 25 per cent of observations have a price greater than, or equal to, a 75th percentile.

Tarmac

52. Figure 16 shows histograms of realized increases in delivered prices relative to announced increases in the months announced price increases become effective.¹³ It is apparent that the degree of dispersion varies across different price announcement rounds. January 2008 increases were concentrated around 80 per cent of the announced increase, albeit with a significant proportion of customers facing no or small increases in price. August 2008 increases were quite concentrated around the announced increase. Notably, Tarmac's 2008 increases were particularly successful in terms of increasing the average price paid by customers. In January 2009 and January 2011 most customers appear to have faced no price increase, but still a significant proportion of customers faced increases or decreases. January 2010 increases were concentrated around zero, with little dispersion.

FIGURE 16

Tarmac's price increases relative to announced increases

[✂]

Source: CC calculations using Tarmac's price increase announcement letters and transaction data.

¹³ Tarmac told us that it had been unable to replicate the figure.

53. Table 15 shows the 25th and 75th percentiles for realized increases in delivered prices relative to announced increases in each month where a price increase becomes effective.

TABLE 15 Percentiles for relative increase in Tarmac's delivered prices

Date at which announced price increase became effective	Percentiles of realized price increases relative to announced increase for the month in which the price increase became effective* (%)	
	25 th	75 th
Jan 08	[X]	[X]
Aug 08	[X]	[X]
Jan 09	[X]	[X]
Jan 10	[X]	[X]
Jan 11	[X]	[X]

Source: CC calculations using Lafarge data.

*A 25th percentile is a price such that 25 per cent of observations have a price less than, or equal to, that price. A 75th percentile is a price such that 75 per cent of observations have a price less than, or equal to, that price. It follows that 25 per cent of observations have a price greater than, or equal to, a 75th percentile.

Note: Tarmac told us that it had been unable to replicate the contents of the table.

Evolution over time

54. The dispersion is not constant over time. Dispersion is usually most pronounced in the months where price increases become effective. Figures 17 to 20 illustrate how the 25th and 75th percentiles of changes to delivered price evolve over time for Cemex, Hanson, Lafarge and Tarmac, respectively.¹⁴ For reference, the 50th percentile is also included in the figures. The percentiles in these pertain to absolute price changes, *not* change relative to announced increases.

55. Periods where many customers face price changes show as spikes in the time series. It appears that the February 2010 price increases announced by Hanson and Tarmac did not translate into actual price increases until March 2010. This coincides with the month at which the price increases announced by Cemex and Lafarge became effective. Moreover, Cemex's October 2008 price announcement appears not to have translated into actual price increases.

¹⁴ Tarmac told us that it had been unable to replicate the figure relating to its price increases.

FIGURE 17

25th and 75th percentiles of Cemex's price increases



Source: CC calculations using Cemex's transaction data.

FIGURE 18

25th and 75th percentiles of Hanson's price increases



Source: CC calculations using Hanson's transaction data.

FIGURE 19

25th and 75th percentiles of Lafarge's price increases



Source: CC calculations using Lafarge's transaction data.

FIGURE 20

25th and 75th percentiles of Tarmac's price increases



Source: CC calculations using Tarmac's transaction data.

Cement price parallelism

1. This appendix sets out the methodology for our analysis of the relationships between the GB cement producers' prices for bulk cement, and the prices of cement importers for which data was available, as well as the detailed results from this analysis.

Data and methodology

2. The prices are calculated using revenues and volumes provided by the GB cement producers and cement importers in their transactions data. The GB cement producers' transactions data is available on a monthly basis, while the cement importers' transactions data is available on a quarterly basis. Therefore, we calculate a quarterly average delivered price for each GB cement producer and cement importer, by adding up the revenues (including haulage) and volumes for each quarter, and then dividing the quarterly revenues with quarterly volumes to obtain a quarterly average delivered price.¹ However, we have also calculated the ex-shipping-point prices for those GB cement producers for which we have the relevant data, by subtracting the quarterly haulage costs from the quarterly revenues, and then dividing by quarterly volumes. All prices are calculated on a nominal basis (ie they have not been deflated).
3. We have excluded from this analysis data on bagged/packed cement and plant-to-plant transfers of bulk cement.² It is worth noting that Tarmac has provided revenues which have not netted off rebates and discounts (to the extent that they apply). However, Tarmac has provided a separate data set with the rebates and discounts, and we have netted off rebates and discounts from the revenues for Tarmac in order

¹ Separate haulage costs have not been provided by all companies. Also, where haulage costs have been provided separately, these have in some cases been collated specifically for the CC, and may not reflect the actual haulage costs paid by customers on each transaction. Therefore, we consider it is more appropriate to use delivered prices.

² [REDACTED]

to obtain prices which are, as far as possible, equivalent to those of the other GB cement producers.

4. In this appendix, we focus on delivered prices of CEM I for sales to independents, in order for the prices to be directly comparable across GB cement producers and importers. As the GB cement producers' revenues comprise different proportions of CEM I sales, this is expected to be reflected in the price for all types of cement, as CEM I tends to be more expensive than CEM II/III/IV. The cement importers supply only CEM I. CEM I makes up the majority of the GB cement producers' sales, as well as being an input into non-CEM-I products, and therefore, we consider that it is relevant to look at CEM I separately.

5. In addition, we consider that it is relevant to look at sales to independents, ie excluding sales to other Majors and internal sales from the analysis. Internal sales are priced at an internal transfer price which may not reflect a transaction price, and could be used as a means of transferring profits from one part of the company into another.³ Sales to other Majors may not reflect a market price if coordination is present (for instance, prices charged for cement to other Majors could be used as a mechanism for side payments if coordination exists). Prices charged for cement by GB cement producers to other Majors are analysed in a separate appendix on cross-sales (Appendix 7.13).

6. Hanson told us that it was difficult to measure prices accurately; for example, the prices charged for bulk cement were individually negotiated, so that even if prices were unchanged, computed average prices would vary depending upon the proportion of sales to each customer. Our switching analysis (see Appendix 7.9) shows that

³ Cemex told us that all transactions between Cemex's relevant GB operations were charged at the prevailing market price. If this is the case, then we note that price correlations would be unaffected by the inclusion/exclusion of internal sales as price changes will be the same regardless.

the GB producers' customer base is relatively stable over time, while the fact that we observe strong parallelism in average prices suggests that it is unlikely that average prices are significantly affected by customer mix over time. Therefore, average prices seem to be a good proxy for the analysis.

CEM I prices faced by independent customers

Correlations between the GB cement producers', and the GB cement producers' and importers', prices

7. Figure 1 displays the quarterly average prices for CEM I for sales to independents for the four GB cement producers, across the period Q1 2007 to Q4 2011. The figure shows that there appears to be a strong relationship between the GB cement producers' prices.

FIGURE 1

GB cement producers' quarterly average prices for CEM I for sales to independents, Q1 2007 to Q4 2011

[✂]

Source: Transaction data submitted by Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

8. Figure 2 shows the quarterly average prices for CEM I for sales to independents for the four GB cement producers and for four cement importers ([Importer A], [Importer B], [Importer C] and Aggregate Industries),⁴ across the period Q1 2007 to Q4 2011. As the figure shows, there seems to be a strong relationship between the GB cement producers' and [Importers A–C]'s prices. For Aggregate Industries, the relationship is [✂].

⁴ These importers make up between 71 and 81 per cent (varies by year) of volumes of cement imports (excluding imports by GB producers). Aggregate Industries imports [✂] cement [✂] into GB, which is predominantly for internal use.

FIGURE 2

GB cement producers' and importers' quarterly average prices for CEM I for sales to independents, Q1 2007 to Q4 2011

[✂]

[✂]

Source: Transaction data submitted by Cemex, Hanson, Lafarge, Tarmac, [Importer A], [Importer B], [Importer C] and Aggregate Industries, and CC analysis.

9. Table 1 shows the correlation coefficients between the quarterly average CEM I prices for sales to independents of the four GB cement producers as well as Aggregate Industries and [Importers A–C],⁵ across the period Q1 2007 to Q4 2011. A correlation coefficient is a single number that describes the degree of relationship between two variables. Correlation coefficients range between –100 per cent and 100 per cent. The closer the correlation coefficient is to 100 per cent, the more changes in one variable (eg costs) are associated with changes of the same sign in the other variable (eg price). The closer the correlation coefficient is to –100 per cent, then the more changes in one variable are associated with opposite changes in the other variable. It is not unusual for time series (eg prices) to have high (positive) correlation coefficients.

TABLE 1 Correlation coefficients between the quarterly average prices for CEM I for sales to independents, Q1 2007 to Q4 2011

	Hanson	Lafarge	Tarmac	[✂]	[Importer A]	[Importer B]	[Importer C]
							<i>per cent</i>
Cemex	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Hanson		[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Lafarge			[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac				[✂]	[✂]	[✂]	[✂]
[✂]					[✂]	[✂]	[✂]
[Importer A]						[✂]	[✂]
[Importer B]							[✂]

Source: Transaction data submitted by Cemex, Hanson, Lafarge, Tarmac, Aggregate Industries, [Importer A], [Importer B] and [Importer C], and CC analysis.

⁵ These importers make up between 41 and 48 per cent (varies by year) of volumes of cement imports (excluding imports by GB producers) and represent the majority of imported cement (excluding imports by GB producers) which is sold to independents.

10. Lafarge, Tarmac, Cemex and Hanson have stated that the sample size used to calculate correlation coefficients between quarterly price series is too low. Table 2 shows the correlation coefficients between the monthly average CEM I prices for sales to independents of the four GB cement producers. This increases the number of observations across which correlations are calculated from 20 (in the case of quarterly prices) to 60. However, the results remain unchanged, with the correlations between the GB cement producers' CEM I monthly prices ranging from 86 to 97 per cent.

TABLE 2 Correlation coefficients between the monthly average prices for CEM I for sales to independents, January 2007 to December 2011

	<i>per cent</i>		
	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
Cemex*	[⊗]	[⊗]	[⊗]
Hanson		[⊗]	[⊗]
Lafarge			[⊗]

Source: Transaction data submitted by Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

*Cemex data is not available for January 2007, and therefore correlations with Cemex start in February 2007.

11. We see from Figures 1 and 2 that the average quarterly prices for all GB cement producers and importers display an upward trend over the period in question. Therefore, we also calculate correlations between detrended differences in quarterly prices, in order to remove any correlation impacts driven purely by trend. In particular, we calculate a price difference series for each company by subtracting two successive quarters (eg price in Q2 2007 minus price in Q1 2007), and we do this across the whole period (or mathematically, Δy_t). We then calculate an average difference for the period Q1 2007 to Q1 2009 ($\Delta \bar{y}_0$), and an average difference for the period Q2 2009 to Q4 2011 ($\Delta \bar{y}_1$) for each company, as we can see from Figure 1 that the series appear to have different trends in the two periods.⁶ We then subtract the average difference from the calculated difference for each quarter ($\Delta y_t - \Delta \bar{y}_0$ for the

⁶ By calculating separate average differences for each of the periods Q1 2007–Q1 2009 and Q2 2009–Q4 2011, we are allowing for the possibility that there may be a break in the trend between the two periods, while allowing for the possibility that the trend is constant over the whole period of our sample. We are also allowing for the possibility that there is no trend in either or both periods.

first period, and $\Delta y_t - \Delta \bar{y}_1$ for the second period) to obtain price differences controlled for trend.⁷ This approach does not exclude the possibility that the two periods have the same trend, and we are therefore not imposing an ex ante assumption that there is a break-point in trend in Q1 2009. This reduces the number of degrees of freedom for the detrended data by 2.⁸ We then calculate correlation coefficients between these detrended price difference series. The results are shown in Table 3.

TABLE 3 Correlation coefficients between the quarterly detrended prices for CEM I for sales to independents, Q1 2007 to Q4 2011

	<i>per cent</i>					
	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>[Importer A]</i>	<i>[Importer B]</i>	<i>[Importer C]</i>
Cemex	[\times]*	[\times]*	[\times]†	[\times]*	[\times]*	[\times]
Hanson		[\times]*	[\times]†	[\times]*	[\times]*	[\times]
Lafarge			[\times]†	[\times]*	[\times]*	[\times]
Tarmac				[\times]*	[\times]*	[\times]
[Importer A]					[\times]*	[\times]
[Importer B]						[\times]

Source: Transaction data submitted by Cemex, Hanson, Lafarge, Tarmac, [Importer A], [Importer B] and [Importer C], and CC analysis.

*Significant at 99 per cent level.

†Significant at 95 per cent level.

Note: n=19, d.f.=15.

12. We have also checked whether the results in Table 2 are statistically significant at the 95 and 99 per cent level, and have marked the results accordingly. We looked up the significance thresholds in a standard statistics book, which gave thresholds of 48.2 and 60.6 per cent at 95 and 99 per cent significance levels respectively where there are 15 degrees of freedom.⁹

13. Lafarge told us that our approach to detrending the price series (as outlined in paragraph 11) appeared to be unconventional and that Lafarge was not aware of its previous use. Cemex also questioned the CC's choice of detrending method. Hanson questioned the CC's method of detrending prices, stating that it was an unusual approach. As noted in the last footnote to paragraph 11 above, this approach is

⁷ This step is implicit in any time-series regression which controls for a time trend. This approach is equivalent to regression on a time trend allowing for a possible break in the trend in Q1 2009.

⁸ The degrees of freedom reduce from 19 to 17 when we detrend the data, and by a further 2 degrees when we calculate correlation coefficients.

⁹ G.M. Clarke and D. Cooke, 'A Basic Course in Statistics', p359.

equivalent to a regression on a time trend allowing for a possible break in the trend in Q1 2009, and as such is not unconventional or unusual. However, we have also calculated correlation coefficients between quarterly differences in price series,¹⁰ and these also show high correlations between the GB cement producers' quarterly price differences, and between the GB cement producers' and [Importer A]'s and [Importer B's] quarterly price differences. The results are shown in Table 4.

TABLE 4 Correlation coefficients between the quarterly price differences for CEM I for sales to independents, Q1 2007 to Q4 2011

	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>[Importer A]</i>	<i>[Importer B]</i>	<i>[Importer C]</i>
Cemex	[<]>*	[<]>*	[<]>*	[<]>*	[<]>*	[<]>†
Hanson		[<]>*	[<]>*	[<]>*	[<]>*	[<]>†
Lafarge			[<]>*	81.7*	90.5*	48.8†
Tarmac				68.7*	57.1†	37.6
[Importer A]					[<]>*	[<]>
[Importer B]						[<]>†

Source: Transaction data submitted by Cemex, Hanson, Lafarge, Tarmac, [Importer A], [Importer B] and [Importer C], and CC analysis.

*Significant at 99 per cent level.

†Significant at 95 per cent level.

Note: n=19, d.f.=15.

14. Lafarge, Tarmac, Cemex and Hanson stated that the sample size used to calculate correlation coefficients between quarterly detrended price series was too low. In Table 5 we show the correlations between detrended differences in the GB cement producers' monthly prices.¹¹ As the table shows, there is statistically significant (at 99 per cent significance level) and positive correlation between Cemex's, Hanson's and Lafarge's price difference series (ranging between [40–85] per cent), which is independent of trend in the actual price series. The correlations between Tarmac's and other GB cement producers' price difference series are also positive and statistically significant in two out of three cases, ranging between [25–65] per cent.

¹⁰ Calculated as in paragraph 11, by subtracting two successive quarters (eg price in Q2 2007 minus price in Q1 2007) across the whole period (or mathematically, Δy_t).

¹¹ As with quarterly prices, we calculate a price difference series for each company by subtracting two successive months (eg price in February 2007 minus price in January 2007), and we do this across the whole period (or mathematically, Δy_t). We then calculate an average difference for the period January 2007–March 2009 ($\Delta \bar{y}_0$), and an average difference for the period April 2009–December 2011 ($\Delta \bar{y}_1$) for each company, as we can see from Figure 1 that the series appear to have different trends in the two periods. We then subtract the average difference from the calculated difference for each month ($\Delta y_t - \Delta \bar{y}_0$ for the first period, and $\Delta y_t - \Delta \bar{y}_1$ for the second period) to obtain price differences controlled for trend. This reduces the number of degrees of freedom for the detrended data by 2. We then calculate correlation coefficients between these monthly price difference series.

We looked up the significance thresholds in a standard statistics book, which gave thresholds of 26.2 and 34.0 per cent at 95 and 99 per cent significance levels respectively where there are 55 degrees of freedom.¹²

TABLE 5 Correlation coefficients between the monthly detrended prices for CEM I for sales to independents, January 2007 to December 2011

	<i>per cent</i>		
	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
Cemex*	[0.99]†	[0.99]†	[0.99]
Hanson		[0.99]†	[0.99]‡
Lafarge			[0.99]†

Source: Transaction data submitted by Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

*Cemex data is not available for January 2007, which reduces the number of observations and degrees of freedom for any correlations with Cemex by 1.

†Significant at 99 per cent level.

‡Significant at 95 per cent level.

Note: n=59, d.f.=55.

¹² G M Clarke and D Cooke, *A Basic Course in Statistics*, p359. We calculated the significance level for 55 degrees of freedom by linearly interpolating between the results for 50 and 60 degrees of freedom.

Cross-sales in bulk cement

Introduction

1. This appendix sets out our analysis of the Majors' sales and purchases of cement to and from each other (which we term 'cross-sales').

Cross-sales as proportion of external sales

2. The Majors have historically sold to, and/or bought from, each other significant amounts of cement (as a proportion of external sales), as shown in Figures 1 to 5.¹ However, cross-sales have fallen over time, mainly driven by the Majors' self-supply strategies.
3. Lafarge told us that the volume of cement sales between Majors had significantly reduced since 2007 in response to the downturn in economic activity/demand and as Major producers had pursued self-supply strategies and increased vertical integration.
4. Hanson told us that the majority of its sales to other Majors were made to [REDACTED], and that there was [REDACTED] over the period 2007 to 2011, as [REDACTED]. Hanson also told us that its purchases from other Majors were predominantly from [REDACTED], and that [REDACTED] in 2009 as a consequence of Heidelberg's acquisition of Hanson in 2007.
5. Cemex told us that its RMX Division has made fewer purchases from [REDACTED] in recent years, and that it had moved to taking larger internal volumes from Cemex Cement, and from [REDACTED], which has reduced logistics costs.

¹ We note that Aggregate Industries has not sold much cement to other Majors historically, but it has purchased significant amounts of cement from other Majors over the period in question.

FIGURE 1

Cemex's revenue shares by customer for external sales of bulk cement

[REDACTED]

Source: Cemex data and CC analysis.

FIGURE 2

Hanson's revenue shares by customer for external sales of bulk cement

[REDACTED]

Source: Hanson data and CC analysis.

FIGURE 3

Lafarge's revenue shares by customer for external sales of bulk cement

[REDACTED]

Source: Lafarge data and CC analysis.

FIGURE 4

Tarmac's revenue shares by customer for external sales of bulk cement

[REDACTED]

Source: Tarmac data and CC analysis.

Note: Revenues are net of rebates, which Tarmac provided separately.

FIGURE 5

Aggregate Industries' revenue shares by customer for external sales of bulk cement

[REDACTED]

Source: Aggregate Industries data and CC analysis.

Note: [REDACTED]

Value of cross-sales between the Majors

- Figures 6 to 11 show the value of cross-sales between each pair of Majors which produce cement in the UK. From the figures we observe that [REDACTED] is a net buyer of cement from [REDACTED] and a net seller of cement to [REDACTED]. [REDACTED] is a net seller of cement to [REDACTED] and [REDACTED] and a net buyer of cement from [REDACTED]. [REDACTED] is a net seller of cement to [REDACTED] and [REDACTED]. [REDACTED] is a net buyer of cement from all other Majors, and it did not sell

any cement to [REDACTED], and it sold [REDACTED] amounts of cement to [REDACTED] in Q4 2007 and Q4 2010.

FIGURE 6

Sales of bulk cement between Cemex and Hanson

[REDACTED]

Source: Cemex and Hanson data and CC analysis.

FIGURE 7

Sales of bulk cement between Cemex and Lafarge

[REDACTED]

Source: Cemex and Lafarge data and CC analysis.

FIGURE 8

Sales of bulk cement between Cemex and Tarmac

[REDACTED]

Source: Cemex and Tarmac data and CC analysis.

Note: Tarmac's revenues are net of rebates, which Tarmac provided separately.

FIGURE 9

Sales of bulk cement between Hanson and Lafarge

[REDACTED]

Source: Hanson and Lafarge data and CC analysis.

FIGURE 10

Sales of bulk cement between Hanson and Tarmac

[REDACTED]

Source: Hanson and Tarmac data and CC analysis.

Note: Tarmac's revenues are net of rebates, which Tarmac provided separately.

FIGURE 11

Sales of bulk cement between Lafarge and Tarmac

[REDACTED]

Source: Lafarge and Tarmac data and CC analysis.

7. Figures 12 to 15 show the value of cross-sales between Aggregate Industries and each other Major. [X]

FIGURE 12

Sales of bulk cement between Aggregate Industries and Cemex

[X]

Source: Aggregate Industries and Cemex data and CC analysis.

Note: [X].

FIGURE 13

Sales of bulk cement between Aggregate Industries and Hanson

[X]

Source: Aggregate Industries and Hanson data and CC analysis.

Note: [X].

FIGURE 14

Sales of bulk cement between Aggregate Industries and Lafarge

[X]

Source: Aggregate Industries and Lafarge data and CC analysis.

Note: [X].

FIGURE 15

Sales of bulk cement between Aggregate Industries and Tarmac

[X]

Source: Aggregate Industries and Tarmac data and CC analysis.

Note: [X].

8. In addition to transactions data, which was used to produce the above charts, the Majors also provided us with annual summaries of their sales to and purchases from each other Major. This data is presented in Tables 1 to 5 below. This data does not always match that provided in the transactions data for bulk cement. The Majors told us that this could be due to differences in the way transactions data and purchasing data was recorded and held. In particular, Tarmac told us that data provided by other Majors could include Tarmac Building Products, which was not included in Tarmac's data. Hanson told us that discrepancies could occur as a result of different company

percentage definitions or other company groupings, or different treatment of credits or other corrections, or miscoding or other data entry errors. Lafarge told us that its purchasing data was not as inherently accurate as its sales data, and to the extent that there were discrepancies between Lafarge's purchasing data and other suppliers' sales data, Lafarge suggested that sales-side data was more accurate. Cemex told us that its transactions data did not capture purchases of cement by its Cement business (only the RMX business); Castle Cement was not recognized in the data as part of Hanson, and therefore Hanson figures appeared lower than was actually the case; and some slag purchases by Cemex may have been classed as purchases of cement.

9. Table 1 shows Cemex's annual sales and purchases to other Majors. In addition, we also calculate net sales (ie sales less purchases) to each other Major. As the table shows, Cemex was a net seller of cement to Aggregate Industries and Tarmac and a net purchaser of cement from Hanson and Lafarge across most of the period 2007 to 2011.²

² Cemex told us that the [REDACTED].

TABLE 1 **Cemex's annual sales and purchases of cement from other Majors**

		<i>Sales</i>		<i>Purchases</i>		<i>Net (sales–purchases)</i>	
		<i>Quantity (kt)</i>	<i>Value (£k)</i>	<i>Quantity (kt)</i>	<i>Value (£k)</i>	<i>Quantity (kt)</i>	<i>Value (£k)</i>
Aggregate Industries	2007*	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	2007*	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Lafarge	2007*	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	2007*	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
All Majors	2007*	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex and CC calculations.

*2007 data starts on 1 February 2007.

10. Table 2 shows Hanson's annual sales and purchases to other Majors. In addition, we also calculate net sales (ie sales less purchases) to each other Major. As the table shows, Hanson was a net seller of cement to Aggregate Industries, Cemex and Tarmac across most of the period 2007 to 2011, and it was a net purchaser of cement from Lafarge across the same period.

TABLE 2 Hanson's annual sales and purchases of cement from other Majors

		Sales		Purchases		Net (sales–purchases)	
		Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)
Aggregate Industries	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Lafarge	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
All Majors	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson and CC calculations.

11. Table 3 shows Lafarge's annual sales and purchases to other Majors. In addition, we also calculate net sales (ie sales less purchases) to each other Major. As the table shows, Lafarge was a net seller of cement to the other Majors across the period 2007 to 2011.

TABLE 3 Lafarge's annual sales and purchases of cement from other Majors

		Sales		Purchases		Net (sales–purchases)	
		Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)
Aggregate Industries	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
All Majors	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge and CC calculations.

12. Table 4 shows Tarmac's annual sales and purchases to other Majors. In addition, we also calculate net sales (ie sales less purchases) to each other Major. As the table shows, Tarmac was a net purchaser of cement from the other Majors across most of the period 2007 to 2011.

TABLE 4 Tarmac's annual sales and purchases of cement from other Majors

		Sales		Purchases		Net (sales–purchases)	
		Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)
Aggregate Industries	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Cemex	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Lafarge	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
All Majors	2007	[X]	[X]	[X]	[X]	[X]	[X]
	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac and CC calculations.

Note: The values shown in this table are before rebates are netted off.

13. Table 5 shows Aggregate Industries' annual sales and purchases to other Majors. In addition, we also calculate net sales (ie sales less purchases) to each other Major. As the table shows, Aggregate Industries was a net purchaser of cement from the other Majors across the period 2008 to 2011.

TABLE 5 **Aggregate Industries' annual sales and purchases of cement from other Majors**

		Sales		Purchases		Net (sales–purchases)	
		Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)	Quantity (kt)	Value (£k)
Cemex	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Hanson	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Lafarge	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
Tarmac	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]
All Majors	2008	[X]	[X]	[X]	[X]	[X]	[X]
	2009	[X]	[X]	[X]	[X]	[X]	[X]
	2010	[X]	[X]	[X]	[X]	[X]	[X]
	2011	[X]	[X]	[X]	[X]	[X]	[X]
	Total	[X]	[X]	[X]	[X]	[X]	[X]

Source: Aggregate Industries and CC calculations.

Note: 2007 data is not available. The table shows sales and purchases of bulk CEM I only; data on all bulk cement was not available. Aggregate Industries told us that [X].

Average prices on cross-sales

14. Next we compare the average prices paid by the GB producers to each other, alongside the average prices paid by Aggregate Industries and independent customers to the GB producers.³ As differences in price can be driven by size of customer and the distance over which cement is delivered, we calculate prices controlling for both size of customer and delivery distance.⁴
15. The Majors tend to be very large customers for cement, and therefore there are not always many independents making similar-sized cement purchases to use as comparators. Therefore, to control for the size of customers, we compare, for each GB

³ Unless otherwise stated, by prices we mean delivered prices.

