

AGGREGATES, CEMENT AND READY-MIX CONCRETE MARKET INVESTIGATION

Coordinated effects in Great Britain cement

Introduction and outline

1. In this working paper, we review the evidence on the main characteristics of the GB cement market and the way in which competition occurs in the cement market, as well as evidence on the outcomes in the cement market. We aim to analyse
(a) whether the conditions for coordination to emerge are met, *(b)* whether the outcomes and conducts we observe are supportive of the existence of coordination, and if so, *(c)* the likely mechanism for such coordination and whether this mechanism is likely to be effective.

2. This working paper is organized as follows:
 - (a)* We first set out the structure of the cement market and analyse whether structural aspects of the cement market are conducive to coordination (as set out in the [CC's Draft Market Investigation Guidelines](#) ('CC draft guidelines'), paragraph 234).
 - (b)* We then summarize the evidence we have presented in previous [working papers](#) on the way in which competition occurs in cement.
 - (c)* We then examine whether the conditions for coordination to emerge are likely to be met.
 - (d)* We finally assess in more detail how coordination could take place in cement (the coordination mechanism), the incentives on each GB cement producer to adhere to this mechanism, and its likely effects.

3. Our analysis is based on the market structure prior to 7 January 2013, when Mittal entered the market and the Anglo American-Lafarge joint venture (JV) completed. We analyse the possible impact of these changes in a separate working paper.
4. This working paper does not take into account substantive comments we have already received on published working papers, in main party hearings and in responses to the updated issues statement, simply for reasons of practicality, although all such substantive comments will be carefully considered prior to publication of the provisional findings.

Executive summary

5. We have reviewed the evidence on the structure of the cement market, the behaviours observed and some of the outcomes of competition in the cement market.¹ We have found that the cement market is characterized by high concentration, a significant degree of transparency, frequent interactions between the main cement producers and a lack of complexity in the competitive environment. These factors, taken together, suggest that the GB cement producers are likely to have strong awareness of each other's actions and may be able to anticipate each other's future actions, which could lead to strategic interdependence in the competitive behaviour of the cement suppliers and some form of coordination.
6. In addition to this, we have seen behaviour by some GB cement producers based on the maintenance of stable market shares, and, when faced with loss of market shares, retaliation by recovering market share from the competitor to whom it was lost ('tit-for-tat' strategies). Such types of behaviour could lead to coordinated outcomes, with market shares as the focal point for coordination. We therefore analysed whether the conditions for coordination were likely to be met, with market

¹ Results from the CCA profitability analysis are still to be considered.

shares as the focal point for such coordination, and found that these conditions were largely met. We also found that it is likely to be in the interests of Lafarge, Cemex and Hanson to adhere to such coordination, whereas Tarmac is likely to be a fringe player. Furthermore, Lafarge's position as the largest cement producer, [X], is likely to give it strong incentives to take a leadership role in any coordination—and in particular to take on a larger share of the costs of coordination (including the costs of accommodating the growth of fringe cement suppliers).

7. Overall, such coordination, if it exists, is likely to result in higher prices of cement in GB. Though certain buyers (such as [X] and some of the larger bulk and bagged cement buyers) may be able to exert a degree of buyer power and resist price increases, the exercise of such power may not benefit customers of cement more generally because of the high degree of price discrimination in the market.

Conducive market characteristics

8. A market must exhibit certain characteristics for coordination to be possible:
 - Firms need to be able to agree and monitor the terms of coordination or, where there is no explicit agreement, have sufficient awareness of each other and be able to anticipate each other's reactions.
 - Coordination needs to be internally sustainable among the coordinating group, ie firms have to find it in their individual interests to adhere to the coordinated outcome; the firms must lack an incentive, or have a positive disincentive, to compete because they appreciate how each other will react. However, coordination does not need to be perfect or continuous to fulfil this criterion.
 - Coordination needs to be externally sustainable, in that coordination is unlikely to be undermined by competition from outside the coordinating group or from the reactions of customers (CC draft guidelines, paragraph 233).

9. We first examine structural aspects of the market in order to inform our analysis of whether the conditions for coordination are likely to be met.