⁴ For completeness, we show average prices not controlled for size of customer and delivery distance in [Annex A](#).

producer, the average prices charged to other Majors with the average prices charged to the top X independent customers of this GB producer. We allow X to differ for each GB producer, as each GB producer has a different number of customers. To illustrate this, if we held X the same across GB producers, for example the top 40 customers for each of them, this would represent 14 per cent of Lafarge's bulk cement customers (by number), as Lafarge has around [REDACTED] bulk cement customers, and [REDACTED] per cent of Tarmac's bulk cement customers, as Tarmac has around [REDACTED] bulk cement customers. Similarly, Lafarge's 40th customer (ranked in descending order by volume) purchases approximately [REDACTED] tonnes of cement a year (the precise volume varies by year), while Tarmac's 40th customer purchases approximately [REDACTED] tonnes of cement a year.

16. We also considered whether we should set the thresholds for each GB producer using volumes purchased, ie whether we should compare the prices charged by each GB producer to other Majors with the prices charged to independent customers who purchased X tonnes or more in the year. However, the GB producers with greater external cement sales will by default sell greater volumes than the GB producers with lower external sales, so we think it is appropriate to allow the threshold to vary for each GB producer.
17. Therefore, we have analysed the transaction data to devise sensible thresholds for each GB producer given the number of customers each GB producer has and the volumes sold by each GB producer. In light of our analysis, we used the following thresholds for each GB producer:
 - (a) Lafarge—top 45 customers, which represent [REDACTED] per cent of annual volumes;
 - (b) Cemex—top 40 customers, which represent [REDACTED] per cent of annual volumes;
 - (c) Hanson—top 40 customers, which represent [REDACTED] per cent of annual volumes;and

(d) Tarmac—top 30 customers, which represent [X] per cent of annual volumes.⁵

18. This way, we may potentially be capturing some independents which are ‘small’ by some measures (eg in terms of volumes purchased). The aim of this analysis is to understand how the prices charged to other Majors compare with those charged to independents:

(a) If we find that prices to Majors tend to be lower than those for independents controlling for size, we should bear in mind in the interpretation of the results that some of the independents we are using as a comparator may be materially smaller (in terms of volumes purchased) than the Majors and therefore this may account for some of the difference in prices.

(b) If, on the other hand, we find that prices to Majors tend to be higher than those for independents controlling for size, this would be unlikely to be because independents tend to purchase more than the Majors. This would therefore make our analysis more conservative, as it means that our average price for the independents may be somewhat higher than that for the truly large independents (of which there may be too few for averaging). Therefore if we find that the Majors pay higher prices than the independents, it gives us more comfort than that this is a genuine feature of the data.

19. In terms of controlling for delivery distances, we have used two different approaches:

(a) The first approach uses ex-shipping-point prices, which are pre-delivery to the customer, and therefore these prices are less likely to be related to distance than

⁵ Tarmac told us that it was a net purchaser of cement and its business model was focused on self-supply, therefore meaning that it made external sales only where the margin available was high enough to compensate for having to source additional volumes externally. As a result, Tarmac told us that it had very few independent customers making similar-sized cement purchases. Tarmac also told us that a more consistent approach to control for customer size would have been to pick a sample based on absolute percentages of sales. We note that there is no one right approach, and we have chosen our approach for reasons stated in paragraphs 15–17, and we note that our approach looks at, among other factors, percentages of sales.

delivered prices. However, we cannot use this approach for Cemex, as Cemex did not provide data on haulage costs.⁶

(b) The second approach is to analyse the distance over which deliveries to larger customers⁷ are made, and derive some statistics on the distance over which cement is delivered to large customers by each Major (eg 25th percentile, median and 75th percentile). This gives a range for each Major of [§] miles for Lafarge⁸ and Tarmac,⁹ [§]miles for Cemex¹⁰ and [§] miles for Hanson.¹¹ Individual transactions (both by other Majors and by larger independents) which have distances outside these ranges are then dropped from the analysis.¹²

20. Figures 16 to 19 show the delivered prices charged by each GB producer to the other Majors, as well as to independents, controlled for size of customer and delivery distance (using the approach in paragraph 19(b)). The figures show that there can be significant variation in the prices paid by different customers. Annex B shows the results of our analysis using the approach in paragraph 19(a).

21. Figure 16 shows Cemex's average delivered prices to other Majors, as well as independents, controlled for size of customer and delivery distance. The chart shows several interesting facts:

(a) [§]; and

⁶ Ex-shipping-point prices are calculated by subtracting total quarterly haulage costs (for delivery from the shipping point to the customer) from total quarterly revenues, and then dividing by total quarterly volumes. Tarmac told us that the costs of rail freight from the production plant to the depots were included in the material costs, and therefore, all other things being equal, the ex-works prices from rail depots should generally be higher than from the production plant.

⁷ As defined above in paragraph 17.

⁸ [§]

⁹ The interquartile range is [§] miles on average (ie for all [§]), though it can be as low as [§] miles, and as high as [§] miles for the Majors. We use a range of [§] miles for all customers.

¹⁰ The interquartile range is [§] miles on average (ie for all 40 larger customers), though it can be as low as [§] miles, and as high as [§]miles for the Majors. We use a range of [§] miles for all customers.

¹¹ The interquartile range is [§] miles on average (ie for all 40 larger customers), though it can be as low as [§] miles, and as high as [§] miles for the Majors. We use a range of [§] for all customers.

¹² Tarmac told us that haulage costs depended systematically on whether cement was delivered from depot or directly from the cement plant, and if Majors systematically differed from independents in the degree to which they received deliveries directly from cement plants, the comparison between the groups would be distorted. Tarmac further stated that the mileage filter would disproportionately exclude direct sales from the cement plants, since these were more likely to be outside the 25–75 per cent quartiles. We believe that there is no selection problem, as we may expect distances from depots to be shorter than from cement plants, as there are more depots than plants, while also bearing in mind that cement is shipped to a depot (instead of delivered from plant) in order to avoid delivering over large distances from the plant itself. Further, Tarmac has not provided any evidence that Majors differ from independents in the degree to which they receive deliveries directly from cement plants.

(b) the average delivered prices paid by [REDACTED] from 2009 onwards are generally significantly higher than those paid by [REDACTED], or the independents.¹³

FIGURE 16

Cemex's average delivered prices of cement by customer, controlling for customer size and delivery distance, £/tonne

[REDACTED]

Source: Cemex data and CC analysis.

22. Figure 17 shows Hanson's average delivered prices to other Majors, as well as independents, controlled for size of customer and delivery distance. The chart shows several interesting facts:

(a) The average delivered price paid by Aggregate Industries was [REDACTED] paid by independents in [REDACTED], and it was [REDACTED] by independents for most of the remaining period.

(b) The average delivered price paid by Lafarge was [REDACTED] paid by the independents in [REDACTED].

(c) The average delivered prices paid by Cemex are generally [REDACTED] paid by the independents. We also observe a [REDACTED] paid by Cemex in [REDACTED], which is [REDACTED].

(d) The average delivered prices paid by Tarmac are [REDACTED] paid by the independents for most of the period.

FIGURE 17

Hanson's average delivered prices of cement by customer, controlling for customer size and delivery distance, £/tonne

[REDACTED]

Source: Hanson data and CC analysis.

¹³ Cemex told us that it was [REDACTED].

23. Figure 18 shows Lafarge's average delivered prices to other Majors, as well as to independents, controlled for size of customer and delivery distance. The chart shows several interesting facts:

(a) The average delivered price paid by Aggregate Industries was [REDACTED].

(b) The average delivered prices paid by [REDACTED].

FIGURE 18

Lafarge's average delivered prices of cement by customer, controlling for customer size and delivery distance, £/tonne

[REDACTED]

Source: Lafarge data and CC analysis.

24. Figure 19 shows Tarmac's average delivered prices to other Majors, as well as independents, controlled for size of customers and delivery distances. The chart shows that:

(a) The average delivered price paid by [REDACTED] was [REDACTED] the average delivered price paid by independents for most of the period over which we have data.

(b) The average delivered price paid by [REDACTED] is [REDACTED] those paid by the independents across the period over which we have data.

(c) Tarmac did not sell any cement to [REDACTED], and it sold very little cement to [REDACTED] (though at distances falling outside of our control range) across the period in question.

FIGURE 19

Tarmac's average delivered prices of cement by customer, controlling for customer size and delivery distance, £/tonne

[REDACTED]

Source: Tarmac data and CC analysis.

Note: Tarmac's revenues which were used to calculate prices are net of rebates, which Tarmac provided separately.

Implied revenue differentials

25. We have calculated the ‘implied revenue differential’ as the difference between the revenue a GB producer would have received for cross-sales to other Majors had the seller used the prices it charged to its non-Major customers (which we call hypothetical revenue) from its actual revenue for cross-sales to other Majors.¹⁴ We have calculated the hypothetical revenue by using the average prices charged by the GB producers to their larger independent customers controlled for delivery distance (Figures 16 to 19 above). We have assumed that the volumes remain the same in both the actual revenue and hypothetical revenue (ie we have not adjusted volumes when we have used different prices), and that these are equal to the actual volumes purchased by the Major customers controlled for delivery distance (see paragraph 19(b) above).

26. Figure 20 shows the implied revenue differentials for Cemex, split by Major customer. The figure shows that Cemex’s actual revenues [✂].

FIGURE 20

Cemex’s implied revenue differentials by Major customer, controlling for customer size and delivery distance

[✂]

Source: Cemex data and CC analysis.

Note: Implied revenue differential is the difference between actual revenue and hypothetical revenue, as outlined in paragraph 25.

27. Figure 21 shows the implied revenue differentials for Hanson, split by Major customer. The figure shows that Hanson’s actual revenues from Aggregate Industries were typically lower than the hypothetical revenues, while the opposite is true for Cemex, Lafarge and Tarmac. Overall, Hanson earned over £2,883,000 more across the period from other Majors than it would have had it charged the same

¹⁴ We calculate implied revenue differentials to show the value of price differentials between independents and Majors. In particular, what appears to be a relatively small price difference (eg £1) could have a high value to the receiving party once multiplied by the volumes purchased.

average price to other Majors as it did the independents. It is also worth noting that Hanson's implied revenue differentials seem to have decreased over the period, which may be linked with the reduction in cross-sales over the period.

FIGURE 21

Hanson's implied revenue differentials by Major customer, controlling for customer size and delivery distance

[✂]

Source: Hanson data and CC analysis.

Note: Implied revenue differential is the difference between actual revenue and hypothetical revenue, as outlined in paragraph 25.

28. Figure 22 shows the implied revenue differentials for Lafarge, split by Major customer. The figure shows that Lafarge's actual revenues [✂].

FIGURE 22

Lafarge's implied revenue differentials by Major customer, controlling for customer size and delivery distance

[✂]

Source: Lafarge data and CC analysis.

Note: Implied revenue differential is the difference between actual revenue and hypothetical revenue, as outlined in paragraph 25.

29. Figure 23 shows the implied revenue differentials for Tarmac, split by Major customer. The figure shows that Tarmac's actual revenues from [✂] were typically lower than the hypothetical revenues. Overall, Tarmac earned [✂] across the period from other Majors than it would have had it charged the same average price to other Majors as it did the independents.

FIGURE 23

Tarmac's implied revenue differentials by Major customer, controlling for customer size and delivery distance

[✂]

Source: Tarmac data and CC analysis.

Note: Implied revenue differential is the difference between actual revenue and hypothetical revenue, as outlined in paragraph 25. Tarmac's revenues which were used to calculate prices are net of rebates, which Tarmac provided separately.

RMX plant purchasing data

30. The GB producers provided us with data on purchases of cement by their RMX plants. We present this data below. Similar data for Aggregate Industries is presented in Appendix 7.5.

Lafarge

31. Lafarge has provided data on purchases of all types of cement (CEM I and non-CEM-I) by its RMX plants for the period Q1 2007 to Q4 2011 inclusive, by individual vendor (including Internal sales).
32. Figures 24 to 28 show Lafarge's purchases of cement (for downstream use in its RMX plants) for each of the years 2007 to 2011 inclusive, by vendor. Each circle represents an RMX plant, with the sizes of the circles denoting the value of purchases by each plant. [✂]
33. The figures also suggest that, [✂].
34. Prior to 2009, there is no clear pattern, and indeed we can see from the figures that Lafarge was purchasing cement from Hanson and Cemex in 2007 and 2008 in areas very close to Lafarge's Hope and Cauldon plants. For these purchases, it is unclear whether there were logistics savings for Lafarge from purchasing cement externally. Lafarge told us that during this period there were significant shortages of cement in market conditions where demand outstripped supply, such that it was often necessary to obtain supplies from competitors in order to satisfy customer orders. Lafarge also told us that this was a consequence of a fatality at Northfleet and an explosion at Hope and at this time the focus across the network was to maintain supply to external customers. Further, Lafarge told us that although Lafarge's RMX plants supplied externally may have been closer to Hope and Cauldon, these plants would not have

been significantly (if at all) further from the plants supplying them (ie Rugby, Ketton, Padeswood or South Ferriby). Lafarge also told us that RMX plants which continued to purchase cement from Cemex in 2009 were those located very close to the South Ferriby plant in Humberside where Lafarge RMX was receiving an attractive price for cement purchased from Cemex due to the competitiveness of local importers such as Dudman and Titan.

35. Further, Lafarge told us that one of the reasons why the Majors might purchase cement from each other was logistical, where there were transport cost savings (ie when a Major's RMX or other concrete operation was located closer to a competitor's cement plant, it might be cheaper to source from the competitor's plant than from its own plant). Lafarge told us that comparing its lowest cost to serve model (based on plant cash costs and logistics costs) versus competitors had showed that there were a large number of other variables in play in cement supply, based on the major differences between the theoretical model output and actual supply profiles.
36. We think that supplying cement from a depot is likely to carry an additional cost penalty compared with supplying from a plant, which is why our analysis focuses on plants.

FIGURE 24

Lafarge's purchases of cement for downstream use, 2007



Source: Lafarge data and CC analysis.

FIGURE 25

Lafarge's purchases of cement for downstream use, 2008



Source: Lafarge data and CC analysis.

FIGURE 26

Lafarge's purchases of cement for downstream use, 2009



Source: Lafarge data and CC analysis.

FIGURE 27

Lafarge's purchases of cement for downstream use, 2010



Source: Lafarge data and CC analysis.

FIGURE 28

Lafarge's purchases of cement for downstream use, 2011



Source: Lafarge data and CC analysis.

Cemex

37. Cemex provided data on purchases of all types of bulk cement (CEM I and non-CEM-I) by its RMX plants for the period 2007 to 2011 inclusive, by individual vendor (including Internal sales).

38. Figures 29 to 33 show Cemex's purchases of cement (for downstream use in its RMX plants) for each of the years 2007 to 2011 inclusive, by vendor. Each circle represents an RMX plant, with the sizes of the circles denoting the value of purchases by each plant.¹⁵ As the figures show, Cemex purchased significant amounts of cement externally across the period 2007 to 2011. However, the source of the external purchases has changed over time. Cemex purchased significant amounts of cement from [redacted] in 2007 and 2008; this was reduced significantly in 2009 to 2011. Purchases from [redacted] increased over time, and became more concentrated in Scotland and Wales, with internal sales in these areas reducing to almost nothing

¹⁵ Locations are not available for every RMX plant (especially those which do not have a fixed location). These plants predominantly purchased cement internally, with some purchases from Hanson, Lafarge and Tarmac over the period 2007 to 2011.

across the period. Purchases from [redacted] were very low in 2007 and 2008, increasing significantly in 2009. Cemex also purchased some cement from importers across the period, though these purchases were a low proportion of total purchases.

39. In particular, we can also see that:

- (a) In 2007 and 2008, Cemex was purchasing cement from [redacted] and from [redacted]—although there was a switch to internal purchasing for South Wales in 2008. Therefore it seems likely that there is a logistics rationale for these purchases. See Section 2, Figure 2.2 for a map of the Majors' cement plants in the UK.
- (b) In 2009, Cemex switched its purchases in [redacted] away from [redacted] to [redacted], despite [redacted] having plants which appear better located for these areas.
- (c) In 2010 and 2011, external purchases by Cemex seem to be broadly in areas where Cemex does not have a nearby plant (in particular, Wales and Scotland). It may be somewhat surprising that Cemex purchases from [redacted] and [redacted] in North Wales and the North-West of England given that [redacted] which are well located to serve these areas. We think that supplying cement from a depot is likely to carry an additional cost penalty compared with supplying from a plant, which is why our analysis focuses on plants.

FIGURE 29

Cemex's purchases of cement for downstream use, 2007

[redacted]

Source: Cemex data and CC analysis.

FIGURE 30

Cemex's purchases of cement for downstream use, 2008

[redacted]

Source: Cemex data and CC analysis.

FIGURE 31

Cemex's purchases of cement for downstream use, 2009



Source: Cemex data and CC analysis.

FIGURE 32

Cemex's purchases of cement for downstream use, 2010



Source: Cemex data and CC analysis.

FIGURE 33


Cemex's purchases of cement for downstream use, 2011



Source: Cemex data and CC analysis.

Hanson

40. Hanson provided data on purchases of cement (although it did not specify whether this is CEM I only, or all types of cement) by its RMX plants for the period Q1 2007 to Q4 2011 inclusive, split into internal and external purchases. Individual vendors were not provided in the data. In the data provided by Hanson, purchases from Castle Cement have been treated as internal throughout the 2007 to 2011 period.

41. Figures 34 to 38 show Hanson's purchases of cement (for downstream use in its RMX plants) for each of the years 2007 to 2011 inclusive, by internal and external purchases. Each circle represents an RMX plant, with the sizes of the circles denoting the value of purchases by each plant.¹⁶ As the figures show, Hanson purchased significant amounts of cement externally across in 2007 and 2008. 

¹⁶ Locations are not available for every RMX plant (especially those which do not have a fixed location). These plants purchased cement both internally and externally over the period 2007 to 2011.

42. Hanson told us that the decrease in its external purchases in 2009 was a natural result of the acquisition by Heidelberg of Hanson in 2007, the full effect of which was not felt until 2009.¹⁷ [✂]

FIGURE 34

Hanson's purchases of cement for downstream use, 2007

[✂]

Source: Hanson data and CC analysis.

FIGURE 35

Hanson's purchases of cement for downstream use, 2008

[✂]

Source: Hanson data and CC analysis.

FIGURE 36

Hanson's purchases of cement for downstream use, 2009

[✂]

Source: Hanson data and CC analysis.

FIGURE 37

Hanson's purchases of cement for downstream use, 2010

[✂]

Source: Hanson data and CC analysis.

FIGURE 38

Hanson's purchases of cement for downstream use, 2011

[✂]

Source: Hanson data and CC analysis.

Tarmac

43. Tarmac provided data on purchases of cement (though not specified whether this is CEM I only, or all types of cement) by its RMX plants for the period Q1 2007 to Q4

¹⁷ Hanson merged with Castle Cement in September 2007 as a result of the acquisition by Heidelberg. Prior to this, Hanson was not vertically integrated between cement and RMX.

2011 inclusive, split into internal and external purchases. Individual vendors were not provided in the data.

44. Figures 39 to 43 show Tarmac's purchases of cement (for downstream use in its RMX plants) for each of the years 2007 to 2011 inclusive, by internal and external purchases. Each circle represents an RMX plant, with the sizes of the circles denoting the value of purchases by each plant.¹⁸ As the figures show, Tarmac purchased the majority of its cement externally in 2007. Over the period 2007 to 2011, external purchases of cement decreased, while internal purchases increased such that in 2011, Tarmac purchased the majority of its cement internally, while external sales were concentrated in Scotland and south-eastern parts of England.

FIGURE 39

Tarmac's purchases of cement for downstream use, 2007



Source: Tarmac data and CC analysis.

FIGURE 40

Tarmac Group's purchases of cement for downstream use, 2008



Source: Tarmac data and CC analysis.

FIGURE 41

Tarmac Group's purchases of cement for downstream use, 2009



Source: Tarmac data and CC analysis.

FIGURE 42

Tarmac Group's purchases of cement for downstream use, 2010



Source: Tarmac data and CC analysis.

¹⁸ Locations are not available for every RMX plant (especially those which do not have a fixed location). These plants purchased cement both internally and externally over the period 2007 to 2011.

FIGURE 43

Tarmac Group's purchases of cement for downstream use, 2011



Source: Tarmac data and CC analysis.

Average prices on cross-sales before controlling for size of customer and delivery distance

FIGURE 1

Cemex's average delivered prices of cement by customer, £/tonne



Source: Cemex data and CC analysis.

FIGURE 2

Hanson's average delivered prices of cement by customer, £/tonne



Source: Hanson data and CC analysis.

FIGURE 3

Lafarge's average delivered prices of cement by customer, £/tonne



Source: Lafarge data and CC analysis.

FIGURE 4

Tarmac's average delivered prices of cement by customer, £/tonne



Source: Tarmac data and CC analysis.

Note: We calculated Tarmac's prices net of rebates.

Alternative method of controlling prices for customer size and delivery distance

1. This annex shows ex-shipping-point prices charged by each Major (excluding Cemex, for which we do not have ex-shipping-point prices) to the other Majors, as well as to independents, controlled for size of customer, as mentioned in paragraph 19(a) above.^{19, 20}

FIGURE 1

Hanson's average ex-shipping-point prices of cement by customer, controlled for customer size, £/tonne



Source: Hanson data and CC analysis.

FIGURE 2

Lafarge's average ex-shipping-point prices of cement by customer, controlled for customer size, £/tonne



Source: Lafarge data and CC analysis.

FIGURE 3

Tarmac's average ex-shipping-point prices of cement by customer, controlled for customer size, £/tonne



Source: Tarmac data and CC analysis.

Note: We calculated Tarmac's prices net of rebates.

¹⁹ Ex-shipping-point prices are calculated by subtracting total quarterly haulage costs (for delivery from the shipping point to the customer) from total quarterly revenues, and then dividing by total quarterly volumes.

²⁰ Lafarge told us that ex-shipping point prices would not include costs Lafarge incurred in shipping product from works of manufacture to shipping point and that Lafarge incurred haulage costs both when shipping product from works of manufacture to shipping point and from shipping point to end-customer, and these costs were reflected in final delivered prices to end-customers. We consider that, while haulage costs from shipping point to customer are incurred in relation to each individual transaction, the haulage costs from works of manufacture to shipping point are incurred based on logistical considerations and not (only) in response to sales to individual customers. Also, shipping from works of manufacture to shipping point is often by rail, which is a cheaper form of transport.

Analysis of the internalization of cement purchases by Hanson in 2009

Hanson rationale for repatriation

1. Hanson told us that the rationale for the internalization of cement supplies in 2009 was linked to [REDACTED]. Hanson told us that the move towards internal supply of cement (where economically feasible) was a natural progression arising [REDACTED]. Hanson also told us that internalization was a deliberate and considered move that it expected would result in improvement in its market share. It said that the decision to internalize was taken during the second half of 2008,¹ towards the start of the economic downturn, and that the internalization of purchases was not fully implemented until 2009. As a result, there was a strong decline in Hanson's purchases from third parties, in particular Lafarge.
2. Hanson told us that Lafarge was concerned at losing such a large customer as volume leader in the market preservation of its market share was a natural priority, and as a result Lafarge did what it could to deter Hanson from taking volumes away.
3. Hanson told us that the primary factor for selecting its sites to be switched from Lafarge to Hanson cement related to the transportation costs associated with supplying grey cement from a Hanson grey cement production plant to an internal downstream site. Hanson said that initially, at the beginning of 2009, it decided to supply all of its downstream RMX and precast concrete sites internally. However, by the end of January 2009, it became apparent that the additional costs incurred in supplying its own grey cement to Hanson sites located in [REDACTED] meant that such supply was not commercially viable, involving significant transportation costs ([REDACTED]). From the end of

¹ Hanson told us that, whilst the decision to internalize was taken during the second half of 2008, the internalization was already considered as a key strategic aim in December 2007.

January 2009, Hanson told us that it continued to purchase cement from Lafarge in [REDACTED].

Timeline of the internalization event and evolution of the Hanson/Lafarge relationship

4. Our review of the internal documents provided by Hanson and Lafarge, and of the correspondence between Hanson and Lafarge, suggests that there was a breakdown in the customer–supplier relationship between Hanson and Lafarge in the autumn of 2008. The failure of Hanson and Lafarge to come to an agreement on prices of supplies of cement by Lafarge to Hanson for 2009 resulted in Hanson internalizing much larger volumes of cement than it had initially intended to by January 2009.

5. Our review of the documents that [REDACTED] were provided by Hanson suggests that Hanson’s assessment in the early part of 2008 was that Lafarge needed cement volume and that this could be used as a lever to extract better pricing from Lafarge. In June 2008, Lafarge notified Hanson that it intended to put prices up from 1 August. Hanson then suggested that it could internalize (Lafarge replied saying that it did not think this was a ‘viable alternative’) but agreement regarding the price increase was eventually reached. By no later than August 2008, Hanson had decided to internalize [REDACTED] from Lafarge. The decision of [another Major] to repatriate from Hanson in September 2008 accelerated Hanson’s plans.²

6. Around September 2008, Hanson communicated to Lafarge that it intended to stop purchasing [REDACTED] of its supplies from Lafarge in 2009 and instead self-supply these volumes ([REDACTED]). However, Lafarge then responded by attempting to renegotiate the terms of supply with Hanson, which included possible increases in prices to Hanson or reductions in rebates to Hanson for 2009 to reflect a reduction in the volumes

² Supporting documents are presented in [Annex E](#).

purchased by Hanson. After a series of negotiations over the prices proposed by Lafarge to Hanson for 2009, Hanson indicated to Lafarge that it was considering internalizing all purchases in 2009. [REDACTED] Lafarge did not reconsider its offerings as a consequence of Hanson threatening to internalize all its purchases from Lafarge, and in January 2009 Hanson internalized its entire demand from Lafarge—[REDACTED].

7. This is documented in internal Hanson emails from January 2009. In an email from [REDACTED]³ to [REDACTED],⁴ dated 7/1/2009, subject [REDACTED] writes: '[REDACTED]'
8. On 28/1/2009, in an email from [REDACTED]⁵ to [REDACTED]⁶ on the subject of [REDACTED] writes: [REDACTED].
9. Around February 2009, Lafarge and Hanson managed to come to an agreement on supplies and Hanson started to purchase cement from Lafarge again from then on.
10. A selection of emails and notes of meetings from the Hanson document request which retrace the negotiations with Lafarge during the period between October 2008 and April 2009 are reproduced in [Annex A](#). These are only part of the exchanges between Hanson and Lafarge and internal Hanson emails commenting on the situation. However, reading through these selected documents gives a fairly comprehensive idea of the evolution of negotiations between Hanson and Lafarge at the time.
11. [Annex B](#) sets out extracts of the documentation provided to us by Lafarge relating to the negotiations with Hanson at that time. The correspondence submitted by Lafarge shows the evolution of the negotiations between Lafarge and Hanson at the time.

³ [REDACTED]
⁴ [REDACTED]
⁵ [REDACTED]
⁶ [REDACTED]

12. It also appears from the internal documents provided by Hanson that Hanson had to some extent expected a reaction from Lafarge to Hanson's internalization (ie Lafarge responding by taking customers from Hanson), but that Hanson may have downplayed the threat somewhat (at least initially).
13. In an email from [X]⁷ to [X]⁸ and [X],⁹ dated 23/9/2008, Hanson does not appear to have fully anticipated the response by Lafarge to the internalization: '[X]'.¹⁰ Hanson commented on this email and said that this showed that it was trying to gain 2.5 to 3 per cent share from Lafarge, and therefore clearly showed that Hanson was trying to increase its share. We note, however, that in this email, Hanson expects that Lafarge would accommodate such a market share change because it would bring Lafarge back to its production volumes.
14. An email from [X]¹¹ to [X]¹² contains as an attachment the Lafarge Cement UK price increase letter for bulk cement (dated 1 October 2008 and notifying a price increase on 1 January 2009).¹³ Price increases announced by Lafarge are the following: Portland PCRM/PCCP: £16.00; Phoenix: £11.80; PLC: £13.60; Ferrocete: £16.00; Fly Ash: £2.00; Snowcrete: £21.00. The email from [X] comments on the price increase letter from Lafarge (and in particular, the relatively low increase on Phoenix cement compared with the other cements): [X].
15. [X]

7 [X]
8 [X]
9 [X]
10 [X]
11 [X]
12 [X]
13 [X]

16. In an email from [REDACTED]¹⁴ to [REDACTED],¹⁵ entitled '[REDACTED]', dated 11/10/2008: [REDACTED]^{16,17}
17. Hanson told us that this email showed that there was no immediate or precise knowledge at the top of Hanson Cement commercial team as to which competitors had won business, and that despite some attempts to establish Hanson market share over time, the email showed that Hanson was not able to assess Hanson's share at that time, and that Hanson market share was subject to fluctuation. We note that this email shows that, when Hanson realized that it was losing market share, its management reacted by asking details on which competitors share had been lost to. The email actually shows that Hanson knows its market share (MAT¹⁸ market share and August market share), and that it is changing fast in the context of the internalization event.
18. In the documents dated December 2008, and even more so in early 2009, Hanson appears to become very aware that Lafarge is 'attacking' some of its key cement customers. The email below, from [REDACTED]¹⁹ to [REDACTED]²⁰ and [REDACTED],²¹ dated 18/12/2008 and entitled '[REDACTED]', states: [REDACTED].
19. The following extracts from Hanson [REDACTED] dated February 2009 again mention the pressure in the cement market: [REDACTED].

The Lafarge response to internalization

20. We first summarize Lafarge's response to our information request regarding its reaction to the Hanson internalization. We then summarize the main internal docu-

¹⁴ [REDACTED]
¹⁵ [REDACTED]
¹⁶ [REDACTED]
¹⁷ [REDACTED]
¹⁸ [REDACTED]
¹⁹ [REDACTED]
²⁰ [REDACTED]
²¹ [REDACTED]

ments provided by Lafarge which relate to Lafarge's reaction following Hanson's internalization.

Lafarge's answer to our request²²

21. Lafarge told us that it was informed by Hanson around September 2008 that Hanson would cease to purchase a significant proportion of its existing bulk cement from Lafarge and would in the future satisfy its bulk cement requirements largely from its own production. Lafarge told us that the loss of volumes was unexpected and sudden, [REDACTED].

22. Lafarge told us that it sought to engage Hanson in discussions in an effort to minimize any reduction in Hanson's cement purchases from Lafarge, but that the negotiations stalled on the level of the proposed price for cement to be supplied by Lafarge, and on whether or not Hanson would be entitled to a volume rebate in respect of its 2008 purchases. The disagreement in relation to prices resulted from Lafarge seeking to negotiate a higher price than it would have done, in the absence of Hanson's decision to adopt a self-supply strategy (in other words, the prices that Lafarge was willing to offer for a smaller volume was higher than the price it had offered for a far larger volume). Lafarge told us that, despite intensive negotiations in the weeks leading up to Christmas, the two sides failed to reach an agreement. It was not until January 2009 that the parties were able to agree a price with effect from 1 February 2009.

23. [REDACTED]

²² [REDACTED]

Review of the Lafarge internal documents on Lafarge's response to the Hanson internalization

24. We have received internal documents in relation to the Lafarge strategy following Hanson's internalization. We summarize here the main documents discussing Lafarge's strategy and response to the Hanson internalization.

25. [REDACTED]

26. An email dated 26 September 2008 from [REDACTED]²³ to [REDACTED]²⁴ contains some slides discussing options following repatriation. [REDACTED]²⁵

27. The third slide says: [REDACTED].²⁶

28. In this presentation, [REDACTED].

29. [REDACTED]

30. The correspondence presented in [Annexes A](#) and [B](#) [REDACTED].^{27,28,29,30,31,32,33,34}

31. Subsequent internal documents provided by Lafarge [REDACTED].

32. In an internal Lafarge presentation entitled [REDACTED].³⁵

23 [REDACTED]
24 [REDACTED]
25 [REDACTED]
26 [REDACTED]
27 [REDACTED]
28 [REDACTED]
29 [REDACTED]
30 [REDACTED]
31 [REDACTED]
32 [REDACTED]
33 [REDACTED]
34 [REDACTED]
35 [REDACTED]

33. Generally throughout 2009, a number of Lafarge internal documents specifically track the [REDACTED]. For instance, [REDACTED], where [REDACTED], comparing [REDACTED]. In a presentation entitled [REDACTED], a slide entitled [REDACTED].
34. In a presentation entitled [REDACTED], are summarized: [REDACTED].³⁶
35. We also see in some internal Lafarge documents reviewed that Lafarge [REDACTED]. A presentation entitled [REDACTED], sent by [REDACTED], contains the following bullet point in a slide entitled [REDACTED].³⁷
36. Some internal Lafarge documents we received [REDACTED]. In particular, [REDACTED].^{38,39,40,41} [REDACTED] comments: [REDACTED].
37. In an internal Lafarge email from [REDACTED]. The idea is also developed in the presentation mentioned above in paragraph 28, in which, in a slide entitled [REDACTED], the following bullet point appears: [REDACTED].
38. However, we see no indications in subsequent internal Lafarge documents that this option was considered further, and it does not seem to have been pursued. Lafarge subsequently told us that it had long held the belief that the [REDACTED].
39. There are also a number of internal Lafarge documents in which [REDACTED]. The relevant extracts are reproduced in [Annex D](#). Of particular interest is the presentation⁴² sent [REDACTED].⁴³ In this presentation, Lafarge [REDACTED].

³⁶ [REDACTED]

³⁷ Lafarge told us that, [REDACTED].

³⁸ [REDACTED]

³⁹ [REDACTED]

⁴⁰ [REDACTED]

⁴¹ [REDACTED]

⁴² [REDACTED]

⁴³ [REDACTED]

40. In its response to the request for information on cement switching in 2009, Lafarge told us that it [REDACTED]. Lafarge said that: [REDACTED].
41. We note that the data submitted by Lafarge [REDACTED].
42. We also note that, subsequently, Lafarge accepted that its initial reaction to the Hanson decision to internalize had been 'emotional' and involved the specific targeting of Hanson customers, though it also noted that Hanson was Lafarge's largest customer and also had the largest and easiest customers for Lafarge to target.
43. We also note that Lafarge repatriated proportionally more of its purchases from Hanson-supplied sites than from Cemex-supplied sites. In 2008, 40 Lafarge RMX sites were purchasing cement from Hanson and all these sites had switched to internal purchasing by the second quarter of 2009. [REDACTED]
44. Lafarge told us that did not specifically target Hanson-supplied sites as opposed to Cemex-supplied Lafarge RMX plants. It said that it was not possible for Lafarge RMX to stop purchasing as much cement from Cemex as from Hanson, because the Lafarge RMX plants which continued to purchase cement from Cemex in 2009 were those located very close to the South Ferriby plant in Humberside where Lafarge RMX was receiving an attractive price for cement purchased from Cemex, due to the competitiveness of local importers such as Dudman Group and Titan supply cement. We note, however, that the some of the Lafarge RMX plants previously purchasing from Hanson were also located very close to Hanson cement plants, as can be seen in Appendix 7.13, but that Lafarge switched these purchases nonetheless (in particular many purchases near the Ketton plant).

Summary of correspondence with customers who switched

45. We have observed that a number of customers switched from Hanson to Lafarge in early 2009, so that market shares were almost rebalanced (ie the Hanson gain of cement volumes from internalization was almost compensated by an equivalent loss of cement volumes from external customers switching to Lafarge). The customers who switched were:

- (a) Lafarge Aggregates Limited (Lafarge's UK aggregates and RMX business): in 2009, Lafarge internalized all cement purchases that it had previously sourced from Hanson;
- (b) other Majors: [two other Majors] both switched volumes from Hanson to Lafarge in 2009;
- (c) a number of large packed cement customers (Travis Perkins, Jewson, etc); and
- (d) a number of independent RMX and concrete customers.

46. In the context of the internalization and the rebalancing of shares between Lafarge and Hanson, it is particularly interesting to understand the rationale for two of the other majors ([redacted] and [redacted]) for switching from Hanson to Lafarge at the time (which greatly contributed to rebalancing the shares). The locations of [other Majors'] cement-consuming sites (largely RMX plants) and the locations of Hanson and Lafarge's cement production sites did not change during this time period, therefore the costs to Hanson and Lafarge to serve the [other Majors] sites that were switched from Hanson-supplied cement to Lafarge-supplied cement are unlikely to have changed. If Lafarge offered a lower price to [other Majors] for cement supplies to these sites than it had previously, it can only have been because Lafarge was prepared to accept a lower margin for these sales than it had been prior to 2009.

[Other Major 1] switch

47. [Other Major 1] told us that the switch from Hanson to Lafarge in 2009 was just one consequence of an initiative designed to reduce costs. It told us that the initiative included a review of [other Major 1] RMX's cementitious supplies including the renegotiation of supply prices. [REDACTED]

48. [REDACTED]⁴⁴ but Lafarge [REDACTED].⁴⁵

49. [REDACTED]

50. [REDACTED]

51. [REDACTED]

52. [REDACTED]

53. Our review of the documents that were [REDACTED] also revealed [REDACTED].^{46,47,48,49}

54. [REDACTED]

[Other Major 2] switch

55. We received many more documents on the switch by [other Major 2].

56. [REDACTED]

⁴⁴ [REDACTED]

⁴⁵ Lafarge told us that [REDACTED].

⁴⁶ [REDACTED]

⁴⁷ [REDACTED]

⁴⁸ [REDACTED]

⁴⁹ [REDACTED]

57. [X]^{50,51,52}

58. [X]^{53,54,55}

59. [X]^{56,57}

60. [X]^{58,59}

61. [X]

62. [X]^{60,61}

63. [X]^{62,63}

64. [X]^{64,65}

65. [X]⁶⁶

66. [X]

67. [X]

-
- 50 [X]
 - 51 [X]
 - 52 [X]
 - 53 [X]
 - 54 [X]
 - 55 [X]
 - 56 [X]
 - 57 [X]
 - 58 [X]
 - 59 [X]
 - 60 [X]
 - 61 [X]
 - 62 [X]
 - 63 [X]
 - 64 [X]
 - 65 [X]
 - 66 [X]

68. [REDACTED]^{67,68}

69. [REDACTED]^{69,70}

70. [REDACTED]⁷¹

71. [REDACTED]^{72,73,74,75}

Independent customers who switched (packed cement and RMX customers)

72. We have reviewed the internal documents and correspondence with cement customers who switched between Hanson and Lafarge. Our review suggests that Hanson's perception was that Lafarge was 'attacking' some key customers. Extracts from our review of the correspondence and documents on customers who switched is reproduced in [Annex C](#).

73. We also conducted interviews with four of the independent bulk customers who switched at the time. One RMX customer (Geddes) told us that it was only able to get a good price for its cement when there was a dispute between the majors: Geddes told us that the periods where a competitor would undercut an incumbent supplier coincided with disputes between the vertically-integrated cement manufacturers arising from their practice of supplying each other with significant quantities of cement. Geddes considered that competing suppliers were usually reluctant to give quotes to Geddes, and that options for switching to another Major producers only

67 [REDACTED]
68 [REDACTED]
69 [REDACTED]
70 [REDACTED]
71 [REDACTED]
72 [REDACTED]
73 [REDACTED]
74 [REDACTED]
75 [REDACTED]

arose during disputes between the Majors. Another recent dispute between the Major producers had led to [✂].

**Selected correspondence and notes of meetings between Lafarge
and Hanson in the period of September 2008 to March 2009**



**Selected correspondence between Lafarge and Hanson in the period of
December 2008 to February 2009**



Extracts of documents and correspondence with customers who switched



Further extracts of Lafarge internal documents relating to the Hanson repatriation



Documents obtained from Hanson [✂]

[✂]

The impact of the JV and entry of Mittal

The CC's investigation of the proposed Anglo–Lafarge JV and the CC's decisions on remedies

1. On 2 September 2011, the OFT referred to the CC for investigation and report under the Act the anticipated construction materials JV between Anglo American and Lafarge Group. The CC published its final report of its investigation (the Anglo/Lafarge final report) on 1 May 2012.
2. As set out in Section 2 of the Anglo/Lafarge final report, Anglo American's and Lafarge Group's UK activities in aggregates, asphalt, RMX, cement, waste management and asphalt surfacing would be contributed to the proposed JV. Excluded from the proposed JV were Anglo American's UK activities in building products (ie its Tarmac Building Products subsidiary), and Lafarge Group's UK activities in gypsum (ie plaster, plasterboard, plaster blocks and joint compounds). The pro-forma FY10 revenues for the proposed JV were estimated to be around £2 billion with EBITDA of around £210 million. Anglo American and Lafarge Group would each hold a 50 per cent stake in the proposed JV's share capital with equal representation on the board.
3. Further details of the structure of the JV are set out in Appendix E of the Anglo/Lafarge report, along with an outline of its rationale and the events leading up to the proposal to create the JV.
4. In the Anglo/Lafarge final report, the CC concluded that the proposed JV may be expected to result in an SLC leading to prices that would be higher than might otherwise be the case in the following markets:
 - (a) the market for the supply of bulk cement in the UK, as a result of coordinated effects that were expected to arise from the proposed JV;

- (b) 19 local markets for the supply of primary aggregates for construction applications, as a result of unilateral effects;
- (c) the market for the supply of rail ballast in the UK, as a result of unilateral effects;
- (d) the market for the supply of HPL in the UK, in relation to HPL supplied for FGD applications, as a result of unilateral effects;
- (e) two local markets for the supply of asphalt, as a result of unilateral effects; and
- (f) seven local markets for the supply of RMX as a result of unilateral effects.
5. Anglo American and Lafarge (collectively the JV parties) proposed a series of divestitures to address these SLC findings.
6. Following discussions with the CC about a range of possible divestitures, the final divestiture proposal put forward by the JV parties to remedy the SLC finding of coordinated effects in cement comprised:
- Lafarge's Hope cement plant (with a cement capacity of around [REDACTED] Mt a year);
 - Lafarge's Dowlow quarry, which would provide the acquirer of Hope with a potential alternative source of limestone;¹
 - associated rail-linked depots at Theale in west Berkshire, Walsall in the West Midlands and Dewsbury in West Yorkshire (Hope also has permission to deliver up to [REDACTED] kt per year of cement by road);² and
 - a portfolio of [REDACTED] RMX plants with approximately [REDACTED] of sales volume (equivalent of around [REDACTED] of blended cement³). This would enable the purchaser to meet around [REDACTED] of Hope's cement capacity through internal sales.⁴

¹ Lafarge told us that the Dowlow site contained over [REDACTED] Mt of consented limestone reserves and was rail-linked and 10 miles away from Hope. [REDACTED]

² The JV parties told us that Theale would provide the buyer of Hope with capacity of [REDACTED] and access to demand in the South of England, while Dewsbury with capacity of [REDACTED] was well located to serve the major conurbations in the North of England. Each of these depots has blending facilities on site which could be utilized by the purchaser to produce CEM II or CEM III, effectively expanding the cement production capacity of the cement plant. The Walsall depot has further capacity of [REDACTED].

³ Based on a conversion rate of [REDACTED].

7. The CC's assessment of the effectiveness of this divestiture in remedying the SLC it had identified in cement is set out in paragraphs 8.102 to 8.145 of the Anglo/Lafarge final report. It is important to note that this assessment was focused on the specific and narrow question of the effectiveness of this remedy, rather than of the overall effect of such a divestiture on all aspects of competition.

8. To address the SLC findings of unilateral effects in markets for aggregates, asphalt and RMX, the JV parties proposed to divest one or more sites in each problematic overlap area in order to remove any potential source of the SLC. This divestiture package comprised:
 - (a) Tarmac's 50 per cent interest in MQP;⁵
 - (b) six other primary aggregates sites (three from Lafarge,⁶ three from Tarmac⁷) and one aggregates depot (Lafarge's Ashbury depot);
 - (c) two other asphalt plants;⁸ and
 - (d) six RMX plants.⁹

9. The CC concluded that the above combination of divestitures would be an effective remedy to address the SLCs that had been found and represented a less onerous solution than full prohibition (the only other effective remedy identified). As this combination of divestitures was more proportionate than prohibition, it was therefore the CC's preferred solution.

⁴ Paragraph 8.75 of the Anglo/Lafarge final report indicated that, in the remedies implementation phase, the CC would be prepared to allow some flexibility about the specific RMX sites to be divested—for example, if potential purchasers did not wish to acquire specific RMX sites, or if local unilateral effects concerns might be raised in respect of a purchaser's existing RMX operations. However, the CC would need to be satisfied that this was necessary to achieve an effective disposal, did not compromise the remedy's effectiveness and did not reduce the overall volumes of RMX to be divested from the JV entity.

⁵ MQP includes aggregates quarries at Cliffe Hall and Griff, divestiture of which addressed specific problematic overlaps.

⁶ Dowlow, Britton Ferry and Willington. A collocated RMX plant at Briton Ferry was also included in the divestiture package.

⁷ Coxhoe, Holme Hall and Potton.

⁸ Tarmac's asphalt plant at Cavenham and Lafarge's Wivenhoe plant.

⁹ We found seven problem areas in relation to RMX for which the main parties proposed six divestitures. This reflects the position that the seven problem areas included both the Lafarge Greenock and Tarmac Greenock areas. The proposed divestiture for both the Lafarge Greenock and Tarmac Greenock areas is the same RMX site (Tarmac Greenock).

10. The CC decided to require Anglo American and Lafarge to implement these divestitures as a condition for allowing the proposed JV to proceed. The implementation of these divestitures was made subject to various safeguards including CC scrutiny of potential purchasers, the ability for the CC to appoint a divestiture trustee and a requirement on the JV parties to complete the divestiture of cement, RMX and associated operations before the CC would give its final approval to the proposed JV.

Implementation of remedies following the Anglo/Lafarge final report

11. Following the publication of the Anglo/Lafarge final report, the CC negotiated undertakings with the JV parties to implement the divestiture remedies as set out in that report. Final undertakings were accepted by the CC on 27 July 2012.¹⁰

12. At around the same time, the JV parties started the process of marketing the operations to be divested to interested bidders. The JV parties had a preference for marketing the majority of these operations together as a single package. There were two main constraints on their ability to sell all the operations to be divested to a single purchaser:
 - Any sale of Tarmac's 50 per cent ownership interest in MQP is subject to a right of pre-emption in favour of Hanson Quarry Products Europe. Tarmac was therefore not in a position to conclude a sale of MQP to any other party unless and until Hanson had considered whether or not to exercise this right.
 - It would not be possible to sell all the RMX sites to be divested to a single bidder. This was because both the Tarmac and Lafarge RMX sites involved in four of the six problematic overlaps had been included in the list of RMX sites which the JV parties had undertaken to divest. As such, had both Tarmac and Lafarge sites in a particular area been sold to the same bidder, this would not have resulted in an effective remedy to the specific SLC resulting from the problematic RMX overlap.

¹⁰ These are available at www.competition-commission.org.uk/our-work/anglo-american-lafarge/undertakings-and-order.

In addition, when the undertakings were agreed, it was conceivable that problems might arise in relation to other specific RMX sites (eg as a result of competition conflicts with a specific purchaser, or in relation to consents required from third parties).

13. Given these preferences and constraints, the JV parties marketed the following two packages to potential bidders:
 - The 'Hope package'—comprising the Hope cement plant, all the aggregates and asphalt operations to be divested (other than those that formed part of MQP) and all the RMX operations to be divested (with the exception of the five RMX sites which needed to be sold separately); and
 - Tarmac's 50 per cent share in MQP.
14. On 16 November 2012, after considering offers from a number of bidders, the JV parties exchanged contracts in relation to both the Hope package and (subject to Hanson's consideration of its pre-emption rights) Tarmac's 50 per cent share in MQP with MI.
15. Following clearance under the EU Merger Regulations on 14 December 2012 and final purchaser approval from the CC, the sale of the Hope package to MI was concluded on 7 January 2013. MI named the acquired business Hope Construction Materials. On the same day, all regulatory conditions having been met, Anglo and Lafarge concluded the JV which was named Lafarge Tarmac.
16. The total consideration agreed for the purchase of the Hope package and of Tarmac's stake in MQP was £272 million. [✂]

17. Three further aspects of the Sale and Purchase Agreement are likely to affect commercial relationships between HCM and Lafarge Tarmac for a period following the transaction:
- [✂]
 - As anticipated in paragraph 8.37 of the Anglo/Lafarge final report, [✂].
 - [✂]
18. Following the completion of the divestiture of the Hope package, the formation of Lafarge Tarmac and the completion of the divestiture of Tarmac's 50 per cent stake in MQP to Hanson, the remaining divestitures to be completed were of five RMX sites, namely the Lafarge sites at Whisby, Greenock and Newport and the Tarmac sites at Thirsk and Selby which it was not possible to include within the scope of the Hope package.¹¹

CC assessment of the impact of divestiture in Anglo/Lafarge investigation

19. In the Anglo/Lafarge investigation, the CC considered whether the divestitures put forward by the JV partners would be effective in remedying the loss of competition arising from the proposed JV. In that investigation, while the CC compared the situation with remedies against the counterfactual (ie the pre-merger situation), the focus on the CC's assessment was on the effectiveness of the divestitures in addressing the SLC that it had found. As such, the CC did not conclude as to whether the new market structure following the formation of the proposed JV and implementation of the required divestitures might actually increase competition.

¹¹ The first four of these sites had needed to be divested separately because Anglo and Lafarge decided to divest both Anglo and Lafarge's RMX sites in a number of the problematic RMX overlaps (see paragraph 8(d)). [✂] As at the end of April 2013, Lafarge Tarmac had sold one of these five sites to an independent RMX producer, and had yet to sell the remaining four (which will be divested separately by Lafarge Tarmac during 2013).

Remedies to address unilateral effects in aggregates, asphalt and RMX markets

20. The assessment of the various divestitures to address unilateral effects in aggregates, asphalt and RMX markets is in paragraphs 8.13 to 8.30 and 8.101 of the Anglo/Lafarge final report, which concluded that they would be effective in remedying all the CC's SLC findings of unilateral effects in markets for aggregates, asphalt and RMX.

Remedies to address coordinated effects in cement

21. The consideration of the effectiveness of the divestiture of the Hope package (and specifically of the operations set out in paragraph 5 above) on the SLC finding of coordinated effects in cement is set out in paragraphs 8.102 to 8.145 of the Anglo/Lafarge final report and is summarized in paragraphs 4 to 10 above.
22. This CC's assessment in the Anglo/Lafarge final report considered whether the combined effect of the JV and the divestiture on the structure of cement and RMX markets would increase the susceptibility of the GB cement market to coordination. In so doing, the Anglo/Lafarge final report considered the potential impact of these structural changes on the three conditions for coordination:
23. Looking first at the ability to reach and monitor coordination, the CC concluded that the divestiture would maintain the situation before the proposed JV in terms of the number of major UK cement producers. Similarly, as a result of the scale and geographic scope of the RMX operations to be divested, Lafarge Tarmac post-divestiture was unlikely to have materially different information from its RMX operations than Lafarge does today about the actions of other UK cement producers. The CC therefore concluded that allowing the JV to proceed subject to the divestiture was unlikely to make it materially easier to reach and/or monitor the terms of coordination in cement, whether such coordination was new or pre-existing.

24. Second, having reviewed various potential effects on the incentives of individual cement producers to deviate from coordination and/or to punish any deviation from coordination by others, the CC concluded that allowing the JV to proceed subject to the divestiture was unlikely to result in a material increase in the internal sustainability of coordination, whether such coordination was new or pre-existing.
25. Third, in relation to external sustainability, the CC noted that the divestiture would replace Tarmac with a competitor with different characteristics from Tarmac in terms of key competitive variables such as size of plant, prospects for future expansion and, to some degree, the extent of its vertical integration. Some of these factors—in particular the size of the cement plant—might increase, relative to Tarmac, the external constraint posed by the new competitor on any coordinating group. Other factors—including the absence of scope for plant expansion in the medium to long term—might reduce the strength of any such constraint.
26. The CC also noted a risk that the acquirer of the divested business might, at some stage, participate in a current or future coordinating group. The CC took the view that this risk had been substantially reduced by the design of the divestiture package, in particular, because the divestiture of a large volume of RMX capacity would ensure that a large proportion of the new company's cement output will be absorbed by its downstream RMX business. The CC took the view that, as with Tarmac prior to the JV, this should encourage the new company to operate its cement plant at a high level of capacity. The CC's oversight of the divestiture process, including scrutiny of potential purchasers, was also expected to reduce this risk.
27. In conclusion, based on its assessment of the impact of the divestiture on market structure and on the conditions for coordination, the CC took the view that the divestiture would address its key concerns about the impact of the JV (as originally pro-

posed) on coordination in the UK bulk cement market. In particular, the divestiture would remove concerns that resulted from the reduction in the number of UK cement producers from four to three and from the increased similarity in terms of vertical integration, between the Lafarge Tarmac, Cemex and Hanson.

28. However, the CC acknowledged that the divestiture did involve some risks. Many of these would have arisen to some degree in any divestiture and the CC took the view that these were generally capable of being effectively managed through careful design and implementation. Against these risks was the fact that the divestiture package included a larger cement plant than the Tarmac plant that was being contributed to the JV. The CC concluded that this, combined with the strategic uncertainty associated with the entry of a new player into the UK cement market, had some potential to undermine coordinated behaviour.

29. The CC concluded that the divestiture was of sufficient scale and scope effectively to restore the essential characteristics of the market structure in cement and RMX before the proposed JV. The competitive conditions that would result from allowing the proposed JV to proceed subject to the divestiture would depend on a variety of factors that were difficult to predict with certainty. There are possible scenarios in which the divestiture might result in a more competitive situation than the counterfactual, and other possible scenarios in which it might result in a less competitive situation. On balance, the CC concluded that allowing the proposed JV to proceed subject to the divestiture was unlikely to result in a material change in the susceptibility of the UK bulk cement market to coordination relative to the counterfactual. Consequently, the CC concluded that the divestiture would be an effective remedy.