Market structure

10. The CC draft guidelines state that the CC will seek to identify structural characteristics conducive to coordinated conduct by market participants. The CC will also look at evidence of market outcomes and the actions of market participants which could be the product of coordinated conduct.
11. The CC draft guidelines state that the following structural factors will facilitate coordination: a non-complex and stable economic environment, simple and relatively undifferentiated products, customers with easily identifiable characteristics, firms that are relatively symmetric, especially in terms of costs structures, market shares or capacity levels, and the existence of institutions and practices facilitating the sharing of information (paragraphs 237 to 242 of the CC draft guidelines).
12. There is also some recent economic literature which emphasizes the role of price leadership in facilitating coordination, which we took into account in our analysis. This is set out in more detail in paragraph 167 below.
13. In this section we assess in turn the following structural market characteristics in the supply of grey cement in GB:
 - (a) Production capacity, cost structures, market concentration and demand conditions.
 - (b) The complexity and differentiation of products.
 - (c) Customer characteristics and purchasing behaviour.
 - (d) Other factors contributing to transparency, such as JVs, vertical integration and data available to GB cement producers on their competitors.

Cement production capacity in GB

14. There are currently four companies active in the production of cement in GB (Lafarge, Tarmac, Cemex and Hanson). Together, they have ten cement plants in GB with capacity to produce clinker and cement, as well as a further three plants without clinker production capacity but with capacity to grind clinker into cement. Our analysis of the cement capacity of each GB cement producer over time is set out in Appendix 1.
15. This shows that:
- (a) Total cement capacity has reduced between 2007 and 2011, as a consequence of the closure of three cement plants (Lafarge's Northfleet and Westbury plants and Cemex's Barrington plant), mothballing of kilns (Hanson mothballed one kiln at Ketton and Cemex mothballed one kiln at South Ferriby) [REDACTED].
 - (b) The only producer to have increased cement capacity during this period is Tarmac, which increased capacity at its Tunstead plant in April 2008 [REDACTED].
 - (c) As a result of these changes in capacity, total capacity to produce clinker in GB has reduced from around [REDACTED]MT in 2007 to around [REDACTED]MT in 2011, ie a [REDACTED] per cent reduction in clinker capacity which is 'immediately available'. If we also include mothballed capacity by [REDACTED]² total reduction in capacity is [REDACTED] per cent over the period.
16. Table 1 sets out the shares of clinker capacity of the different GB cement producers in 2007 and in 2011.³ We see that Lafarge has the largest amount of clinker capacity in GB ([REDACTED]), and we also see that [REDACTED] has reduced clinker capacity the most since 2007, as evidenced by the reduction in its share of clinker capacity from 2007 to 2011.

² [REDACTED] mothballed a kiln relatively recently; [REDACTED]. See Appendix 1.

³ We do not show shares for years 2008 to 2010 as these are transition years (capacity changes occurring mid-year), which makes it difficult to calculate comparable annual capacity shares of the different producers.

TABLE 1 GB producers' number of cement plants and shares of clinker capacity in 2007 and 2011

	<i>per cent</i>			
	<i>Number of GB cement plants*</i>		<i>Share of clinker capacity</i>	
	<i>2007</i>	<i>2011</i>	<i>2007</i>	<i>2011</i>
Cemex	3	2	[X]	[X]
Hanson	3	3	[X]	[X]
Lafarge	6	4	[X]	[X]
Tarmac	1	1	[X]	[X]

Source: CC analysis based on data from Cemex, Hanson, Lafarge and Tarmac.

*We only include cement plants with capacity to produce clinker in this table (ie excluding grinding, blending and packing plants).

17. We also analysed the cost structures of the GB cement producers in the working paper 'Assessment of cost structures and profit margins'. We found that there was a large degree of symmetry in the unit variable costs of the cement divisions of the GB cement producers. In FY11 for all of the cement-producing Majors, variable costs per tonne sold ranged from £[X] to £[X], or between [X] and [X] per cent of total costs.⁴ Among the cement producers, [X] benefited from the lowest unit variable cost at £[X]. Excluding [X], the range for the unit variable cost of the remaining three cement producers tightens: from £[X] ([X]) to £[X] ([X]).

18. Our analysis of Lafarge, Hanson, Cemex and Tarmac consolidated profits showed that [X] have similar profit drivers, in the sense that their respective cement divisions make the largest contribution to their consolidated profits (ie the combined EBITDA of their aggregates, cement and RMX divisions), whilst [X] cement division contributes [X] per cent to its consolidate profits.

19. The similarity in the costs structures of the GB cement producers, and in particular of [X] would enhance firms' ability to reach a common understanding.

⁴ [X]

Market shares and concentration

20. We have calculated shares of GB production for the four GB producers of cement, as well as market shares based on sales volumes in GB (see Appendix 2). Table 2 shows market shares of GB producers and cement importers, based on sales volumes of all grey cement in GB, over the period Q2 2007 to Q4 2011.

TABLE 2 Market shares based on sales volume of all grey cement, Q2 2007 to Q4 2011

	<i>per cent</i>								
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>AI*</i>	[X]	[X]	[X]	<i>Other importers†</i>
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Parties' data and CC analysis.