Mittal Investments' plans for Hope Construction Materials

30. MI shared its initial thinking about its plans for HCM with the CC during the purchaser suitability process. We would expect these plans to evolve during the first year of operation of the new business. We set out below our current understanding of these plans as they relate to:

- (a) management (paragraphs 31 and 32);
- (b) projected financial performance (paragraphs 33 and 34);
- (c) cement (paragraphs 35 to 40);
- (d) RMX (paragraphs 41 and 42); and
- (e) aggregates (paragraph 43).

Management

31. HCM was divested with a senior management team comprising former employees of Tarmac/Anglo American and Lafarge.¹² On completion of the acquisition, Amit Bhatia (a member of the Mittal family) was appointed as Chairman.

32. [REDACTED]

Projected financial performance

33. Table 1 shows MI's projections of the overall financial performance of HCM.

TABLE 1 **Projected financial performance of HCM as at December 2012**

	<i>Estimated pro-forma outcome</i>	<i>Business plan, financial year ending 31 December</i>				
	<i>2011</i>	<i>2013e</i>	<i>2014e</i>	<i>2015e</i>	<i>2016e</i>	<i>2017e</i>
Consolidated revenue (ex works) (£m)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Consolidated EBITDA (£m)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Consolidated margin over revenue (%)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: MI.

¹² [REDACTED] (CEO [REDACTED]), [REDACTED] (Finance Director [REDACTED]), [REDACTED] (Managing Director, Cement [REDACTED]), [REDACTED] (Managing Director, Concrete, Aggregates & Asphalt [REDACTED]), [REDACTED] (HR [REDACTED]), [REDACTED] (Legal Director [REDACTED]).

34. MI expects [REDACTED].

Cement

35. MI intends [REDACTED]. Table 2 shows [REDACTED].

TABLE 2 Expected annual cement output of HCM as at December 2012

		<i>kt a year</i>			
	<i>Actual output</i>	<i>Projections, financial year ending 31 December</i>			
	<i>2011</i>	<i>2013e</i>	<i>2014e</i>	<i>2015e</i>	<i>2016e</i>
Total cement volume [REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Of which:					
CEM I	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
% of total volume	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
CEM II	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
% of total volume	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
CEM III	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
% of total volume	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
CEM IV	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
% of total volume	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: MI.

36. [REDACTED]

37. As shown in Table 2, [REDACTED].

38. [REDACTED]

39. Given its expectations regarding the output of the Hope plant, MI's GB cement market share will depend on a range of factors, including the extent to which the GB cement market expands during the next few years. [REDACTED]

40. MI's longer-term plans for its cement business [REDACTED].

RMX

41. MI told us that [REDACTED].

42. MI estimated that [REDACTED].

Aggregates

43. MI expects [REDACTED].

Views of the majors

44. The majors made the following comments about the likely impact of the formation of Lafarge Tarmac and of HCM.

45. Lafarge told us that the creation of Lafarge Tarmac and the divestments resulting from the remedies package would have a substantial impact on the relevant markets, as well as the structure of Lafarge's existing business. The divested assets allowed for the creation of a new, national player with significantly greater cement capacity and external cement sales than those of Tarmac prior to the JV. The new player, HCM, would be a more competitive player than Tarmac in cement. Tarmac operated at full capacity and was a net purchaser of cement. HCM would have greater scope to compete externally than Tarmac. It would thus represent a more effective competitor in cement than Tarmac. Lafarge also told us that Tarmac's cement operations ceasing to be independent would not materially facilitate transparency, since Tarmac was not a disruptive force that caused variability regarding cement supplies to non-Major customers. The formation of Lafarge Tarmac would also result in substantial reductions in variable cost of production. The competitive benefits flowing from the formation of Lafarge Tarmac were unlikely to fully materialize within the period of the market investigation. Any conclusions that the CC reached on the likelihood of coordination between GB cement producers and any possible remedies must be cast in light of the impact of the divestments required as a result of the Anglo/Lafarge final report.

46. Tarmac told us that given the number of divestments required before the JV could be established, the market structure in each of the reference markets was likely to change, paving the way for new entrants and additional competition. The divestments would result in more choice for customers. The shape of the cement market would change considerably and significantly due to the JV as well as HCM being net suppliers of cement.
47. Hanson told us that it would be very important for the CC's analysis to take into account the changing market dynamics resulting from the completion of the Lafarge Tarmac JV and the entry of Lakshmi Mittal and HCM into the cement, RMX and aggregates markets. It noted, for example, that Lafarge Tarmac had a different cement and RMX profile from that of either of the legacy companies. HCM was a new entrant into the GB cement and RMX markets with material positions in both markets, but a different profile and potentially different incentives to either of the legacy operators.
48. Hanson considered that these developments introduced great uncertainty into the markets and would most likely lead to a fundamental shift in market dynamics (in particular, as regards cement and RMX) and on a very significant scale, signs of which were already clearly visible (according to what Hanson said was its recent and current experience) in the market at present. [REDACTED] It could not know what strategy HCM and Lakshmi Mittal may bring to the UK cement market, other than to note that HCM would in all likelihood work to establish a very significant market share to match their capacity. According to Hanson, both theoretically and in actuality, HCM was likely to seek growth within the market commensurate with what Hanson considered to be HCM's very significant capacity in cement. Hanson told us that this was further facilitated by HCM's ownership of a similar number of RMX sites to each of Hanson

and Cemex, which Hanson said provided the principal route to market for GB produced cement and so would allow HCM to take a very significant UK cement share.

49. Hanson commented that the extent of change and instability likely to be introduced by HCM meant that it should be considered a new entrant. For example, according to Hanson:

(a) Unlike Tarmac, HCM is expected to be 'long' in cement with a significant surplus to carry out external sales. Hanson said that Tarmac's cement plant was largely concentrated on internal supply, whereas HCM would have excess capacity to supply independent customers. Hanson told us that the net effect would be to introduce a new major player into the supply of cement to the independent RMX sector.

(b) Hanson noted that HCM was ultimately owned by an investor (Lakshmi Mittal and MI) who had world-leading experience in steel manufacture. Hanson argued that this brought inherent scope for change and instability. According to Hanson, MI had a reputation for bringing in world-leading process improvements and efficiency investments in logistics. Hanson expected this to generate a differentiated approach to GB cement production and supply.

50. Hanson said that MI's investment represented a clear opportunity for HCM to leverage the international spread and financial resources of its group to produce clinker overseas and grind it in GB. According to Hanson, this opportunity for clinker import clearly added an additional layer of opportunity for MI and scope for further changes to the market. Hanson drew specific attention to the Movies in Pay TV market investigation, noting that in that case the CC had concluded that changing market dynamics meant that there was no AEC. This was due to the entry of Netflix and LOVEFiLM during the course of the investigation, which led the CC to revise its provisional views. Hanson made the point that in view of HCM's position in cement, RMX and

aggregates, it would similarly expect the CC to recognize the competitive impact of the new entrant, particularly in the context of the production capacity of the cement market's latest new entrant being considerably greater than the new market share established by the new entrants in the Movies on Pay TV market investigation.

51. [REDACTED] told us that it expected HCM to be an aggressive competitor. This expectation was due to that fact that an entrant buying the divested assets would be a net supplier of cement. It was therefore likely that HCM would impose a considerably greater constraint on those allegedly coordinating than Tarmac would have done previously. Moreover, given current market conditions, an entrant would have to push very hard for profit. In support of these views, [REDACTED] provided us with a non-exhaustive table of 15 [REDACTED] customers which had potentially been approached by HCM. The table indicates that in nearly all these cases HCM has offered a lower price than that currently offered by [REDACTED], with an average reduction proposed of around £[REDACTED].

52. Aggregate Industries told us that it did not expect any major change in the competitiveness of the reference market due to the JV.

Internal documentary evidence: methodology

1. In paragraphs 8.18 to 8.157 we describe what we observed from a body of documentary evidence we gathered from the Majors during our investigation. We discuss three categories of documents: ‘the 2008 documents’, ‘the strategy documents’; and ‘the 2012 documents’. In this appendix we provide further information on those documents. In relation to each category of documents, we describe the nature of the documents, the process for gathering them and how we used that evidence in our investigation.

The 2008 documents

2. The 2008 documents are documents provided by Lafarge, Hanson, Cemex and Aggregate Industries relating in the main¹ to the period 2002 to 2008. They include emails, strategy and other business documents. They do not exclusively cover cement, though our focus has been on those documents relating to cement. In the following paragraphs we explain the background to the request for these documents and how we used them in our review.

3. [REDACTED]^{2,3,4,5}

4. [REDACTED]

5. We conducted an initial review of the 2008 documents and identified certain general points of interest or ‘themes’ which emerged from them. Those themes included the following:

¹ There are a small number of documents that predate 2002 or are undated. There are only a limited number of documents that predate 2005.

² [REDACTED]
³ [REDACTED]
⁴ [REDACTED]
⁵ [REDACTED]

- (a) pricing strategy;
- (b) market share;
- (c) cross-sales;
- (d) verticalization;
- (e) imports; and
- (f) senior level business contacts between the Majors.

Within those themes we identified certain behaviours.

6. We provided a document setting out these themes to Lafarge, Cemex, Hanson and Aggregate Industries for comment, together with some selected extracts of their own internal documents that appeared to show the behaviours concerned taking place in practice. We also asked each of these parties some questions on their own documents during our hearings with them. We published a non-confidential version of the document setting out the themes to enable any interested parties to comment.
7. In order to make best use of the 2008 documents to capture the dynamics in the market over time we also prepared a chronology of events, drawing on key documents, grouping together documents from different sources covering the same event or theme and setting out those documents in broad time order. This is in Appendix 8.2.
8. We set out in paragraphs 8.36 to 8.74 what we observed from the 2008 documents.

The strategy documents

9. The strategy documents are documents relating to each of the Majors' business strategies and business planning created mainly during the period 2009⁶ to 2011, of

⁶ Some of the Lafarge documents are from 2008.

which some are forward looking. In the following paragraphs, we explain the background to the request for these documents and how we used them in our review.

10. As part of our standard document request at the outset of our investigation, we requested pre-existing strategy plans, business plans and other documents relevant to the Majors' strategy that were produced in the previous three years at a local and a national level. The request was not specific to strategy documents relating to cement. We outline below broadly the scale and nature of those documents we received relating to cement.
11. Hanson provided 30 strategy documents covering cement, which covered the period 2009 to 2011, as well as some forward-looking documents covering the period up to 2015.
12. Cemex provided five strategy documents covering cement. The documents were from 2009, 2010 and forward looking over the period 2011 to 2015.
13. Lafarge provided four strategy documents specifically covering cement: a 'Cement Strategic Base File' including 'Strategic Reviews' for the years 2009 to 2011 inclusive as well as a 'Western Europe – UK 2011–2015 Marketing Sales Plan'. A number of the documents provided on other product categories also included information on cement. Lafarge also subsequently provided a 2009 document and a 2010 document and presentation in addition.
14. Aggregate Industries provided many strategy documents, including strategic business reviews and business plans, and a relatively large number of risk assessment documents (separately for Aggregates, RMX, Cement, Corporate risk) that cover the years 2007 to 2011.

15. Tarmac provided five strategy documents, which covered its strategy plans for 2012 for four regions (West, North & Scotland, South East and Central). While all documents contained specific strategies for aggregates and concrete, none contained cement-specific strategies.
16. We reviewed these strategy documents. Given that the periods covered by these documents overlap to a great extent with periods covered by the 2012 documents described below, we describe what we observe from the 2012 documents and the strategy documents together in paragraphs 8.78 to 8.155.

The 2012 documents

17. The 2012 documents comprise emails and their attachments obtained from each of the Majors relating to the period from August 2010 to September 2012. In the following paragraphs we explain the background to the request for these documents and how we used them in our review.
18. Following the initial review of the 2008 documents, in November 2012 we sent the Majors a request for internal documents in relation to cement. This request was split into two parts: 'Request 1' asked for all emails sent between the Majors by certain 'named postholders' and 'Request 2' asked, for each 'named postholder', for all internal emails which contained certain key search terms. The document request built on our previous analysis of the 2008 documents.
19. 'Request 1' was designed to provide documentary evidence on commercial negotiations between the Majors for cement sales.
20. 'Request 2' was designed to provide us with internal documentary evidence which could indicate whether any of the behaviours we had identified in our earlier working

paper on the 2008 documents (referred to in paragraph 6 above) had continued after 2008.

21. We requested documents for the period 1 August 2010 to 30 September 2012 inclusive.
22. To make the request as targeted and proportionate as possible, we asked for documents for certain 'named postholders'—essentially, the Chief Executive Officer/ Managing Director of the UK business, the senior cement sales directors/managers (and in some cases the cement strategy managers), and the head of the business's RMX division (and in some cases the key cement procurement managers).
23. Aggregate Industries, Tarmac and Hanson all raised a number of questions concerning the document request and, following discussions with these parties, we agreed to some amendments to the document request in order to narrow the request. Cemex was unable to provide us with documents covering the full date range citing its corporate document retention policy. Further details are provided below for each party.
24. Lafarge provided us with 1,452 documents in response to Request 1 and 1,150 documents in response to Request 2.
25. The postholders for Lafarge were:⁷
 - (a) [REDACTED] [Senior Executive], [REDACTED] (906, 282);
 - (b) [REDACTED] [Senior Cement Executive], [REDACTED] (19—each document is more than one unique email);
 - (c) [REDACTED] [Senior Cement Executive], [REDACTED] (125, 216);

⁷ The numbers in parentheses are, respectively, the numbers of responsive documents which were submitted for each postholder in respect of Request 1 and Request 2.

- (d) [REDACTED] [Senior Cement Executive], [REDACTED] (5, 122);
- (e) [REDACTED] [Senior Cement Employee], [REDACTED] (3 across both requests); and
- (f) [REDACTED] [Senior RMX Executive], [REDACTED] (331, 530).
26. Hanson provided us with 11,804 documents across both Request 1 and Request 2.
27. The postholders for Hanson were:⁸
- (a) [REDACTED] [Senior Executive]: [REDACTED] for the whole period (850);
- (b) [REDACTED] [Senior Cement Executive]: [REDACTED] (623); [REDACTED] (33);
- (c) [REDACTED] [Senior RMX Executive]: [REDACTED] (160); [REDACTED] held this role for [REDACTED] until a replacement for [REDACTED] was appointed; [REDACTED] then appointed and held this role for [REDACTED] (475);
- (d) [REDACTED] [Senior Cement Executive]: [REDACTED] (2,127); and
- (e) [REDACTED] [Senior Cement Executive]: [REDACTED] (2,108).
28. Cemex provided us with 113⁹ documents in response to Request 1 and 513 documents in response to Request 2.
29. The postholders for Cemex were:¹⁰
- (a) [REDACTED] [Senior Executive]: [REDACTED] (0, 0) [REDACTED] (7, 170);
- (b) [REDACTED] [Senior Cement Executive]: [REDACTED] (0, 4);
- (c) [REDACTED] [Senior Cement Executive]: [REDACTED] (0, 0); [REDACTED] (62, 211);
- (d) [REDACTED] [Senior Readymix Executive]: [REDACTED] (1, 9); and
- (e) [REDACTED] [Senior Cement Executive]: [REDACTED] (42, 120).
30. Cemex informed us that according to its 'Information Retention Policy' (last updated in December 2009 and applicable across its global business), emails were retained

⁸ The numbers of responsive documents for each postholder are estimated as Hanson was unable to de-duplicate documents.

⁹ The numbers of documents are estimated as Cemex supplied single PDFs containing multiple documents for each postholder.

¹⁰ The numbers in parentheses are, respectively, estimates of the numbers of responsive documents which were submitted for each postholder in respect of Request 1 and Request 2.

on a user's 'live' email system for 30 days after which they were automatically deleted. Automatically deleted emails are retained for a further 30 days on a server in Monterrey, Mexico, after which they are then deleted permanently and are irrecoverable. If a user has him/herself sent the email to 'trash' (before automatic deletion) and emptied the 'trash', then the relevant email(s) are also irrecoverable. When an employee leaves Cemex, his/her laptop is wiped within weeks of their leaving the business in order that it can be allocated to his/her replacement or another employee. Therefore, unless a user has printed an email or saved it in some other way, emails from calendar year 2011 are likely not to exist any longer. According to Cemex, a similar 30-day policy applies to most other Cemex documentation whether held electronically or in hard copy.

31. Aggregate Industries provided us with 736 documents in response to Request 1 and 785 documents in response to Request 2.

32. The postholders for Aggregate Industries were:
 - (a) [Senior Executive] [redacted]: [redacted];
 - (b) [Senior Aggregates and Cement Executive] [redacted]: [redacted] & [redacted];
 - (c) [redacted] [Senior Executive]: [redacted] & [redacted]; and
 - (d) [redacted] [Senior Executive]: [redacted], [redacted] & [redacted].

33. Tarmac provided us with approximately 2,000 documents.

34. The postholders for Tarmac were:
 - (a) [redacted] [Senior Executive]—[redacted] (3);¹¹
 - (b) [redacted] [Senior Cement Executive]: [redacted] (341); [redacted] (20);
 - (c) [redacted] [Senior Cement Executive]—[redacted] (324);

¹¹ The numbers in parentheses are estimates of the numbers of responsive documents which were submitted for each postholder.

(d) [REDACTED] [Senior Cement Executive]—[REDACTED] (616); and

(e) [REDACTED] [Senior Cement Employee]—[REDACTED] (0); [REDACTED] (0); [REDACTED] (14); [REDACTED] (719).

35. We conducted an initial review of these documents, focusing on extracts of those 2012 documents that suggested the continuance of some of the behaviours identified in the themes arising from our analysis of the 2008 documents. We also noted certain instances where documents provided useful insights into a company's view of the market in which it operated or particular market conditions. We provided to each Major a document setting out (a) general themes based on the documents as a whole and (b) specific themes based on documents of the Major concerned, together with relevant extracts from its own documents. We published a non-confidential version of the document setting out the themes to enable any interested parties to comment.
36. As with the 2008 documents, we prepared a chronology of events based on the 2012 documents, drawing on key documents, grouping together documents from different sources covering the same event or theme and setting out those documents in broad time order. We prepared a chronology covering key documents from Hanson, Cemex and Lafarge (see Appendix 8.3). We prepared further chronologies setting out separately certain documents of interest for each of Tarmac and Aggregate Industries (see Appendix 8.4).
37. We set out in paragraphs 8.78 to 8.155 what we observed from the 2012 documents.

2008 documents: chronology



2012 documents: Chronology—Cemex, Hanson and Lafarge



2012 documents: chronologies—Aggregate Industries and Tarmac



The role of vertical integration in facilitating coordination in the GB cement markets

Introduction

1. In this appendix, we consider in more detail whether coordination is likely to be facilitated by vertical integration compared with a situation where there is no such vertical integration. Specifically, we analyse how vertical integration is likely to affect each of the following conditions for coordination, compared with a situation where there is no such vertical integration:
 - (a) ability to agree and monitor terms of coordination;
 - (b) internal sustainability; and
 - (c) external sustainability.

2. In this appendix, we focus on vertical integration into RMX. However, our arguments apply in the same way to vertical integration into other downstream sectors which use cement (for example, manufacture of concrete products).

Ability to agree and monitor the terms of coordination

3. Compared with a situation where there is no vertical integration, vertically-integrated cement producers have more points of contact with each other by virtue of their RMX operations.¹ These include cross-sale of cement to one another's downstream RMX operations and interaction between their RMX divisions in the downstream market. These points of contact could facilitate greater information exchange and monitoring of the cement market. In particular, an RMX operation is likely to increase a cement

¹ Hanson told us that this was not necessarily the case because its cement and RMX businesses were separate legal entities with separate management. Hanson also told us that ongoing vertical integration and moves to internalization and self-supply showed how the market had evolved towards a model of independence rather than interdependence. We consider the changes in amount of cross-sales over time in Appendix 7.13. We note that, though there has been a reduction in the amount of cross-sales over time, compared with a counterfactual of no vertical integration, the fact that cement producers are integrated into RMX increases the points of contacts between cement producers.

producer's understanding of cement pricing, demand conditions and supply relationships.

4. In a situation with no vertical integration, a cement producer will gain knowledge of rivals' cement sales through knowledge of its own market share of cement, wins/losses of its cement customers, and through pricing pressure on remaining sales.
5. However, this knowledge of rivals' cement sales may be enhanced by vertical integration into RMX.
6. First, it may be difficult for a cement producer to detect cheating behaviour if such behaviour is limited to the cheater supplying more volume at lower price through a small number of customers already served by the cheater. The impact of this cheating would not be evident directly to other cement producers from cement customer wins/losses. Its impact would instead be felt through lower cement demand from other RMX suppliers who compete with the beneficiary of the cheater's low-priced/high-volume sale. However, such lower demand in a local RMX market from competitors to the customer of a cheater may be difficult to perceive since:
 - (a) a cement producer will supply a large number of cement customers over a wide area which will cover many local RMX markets;
 - (b) there might be other reasons for fluctuations in demand from individual cement customers given the competitive nature of the RMX market and prevalence of short-term contracts; and
 - (c) lower demand from cement customers due to cheating may be difficult to distinguish from lower demand due to changes in market conditions.
7. However, ownership and operation of an RMX business may increase the transparency of cement volumes entering the supply chain in different local areas (including

supply arrangements) as well as providing greater appreciation of underlying demand for RMX.

8. Furthermore, in the event of a deviation, a cement producer may know when it has been undercut by a rival cement producer and lost a customer, but not the exact price which resulted in it being undercut. By also being active in the RMX market, a cement producer may gain further insight to the price at which the lost customer was supplied and the volumes supplied to it. This may be inferred through the intensity of competition within the RMX market in which the lost customer operates.
9. Lafarge stated that RMX sales accounted for only around half of cement sales so RMX activity would give only limited information on the cement market. In addition, Lafarge said that aggregates represented a more important input into RMX than cement, making it harder to understand causes of price or volume changes observed at the RMX level. According to Lafarge, separately identifying cheating behaviour from changes in RMX competition would also be difficult given that RMX competition was inherently local and independent RMX operators could be strong local competitors.
10. However, internal documents from the Majors show a relatively high level of transparency in the RMX market on a national and regional level, including information on wins and losses by different RMX suppliers.
11. Therefore, simply having an RMX operation appears to improve the ability of cement producers to monitor the terms of coordination and any subsequent deviation at the cement level.

Internal sustainability of coordination

Incentive to deviate

12. In a situation where cement producers are not integrated, profits attained from deviating on coordination in the cement market would be derived from increasing sales of cement to independent RMX producers, independent concrete block producers and bagged cement buyers. With vertical integration, the rewards from deviating by offering a lower price to independent customers are lower because there are fewer independent customers that can switch.

13. To illustrate this, we give the following (highly stylized) example where there are two producers of cement, each producing 50 units of cement in the coordinated equilibrium. If there is no vertical integration, the gains to Producer 1 from deviating would potentially be the ability to sell up to 50 units more by supplying all the independent RMX operators that are currently being supplied by Producer 2.

14. If there is full vertical integration, so that each cement supplier sells 50 units of cement through its own RMX operation, it would not be possible to deviate in that way: Producer 1 cannot offer a lower price to the vertically-integrated RMX operations of its rival Producer 2. The only way of deviating, with full vertical integration, would be to lower the 'internal price of cement' to Producer 1's own RMX operations in order to reduce the price of RMX charged by Producer 1's downstream operations and increase RMX sales (so as to lead indirectly to an increase in cement sales). However, such deviation is likely to be less effective and less immediate than deviating by increasing cement sales to independents. The effectiveness of such deviation will depend on:
 - (a) the importance of the costs of cement in the final price of RMX (ie the extent to which cement cost reductions result in lower RMX prices);

(b) the speed at which RMX customers would switch between RMX producers in response to a reduction in the price of RMX. Intuitively, there may be a delay in switching by RMX customers because RMX demand is mainly project based and therefore there may be a lead time to the next project; and

(c) the extent to which the integrated RMX producers of Producer 1 compete directly with RMX producers of Producer 2. If there is differentiation in the offerings (eg because of distance and travel time), a small change in relative price may not result in a large change in demand. For instance, even if Producer 1 lowered prices of RMX to very low levels, it is unlikely that it would be able to capture all additional 50 units of volumes in the example above because it is highly likely that there will be some areas of the country that it will not be able to serve. The highly localized nature of RMX markets is likely to reduce the effectiveness of deviating through reducing internal prices of cement.

15. Therefore, it is likely that deviating by increasing sales of cement through a cement producer's own RMX business would be less effective and less immediate than increasing sales of cement by reducing prices to independent customers who are currently supplied by competing suppliers. This reduces the incentives to deviate in this way.
16. The profits available from deviating may be lower if—as is currently the case—a significant proportion of RMX outlets are vertically integrated with other cement producers. Cheating may similarly be more easily detected if any such cheating is concentrated among a smaller number of independent cement customers who can more easily be monitored.
17. On the other hand, it should be noted that deviating by reducing internal prices may be more difficult to detect than deviating through reducing prices to independent

customers. If a cement producer deviates by offering lower prices to an independent RMX producer, resulting in the independent RMX producer switching cement suppliers, this is likely to be easily detected by competitors who will be able to detect that one customer has switched cement providers. If a cement producer deviates by reducing internal prices in order to reduce RMX prices and increase RMX sales, this may be more difficult to observe, and therefore will require that cement producers monitor what is happening in the RMX market in terms of contracts and prices and any changes in RMX market shares by the Majors.

18. There may also be scope for cement suppliers to try to commit to high internal prices for cement. One such mechanism is cross-sales: rather than supplying their own RMX operations, cement producers could purchase cement from each other at relatively high prices as a commitment to high cement and RMX prices. There is some evidence from our analysis of the prices of cement cross-sales that the GB cement producers may have charged each other cement prices higher than market prices. This would have had the same effect as a firm charging its own downstream operation a high price, and could be used as a mechanism for cement suppliers to commit not to deviate through their own internal businesses. We also note the following Cemex email chain [✂].

Ability to punish

19. The arguments set out above in relation to incentives to deviate would equally apply to ability to punish. All other things equal, it is likely to be more effective to punish via lowering prices to independent customers rather than to punish indirectly via lowering internal cement prices in order to increase cement sales through the vertically-integrated RMX outlets. So vertical integration may therefore have mixed effects on the internal sustainability of coordination as it reduces both incentives to deviate and ability to punish.

20. There is little academic work on the relationship between coordination and vertical integration. We are aware of one academic paper that analyses this relationship, and it concludes that vertical integration will facilitate coordination rather than hinder it. Volker and White (2007)² investigate the impact of vertical mergers on upstream firms' ability to collude when selling to downstream firms in a repeated game. The authors find that vertical mergers give rise to an outlets effect: the deviation profits of cheating unintegrated firms are reduced as these firms can no longer profitably sell to the downstream affiliates of their integrated rivals. Vertical mergers also result in an opposing punishment effect: integrated firms typically make more profit in the punishment phase than unintegrated upstream firms. The authors find that the net result of these effects in an unintegrated industry is to facilitate upstream collusion (at least with respect to initial vertical integration).
21. [REDACTED] submitted that punishing deviation in the RMX market was not possible due to the transitory nature of RMX contracts themselves. According to [REDACTED], a producer would not be able to target a specific RMX producer's customers and an attempt to do this might inadvertently punish another member of the colluding group. [REDACTED]
22. With respect to repatriation as a punishment mechanism, [REDACTED] also stated that it has not had the ability to repatriate material volumes since [REDACTED]. Similarly Hanson observed that there was no evidence that Majors have reverted to cross sales after repatriating volumes.
23. Internal documents from the vertically-integrated firms provide a detailed account of how cross-sales provided cement producers with a credible punishment mechanism. This includes using internalization of cement purchases as a punishment mechanism. As set out in Appendix 7.13, internalization appears to have been driven in part

² Volker and White, 'Do Vertical Mergers Facilitate Upstream Collusion?', *American Economic Review*, Vol 97(4), September 2007.

by the economic downturn. However, this does not mean that remaining cross-sales do not act as a deterrent to cheating, nor that previous cross-sales did not do likewise.

External sustainability

24. An alternative to cement sold by the GB cement producers is imported cement (see Appendix 7.5 for our analysis of cement imports). However, via ownership of RMX operations, the cement producers may be able to restrict an important route to market for importers.

25. There is some evidence from importers that vertical integration in GB can limit the extent of imports. Titan told us that it considered vertical integration in GB as a barrier to entry and that if it were to expand further in GB it would need to acquire an RMX or aggregates business which would require considerable capital expenditure.
[REDACTED]

26. Majors' purchases of cement from importers are negligible, even though the Majors purchase cement from each other (including some small volumes from Aggregate Industries). There is some evidence from internal documents suggesting that Majors shun importers intentionally. A Tarmac email dated 12 March 2012 says: [REDACTED].

27. As Table 1 below shows, around 52 per cent of bulk cement purchases in GB in 2011 were made by the Majors. This effectively limits the 'addressable' market available to importers or other potential entrants, making entry less attractive and coordination more sustainable.³ Furthermore, the 'addressable' market may be smaller in parts of GB where Majors have a high combined share in RMX and other concrete products.

³ Hanson argued that Aggregate Industries should not be excluded from the 'addressable market' for independent importers, as Aggregate Industries was an importer itself. We set out in paragraphs 8.257–8.264 the role of Aggregate Industries and explain why we think that Aggregate Industries does not have an incentive to increase imports into GB.

There may also be customers whose needs could not be served by the importers, for example if customers have a perceived concern about the security and/or quality of supply of imported cement.

TABLE 1 Proportion of bulk cement purchases in GB accounted for by Majors in 2011

	2008	2009	2010	2011
Total purchases of bulk cement by Majors	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total GB sales of bulk cement including imports*	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Proportion of bulk cement purchases by Majors	58%	55%	53%	52%

Source: Cemex, Hanson, Lafarge Group, Tarmac Group, Aggregate Industries, [REDACTED], [REDACTED] and [REDACTED]; cement importers; and CC analysis.

*Includes sales of bulk cement by the Majors, [REDACTED], and total sales by [REDACTED].

28. We found evidence in a Lafarge internal document, dated 2009, suggesting that vertical integration may be in part a tactical response to the threat of imports. The Lafarge document states that: [REDACTED].

29. This appears to refer to a cross-sale arrangement where the RMX operation of one Major supplied by another Major would be deterred from sourcing cement imports by the threat of punishment. This could further prevent an importer from gaining a foothold in the local market.

Barriers to entry and expansion in the provision of RMX

Introduction

1. In this appendix, we set out some of the views and evidence presented to us by parties in relation to barriers to entry and expansion in the supply of RMX.

Capital cost

2. The Majors told us that the capital investment required for RMX production was low. Their estimates are set out in Table 1:
 - Lafarge told us that the cost of building an RMX plant could range from £0.3 million to £1.5 million for a large fixed installation, and that minimal upfront investment would be required in either land or trucks as they could be leased (or the transport could be subcontracted).
 - Tarmac estimated the cost to be from £0.1 million for a second-hand plant to £1.5 million for a new large-scale installation, and also told us that no initial investment would be required in relation to transport as trucks could be leased or the delivery subcontracted.
 - Hanson said that the cost would be between £[redacted] million for a small-scale plant to £[redacted] million for a large-scale plant.

TABLE 1 Parties' estimates of capital cost of RMX plants

	<i>£ million</i>			
	<i>Plant scale: small/medium/large</i>	<i>Small scale</i>	<i>Medium scale</i>	<i>Large scale</i>
Aggregate Industries	[redacted]	[redacted]	[redacted]	[redacted]
Cemex	[redacted]	[redacted]	[redacted]	[redacted]
Hanson	[redacted]	[redacted]	[redacted]	[redacted]
Lafarge	[redacted]	[redacted]	[redacted]	[redacted]
Tarmac	[redacted]	[redacted]	[redacted]	[redacted]

Source: The Majors.

3. The Majors told us that entry into the RMX market using volumetric trucks required very little investment as the trucks could be purchased second-hand or leased.

4. Leiths told us that a mobile RMX plant and concrete mixer trucks would require investment of approximately £0.7 million. It said that a static plant in rural Scotland would cost approximately £1 million to establish, including concrete mixer trucks, while an urban plant would cost more, up to £2 million, owing to the site acquisition costs. Leiths also said that the cost of entry using volumetric trucks would be less than £250,000.
5. [An operator of volumetric trucks] told us that the initial capital cost of entering the RMX market with one volumetric truck was between £220,000 and £240,000. The operator said that the main cost items were the volumetric truck (£160,000), a cement silo (£30,000), a loading shovel for loading aggregates (£15,000 to £20,000) and tanks for water and diesel.

Availability of raw material

6. Cemex and Lafarge told us that aggregates and cement were readily available from suppliers in the UK and Europe and therefore they did not consider access to raw materials to be a barrier to entry. Cemex noted that independent RMX producers formed an essential customer base for its cement business. Hanson told us that it sold a significant proportion (some [X] per cent) of its cement production to independent RMX producers, which it considered to be a crucial segment of its customer base. Hanson also noted that the Majors' networks of aggregates plants and RMX plants were not optimized for self-supply, with the result that individual aggregates plants might be dependent on sales to non-vertically-integrated RMX producers. Aggregate Industries noted that RMX producers had a significant choice of suppliers of aggregates. Tarmac also noted that supplies of cement and aggregates were readily available to RMX producers given the excess capacity in aggregates and cement and the availability of imported cement.

7. Breedon Aggregates told us that it had not encountered any problems with obtaining cement for its RMX plants during periods of heightened RMX competition with its cement suppliers.

8. Leiths, on the other hand, told us that access to supplies of aggregates and competitively priced cement was a potential barrier to entry. Leiths also said that in some areas of Scotland it was difficult for it to compete with the vertically-integrated RMX/cement majors because the Majors could control the price of the cement that went into Leiths' RMX. Leiths said that it had planning permission for a new RMX plant in south-east Edinburgh but the investment was not viable because the Majors ensured that concrete prices remained low.

Planning permission

9. Lafarge and Tarmac told us that any planning consents required could be obtained within three months of application and therefore they did not consider planning permission to be a barrier to entry.

Barriers to expansion

10. The Majors told us that increasing production at an RMX plant based on its existing capacity would be straightforward when prevailing levels of capacity were low. Hanson noted that there might be planning limits on the maximum operating hours or vehicle movements at a site, but since most plants were currently operating below capacity, in practice any planning limits would not, in Hanson's view, constrain an increase in production. Lafarge said that almost all of its RMX plants had significant spare capacity and that there were no barriers to expanding production within their existing capacity. It also noted that variable costs constituted [] per cent of total cost of sales in the RMX business, and therefore no significant increase in fixed costs would be incurred to increase production within existing capacity.

11. The Majors also told us that there were no significant barriers to increasing capacity at an existing RMX site. Aggregate Industries noted that planning permission might be required. Lafarge said that increasing capacity at a site would be likely to be achieved by replacing the plant with a higher-capacity model. Lafarge noted that a revision to the site's planning consent would probably be required but this would not be costly or difficult. Lafarge also noted that its RMX plants typically operated at [X] per cent capacity and therefore production capacity was unlikely to be a barrier to increasing output. Hanson noted that potential limits on increasing plant capacity might include the requirement for some capital investment in new plant or plant modifications and planning constraints, but the extent to which these factors constituted actual barriers would depend on site-specific circumstances.

Analysis of the Majors' profitability in the supply of RMX

Introduction

1. The purpose of this appendix is to analyse the profitability of the Majors' RMX operations in accordance with our profitability framework as set out in Appendix 4.1. This framework sets out the various purposes of our profitability analysis and the methodological approach adopted to derive our chosen measure of profitability.
2. Most facets of the framework for assessing profitability, for example our chosen measure of profitability and the overarching approach to valuing a firm's asset base, are common across all three reference products being investigated and as such are set out once in Appendix 4.1. We have not identified methodologies which are specific to RMX. As a result this appendix contains no further explanation or justification of how we have prepared the numbers we present.
3. The results in this appendix are presented on the same basis of preparation that each Major adopts for its UK statutory reporting. We refer to this basis as historical cost accounting (HCA). However, it is the case that some Majors at one stage or another have revalued some of their assets. This basis of preparation is known as modified HCA. In this appendix we refer to (modified) HCA when referring to the Majors' existing basis of preparation.
4. We have not made any adjustments to the basis of preparation on which the firms' provided their financial information in respect of their RMX operations, namely (modified) HCA. In contrast to the profitability analysis for the cement reference products,

we have not, as explained in paragraph 25, also sought to present profitability on a CCA¹ basis.

Structure of the appendix

5. This appendix sets out:
 - (a) basics of RMX production;
 - (b) results of analysis;
 - (c) findings and interpretation; and
 - (d) implications of CCA accounting for RMX profitability.

Basics of RMX production

6. In Section 2 we provide some background information on the reference markets including that relating to the RMX market. The purpose of this subsection is to describe the key activities and inputs required to produce, distribute and sell RMX, namely the activities to which the profitability information we present relates.
7. The key inputs into RMX are cement, aggregates and water. These inputs are typically mixed together at a permanent site where silos store the cement and there is space to store aggregates. RMX is mixed in mixing equipment and then piped into specialist lorries (with the rotating drums) which then deliver the RMX to a job at a construction site before the RMX sets hard. As this setting process typically takes place within 1 to 2 hours, there is a limit to how far away from the permanent site in travelling time a firm can deliver its product. The capacity of the road network and dependability of local traffic conditions will also be factors in the economic delivery area for a particular site. Ease of access to aggregates and cement, both of which are heavy and bulky ingredients, will also be potentially important factors in the viability of an individual site.

¹ See second footnote to paragraph 4.14 for an explanation of the modified HCA and CCA bases of preparation.

Results of analysis

8. We determine profitability on a ROCE basis over the period 2007 to 2011. The approach taken to determine capital employed is to value the Majors' assets as reflected in their own financial statements. These ROCE figures have been calculated on a pre-interest and pre-tax nominal basis using year-end capital employed. All the Majors have December financial year ends.
9. We make a distinction between adjustments to the basis of preparation² and the scope³ of the operating revenues, costs, assets and liabilities relevant to our assessment. This means that the analysis of HCA profitability reflects as far as practically possible our view of what is relevant, rather than necessarily the activities the firm would reflect within financial information prepared for its own purposes.
10. Costs include all direct and indirect costs identified by the Majors as attributable to their RMX operations. These costs will therefore include, to the extent identified, costs incurred at the UK parent level, and in some cases, by the foreign ultimate holding company. However, to the extent that these costs are in fact causally related to the production and sale of RMX, they are likely to be variable with the levels of production in the medium to longer term.

Results for the Majors as a whole

11. In Table 1 below, in addition to presenting summary profit and loss accounts and balance sheets totalled across all the Majors, we also provide the volume of RMX sold in each year. This volume information gives an indication of the extent of the downturn experienced in this market during the period of review.

² A change to the basis of preparation would be to restate assets on their current value to the business rather on the basis of their historical cost or a revalued amount.

³ See Appendix 4.1, paragraphs 58–61.

TABLE 1 **Total (modified) HCA profit and loss accounts and balance sheets for Majors and ROCE calculated thereon**

	2007	2008	2009	2010	2011
<i>Volumes</i>					
RMX sales volumes (million m ³)	22.7	19.5	13.9	13.7	14.7
<i>£ million</i>					
<i>HCA profit and loss</i>					
Revenues	1,299	1,211	925	873	944
Costs excluding depreciation	-1,282	-1,208	-968	-928	-988
HCA depreciation	<u>-15</u>	<u>-17</u>	<u>-20</u>	<u>-20</u>	<u>-18</u>
Profits reflecting all costs incurred	<u>2</u>	<u>-14</u>	<u>-63</u>	<u>-75</u>	<u>-62</u>
<i>HCA balance sheet</i>					
Plant and machinery/AICC	159	164	153	147	134
Other fixed assets	46	58	69	64	65
Net current assets	84	59	34	21	34
Provisions	<u>-5</u>	<u>-7</u>	<u>-7</u>	<u>-9</u>	<u>-7</u>
Total assets	<u>284</u>	<u>275</u>	<u>249</u>	<u>223</u>	<u>226</u>
<i>ROCE</i>					
Profit/year-end capital employed (%)	0.7	-5.1	-25.2	-33.6	-27.5

Source: CC analysis based on Tables 3(a) to (e).

Firm-specific return on capital employed

12. In Table 2 we set out our estimates of each Major's ROCE from supplying RMX in each of the years over the period of review, 2007 to 2011 as well as providing an overall weighted average figure for each of the years.

TABLE 2 **Calculated ROCE for each Major and in total over the period 2007 to 2011**

	<i>Profit/capital employed (%)</i>				
	2007	2008	2009	2010	2011
Cemex	[x]	[x]	[x]	[x]	[x]
Hanson	[x]	[x]	[x]	[x]	[x]
Tarmac	[x]	[x]	[x]	[x]	[x]
Aggregate Industries	[x]	[x]	[x]	[x]	[x]
Lafarge	[x]	[x]	[x]	[x]	[x]
Total	0.7	-5.1	-25.2	-33.6	-27.5

Source: CC analysis based on Tables 3(a) to (e).

Firm-specific results detail

13. In Tables 3(a) to (e) we set out for each Major at a high level its (modified) HCA profit and loss account and balance sheet relating to each year and our calculation of its ROCEs based on this information.

TABLE 3(a) **Cemex: HCA summary results and ROCEs based thereon**

	2007	2008	2009	2010	2011
<i>Volumes</i>					
RMX sales volumes (million m ³)	[x]	[x]	[x]	[x]	[x]
<i>£ million</i>					
<i>HCA profit and loss</i>					
Revenues	[x]	[x]	[x]	[x]	[x]
Costs excluding depreciation	[x]	[x]	[x]	[x]	[x]
HCA depreciation	[x]	[x]	[x]	[x]	[x]
Profits reflecting all costs incurred	[x]	[x]	[x]	[x]	[x]
<i>HCA balance sheet</i>					
Plant and machinery/AICC	[x]	[x]	[x]	[x]	[x]
Net current assets	[x]	[x]	[x]	[x]	[x]
Total assets	[x]	[x]	[x]	[x]	[x]
<i>ROCE</i>					
Profit/year-end capital employed (%)	[x]	[x]	[x]	[x]	[x]

Source: CC analysis based on information provided by Cemex.

Notes: [x].

TABLE 3(b) **Hanson: HCA summary results and ROCEs based thereon**

	2007	2008	2009	2010	2011
<i>Volumes</i>					
RMX sales volumes (million m ³)	[x]	[x]	[x]	[x]	[x]
<i>£ million</i>					
<i>HCA profit and loss</i>					
Revenues	[x]	[x]	[x]	[x]	[x]
Costs excluding depreciation	[x]	[x]	[x]	[x]	[x]
HCA depreciation	[x]	[x]	[x]	[x]	[x]
Profits reflecting all costs incurred	[x]	[x]	[x]	[x]	[x]
<i>HCA balance sheet</i>					
Plant and machinery/AICC	[x]	[x]	[x]	[x]	[x]
Other fixed assets	[x]	[x]	[x]	[x]	[x]
Net current assets	[x]	[x]	[x]	[x]	[x]
Provisions	[x]	[x]	[x]	[x]	[x]
Total assets	[x]	[x]	[x]	[x]	[x]
<i>ROCE</i>					
Profit/year-end capital employed (%)	[x]	[x]	[x]	[x]	[x]

Source: CC analysis based on information provided by Hanson.

TABLE 3(c) **Tarmac: HCA summary results and ROCEs based thereon**

	2007	2008	2009	2010	2011
<i>Volumes</i>					
RMX sales volumes (million m ³)	[x]	[x]	[x]	[x]	[x]
<i>£ million</i>					
<i>HCA profit and loss</i>					
Revenues	[x]	[x]	[x]	[x]	[x]
Costs excluding depreciation	[x]	[x]	[x]	[x]	[x]
HCA depreciation	[x]	[x]	[x]	[x]	[x]
Profits reflecting all costs incurred	[x]	[x]	[x]	[x]	[x]
<i>HCA balance sheet</i>					
Plant and machinery/AICC	[x]	[x]	[x]	[x]	[x]
Other fixed assets	[x]	[x]	[x]	[x]	[x]
Net current assets	[x]	[x]	[x]	[x]	[x]
Provisions	[x]	[x]	[x]	[x]	[x]
Total assets	[x]	[x]	[x]	[x]	[x]
<i>ROCE</i>					
Profit/year-end capital employed (%)	[x]	[x]	[x]	[x]	[x]

Source: CC analysis based on information provided by Tarmac.

TABLE 3(d) **Aggregate Industries: modified HCA summary results and ROCEs based thereon**

	2007	2008	2009	2010	2011
<i>Volumes</i>					
RMX sales volumes (million m ³)	[X]	[X]	[X]	[X]	[X]
<i>£ million</i>					
<i>HCA profit and loss</i>					
Revenues	[X]	[X]	[X]	[X]	[X]
Costs excluding depreciation	[X]	[X]	[X]	[X]	[X]
HCA depreciation	[X]	[X]	[X]	[X]	[X]
Profits reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
<i>HCA balance sheet</i>					
Plant and machinery/AICC	[X]	[X]	[X]	[X]	[X]
Other fixed assets	[X]	[X]	[X]	[X]	[X]
Net current assets	[X]	[X]	[X]	[X]	[X]
Provisions	[X]	[X]	[X]	[X]	[X]
Total assets	[X]	[X]	[X]	[X]	[X]
<i>ROCE</i>					
Profit/year-end capital employed (%)	[X]	[X]	[X]	[X]	[X]

Source: CC analysis based on information provided by Aggregate Industries.

TABLE 3(e) **Lafarge: HCA summary results and ROCEs based thereon**

	2007	2008	2009	2010	2011
<i>Volumes</i>					
RMX sales volumes (million m ³)	[X]	[X]	[X]	[X]	[X]
<i>£ million</i>					
<i>HCA profit and loss</i>					
Revenues	[X]	[X]	[X]	[X]	[X]
Costs excluding depreciation	[X]	[X]	[X]	[X]	[X]
HCA depreciation	[X]	[X]	[X]	[X]	[X]
Profits reflecting all costs incurred	[X]	[X]	[X]	[X]	[X]
<i>HCA balance sheet</i>					
Plant & machinery/AICC	[X]	[X]	[X]	[X]	[X]
Other fixed assets	[X]	[X]	[X]	[X]	[X]
Net current assets	[X]	[X]	[X]	[X]	[X]
Provisions	[X]	[X]	[X]	[X]	[X]
Total assets	[X]	[X]	[X]	[X]	[X]
<i>ROCE</i>					
Profit/year-end capital employed (%)	[X]	[X]	[X]	[X]	[X]

Source: CC analysis based on information provided by Lafarge.

Findings and interpretation

14. According to Table 1 the Majors taken together have been loss-making since 2008 even before factoring in the opportunity cost of capital employed. Caution should be exercised when interpreting ROCE figures calculated as the loss for the period over the capital employed. This is because a £1 loss on a £2 investment (ROCE –50 per cent) would be ranked far worse than a £100,000 loss on a £2 million investment (ROCE –5 per cent). However, the latter scenario could be regarded as a much worse performance.

15. We understand that a significant number of RMX sites were closed in response to the downturn and that the costs presented here may not reflect the full extent of losses incurred in the period of review. This is because, at least for some Majors, they have not fully included one-off rationalization costs such as asset write-downs in the figures they supplied to us. Instead it appears that they provided us with financial information whose scope is more aligned to that which they use for their own internal management reporting.
16. There is some variation across the individual firms. [One firm] was significantly loss-making at the height of the boom in 2007 and these losses have persisted albeit to a lower extent through to 2011. The other Majors only began to make losses in 2009.
17. This loss-making situation is somewhat surprising in that there has been plenty of time for the Majors to 'right size' their businesses in the face of the sharp downturn in demand experienced towards the end of 2008 and into 2009. All the Majors appear to have successfully right-sized their aggregates and cement businesses in response to the demand shock (ie after a dip in profitability, their ROCEs have recovered somewhat although in some cases they remain at a lower level than previously).
18. One possible explanation for the apparent losses in RMX could be that the price paid for internally⁴-supplied inputs such as cement and aggregates may not have genuinely reflected market prices.⁵ Around 75 to 85 per cent of total production⁶ costs relate to the key raw material inputs, namely cement, other cementitious material and/or additives as well as aggregates, much of which is internally supplied. However, we have been assured that transfer charges have been undertaken either

⁴ All Majors have upstream aggregates operations. All Majors except Aggregate Industries have upstream cement operations.

⁵ See also discussion of internal sales/transfer charges in Appendix 6.5.

⁶ This includes all costs ascribed to RMX including where attributed UK and foreign parent costs but excludes the cost of capital. For this illustration it also excludes distribution and haulage costs which, in line with the Majors' normal practice, are treated as a deduction from gross revenue.

at market prices or been adjusted with the benefit of hindsight so that they reflect market prices.⁷

19. If the figures presented reflect the true extent of the losses being made, then it would be in the economic interest of at least some of the Majors to further rationalize their number of RMX sites, so that the remaining portfolio of sites delivers their required rate of return. As the share of the non-Major RMX operators has grown in GB over the period of review,⁸ this suggests that it has been possible for the other RMX operators to make sustainable profits and expand operations when purchasing key inputs such as cement and aggregates at market prices.

Implications of CCA accounting for RMX profitability

20. We do not believe it would be worthwhile for us to attempt to prepare the Majors' RMX profitability on a CCA basis for the reason set out in paragraph 25 below. However, it is nevertheless worthwhile first explaining what such an exercise would involve.
21. Were we to seek to ascertain RMX profitability on a CCA basis, we would need to estimate the value of a firm's plant and machinery RMX assets on a site-by-site basis. If we start with the assumption that at 1 January 2007, the beginning of the period of review, all sites were worth replacing,⁹ then the appropriate valuation basis would have been on an MEA basis.
22. Many RMX sites were subsequently mothballed and/or closed during the period of review following the unexpected sharp drop in demand. In these cases the value

⁷ There was one exception to this picture in that [REDACTED].

⁸ Table 10.1 shows independents' share of GB RMX sales rising from 22.0 per cent in 2006 to 26.9 per cent in 2011.

⁹ See Appendix 4.1, paragraph 70.

associated with sunk¹⁰ investment in the site would be written off as an impairment loss. However, there are likely to have been further sites which, while still worth operating from, would not be worth replacing. The assets located at these sites are therefore likely to have also been impaired.

23. However, all sites may not have been worth replacing in their existing location at 1 January 2007 as they may not have been situated in a location which a new entrant would have chosen to invest in at that date. In other words the firms operating at such a site would on average incur higher operating costs than a new entrant operating from a better location would have done to supply any particular job. Our understanding is that investment in new sites in recent years has focused in areas characterized by strong growth in construction activity such as London's docklands.
24. Furthermore it is also possible that sites which were well located at 1 January 2007 became less so over the period of review as a result of the slump in demand. For example, a firm may have had two sites in the same general location at 1 January 2007 but after the slump in demand would have chosen to invest in only one of these sites. Each of the Majors indicated to a greater or lesser degree that the location of its present portfolio of RMX sites was not ideal.
25. Therefore any meaningful CCA analysis of RMX profitability would need to evaluate the commercial viability of RMX sites on a site-by-site basis¹¹ both at 1 January 2007 and at each successive period end. As the centres of concentration of construction activity in GB have shifted over time, it should be expected that the optimal siting of RMX sites will have changed.

¹⁰ By 'sunk' we mean that the only way to realize investment in assets at that particular site would be to continue to use them for the purposes of supplying RMX from that site.

¹¹ Both on an individual stand-alone basis and for their contribution to the overall network

26. On the basis that the Majors have all been making losses on an HCA basis, and these losses do not reflect any significant levels of non-cash items such as depreciation,¹² then they would still continue to make losses were we to prepare these results on a CCA basis. As the conclusions we draw from this profitability analysis stem from the fact that the Majors are making losses rather than profits—let alone earning economic profits—we infer that further analysis of RMX profitability would not alter these conclusions.

¹² CCA adjustments would alter the level of the depreciation charge as well as the value placed on the assets employed.

**Vertical effects: supporting material from
internal documents and parties' submissions**

Advantages and disadvantages of vertical integration and efficiencies

1. Hanson told us that, subsequent to acquisition by Heidelberg, its objective had been to self-supply cement entirely and that this had been an express objective and efficiency driver of the acquisition. [REDACTED]¹

2. In one of Hanson's strategy documents it states: 'Cement growth will come through additional internal concrete volume and as such, strengthening our concrete market position is a priority'. In the same document its vertically integrated market position is described as a strength. [REDACTED]

3. Other internal documents from Hanson suggest that a lack of internal aggregate/cement supply characterizes its poor-performing RMX plants. One of Hanson's internal documents also states that vertical integration of Lafarge concrete made Lafarge RMX plants more competitive.

4. Tarmac told us that vertical integration provided it with certain efficiencies and economies, which came from scale and the ability to manage the supply chain from its own supply sources. It added that downstream operations provided an important channel to market for its aggregates. Tarmac stated it followed a strategy of self-supplying cement into its downstream businesses.²

5. Cemex told us that it tried to run its businesses separately and did not regard vertical integration as the driver of its business. It noted that it was advantageous to have a

¹ Second hearing with Hanson.