*[X]

†Other importers comprise [X]. Sales volumes for other importers were not always available on a quarterly basis. Where this is the case, we have calculated quarterly volumes by dividing annual volumes by 4. Where annual volumes were missing, we used linear interpolation to calculate volumes for the missing years.

21. From Table 2 we see that there are four large suppliers of grey cement (the GB producers), and a competitive fringe (the cement importers). The four firm concentration ratio ranges between 86 and 92 per cent over the period 2007 to 2011, suggesting that the market is highly concentrated.⁵ We have also calculated the Herfindahl-Hirschman Index (HHI) based on the market shares in Table 2, and find that it varies between 2,220 and 2,744 across the period, also suggesting that the

⁵ The concentration ratio measures the combined market share of the largest firms in a market. For example, the 'four firm' concentration ratio is simply the sum of the market shares of the four largest firms in the market.

market is highly concentrated.⁶ We can also see, from Table 2, a lack of volatility in quarterly market shares.

22. Table 3 shows the annual market shares of GB producers and cement importers (including Aggregate Industries), based on sales volumes of all grey cement in GB, over the period 2007 to 2011.

TABLE 3 Annual market shares based on sales volume of all grey cement, 2007 to 2011

	<i>per cent</i>					
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>Aggregate Industries*</i>	<i>Independent importers†</i>
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]

Source: Parties' data and CC analysis.

*[X]

†Independent importers comprise [X]. Sales volumes for independent importers were not always available for each year. Where this is the case, we have calculated volumes for the missing years using linear interpolation.

23. We see from Table 3 that [X] has had a fairly stable market share over the period 2007 to 2011, losing in total [X] percentage point share during the period. [X] market share reduced by [X] percentage points and [X] market share reduced by [X] percentage points between 2007 and 2011. We can see from Table 3 that this loss of market share by [X] (and to a lesser extent by [X] and [X]) was to the benefit of [X], whose share increased from [X] to [X] per cent between 2007 and 2011) as well as to cement importers ([X] increased its share by [X] percentage points and independent importers increased their share by [X] percentage points).
24. We also analysed shares of production of cement in GB over the period 2007 to 2011, as shown in Table 4. Over the last five years, [X] share of GB production remained fairly constant, increasing from [X] per cent in 2007 to [X] per cent in

⁶ 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.

2011; [x] share remained stable at around [x] per cent between 2007 and 2011.

[x] share of GB production reduced somewhat over the period, from [x] per cent in 2007 to [x] per cent in 2011; and [x] share increased over the period from [x] per cent in 2007 to [x] per cent in 2011.

TABLE 4 Shares of production of the GB producers, all grey cement, 2007 to 2011

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

Source: Producers' data and CC analysis.

25. During the same period, there was a large shock in cement demand. Demand reduced by 13 per cent between 2007 and 2008, and a further 23 per cent between 2008 and 2009 (an overall reduction of 34 per cent in two years). Since then, there has been some small recovery in demand for cement (although demand for cement remains low compared with its 2007 levels): demand for cement increased by 5 per cent in 2010 and by 7 per cent in 2011.

26. It is surprising that there have not been much larger changes in market shares between 2007 and 2011 given the size of the demand shock in 2008 and 2009, the large excess capacity in cement at the time where demand reduced, large shifts in cross-sales that occurred at the time and the increase in imports of cement. Indeed, one could have expected GB cement producers to react strongly to the reduction in demand by competing aggressively for additional customers in order to increase their sales, thereby resulting in large variations in market shares. Similarly, we would also expect that the large changes in the amount of cross-sales in 2008 and 2009 may have introduced instability in the market and resulted in variations in share. In this respect, we note that despite the very large reduction in the demand for cement and large changes in amounts of cross-sales over time, market shares seem to have

remained relatively stable as between [REDACTED], [REDACTED] and [REDACTED], though they collectively lost share to [REDACTED] and importers. With the exception of [REDACTED], there was no evidence in the market share data to suggest that the GB cement producers had attempted to increase their market share, and the strategy documents we reviewed also showed that stability of market share/defending market share was a primary objective, with no evidence of any strategies to increase market shares.

27. Table 5 shows the shares of production of cement and ground granulated blast furnace slag (GGBS) in GB of the four GB producers, over the period 2007 to 2011.⁷ The trends broadly match those for cement only, shown in Table 3, but with Hanson having a significantly higher share of production (as it is the only GB producer of GGBS), and the other producers having correspondingly lower production shares.

TABLE 5 Shares of production of the GB producers, grey cement and GGBS, 2007 to 2011

	<i>per cent</i>				
	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]

Source: Producers' data and CC analysis.