² Second hearing with Tarmac.

downstream business that served as a channel to market for substantial proportions of Cemex's cement and aggregates sales.³

6. [REDACTED] noted in relation to RMX: 'VI is a key driver for competitors, RMX not seen as stand-alone'. In another document [REDACTED] says that 'cement is a consolidated market defined by unbalanced vertical portfolios' while for the aggregates market it says that 'market dominated by downstream VI with fierce spot market competition'. Throughout [REDACTED] documents, vertical integration is seen as an important strategic issue. For example, one document reads: 'Capture VI potential – will identify areas where [REDACTED] relative aggregates strength can lead to increased RMX'. In another document which analyses the RMX business in the Eastern region, [REDACTED] says: 'Build upon Eastern's asset strength and VI position to enhance benefit for [REDACTED]'. One of the main regional strategic issues in the same document is to 'maximise vertically integrated returns'. In these documents [REDACTED] also refers to [REDACTED] unbalanced vertical integration.
7. Lafarge told us that it ran a business where each of the product lines was accountable for itself.⁴ We note that the 'Virtual Vertical Integration arrangement' between Hanson and Lafarge up until 2008 is another example that highlights the perceived importance of vertical integration in this industry.
8. The importance of vertical integration (or weakness resulting from lack of vertical integration) is also stressed throughout Lafarge's strategy documents. For example, in one such document Lafarge notes that its smaller vertical integration positions in RMX and asphalt relative to main competitors, and the fact that it is more reliant on external sales, are weaknesses. In the same document, it notes that nationally, over 85 per cent of RMX is vertically integrated with aggregates and that in some local markets this is close to 100 per cent. In another document Lafarge says: 'Low level of

³ Second hearing with Cemex.

⁴ Second hearing with Lafarge.

cement VI in our portfolio is due to footprint non-alignment, lack of GGBS from Lafarge and desire to maintain leverage purchases over other VI players. All major players have strong Aggregates VI into RMX and Lafarge's figure of [REDACTED]% would be typically of other UK players'. In the same document it says that 'lack of VI alignment of overall size with cement BU' is a weakness. Lafarge also describes itself as the 'odd man out as a cement player with low VI'.

9. Lafarge's rationale for the recent Tarmac/Lafarge JV highlights the importance of having a 'balanced' portfolio of products. [REDACTED]⁵
10. Aggregate Industries told us that its rationale for vertical integration was largely driven by efficiency considerations—quality of supply, offering to customers, innovation. It explained that it saw its vertical integration model as a way to differentiate from competitors, and that having RMX was as a necessary condition to be able to bid for some projects directly.⁶ Aggregate Industries also told us that its aggregates-RMX vertical integration allowed it to offer full value-added solutions to customers, and that it balanced the risk between public and private sector.⁷
11. In Aggregate Industries' strategy documents we find similar references to the advantages of vertical integration. One such document states for [REDACTED].
12. In addition, cement supply and aggregates supply are highlighted as medium- or high-risk issues for [REDACTED] RMX business in many of its risk assessment documents. In one such document in which cement supply is highlighted as high risk, [REDACTED] notes: [REDACTED]. Similarly, from the point of view of the RMX business, [REDACTED] internal document from 2010 states: [REDACTED].

⁵ Anglo American–Lafarge JV final report, Appendix E.

⁶ Second hearing with Aggregate Industries.

⁷ Second hearing with Aggregate Industries.

13. One [REDACTED] document considers the need for accurate knowledge of RMX customer requirements when discussing potential widening of its cement product portfolio. Vertical integration is not specifically referenced, but this document appears consistent with some of [REDACTED].
14. On the other hand, there are several documents from the Majors highlighting the inefficiencies associated with vertically integrating.
15. For instance, a [REDACTED] internal document specifically states that vertical integration gives higher certainty of cement sales volume although with extra cost to supply, and that repatriated RMX business has a higher logistics cost. [REDACTED]
16. MI agreed that vertical integration played an important role in improving competitive position and customer service in terms of quality and reliability.⁸
17. Titan expressed a view that loss of ‘personal touch’ with local customers was one of the disadvantages of vertical integration, and could explain the success of independent RMX producers in growing their market share over the past few years.⁹
18. Breedon Aggregates explained that the expansion of the aggregates business (either through acquisitions or by exploiting plants with rail-heads) was usually into markets where it already had RMX plants, so that the aggregate plant would already have a captive market. Similarly, Breedon Aggregates argued that it was looking at increasing its ready-mix presence and expanding it in areas where it could supply aggregates, but that it would not be attractive to open concrete plants in areas where it did not have its own supply of aggregates. Breedon Aggregates also commented on the UK business as a whole and noted that the business had become vertically inte-

⁸ Hearing with MI.

⁹ Hearing with Titan.

grated. It noted that there was a logic to this because of the credit risk involved with supplying to small concrete producers.

19. Brett Group told us, in relation to the cement suppliers, that vertical integration by the cement suppliers allowed it to pull levers in its own business to balance its position. It also said that following integration in the industry, there were a number of moves to increase the price of cement and increase pressure on the RMX prices. Brett Group also discussed the notion of virtual vertical integration, whereby cement suppliers seemed interested in tying up fixed outlets for their cement within an advantageous supply area. It said that these large cement installations were very volume-sensitive because of fixed costs and high capital intensity, so cement producers wanted to make sure that they had long-term stability in volume demand in that area. Another point stressed by Brett Group was that cement producers which did not have downstream capacity sufficient to utilize all their cement tended to treat Brett Group more like a customer, while integrated cement producers tended to treat it more like a competitor (unless they had more cement that they wanted to sell).
20. Balfour Beatty said that in some instances, for example when it had a business that did ground engineering, it could prefer a supplier that was much closer to the job and had more truck mixers available. In those cases it might judge that particular order on those kind of elements, but most of the time the key factor was price. Balfour Beatty also said that there were advantages of going to a vertically-integrated company when it had a major project because the volumes it required were enormous.
21. BAM Nuttall mentioned potential advantages in dealing with vertically integrated companies, including security of supply from having an in-house source of aggregates. It noted, however, in relation to [REDACTED], that it did not mind where [REDACTED] got its cement from as long as the cement met the right standards. Commenting on the

extent of vertical integration in the UK RMX markets, BAM Nuttall said that vertical integration amounted to good business practice, because it enabled efficient control of the supply chain.

Foreclosure

22. The Majors' internal documents refer to the RMX market as unstable and subject to increased competition. There are several comments in [REDACTED] internal documents relating to competitors 'chasing volume' and driving down prices 'through low cement costs (increased vertical integration)' and of the 'Added impact [ie threat] of major competitors viewing rmx as downstream vehicle for cement/aggregates business and chasing volume rather than price'.
23. Pricing pressure is not consistently attributed to any one source—with some internal documents referring to independents (for example, independents in London are said to be able to source cheaper aggregates than [REDACTED]), specifically large independents (for example, Euromix in London), and the vertically integrated companies themselves.
24. There is specific reference by [REDACTED] to the possibility that pricing pressure from Cemex and Hanson might have been as a result of [REDACTED]. [REDACTED] refers to the 'aggressive VI strategy of the other major players who see RMX purely as a route to market for cement & aggregates'¹⁰ and [REDACTED].

¹⁰ [REDACTED]

Effects of policy and regulation on competition

Introduction

1. In this appendix we set out some of the evidence and supporting submissions relevant to our assessment of the impact on competition of certain aspect of policy and regulation set out in Section 11.

Planning permission and incumbency advantages

2. Two of the Majors provided views on whether the planning system provided incumbency advantages because it was easier to obtain permissions for extensions of existing aggregates sites than for the development of greenfield sites by new entrants.
3. Lafarge said that there was a natural inclination for LMPAs to resist granting applications for greenfield quarries simply because they were not popular within local communities. It noted that the national framework for aggregates planning, however, captured within the MASS,¹ forced local authorities to grant permissions (whether to greenfield sites or to quarry extensions) in order to generate sufficient supply to meet local demand,² and told us that in its view, the planning system treated applications for greenfield developments and extensions similarly.
4. Hanson told us that the guidelines set out in the NPPF that required LMPAs to assess planning applications against environmental criteria might lead to a preference for LMPAs to grant extensions for existing sites, rather than to authorize the development of new greenfield sites. Hanson noted that extending existing sites was important in terms of managing the country's finite mineral resources, where small

¹ The MASS was introduced in the late 1970s to manage regional imbalances between aggregates supply and demand in England and Wales.

² [Lafarge response to the issues statement](#).

resources might otherwise be left unworked if they were not extracted through an existing, adjoining operation, whilst that was active. It was likely that such small extensions would not be economic to open and operate as stand-alone sites and hence, if they were to be worked at all, they needed to be planned as extensions. Hanson said that this did not exclude the possibility of planning being obtained for the development of greenfield resources, as all sites would ultimately reach the end of their potential life either through reserve exhaustion or through the economic cost of operation as reserves became more distant. According to Hanson, achieving an adequate and steady supply of aggregates (one of the objectives set out in the NPPF) could only be achieved through the allocation of sites in development plans and ultimately the grant of planning permission through a range of sites, some comprising extensions and some greenfield.³ Accordingly, Hanson told us that it did not find that new sites were disadvantaged compared with existing sites in relation to obtaining planning permission and that it believed that the figures in paragraph 11.5 confirmed that a meaningful number of planning permissions were granted for new sites such that the planning system should not be regarded as a barrier to entry.

Incentives to produce aggregates at sites where planning permission has been granted

5. Lafarge told us that once permission had been granted to operate a quarry, there was in most cases a strong incentive to produce aggregates from the site. It explained that this was because often the leasehold arrangements granting permission to quarry materials imposed minimum rents per year (known as 'certain rents') and that while the royalties payable would depend upon the quantity of aggregates produced once production was above the minimum level, certain rents were payable regardless of whether aggregates were quarried. In addition, according to Lafarge, the local geographic scope of aggregates markets made it inefficient to mothball sites

³ [Hanson response to the issues statement.](#)

and withdraw from local areas. It considered that it would not be commercially rational to close a site if there were no nearby sites from which it was economical to transport aggregates and serve local demand. It argued that this therefore encouraged producers to resist mothballing sites and to operate a greater number of local sites, rather than fewer sites.⁴

6. Aggregate Industries told us that [REDACTED].⁵
7. Cemex said that, given the lengthy and costly process of obtaining planning permission, there was a clear commercial imperative for implementing it as soon as possible to recoup the costs of obtaining it. Cemex noted that holding undeveloped sites in a landbank and/or mothballing previously active sites did not make commercial sense.⁶
8. Tarmac told us that it had no wish to mothball sites given the levels of investment made in securing land and mineral rights, obtaining permission and acquiring the necessary plant and equipment in order to produce aggregates from the site. Furthermore, it argued that the costs of mothballing a site could be significant, including the cost of making the workforce redundant, rent, security, maintenance and other costs. It told us that many of its aggregates quarries were leasehold sites and often the lease would require the operator to pay a minimum royalty each year to the landlord, irrespective of whether the site was being worked or not. According to Tarmac, the minimum royalty could be up to 40 per cent of the typical total royalty that was expected on the site which was an onerous cost if the site was mothballed. It explained that, although such payments could often be recovered, the period of

⁴ Lafarge response to the issues statement.

⁵ Aggregate Industries response to the issues statement.

⁶ Cemex response to the issues statement.

recovery was often time limited, for example to three years. Consequently, its approach was to mothball a site only as a last resort.⁷

Other comments on the planning regime

9. We have summarized below the comments we have received on whether the planning regime favours large companies over small companies.
10. The BAA told us that the Majors were better placed to ride out the lengthy planning process.
11. Lafarge said that it did not consider that its size or experience accorded it any special advantage in comparison with independent or local aggregates producers in navigating the planning regime.⁸
12. Aggregate Industries said that the general UK planning system was bureaucratic, slow and expensive and that significant improvements could and should be made within the current national framework, which would, among other things, benefit the minerals planning regime and reduce the cost for all applicants. Aggregate Industries added that the planning system could be navigated by any entrant with the help of planning consultants. According to Aggregate Industries, it was common practice for all suppliers to use planning consultants and there were a large number of planning consultants to whom an entrant could turn for assistance with the detailed process of a planning application. Aggregate Industries told us that planning costs varied significantly depending upon the characteristics of the site in question but did not need to constitute a prohibitively large part of the overall investment costs for establishing a quarry. Finally, Aggregate Industries noted that planning was not an insurmountable

⁷ Tarmac response to the issues statement.

⁸ Lafarge response to the issues statement.

hurdle to entry and that the regime was designed to aid entry and applied equally to large and small suppliers, entrants and incumbents.⁹

13. Hanson said that in some cases smaller local operators might be treated more favourably than larger companies. Hanson told us that there was sometimes a perception among LMPAs that smaller operators were local players which would be more committed to a particular region and employing local people. Hanson also said that smaller operators might also utilize external consultants to assist in the planning process where these resources were unavailable in-house. According to Hanson, the costly nature of the planning process was not due to the actions of operators but rather a result of the design of the regime. Hanson noted that the need to comply with EU legislation was an additional cost: for example, under the Review of Old Minerals Permissions Process an aggregates producer was required to review relevant minerals planning permissions every 15 years and to propose new planning conditions that those permissions would be subject to. These may include new working and restoration schemes and such submissions may be subject to a full environmental impact assessment.¹⁰

Views on procedures of the aggregates working parties

14. We were told by Hanson that the procedures and controls maintained by the AWP's prevented the AWP's being used as a forum for disclosure or exchange of information between aggregate producers. Hanson told us the AWP's' procedures and controls included the following:
 - The Secretary and Chairman of each AWP set the agenda for each meeting. The Secretary and Chairman were invariably from LMPAs. Hanson also noted that industry personnel represented a relatively small proportion of those involved in

⁹ [Aggregate Industries response to the issues statement.](#)

¹⁰ [Hanson response to the issues statement.](#)

AWPs and that members were drawn from smaller producers as well as the Majors.

- The minutes of each AWP meeting were published in the public domain.
- The questionnaires for the annual and four-yearly survey were sent out by the LMPAs, which collated the data and responses received from the operators. Once collated, the information was sent to the Secretary of the AWP. The AWP Secretary collated the returns from each LMPA in such a way that information on sales and reserves of any individual operator or for any individual quarry could not be ascertained.
- At no stage in the survey process could one operator ascertain other operators' responses because information was never sent directly from one operator to another, and the survey results were published only in accordance with the 'three company rule' whereby information from one operator was collated with that of at least two other operators, so that none of the three operators could identify the sales or reserves of either of the other two operators.

15. Hanson also told us that when it responded to the AWP surveys, it did so with a covering letter that made it clear that any information supplied was for the sole purpose of being used in the surveys and was not to be disclosed more widely.

16. Hanson said that the degree of transparency resulting from the operation of the planning process went no further than would be expected in a planning system in which long-term investment decisions were made, and careful planning of total capacity was necessary to ensure that future demand was met.¹¹ Hanson also noted that AWP published agendas and minutes in the public domain and took appropriate steps to ensure that no confidential information was ever exchanged.

¹¹ [Hanson response to the issues statement.](#)

17. Tarmac told us that the LMPAs compiled the annual monitoring reports, and that data on minerals production and permitted reserves was provided by producers to the LMPAs on a confidential basis.¹² Tarmac also noted that figures were released by the Local Mineral Planning Secretaries on an aggregated basis, and only if a minimum number of operators contributed data, to avoid the possibility that an individual operator's figures could be deduced.
18. Aggregate Industries told us that it did not understand why the current degree of transparency in the system was a concern. It told us that meetings of the AWPAs were technical in nature and that commercially sensitive information was not disclosed. It said that minutes of the meetings were published on the DCLG website, which was difficult to reconcile with an inappropriate information exchange.¹³

Views on the aggregates levy

19. Tarmac told us that the fact that secondary and recycled aggregates were exempt from the aggregates levy was one of the reasons why secondary and recycled aggregates were cheaper to produce than primary aggregates and why the share of secondary and recycled aggregates in the overall aggregates market had grown in recent years.¹⁴
20. Lafarge said that the fact that recycled and secondary aggregates could be produced more cheaply than primary aggregates (due to the fact that they were produced from waste materials and did not attract the aggregates levy) directly constrained the pricing of primary aggregates. According to Lafarge, the aggregates levy had had the direct effect of making secondary and recycled aggregates more price competitive than primary aggregates. Lafarge also said that in its experience, recycled and

¹² [Tarmac response to the issues statement.](#)

¹³ [Aggregate Industries response to the issues statement.](#)

¹⁴ [Tarmac response to the issues statement.](#)

secondary aggregates were often used interchangeably by customers for economic reasons, with secondary and recycled aggregates often being favoured on grounds of price. Lafarge noted that it was estimated that 28 per cent of the share of supply of aggregates was accounted for by secondary and recycled aggregates, which in Lafarge's view demonstrated that they were an important source of competition in this market.¹⁵

21. Cemex told us that the exemption of secondary and recycled aggregates from the aggregates levy was under review following a negative decision by the EU General Court but for the moment the levy increased the considerable cost advantage enjoyed by secondary and recycled aggregates.¹⁶

22. Aggregate Industries told us that it was strongly of the view that aggregates taxes and credits distorted efficient production. Aggregate Industries also said that the aggregates levy had been a barrier to the expansion of primary aggregates and resulted in the favouring of secondary and recycled aggregates over primary aggregates. According to Aggregate Industries, the levy constituted approximately 20 to 25 per cent of the average sales price of aggregates. It said that the levy had given producers of secondary and recycled aggregates (primarily independents) a significant cost advantage. It considered that the levy had been one of the main factors that had contributed to the increase in secondary and recycled aggregates as a proportion of total aggregate production from 9 per cent in 1980 to 28 per cent in 2010.¹⁷

23. Hanson commented that the exemption of recycled and secondary aggregates from the aggregates levy, together with support for the greater use and production of secondary and recycled aggregates (through the NPPF and other public and regulat-

¹⁵ [Lafarge response to the issues statement.](#)

¹⁶ [Cemex response to the issues statement.](#)

¹⁷ [Aggregate Industries response to the issues statement.](#)

ory initiatives) was an example of the policy and regulations in place enhancing and directly subsidizing competition, since these materials could be substituted in full for all primary low-grade aggregates.¹⁸

24. The BAA told us that it had been founded 11 years ago to oppose the imposition of the aggregates levy on behalf of the independent aggregates producers as the levy had not been strongly resisted by the Majors who accounted for between 75 and 80 per cent of the market. The BAA said that the levy exacerbated the impact on the independents of the Majors' ability to price below cost and that the Majors were able to cross-subsidize between aggregates products, between geographical areas and between cement and aggregates, whereas the independents did not have these options available. The BAA said that the Majors were able to cover the cost of the levy with revenue from other areas of their business while the independents could not and therefore the impact of the levy fell disproportionately on the independents.

25. The BAA told us that the aggregates levy created distortion in the aggregates market in the following ways:
 - (a) In many geographic areas the aggregates levy resulted in a price advantage in favour of secondary aggregates compared with primary aggregates and which meant that it was cost-effective to transport secondary aggregates much further by road.
 - (b) The BAA noted that china clay, slate aggregates and shale aggregates are classified as secondary aggregates. According to the BAA, these aggregates are known as secondary aggregates because they are supposed to be by-products of another process and are not therefore subject to the levy. However, the BAA noted that the by-products of primary aggregate production, such as crushed

¹⁸ [Hanson's response to the updated issues statement](#), paragraph 18.8.

finer and scalping, were subject to the levy. It therefore considered that the levy distorted the market.

26. Wardell Armstrong (an independent mining, minerals and engineering consultancy)¹⁹ told us that the introduction of the aggregates levy had had a direct impact on aggregates prices. Wardell Armstrong had observed, through quarry weighbridge audits on behalf of its clients, that the levy comprised approximately 15 to 20 per cent of the average sale price of aggregates to consumers (net of VAT), with the percentage varying across a range of aggregate products and regions as the levy was applied as a flat rate irrespective of value. Wardell Armstrong told us that an initial consequence of the introduction of the levy was an increase in low-value quarry products being used on site as restoration material, which in many cases would have been the result of a direct substitution for recycled aggregates which could be sold net of the levy. In Wardell Armstrong's view, the quantity of construction and demolition waste being recycled as aggregates would not, however, have been increased by the levy, as Landfill Tax (now £56 per tonne) had already resulted in maximum recycling from either construction or restoration purposes. Wardell Armstrong also noted that consumers' choice between the use of primary, secondary and recycled aggregates was determined by end use and specification rather than price, since the aggregates used in any particular project had to be fit for purpose and comply with the Building Regulations.²⁰

¹⁹ Wardell Armstrong acts on behalf of many large land- and minerals-owning clients who have granted rights to extract aggregates to all five of the major aggregates companies active within the UK and many of the smaller regionally-based operators. Clients include the Crown Estate, the Church Commissioners for England, the Forestry Commission, Isle of Man Government and many private landed estates. While the company provides planning and environmental services to aggregates companies, its Mineral Estates Management Group provide services only to land and minerals owners.

²⁰ [Wardell Armstrong response to the issues statement](#).

Views on the EU Emissions Trading Scheme

Effects on costs

27. Hanson told us that as the EU Allowances granted to cement producers had an immediate financial value, producing clinker had an opportunity cost because for each tonne of CO₂ produced via clinker, one less tonne of CO₂ permits could be sold in the open market. Hanson noted that the extent of this opportunity cost varied with the market price of CO₂ permits and that in 2010 the opportunity cost of CO₂ was approximately [X] per cent of Hanson's total costs.²¹ To the extent that the allocations were not sufficient, companies would need to buy additional allowances and bear an additional direct cost. Hanson told us that given the decrease in the overall emissions cap, GB cement producers would need additional EU Allowances during Phase III.
28. DECC told us that, given that the amount of free EU Allowances each installation received would be based on the 10 per cent most efficient EU firms for a particular product, it was likely that 95 per cent of firms in industrial sectors, including those deemed to be at risk of carbon leakage (and therefore receiving 100 per cent of the allocation indicated by the benchmark for free) would need to reduce emissions or buy additional allowances.
29. DECC also noted that the administrative costs of the EU ETS were relatively small when spread over total emissions for a large installation. However, DECC perceived the administrative cost per tonne of carbon to be relatively high for small emitters and it had pursued the option of an opt-out policy for Phase III for these installations to reduce the administrative burden.

²¹ [Hanson response to the issues statement.](#)

30. Hanson noted that there was volatility in this marginal cost, with the volatility being driven by exogenous factors (for example, the severity of the winter). According to Hanson, the value of EU Allowances had varied significantly across time—which affected cement production in that it created volatility in cement margins (making the calculus of pricing and production more challenging). Hanson told us that the ability to pass this input cost increase through to price depended on the symmetry of market participants (for example, the energy efficiency of their production facilities) and the constraint from imports from outside the EU (which were unaffected by the allocations).²²
31. Cemex told us that the rationale of the EU ETS was to act as a market mechanism that allowed participants to achieve reductions in their carbon emissions where it was cost-efficient for them to do so. Cemex noted that, in its view, in the cement manufacturing sector this meant that plants that could keep their carbon emissions within their allocation would have no need to pass on any additional costs to their customers (and might even be able to pass on to customers cost savings from the sale of surplus allowances), whereas less efficient plants whose emissions exceeded their allocations, and which therefore needed to buy additional allowances, would incur additional costs that they might consider passing on to their customers. This therefore drove efficiencies in the sector and encouraged, rather than distorted, competition.²³

Effects on investment

32. Tarmac said that the EU ETS had been a contributory factor to cement plant closures, with less carbon-efficient, wet process cement plants being susceptible to closure. According to Tarmac, wet process plants required more heat and generated

²² [Hanson response to the issues statement.](#)

²³ [Cemex response to the issues statement.](#)

more carbon emissions than dry process plants. Tarmac told us that, as a result, wet process plants were more costly to operate and emitted greater levels of CO₂.

Tarmac said that closure of wet process plants had allowed producers in turn to rationalize their emissions allowances to other works. Tarmac believed it unlikely that wet plant upgrades would occur in the future given the already significant level of overcapacity in domestic cement production and import facilities.²⁴

33. Lafarge told us that the EU ETS had discouraged new investment in greenfield cement works (by raising the costs of domestic production and reducing returns on capital employed) and encouraged imports.²⁵
34. Hanson said that the EU Allowances had incentivized the use of carbon-offsetting biomass fuels as an alternative to coal despite the fact that these biomass fuels were less efficient.²⁶

Imports from outside the EU

35. Another implication of the potential increase in costs facing the GB domestic cement producers is the possibility of increased competition from cement plants outside the EU that are not subject to carbon emissions schemes.
36. Cemex said that manufacturers from outside the EU enjoyed increasing advantages due to carbon pricing. According to Cemex, allocations of free EU Allowances to cement producers in Phase III were unlikely to be sufficient to cover all emissions so cement manufacturers were likely to need to buy additional EU Allowances. Cemex told us that importers of cement from outside the EU into the EU would not incur the cost of buying emissions allowances and therefore, in combination with other advan-

²⁴ [Tarmac response to the issues statement.](#)

²⁵ [Lafarge response to the issues statement.](#)

²⁶ [Hanson response to the issues statement.](#)

tages such as cheaper electricity (Cemex considered Egypt in particular to benefit from this), importers from outside the EU had a significant competitive advantage over manufacturers within the EU who were subject to the EU ETS. Cemex noted that the European Commission was of the view that imports from outside the EU into EU markets such as GB was a realistic possibility because it had designated cement as a market which was at risk of 'carbon leakage'.²⁷

37. Lafarge also noted that cement or clinker imports from outside the EU ETS zone would have a significant cost advantage.²⁸
38. Hanson said that imports provided a strong and increasing competitive threat. It told us that, as CO₂ permits also increased the opportunity cost of producing cement in the EU, plants in Morocco and elsewhere in North Africa would have a cost advantage when exporting to the UK. Hanson anticipated that imports of cement and clinker would increasingly come from countries outside the EU.²⁹

Partial cessation rule and imports

39. One of the key aspects of Phase III of the EU ETS is the introduction of the partial cessation rule. The Majors told us that this was a change that had important effects regarding imports from outside GB.³⁰
40. Cemex said that the EU ETS had encouraged imports into GB. It told us that in countries which had been subject to significant building booms and busts, such as the Republic of Ireland, Portugal and Spain in particular, large decreases in demand for cement had meant that most operators were operating at well below the capacity for which they had been allocated EU Allowances. It noted that if such firms'

²⁷ [Cemex response to the issues statement.](#)

²⁸ [Lafarge response to the issues statement.](#)

²⁹ [Hanson response to the issues statement.](#)

³⁰ [Responses to the issues statement.](#)

production fell below 50 per cent of their historical 2005 to 2008 baseline levels, they started automatically to lose allowances, without compensation. It told us that many such firms were now aggressively targeting Britain in order to keep production above 50 per cent of their historical levels, thus enhancing competition.³¹

41. Lafarge told us that the EU ETS Phase III was likely to increase the effectiveness of importers as a competitive source of supply. Lafarge said that those cement manufacturers that were not producing at least 50 per cent of their historical clinker production would have their EU Allowances dramatically reduced (and since the allowances were tradable, their loss would represent a significant loss of revenue). Lafarge told us that this threshold provided strong incentives for cement producers in countries where domestic demand was extremely low relative to recent production levels (eg Spain, Greece and the Republic of Ireland—countries that already exported to GB) to export in order to meet the 50 per cent production threshold. Lafarge considered that these would be ongoing changes, not one-off changes in production volumes depending upon domestic demand conditions in each year.³²

42. Tarmac also said that the EU ETS Phase III was likely to provide even greater incentives for non-GB cement producers in, for example, Spain, the Republic of Ireland and Greece to supply cement into GB. According to Tarmac, this was due to the rule change whereby cement plants using less than 50 per cent of their allocated annual EU Allowance each year would not automatically retain their full allocation for the following year, and would lose 50 per cent of their allocation. Tarmac argued that this would mean that importers would impose an even greater competitive constraint on domestic cement producers going forward.³³

³¹ [Cemex response to the issues statement.](#)

³² [Lafarge response to the issues statement.](#)

³³ [Tarmac response to the issues statement.](#)

43. Hanson noted that the EU ETS was one of the factors driving Spanish and Irish cement producers to increase exports to European countries (including the UK) as they tried to maintain cement production to retain allowances despite significant declines in cement demand in their own countries.³⁴

Partial cessation rule and production allocation

44. Hanson said that the impact of the scheme had been to give it an incentive to keep all its plants open to ensure that it gained its full allocation of EU Allowances but to reduce plant utilization. It told us that this meant that marginal output was provided by the same plant as when demand was higher—there was consequently no reduction in marginal cost, and no pressure on price to fall. Indeed, according to Hanson, marginal costs might increase as inefficiencies were created when plants operated at low utilization rates. [✂]
45. In a Hanson internal document: [✂].

New entrants' allocations

46. A new entrant will be able to receive free carbon allocations in line with incumbents, where instead of the HAL, its allocation will be based on the installation's capacity (or increase in capacity).
47. Cemex said that in each phase of the EU ETS a proportion of EU Allowances were held back for new installations which began operating during that phase (the NER). Cemex told us that these allowances were allocated on the same free basis as allowances for existing installations, so new entrants were not prejudiced in any way.³⁵

³⁴ [Hanson response to the issues statement.](#)

³⁵ [Cemex response to the issues statement.](#)

48. Tarmac said that under the current EU ETS an entrant building its own cement kiln might secure an allocation of EU Allowances to assist in meeting the requirements of the ETS new entrant scheme. However, after implementation of EU ETS Phase III, an application to secure allocations of EU Allowances would only be permissible once a new plant had been built and had started to operate.

Carbon Reduction Commitment

49. Cemex told us that, with regard to aggregates, the CRC was an example of environmental legislation that had a greater impact on larger operators and created a greater barrier to large operators looking to expand than new entrants. Cemex explained that participants in the CRC were required to report on their carbon emissions annually (the first such report was submitted in July 2011) and buy sufficient allowances from the Government to cover their carbon emissions in the previous year. As the scheme covers organizations whose consumption exceeded 6,000 MWh in the relevant qualification period—which Cemex estimated would apply only to aggregates producers extracting more than 1 million tonnes annually—Cemex’s view was that the CRC was unlikely to apply to smaller operators.
50. Aggregate Industries told us that the CRC did distort competition. It noted that large cement producers were exempted from the CRC and small aggregates producers fell below the electricity consumption threshold at which the CRC took effect. Aggregate Industries submitted that this effect would be exacerbated by the new government plan to disapply the CRC rules on the supply of energy to facilities covered by the EU ETS (such as cement plants).

Competition implications of planning policy regarding landbanks for aggregates

Introduction

1. In this appendix we provide further details of our assessment of the length of landbanks and the ownership of permitted reserves.

Summary

2. One of the key characteristics of the planning system for land-won primary aggregates is the use of 'landbanks'.¹ The length of a landbank in a particular area can be used as an indicator as to when new permissions for aggregates are likely to be required. The NPPF states that landbanks should be at least for seven years for sand and gravel and ten years for crushed rock. In paragraphs 6.43 to 6.47 we identify the difficulty of obtaining planning permission for a new aggregates site as a potential barrier to entry. Some parties submitted to us that obtaining planning permission was more difficult if the landbank in an area exceeded the minimum periods set out in the NPPF.
3. We considered whether (as at the date of the available information), in areas in which the landbank of sand and gravel or crushed rock exceeded the relevant minimum period, one or more of the Majors had a significant share of the permitted reserves such that there might be a cause for concern about the impact on competition in that area in the supply of aggregates.
4. We found that in over 50 per cent of counties in England the landbank for sand and gravel and crushed rock exceeded the relevant minimum periods, and one Major had

¹ A landbank is defined as a stock of planning permissions (measured in years) for permitted reserves. It is calculated by dividing the volume of existing permitted reserves by the average annual provision in the area.

over 25 per cent of the permitted reserves. We also found that in Scotland and Wales, in over 50 per cent of regions one Major had over 25 per cent of the permitted reserves.

5. The planning policy framework set out in the NPPF and by DCLG requires that landbanks bound up in a few sites should not be allowed to stifle completion in an area and that adequate or excess landbank should not be used as a reason for declining a planning application.

Regulatory framework

6. Paragraphs 2.14 to 2.28 and Appendix 2.1 describe the planning regime for the extraction of land-won primary aggregates.
7. The Government's planning policies for England are set out in the NPPF published in March 2012 while the responsibility for determining the level of aggregates extraction is decentralized to local LMPAs.
8. The NPPF sets out the ways in which LMPAs should plan for a steady and adequate supply of aggregates by maintaining appropriate landbanks, which include:
 - preparing an annual Local Aggregate Assessment, either individually or jointly by agreement with other LMPAs, based on a rolling average of ten years' sales data and other relevant local information, and an assessment of all supply options (including marine-dredged, secondary and recycled sources);
 - using landbanks of aggregate minerals reserves principally as an indicator of the security of aggregate minerals supply, and to indicate the additional provision that needs to be made for new aggregate extraction and alternative supplies in mineral plans;

- making provision for the maintenance of landbanks of at least seven years for sand and gravel and at least ten years for crushed rock, whilst ensuring that the capacity of operations to supply a wide range of materials is not compromised. Longer periods may be appropriate to take account of the need to supply a range of types of aggregates, locations of permitted reserves relative to markets, and productive capacity of permitted sites;
- ensuring that large landbanks bound up in very few sites do not stifle competition; and
- calculating and maintaining separate landbanks for any aggregate materials of a specific type or quality which have a distinct and separate market.²

9. The NPPF also states that LMPAs should plan for a steady and adequate supply of industrial minerals. The framework includes guidance that a stock of permitted reserves should be maintained to support the level of actual and proposed investment required for new or existing plant including:

- at least 15 years for cement primary (chalk and limestone) and secondary (clay and shale) materials to maintain an existing plant; and
- at least 25 years for brick clay, and for cement primary and secondary materials to support a new kiln.³

10. In October 2012 DCLG published *Guidance on the Managed Aggregates Supply System*⁴ to provide clarity on how the more decentralized approach to aggregate minerals planning should work whilst maintaining the existing groups which form part of the MASS, notwithstanding that planning decisions are determined at a local level by LMPAs.

² NPPF, paragraph 145: www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf.

³ For these purposes landbank is calculated differently from aggregate minerals landbank as defined in paragraph 11.6. For cement raw materials, there should be a stock of permitted reserves (landbank) calculated for each proposed site for a cement plant. The size of the cement industry's landbank should be directly linked to the scale of capital investment envisaged at a site. See www.gov.uk/government/publications/national-planning-policy-framework-technical-guidance, paragraphs 52 & 53.

⁴ www.communities.gov.uk/documents/planningandbuilding/pdf/2238394.pdf.

11. The guidance confirmed that LMPAs should seek to maintain a landbank of at least seven years for land-won sand and gravel and ten years for crushed rock. The guidance states that while landbanks can be used as an indicator to assess when new planning permissions should be considered, each application for minerals extraction should be considered on its own merits, regardless of the length of the landbank, and that LMPAs should not automatically grant planning permission because the landbank is under seven or ten years (as appropriate) and that an adequate or excess landbank is not a reason for withholding planning permission. Possible reasons for approving an application for planning permission in an area where there exists an adequate landbank include:
- reasonably certain forecast of significant future increases in demand;
 - the location of the existing consented reserve is inappropriate for the main market area;
 - the nature, type and qualities of the aggregate such as its suitability for a particular purpose within a distinct market; and
 - known constraints on the availability of consented reserves that might limit output over the plan period.
12. In Scotland, the Scottish Planning Policy states that planning authorities should ensure that a landbank of permitted reserves for construction aggregates of a minimum ten years' extraction is available at all times in all market areas.⁵

Landbank definition

13. Landbank is defined in the *Guidance on the Managed Aggregates Supply System* as the sum in tonnes for all permitted reserves for which valid planning permissions are extant.⁶ This includes current non-working sites but excludes dormant and inactive

⁵ Scottish Planning Policy, paragraph 227: www.scotland.gov.uk/Publications/2010/02/03132605/8.

⁶ *Guidance on the Managed Aggregates Supply System*, paragraph 23.

sites (as set out in the Planning and Compensation Act 1991 and Environment Act 1995) for which a review is required before operation can commence or resume. The length of the landbank should be calculated using the expected provision (supply in response to demand) included in the local minerals plan, expressed on an annual basis. For the purposes of the landbank calculations, some LMPAs will calculate landbanks based on minerals plans which have used annual apportionments derived from the National and Regional Guidelines for Aggregates Provision for 2001 to 2016, and others will calculate landbanks based on minerals plans which have used updated apportionments for 2005 to 2020 published in June 2009.

Possible competition implication of landbank policy

14. In Appendix 6.2 we note that the MPA told us that there were concerns that some LMPAs had interpreted the landbank recommendations too rigidly with the effect that planning applications for aggregates sites might be refused if the landbank in an area extended beyond the minimum periods specified in Minerals Planning Statement 1 (MPS 1),⁷ and also that the BAA told us that if the landbank in an area was sufficient to meet the forecast demand it was almost impossible to obtain planning permission.

15. In support of the concerns noted above, the MPA referred to a research report by Capita Symonds Limited: *Reasons for the decline in aggregate reserves in England*.⁸ The report commented that it was generally felt by the industry that the minerals planning system had been working well and that most applications submitted in accordance with local development plans were successful. The report went on to say that whilst landbank policy was, in accordance with MPS 1, a valid reason for refusal, the industry felt that some mineral planning authorities interpreted the landbank concept too rigidly. The report noted that for 191 applications refused in the period 1990

⁷ The Minerals Planning Statements set out the Government's guidance to local planning authorities. MPS1 was revoked by the NPPF.

⁸ www.british-aggregates.co.uk/documentation/doc88.pdf.

to 2007, reasons for the refusal were recorded in 119 cases (61 per cent). The single most common reason for refusal, cited in 34 per cent of the cases where reasons were given, was the lack of need due to the size of the existing landbank, although various environmental reasons were given in over 60 per cent of cases. The report suggested that sometimes the landbank reason might be used as a cover for more genuine but less effective objections. The report also noted that the rate of refusals was higher in the East of England than elsewhere.⁹

16. We considered that if the concerns raised by the MPA and the BAA were valid, in areas where the existing landbanks exceeded the minimum periods and the ownership of the permitted reserves was concentrated in the hands of one party or a few parties, there might be an impact on competition as it might be difficult for another party to obtain planning permission to undertake aggregates extraction in competition with the incumbents.

Assessment

17. In order to consider whether the policies regarding landbanks might have an impact on competition in the aggregates market, we have sought to identify areas in which landbanks met or exceeded the minimum periods (on the basis that in those areas, the relevant LMPA might be less willing to grant planning permission for new aggregates sites) and whether the ownership of permitted reserves in those areas was concentrated in the hands of any of the Majors. Our approach has been to review:
 - the information on landbanks as disclosed in the annual reports of the AWP's in England and Wales and the Scottish Aggregates Survey; and
 - the ownership of permitted reserves according to the data collated by BDS.

⁹ Paragraphs 5.46–5.49.

Permitted reserves and landbanks

18. The most recent information on the level of permitted reserves and landbanks in England is provided in the annual reports of the AWP.
19. The role of the AWP is described in paragraph 2.27 and Appendix 2.1.
20. Every four years, DCLG carries out a survey to provide a comprehensive and up-to-date understanding of national and regional sales, inter-regional flows, transportation, consumption and permitted reserves of primary aggregates. Information is collected through, but is not held by, the AWP. The majority of the results are reported at regional level, although some are reported at LMPA level.
21. The most recent information on the level of permitted reserves and landbanks in Wales is provided in the South Wales AWP annual reports for 2010 and the North Wales AWP annual report for 2005. For Scotland, the most recent information is provided in the Scottish Aggregates Survey 2005.
22. [Annex 1](#) shows the permitted reserves and landbanks as reported in the sources noted above.

Ownership of permitted reserves

23. As the AWP's annual reports do not disclose the ownership of permitted reserves, we used the data collated by BDS to identify areas in which the ownership of permitted reserves was concentrated in the hands of any of the Majors at the end of 2010. The BDS report for 2010 states that its total reserves figures for each county were close

to those published in AWP reports or minerals plans, allowing for subsequent consents and mineral extracted.¹⁰

24. [Annexes 2 and 3](#) show the proportion of sand and gravel and crushed rock permitted reserves owned by each of the Majors in each county in England, and also in Scotland and Wales, at the end of 2010, based on information provided by BDS.

Our findings

Sand and gravel

25. Table 1 (which is derived from [Annexes 1 and 2](#)) shows the counties in England with permitted reserves of sand and gravel, and for those counties with a landbank of more than seven years, the Majors' share of the permitted reserves.

TABLE 1 **Sand and gravel: landbanks and Majors' share of permitted reserves**

	<i>Number of counties</i>
Landbank less than 7 years (or not disclosed)	14
Landbank greater than 7 years	
Share of permitted reserves:	
No Major had more than 25%	3
At least one Major had 25–50%	15
One Major had more than 50%	<u>11</u>
Total counties with permitted reserves of sand and gravel	43

Source: CC analysis.

Table 1 shows that in England, there were:

- (a) 43 counties in which there were permitted reserves of sand and gravel;
- (b) 15 counties where the landbank of sand and gravel was greater than seven years and at least one Major had between 25 and 50 per cent of the permitted reserves (of these, there were two counties in which the total permitted reserves were less than 1 million tonnes); and
- (c) 11 counties where the landbank of sand and gravel was greater than seven years and one Major had over 50 per cent of the permitted reserves (of these, there

¹⁰ BDS: Estimated reserves of pits and quarries in Great Britain, June 2011.

was one county in which the total permitted reserves were less than 1 million tonnes).

Of the counties in (b) and (c), there were 11 counties where the landbank of sand and gravel was greater than seven years and one Major, or two Majors collectively, had over 75 per cent of the permitted reserves.¹¹

26. In Scotland, BDS identified ten regions with permitted reserves of sand and gravel, of which there were three regions in which at least one Major had between 25 and 50 per cent of the permitted reserves and three regions in which one Major had over 50 per cent of the permitted reserves (of these three, there were two regions in which one Major, or two Majors collectively, had over 75 per cent of the permitted reserves). BDS's regional breakdown did not match that in the Scottish Aggregates Survey 2005 which showed that landbanks overall met the guideline in the Scottish Planning Policy in three of the four regions with material reserves of sand and gravel. The Scottish Aggregates Survey was published five years before the BDS survey.
27. In Wales, BDS identified three regions in Wales with permitted reserves of sand and gravel, of which there was one region in which one Major had between 25 and 50 per cent of the permitted reserves and one region in which one Major had over 75 per cent of the permitted reserves. BDS's regional breakdown did not match that in the North and South Wales AWP reports which showed only one region with material reserves of sand and gravel.

Crushed rock

28. Table 2 (which is derived from [Annexes 1 and 3](#)) shows the counties in England with permitted reserves of crushed rock, and for those counties with a landbank of more than ten years, the Majors' share of the permitted reserves.

¹¹ Market shares based on BDS data; permitted reserves based on AWP reports.

TABLE 2 **Crushed rock: landbanks and Majors' share of permitted reserves**

	<i>Number of counties</i>
Landbank less than 10 years (or not disclosed)	8
Landbank greater than 10 years	
Share of permitted reserves:	
No Major had more than 25%	6
At least one Major had 25–50%	8
One Major had more than 50%	<u>10</u>
Total counties with permitted reserves of crushed rock	32

Source: CC analysis.

Table 2 shows that in England, there were:

- (a) 32 counties in which there were permitted reserves of crushed rock;
- (b) eight counties where the landbank of crushed rock was greater than ten years and at least one Major had between 25 and 50 per cent of the permitted reserves; and
- (c) ten counties where the landbank of crushed rock was greater than ten years and one Major had more than 50 per cent of the permitted reserves (of these, there was one county in which the total permitted reserves were less than 1 million tonnes).

Of the counties in (b) and (c), there were seven counties where the landbank of crushed rock was greater than ten years and one Major, or two Majors collectively, had over 75 per cent of the permitted reserves.¹²

29. In Scotland, BDS identified ten regions in Scotland with permitted reserves of crushed rock, of which there were four regions in which at least one Major had between 25 and 50 per cent of the permitted reserves and three regions in which one Major had over 50 per cent of the permitted reserves (and of these three, there were two regions in which one Major, or two majors collectively, had over 75 per cent of the permitted reserves). BDS's regional breakdown did not match that in the Scottish

¹² Market shares based on BDS data; permitted reserves based on AWP reports.

Aggregates Survey 2005 which showed that landbanks exceeded the guideline in the Scottish Planning Policy in all regions.

30. BDS identified eight regions in Wales with permitted reserves of crushed rock, of which there were three regions in which at least one Major had between 25 and 50 per cent of the permitted reserves and five regions in which one Major had over 50 per cent of the permitted reserves. There were four regions in which two Majors collectively had over 75 per cent of the permitted reserves. BDS's regional breakdown did not match that in the North and South Wales AWP annual reports which showed that landbanks exceeded the guideline in all regions.

Comparison of the Majors' reserves and production

31. We compared the overall share of permitted reserves owned by each of the Majors in GB at the end of 2010 with their share of the production of primary aggregates in 2011, and found them to be similar, as shown in Table 3.

TABLE 3 **The Majors' share of reserves and output in GB**

	<i>Aggregate Industries</i>	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
					<i>per cent</i>
<i>Sand and gravel</i>					
Share of permitted reserves (2010)	11	12	18	8	19
Share of production (2011)	11	14	12	10	19
<i>Crushed rock</i>					
Share of permitted reserves (2010)	25	11	11	8	24
Share of production (2011)	22	9	15	11	21

Source: BDS aggregates database; BDS estimated market shares of pits, quarries and marine wharves (2011).

We also analysed the correlation between each Major's share of reserves and its share of production on a county-by-county basis and found that for sand and gravel, the correlation coefficients were over 0.75 for all the Majors and for crushed rock the correlation coefficients were over 0.6 for all the Majors.

Conclusions

32. In over 50 per cent of counties in England where there were permitted reserves of sand and gravel or crushed rock, the combination of conditions existed which might have given cause for concern about the extent of competition: ie the landbank was more than the minimum period set out in the NPPF, with the implication that obtaining a new planning permission for extraction of aggregates might be difficult, and one Major (or two Majors collectively) had at least 25 per cent of the permitted reserves.
33. In the majority of the regions in Scotland and Wales, one of the Majors had at least 25 per cent of the permitted reserves.
34. We found that each of the Majors' share of permitted reserves in GB is similar to its share of production and each Major's local stock of permitted reserves is positively correlated with its local share of production, which indicated to us that the Majors are not holding significant inactive sites of permitted reserves in the landbanks to prevent entry (whereas if permitted reserves were being 'warehoused' we might expect to see that the size of a Major's local stock of permitted reserves exceeded its local share of production).
35. We found that historically most planning applications were successful and considered that, regarding the applications which were refused, the evidence was not conclusive on the significance of landbank policy as a reason for refusal.
36. In England, planning policy guidelines set out in the NPPF, which requires LMPAs not to allow landbanks that are bound up in a few large sites to stifle competition, and the DCLG Guidance on the Managed Aggregates Supply System, which states that each planning application should be considered on its own merits and that an adequate or excess landbank is not a reason for withholding planning permission, go

some way mitigating the concern that landbank policy might have an adverse impact on competition.

Permitted reserves and landbanks

Region	Sub-region	Reserves		Landbank	
		Sand and gravel Million tonnes	Crushed rock Million tonnes	Sand and gravel Years	Crushed rock Years
<i>England (2009 aggregates survey results)</i>					
East of England	Bedfordshire and Luton	22.9	0.0	12.4	-
	Cambridgeshire and Peterborough	46.2	1.4	16.0	7.0
	Essex, Thurrock and Southend	37.4	0.0	8.4	-
	Hertfordshire	10.8	0.0	7.8	-
	Norfolk	17.0	1.8	6.6	5.9
	Suffolk	<u>13.6</u>	<u>0.0</u>	<u>8.4</u>	
	Total	147.9	3.2	10.0	6.4
East Midlands	Derbyshire	9.9	810.1	6.6	92.7
	Peak District National Park	0.0	92.5	-	22.8
	Leicestershire/Rutland	12.8	342.2	8.5	20.2
	Lincolnshire	22.8	41.3	7.0	37.5
	Northamptonshire	6.2	14.0	8.0	46.8
	Nottinghamshire	<u>28.9</u>	<u>3.4</u>	<u>7.6</u>	<u>33.5</u>
Total	80.6	1303.5	7.4	41.8	
North-East	Durham	2.1	136.3	5.5	28.8
	Northumberland	8.6	78.4	12.3	34.5
	Tees Valley and Tyne & Wear	<u>Not disclosed</u>	<u>2.2</u>	<u>Not disclosed</u>	<u>5.3</u>
	Total	13.7	217.0	10.9	29.2
North-West	Cheshire	12.8	4.4	6.5	34.0
	Cumbria	14.0	169.0	19.9	41.2
	Greater Manchester	6.1	17.2	23.5	10.4
	Lancashire	<u>9.0</u>	<u>136.8</u>	<u>18.0</u>	<u>29.7</u>
	Total	41.8	327.4	12.2	31.2
South-East of England	Berkshire Utilities	10.0	0.0	7.5	-
	Buckinghamshire	11.6	0.0	11.0	-
	East Sussex	<u>Not disclosed</u>	0.0	>7	-
	Hampshire	6.8	0.0	3.3	-
	Isle of Wight	1.4	<u>Not disclosed</u>	14.0	<u>Not disclosed</u>
	Kent	16.8	<u>Not disclosed</u>	10.3	<u>Not disclosed</u>
	Medway	<u>Not disclosed</u>	0.0	<7	-
	Milton Keynes	<u>Not disclosed</u>	0.0	<7	-
	Oxfordshire	9.1	12.6	4.3	25.2
	Surrey	10.9	<u>Not disclosed</u>	8.6	<u>Not disclosed</u>
	West Sussex	<u>5.5</u>	<u>Not disclosed</u>	<u>5.3</u>	<u>Not disclosed</u>
	Total	79.0	48.0	7.1	36.9
	South-West	Avon	0.0	192.3	-
Cornwall		0.0	115.2	-	68.6
Devon		8.7	188.1	9.4	58.8
Dorset		0.0	335.9	-	25.0
Gloucestershire		7.1	27.1	7.1	12.0
Somerset		5.6	0.0	4.0	-
Wiltshire		<u>19.1</u>	<u>8.5</u>	<u>9.7</u>	<u>28.2</u>
Total		40.5	867.0	7.6	33.6
West Midlands		Herefordshire	5.2	15.0	18.2
	Worcestershire	3.7	<u>Not disclosed</u>	4.2	<u>Not disclosed</u>
	Shropshire	14.4	116.0	17.6	39.3
	Staffordshire	79.4	160.5	12.0	115.0
	Warwickshire	4.0	29.1	3.8	33.1
	West Midlands	<u>5.1</u>	<u>0.0</u>	<u>10.0</u>	<u>-</u>
	Total	111.7	320.6	11.0	55.2
Yorkshire and Humber	North Yorkshire	18.4	103.9	7.4	28.3
	Yorkshire Dales National Park	0.0	106.2	-	28.7
	South Yorkshire	5.4	63.4	9.7	27.5
	West Yorkshire	0.0	27.1	-	28.3
	East Riding/North Lincolnshire	<u>10.8</u>	<u>1.7</u>	<u>10.1</u>	<u>6.2</u>
	Total	34.6	302.4	8.4	27.7
London	London	2.0	0.0	2.0	-

Region	Sub-region	Reserves		Landbank	
		Sand and gravel Million tonnes	Crushed rock Million tonnes	Sand and gravel Years	Crushed rock Years
<i>Scotland (2005 survey results)</i>					
	East Central	3.4	43.3	9.0	17.0
	Highland	19.6	481.6	40.0	81.0
	North-East	24.8	622.6	27.0	471.0
	Orkney	0.8	4.0	358.0	75.0
	Shetland	0.0	5.4	0.0	31.0
	South	3.5	36.0	6.0	30.0
	Tayside and Fife	15.9	27.9	9.0	11.0
	West Central	54.1	143.4	16.0	18.0
	Western Isles	<u>0.6</u>	<u>3.5</u>	21.0	20.0
		122.8	1367.7		
<i>North Wales (2005 survey results)</i>					
	Anglesey	0.0	17.7	-	42.0
	Conwy	0.0	69.9	-	50.0
	Denbighshire	14.6	25.1	15.0	25.0
	Flintshire		82.7		25.0
	Gwynedd	<u>1.0</u>	<u>5.4</u>	5.0	27.0
		15.6	200.8		
<i>South Wales (2010 survey results)</i>					
	Dyfed and West Glamorgan	1.7	120.6	-	50.2
	Gwent, Mid Glamorgan, South Glamorgan	Not disclosed	219.3	-	63.7
	Powys	0.0	<u>170.7</u>	-	55.7
			510.7		

Source: England AWP annual reports 2009, Scotland Aggregates Survey 2005, North Wales AWP annual report 2005, South Wales AWP annual report 2010.

Sand and gravel: percentage of permitted reserves owned by the Majors, 2010

Region	Sub-region	Aggregate Industries	Cemex	Hanson	Lafarge	Tarmac	per cent
							Independent
East	Bedfordshire	[X]	[X]	[X]	[X]	[X]	[X]
	Cambridgeshire	[X]	[X]	[X]	[X]	[X]	[X]
	Essex	[X]	[X]	[X]	[X]	[X]	[X]
	Hertfordshire	[X]	[X]	[X]	[X]	[X]	[X]
	Norfolk	[X]	[X]	[X]	[X]	[X]	[X]
	Suffolk	[X]	[X]	[X]	[X]	[X]	[X]
East Midlands	Derbyshire	[X]	[X]	[X]	[X]	[X]	[X]
	Leicestershire	[X]	[X]	[X]	[X]	[X]	[X]
	Lincolnshire	[X]	[X]	[X]	[X]	[X]	[X]
	Northamptonshire	[X]	[X]	[X]	[X]	[X]	[X]
	Nottinghamshire	[X]	[X]	[X]	[X]	[X]	[X]
			[X]	[X]	[X]	[X]	[X]
North-East	Cleveland	[X]	[X]	[X]	[X]	[X]	[X]
	Durham	[X]	[X]	[X]	[X]	[X]	[X]
	Northumberland	[X]	[X]	[X]	[X]	[X]	[X]
	Tyne & Wear	[X]	[X]	[X]	[X]	[X]	[X]
North-West	Cheshire	[X]	[X]	[X]	[X]	[X]	[X]
	Cumbria	[X]	[X]	[X]	[X]	[X]	[X]
	Lancashire	[X]	[X]	[X]	[X]	[X]	[X]
	Manchester	[X]	[X]	[X]	[X]	[X]	[X]
	Merseyside	[X]	[X]	[X]	[X]	[X]	[X]
			[X]	[X]	[X]	[X]	[X]
South-East	Berkshire	[X]	[X]	[X]	[X]	[X]	[X]
	Buckinghamshire	[X]	[X]	[X]	[X]	[X]	[X]
	Hampshire	[X]	[X]	[X]	[X]	[X]	[X]
	Isle of Wight	[X]	[X]	[X]	[X]	[X]	[X]
	Kent	[X]	[X]	[X]	[X]	[X]	[X]
	London	[X]	[X]	[X]	[X]	[X]	[X]
	Oxfordshire	[X]	[X]	[X]	[X]	[X]	[X]
	Surrey	[X]	[X]	[X]	[X]	[X]	[X]
	West Sussex	[X]	[X]	[X]	[X]	[X]	[X]
South-West	Cornwall	[X]	[X]	[X]	[X]	[X]	[X]
	Devon	[X]	[X]	[X]	[X]	[X]	[X]
	Dorset	[X]	[X]	[X]	[X]	[X]	[X]
	Gloucestershire	[X]	[X]	[X]	[X]	[X]	[X]
	Wiltshire	[X]	[X]	[X]	[X]	[X]	[X]
			[X]	[X]	[X]	[X]	[X]
West Midlands	Hereford & Worcester	[X]	[X]	[X]	[X]	[X]	[X]
	Shropshire	[X]	[X]	[X]	[X]	[X]	[X]
	Staffordshire	[X]	[X]	[X]	[X]	[X]	[X]
	Warwickshire	[X]	[X]	[X]	[X]	[X]	[X]
	West Midlands	[X]	[X]	[X]	[X]	[X]	[X]
Yorkshire	Humberside	[X]	[X]	[X]	[X]	[X]	[X]
	North Yorkshire	[X]	[X]	[X]	[X]	[X]	[X]
	South Yorkshire	[X]	[X]	[X]	[X]	[X]	[X]
	West Yorkshire	[X]	[X]	[X]	[X]	[X]	[X]
Scotland	Borders	[X]	[X]	[X]	[X]	[X]	[X]
	Central	[X]	[X]	[X]	[X]	[X]	[X]
	Dumfries & Galloway	[X]	[X]	[X]	[X]	[X]	[X]
	Fife	[X]	[X]	[X]	[X]	[X]	[X]
	Grampian	[X]	[X]	[X]	[X]	[X]	[X]
	Highland	[X]	[X]	[X]	[X]	[X]	[X]
	Islands	[X]	[X]	[X]	[X]	[X]	[X]
	Lothian	[X]	[X]	[X]	[X]	[X]	[X]
	Strathclyde	[X]	[X]	[X]	[X]	[X]	[X]
Tayside	[X]	[X]	[X]	[X]	[X]	[X]	
Wales	Clwyd	[X]	[X]	[X]	[X]	[X]	[X]
	Dyfed	[X]	[X]	[X]	[X]	[X]	[X]
	Gwynedd	[X]	[X]	[X]	[X]	[X]	[X]
			[X]	[X]	[X]	[X]	[X]

Crushed rock: percentage of permitted reserves owned by the Majors 2010

Region	Sub-region	Aggregate Industries						per cent
			Cemex	Hanson	Lafarge	Tarmac	Independent	
East	Cambridgeshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Norfolk	[X]	[X]	[X]	[X]	[X]	[X]	[X]
East Midlands	Derbyshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Leicestershire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Lincolnshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Northamptonshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Nottinghamshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
North-East	Cleveland	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Durham	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Northumberland	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Tyne & Wear	[X]	[X]	[X]	[X]	[X]	[X]	[X]
North-West	Cheshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Cumbria	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Lancashire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Manchester	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Merseyside	[X]	[X]	[X]	[X]	[X]	[X]	[X]
South-East	Kent	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Oxfordshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
South-West	Avon	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Cornwall	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Devon	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Dorset	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Gloucestershire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Somerset	[X]	[X]	[X]	[X]	[X]	[X]	[X]
West Midlands	Hereford & Worcester	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Herefordshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Shropshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Staffordshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Warwickshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Yorkshire	North Yorkshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	South Yorkshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	West Yorkshire	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Scotland	Borders	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Central	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Dumfries & Galloway	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Fife	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Grampian	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Highland	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Islands	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Lothian	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Strathclyde	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Tayside	[X]	[X]	[X]	[X]	[X]	[X]	[X]	
Wales	Clwyd	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Dyfed	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Gwent	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Gwynedd	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Mid Glamorgan	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	Powys	[X]	[X]	[X]	[X]	[X]	[X]	[X]
	South Glamorgan	[X]	[X]	[X]	[X]	[X]	[X]	[X]
West Glamorgan	[X]	[X]	[X]	[X]	[X]	[X]	[X]	

Source: BDS, CC analysis.

Glossary

80% catchment area	The distance from production sites within which 80 per cent of external customer volumes are delivered.
Act	The Enterprise Act 2002.
Aggregate Industries	Aggregate Industries UK Limited, the UK operations of Holcim Limited, a global building materials producer, which is listed on the SIX Swiss Exchange. Aggregate Industries produces and supplies a wide range of construction materials in the UK, including aggregates , asphalt , RMX and precast concrete products, as well as importing and supplying cement and providing a national road surfacing and contracting service.
Aggregates	The granular base materials used (including as a constituent of RMX) in the construction of roads, buildings and other infrastructure, including primary aggregates , secondary aggregates and recycled aggregates .
Anglo American	Anglo American plc. With a primary listing on the London Stock Exchange, Anglo American was the ultimate parent company of Tarmac . On 7 January 2013 Anglo American entered into a JV with Lafarge Group called Lafarge Tarmac in relation to its UK construction materials business, including its activities in the production of cement , aggregates , asphalt and RMX . Anglo American holds 50 per cent of Lafarge Tarmac .
Asphalt	Produced from aggregates and a viscous binding agent, usually bitumen, and primarily used in asphalt surfacing and maintenance activities.
AWP	Aggregates working party. One of several technical working parties set up on a regional basis as part of the MASS , whose core members are drawn from both government bodies and industry representatives. Their primary purpose is to provide technical advice to local planning authorities in relation to the apportionment of aggregates demand to regional and local areas.
BAA	British Aggregates Association. A trade association for aggregates producers.
Base (surveys)	The base shown on any outputs or reported figures from survey information is the total number of responses on which quoted statistics are calculated (based).
BDS	BDS Market Research Limited, a source of market data on (among other things) aggregates and RMX .
BL&C	Buxton Lime and Cement, Tarmac's lime and cement company. BL&C is based in Buxton and comprises a quarry and stone plant, a lime plant and a cement plant.
Breedon Aggregates	Breedon Aggregates Limited.

Brett Group	Robert Brett & Sons Limited.
Carbon allowance	An EU Allowance or EUA relating to the EU ETS . One carbon allowance permits an ETS installation to emit 1 tonne of CO ₂ or CO ₂ equivalent emissions. See also carbon emissions .
Carbon emissions	CO ₂ emissions or any other greenhouse gas emissions regulated by the ETS .
CC	Competition Commission.
CCA	Current cost accounting. A system of accounting which consistently applies value to the business valuation principles to assets and liabilities.
CCAg	Climate Change Agreement. A voluntary agreement entered into with the Government by an industrial sector. Under the sector 'umbrella agreement' any operator (that meets the eligibility criteria) in certain energy-intensive industries can enter the sector agreement. The participation in a sector climate change agreement by an operator requires the operator to have an 'underlying' climate change agreement with the Government which contains targets for improving the business's energy efficiency performance. Once these targets are met, the business will benefit from a discount on its CCL . Cement/clinker production, slag grinding (eg GGBS) and lime production are sectors which have entered into CCAgs with the Government.
CCL	Climate Change Levy. A tax levied on the use of energy above a certain threshold in industry, commerce and the public sector.
CEM I, CEM II, CEM III, CEM IV, CEM V	Types of grey cement . CEM I is made from ground cement clinker and a small percentage of gypsum to control the material's setting time when mixed with water. CEM II contains between 6 and 35 per cent PFA , limestone or GGBS . CEM III contains between 36 and 95 per cent GGBS . CEM IV contains higher proportions of pozzolana than in a CEM II cement. CEM V is a composite cement ; comprising Portland cement and combinations of blast furnace slag and pozzolana or fly ash .
Cembureau	The European trade association for cement based in Brussels.
Cement	Also referred to as 'Portland cement' or grey cement. Produced from a mixture of finely ground limestone or chalk, clay and sand, which is heated almost to melting point (around 1,450°C) in a large rotating kiln. The cement clinker that emerges is then ground to a fine powder or combined with other cementitious products to produce different grades of product. It is used as a binder in building materials including RMX . It can be supplied either in bulk or bagged. There are three main types or grades of grey cement: CEM I , CEM II and CEM III .
Cementitious material	Any of various building materials which are capable of a hydraulic reaction with water to form a solid crystalline structure. Includes cement and GGBS . See also pozzolanic material .

Cementitious products	Substances which can be added to cement made from clinker to create different types cement such CEM II and CEM III . As used in this report, this term encompasses cementitious materials , pozzolanic materials and materials (such as limestone) which have little cementitious or pozzolanic properties.
Cemex	Cemex UK Operations Limited, the UK operations of Cemex SAB de CV, the global building materials company which is listed on the Mexico stock exchange. Cemex produces, distributes and sells cement , asphalt , RMX and aggregates in GB .
Chemical stone	See high purity limestone .
Concrete	A building material consisting of a mix of aggregates , cement and water. See also RMX .
Consolidated	Relating to the Majors' combined relevant GB operations level.
Construction aggregates	Aggregates used for construction purposes, whether directly in construction without further processing (eg as sub-bases and fills) or as inputs to other building materials such as RMX and asphalt .
Correlation coefficient	A single number that describes the degree of relationship between two variables. Correlation coefficients range between –100 per cent and 100 per cent. The closer the correlation coefficient is to 100 per cent, the more changes in one variable (eg costs) are associated with changes of the same sign in the other variable (eg price). The closer the correlation coefficient is to –100 per cent, then the more changes in one variable are associated with opposite changes in the other variable.
Cost of capital	The minimum return that investors in a project expect to receive over the period of that investment. It is an opportunity cost and can be seen as the the yield on capital employed in the next best alternative use.
CPV	Cementos Portland Valderrivas SA. CPV's UK operations comprise Dragon Alfa and Southern Cement . Southern Cement was acquired by CRH Group on 26 February 2013.
CRC	Carbon Reduction Commitment. A UK Government energy efficiency scheme.
CRH	CRH (UK) Ltd, owner of Premier Cement .
CRH Group	CRH plc, ultimate parent company of Premier Cement . CRH Group acquired Southern Cement from CPV on 26 February 2013.
Crushed rock	Primary aggregates made from crushing rock. In addition to high PSV aggregates (such as granite and gritstone), crushed rock aggregates include softer limestone and other rock types.
DCLG	The Department for Communities and Local Government.

DECC	The Department for Energy and Climate Change.
Defra	The Department for Environment, Food and Rural Affairs.
Delivered price	The price that comprises the ex-works price and the cost of haulage.
DG COMP	The European Commission Directorate General for Competition.
Diversion ratio	The proportion of customers lost by one supplier that switch to a competing provider.
Dragon Alfa	Dragon Alfa Limited.
Dry process	A cement manufacturing process in which the feed material for the kiln is in dry powdered form. The moisture content of the raw material is the main criterion governing whether a dry process , semi-wet/semi-dry process or wet process is used.
Dudman Group	Dudman Group Limited.
E&EA	Entry and exit analysis.
EA	The Environment Agency.
EBITDA	Earnings before interest, tax, depreciation and amortization.
Economic costs	The costs of resources used at a price they would be traded at in a highly competitive market, where entry to and exit from the market is easy. The value of resources consumed and assets utilized should reflect their current value to the business , not their historical cost. We also refer to this as the continuing cost of supply.
EIA	Environmental Impact Assessment. The EU EIA Directive requires developers of larger minerals development sites, and of sites expected to have a significant environmental impact, to provide an 'Environmental Statement' to the LMPA , which contains an assessment of the likely environmental effects arising from the proposed development.
EPR	Economic Planning Region. The highest tier of subnational division used by the UK Government for economic planning purposes.
ETS	The Emissions Trading System, introduced on 1 January 2005 by the EU to help meet its greenhouse gas emissions targets under the Kyoto Protocol. The ETS currently operates in 31 countries. The ETS is a 'cap-and-trade' carbon trading system, which uses tradable carbon allowances to limit and reduce carbon allowances produced by its energy-intensive industry sectors and electricity generators. Clinker and lime plants are installations which are covered by the ETS.
EU	European Union.

Ex-works price	Price per unit of measure based on net revenues (gross revenues less distribution and haulage charges) divided by sales volumes. The ex-works price is the price paid by the customer before distribution and haulage charges are added on. See also delivered price .
FCM	Financial capital maintenance.
FGD	Flue gas desulphurization. The process by which sulphur in waste gases from power stations is reduced. High purity limestone is used in powder form, which is then made into a slurry to desulphurize the flue gases. In order to produce the powder, limestone is crushed at the quarry site and then ground by the power stations.
Fly ash	A general term for ash from power stations. See also PFA .
FOB price	'Free on board' price—price of a product including the cost of the product and the cost of loading it on to freight vehicles at the point of sale but excluding the cost of transporting the goods from the point of sale to the buyer.
FRS	Financial Reporting Standards.
FY	Financial year ended/ending.
GB	Great Britain.
GBS	Granulated blast furnace slag. A cementitious granulate material made by water-cooling of the slag emerging from iron blast furnaces. GBS can be ground to produce GGBS .
GGBS	Ground granulated blast furnace slag. GGBS is a by-product of the blast furnaces used to make iron and is a cementitious material . It can be used as a supplementary cementitious product (where it can replace up to 70 per cent of cement in a concrete mix). Hanson is the only supplier of UK-produced GGBS in the UK. See also CEM I , CEM II , CEM III .
Grade	The size of aggregate particles. Typical grade categories are: <ul style="list-style-type: none"> — 'Fine': aggregate with a particle size of less than 5mm. — 'Coarse': aggregate with a particle size of more than 5mm. — 'Granular': aggregate containing a mixture of coarse and fine material.
Grinding station	A site at which no cement clinker is manufactured, but at which clinker (purchased or transferred in from elsewhere) is ground and blended (with the addition of gypsum , limestone , PFA and GGBS) to produce cement .
Gross revenues	Gross revenues equal the delivered price per unit multiplied by the total unit sales volumes. See also delivered price and net revenues .
Guidelines	The CC 's guidelines on the conduct of market investigations (<i>Market Investigation References: Competition Commission</i>)

Guidelines, CC3 (Revised), 5 April 2013), available on the CC's website at www.competition-commission.org.uk/assets/competitioncommission/docs/2013/publications/cc3_revised.pdf.

Gypsum	A very soft mineral composed of calcium sulphate dihydrate. In the production of cement , clinker is ground with a small amount of gypsum to control the initial rate of reaction with water, allowing concrete made from the cement to be placed and compacted before setting commences.
Hanson	The UK construction and building materials businesses of Hanson and HeidelbergCement AG—Hanson's ultimate parent company, a global provider of building materials listed on a number of German stock exchanges. Hanson supplies heavy building materials to the UK construction industry, including aggregates , asphalt , RMX and cement , as well as specialist services in contracting and civil engineering.
HCA	Historical cost accounting. A system of accounting which values assets and liabilities at their historical cost.
HCM	Hope Construction Materials. MI's UK cement , concrete , aggregates and asphalting business, created on 7 January 2013 from assets that the CC required Anglo American and Lafarge to divest as a result of the CC's inquiry into their proposed construction materials JV in the UK.
High purity limestone	A type of limestone with a calcium carbonate content of 95 per cent or above, which can be used in the production of soda ash and in applications relating to FGD . When sold for its chemical properties, high purity limestone is known as chemical stone .
HMT	The hypothetical monopolist test. This test is satisfied if a monopoly supplier of the products or services in question would find it profitable to increase prices.
HPL	High purity limestone.
IFRS	International Financial Reporting Standards.
JV	Joint venture.
Kt	Kilotonne or 1,000 tonnes. See also Mt .
Lafarge	Prior to the formation of Lafarge Tarmac on 7 January 2013, Lafarge comprised both Lafarge Aggregates Limited and Lafarge Cement UK Limited. Lafarge Aggregates Limited conducted all of Lafarge's UK operations in aggregates , asphalt , RMX , road contracting services and waste disposal, while Lafarge Cement UK Limited produced and supplied cement in the UK. Lafarge Group , its ultimate parent company, contributed Lafarge's businesses to the Lafarge Tarmac JV , which was formed on 7 January 2013.

Lafarge Group	Lafarge SA. Headquartered in Paris and listed on the Paris Stock Exchange, Lafarge SA is the ultimate parent company of Lafarge .
Lafarge Tarmac	The entity created on 7 January 2013 as a result of the JV between Lafarge Group and Anglo American in respect of their UK activities in the production of cement, aggregates, asphalt and RMX .
Landbank	In relation to the planning regime for aggregates , a landbank is defined as a stock of planning permissions (as measured in years) for permitted reserves to ensure continuity of aggregates production for a set number of years based on current extraction rates.
Leiths	Leiths (Scotland) Ltd and its subsidiaries, Joss (Aberdeen) Ltd, Howie Minerals Ltd, and Alexander Ross and Sons Ltd.
Lime	Lime is made by heating limestone (calcium carbonate) in a kiln at about 1,000°C to produce quicklime (calcium oxide—also known as burnt lime)—driving off carbon dioxide in the process. Lime is generally used for construction and materials (iron and steel manufacture, component of mortars , soil stabilization, aerated concrete blocks, and plaster), as well as for agricultural lime (adjusting pH of soil), food and drink, and water treatment.
Limestone	A sedimentary rock composed largely of the minerals calcite and aragonite, which are different crystal forms of calcium carbonate (CaCO ₃). Limestone is not itself a cementitious material , but it is used: <ul style="list-style-type: none"> (a) in the production of the cement clinker itself; (b) as a minor additional constituent in the production of all cement grades, when clinker is ground to produce cement; and (c) as a cement extender in the production of CEM II limestone cement.
LMPA	Local Minerals Planning Authority, the planning body of the relevant local authority in GB that takes decisions to grant planning permission for the extraction of minerals including aggregates in its area.
Local Plan	A document published by the LMPA that contains its policy on minerals development for its local area. The Local Plan is known as the Local Minerals Plan in England, and the Local Development Plan in Wales and Scotland.
Majors	The five largest heavy building materials producers in GB . Prior to 7 January 2013, these were (in alphabetic order): Aggregate Industries, Cemex, Hanson, Lafarge and Tarmac . After 7 January 2013, these were (in alphabetic order) Aggregate Industries, Cemex, Hanson, HCM and Lafarge Tarmac . All of the Majors , with the exception of Aggregate Industries , have production facilities to produce cement in GB .

Marshalls	Marshalls plc.
MASS	The Managed Aggregates Supply System sets out the overarching framework within which the planning regime for aggregates in each of England and Wales operates. The principles of the MASS are incorporated into the national planning policies for England and Wales.
MDF	Mineral Development Framework, an LMPA's core strategy and policy on minerals development (and waste disposal) for its local area. It forms the local policy framework upon which decisions on individual planning applications are made. Also known as the Minerals and Waste Development Framework, the MDF was required under the Planning and Compulsory Purchase Act 2004.
MEA	Modern equivalent asset. The MEA value is the cost of replacing an old asset with a new one with the same service capability allowing for any differences both in the quality of output and in operating costs.
Medium-tier independents	An operator which met one of our minimum annual production criteria of: (a) 1 Mt for aggregates ; or (b) 100,000m ³ for RMX . These thresholds were determined based on the top ten largest aggregates or RMX producers (excluding the five Majors) based on BDS 2009 data.
MI	Mittal Investments Sarl.
Minimix	RMX delivery vehicles with a smaller capacity than normal RMX trucks (usually 4m ³ rather than 6m ³ or 8m ³).
Mortar	A mixture of cement , fine aggregate and water used for joining structural blocks and brickwork, and for plastering.
Mothballing	The process of deciding to cease production at a site, whilst retaining the site and maintaining it in reasonable working order with reasonable accessibility, such that it could become operational in a relatively short period of time.
MPA	The Minerals Products Association, a trade association for the UK aggregates , asphalt , cement , concrete , lime , mortar and silica sand industries. Its membership covers 100 per cent of cement production in GB , and for the UK, 90 per cent of aggregates production and 95 per cent of asphalt and RMX production.
MQP	Midland Quarry Products Limited, Tarmac's 50:50 JV with Hanson which is involved in quarrying, dry stone processing, production of asphalt , and the supply of rail ballast . In April 2013, Hanson completed the purchase of Tarmac's 50 per cent share and became sole owner.
Mt	Megatonne or 1 million tonnes. See also kt .

Nameplate capacity	The design capacity of a cement plant based on assumptions about inputs and efficiency. In practice, actual capacity may be lower than nameplate capacity.
National Contracting	Tarmac's road surfacing (also known as asphalt surfacing), maintenance and associated services contracting division.
NER	New Entrants Reserve, part of the ETS . Under ETS Phase III, 5 per cent of all free carbon allowances are set aside in the NER for new installations, including capacity extensions to existing plants.
Net revenues	Net revenues equal gross revenues less distribution costs.
NPPF	The National Planning Policy Framework, published on 27 March 2012, which sets out the national planning framework for England.
OFT	Office of Fair Trading.
PCA	Price-concentration analysis.
Permitted reserves	Reserves of aggregates in relation to which planning permission for extraction exists.
PFA	Pulverized fly/fuel ash , a by-product of pulverized fuel (typically coal) fired power stations and a pozzolanic material . See also CEM I, CEM II, CEM III, CEM IV, CEM V .
Pozzolana	A pozzolanic material of volcanic origin (pumice or volcanic ash), predominantly composed of fine volcanic glass.
Pozzolanic material	A material capable of reactions to form solid crystalline structures (as for a cementitious material) but only in the presence of an alkaline environment.
Precast concrete	A construction product produced by casting concrete in a reusable mould or form which is then cured in a controlled environment and transported to a specific construction site to be lifted into place.
Premier Cement	Premier Cement Limited.
Primary aggregates	Aggregates quarried from the land or dredged from the sea (the latter are also known as marine aggregates).
PSV	Polished stone value, an attribute of aggregates . The higher the PSV of a particular aggregate, the greater the skid resistance of the asphalt produced using that aggregate .
Rail ballast	A specific type of crushed rock aggregate used as a bedding material underneath railway tracks. These are igneous rocks that are resistant to pressure and breakage.
Rebate	A price reduction applied retrospectively and not affecting the invoice price.

Recycled aggregates	Aggregates derived from recycled sources such as demolition sites and construction waste.
Relevant GB operations	A relevant operating entity representing at least one of the following production and/or sale activities in GB : aggregates , cement or RMX .
RMX	Ready-mix concrete, a building material consisting of a mix of aggregates , cement and water supplied in a ready-mixed form that can be poured and that sets in situ.
ROCE	Return on capital employed. A firm's ROCE represents the return to equity and debt investors on their total capital invested in that firm. ROCE is usually calculated by dividing operating profit by the capital invested or employed, or by dividing earnings before interest and tax by shareholders' funds and long-term debt.
Secondary aggregates	Aggregates produced as the by-products of other industrial or mineral activities.
Semi-wet	Cement manufacturing processes in which water is either added to the kiln feed material or removed by filter pressing. See also dry process and wet process .
Sherburn	Sherburn Minerals Ltd.
Site	A relevant operating entity which is either a centre of production, or a centre for storage, distribution and administrative functions.
Site fixed costs	Fixed costs directly incurred at a site level.
Soda ash	Sodium carbonate, a vital ingredient in the manufacture of glass and many household cleaning products. High purity limestone is required for the production of soda ash.
Southern Cement	Southern Cement Limited.
Tarmac	The UK construction materials operations of Anglo American . Anglo American contributed Tarmac to the Lafarge Tarmac JV , which was formed on 7 January 2013. See also TBP .
TBP	Tarmac Building Products Limited, which is ultimately owned by Anglo American . Anglo American did not contribute TBP into the Lafarge Tarmac JV . TBP is active in the production of heavy building materials such as mortar , concrete blocks, bagged aggregates , binding products, sports surfaces and foundry sands.
TFEU	Treaty on the Functioning of the European Union, a treaty which sets out some of the fundamental rules governing the EU .
Thomas Armstrong	Thomas Armstrong (Holdings) Limited.
Titan	Titan Cement UK Limited.

Titan Cement Group	Titan Cement Company SA, the ultimate parent company of Titan .
TOH	Theory of harm.
Value in use	The discounted present value of the cash flows expected from continuing use and ultimate sale of an asset by the present owner.
Value to the business	The loss an entity would suffer if it were deprived of an asset. Also referred to as deprival value or value to the owner.
VAP	Value added product. Whilst this term can also be used in relation to cement , aggregates and asphalt , in this report it is primarily used to refer to innovative RMX products, requiring the use of additives and/or special production processes to develop particular properties for use in specialist applications. Examples include self-compacting RMX , coloured RMX , fast-setting RMX and waterproof RMX .
Volumetric truck	A vehicle which carries aggregates , cement and water in separate compartments to be mixed into concrete at the customer's site.
Wet process	A cement manufacturing process in which the feed material for the kiln is made by wet grinding and the resulting slurry is fed directly into the kiln. See also dry process and semi-wet/semi-dry process .