28. We have also calculated relative shares of sales volumes of the GB producers (ie each GB producer's share of volumes sold by all four GB producers), and find similar results as those based on market shares calculated from sales volume. This is the case both when we consider volumes of all grey cement, as well as volumes of bulk cement only. The results are presented in Appendix 2. We find more variation in market shares based on sales volumes of bulk CEM I, volumes of bulk CEM I sold to external customers and volumes of bulk CEM I sold to independent customers (see Appendix 2). However, we also note that these CEM I shares will reflect to a greater

⁷ We did not include pulverized fly ash (PFA), because PFA volumes are not comparable with GGBS and cement volumes (prices of PFA per tonne are much lower than those of GGBS and cement, which are close).

extent than the aggregated figures [✂] the internalization of bulk cement (predominantly CEM I) volumes in 2009 and the loss of external customers which it experienced around the same time.

29. Further, we have calculated market shares on a regional basis, and find that these show more fluctuation over the period 2007 to 2011 (see Appendix 2). This would suggest that, to the extent that coordination takes place around market shares, any coordination which may have been occurring in grey cement was unlikely to have been occurring at a regional level. Rather, based on the national evolution of market share, and relative shares of the GB producers, it is more likely that national shares (of all cement sales) could have been the focus of any coordination.

Complexity and differentiation of products

30. Simple and relatively undifferentiated products are more easily subject to the coordinated setting of prices than situations in which each firm's offering is different from the offerings of its rivals. Coordination becomes more complex—and may be more difficult to sustain—if important characteristics of the product are changed over time or if new products are introduced (CC draft guidelines, paragraph 238).
31. The environment in which GB cement producers interact does not appear particularly complex. Cement is a relatively homogeneous product: as noted in the '[Market definition](#)' working paper, although there are different types of grey cement product (CEM I, CEM II and CEM III/IV) with different properties, there is a large degree of demand-side substitution between the different types of cement, as well as supply-side substitution between the different types of cement. Similarly, although bulk and bagged cement are distinct product markets because of the lack of demand-side substitutability between bagged and bulk cement, these are produced from the same materials and there is a large degree of supply-side substitution between them.

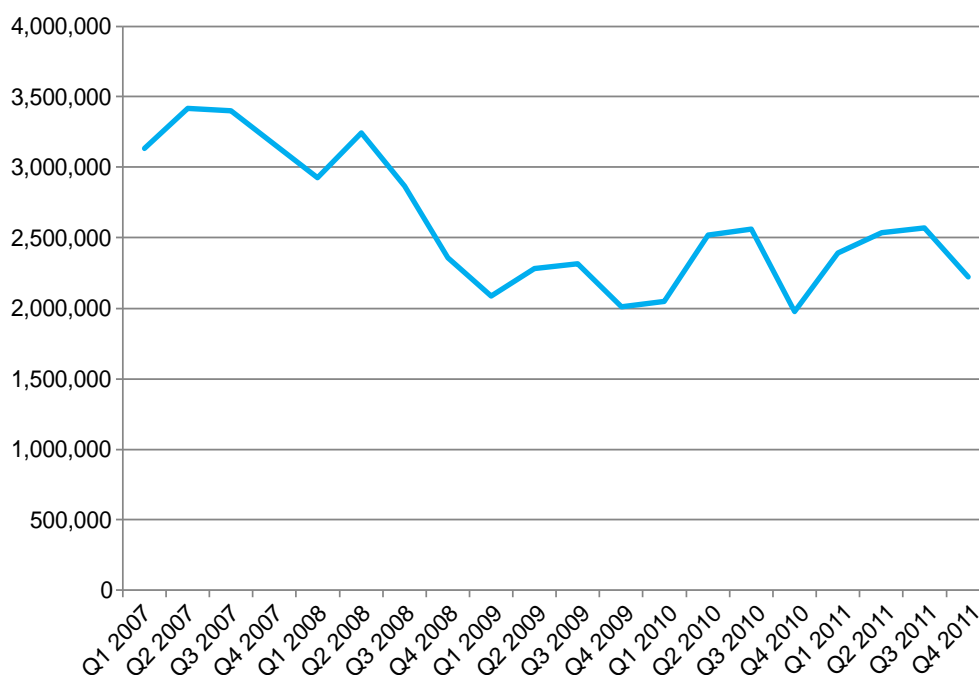
32. The geographic areas over which cement can be transported are quite large. Lafarge told us that the maximum distance over which bulk cement was delivered by it from shipping point (which could be a cement plant, depot or import terminal) to external customers was [redacted] radial miles in 2011 ([redacted]), while the maximum distance over which packed 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.
33. This lack of complexity means that the number of variables on which cement producers would need to have a common understanding is likely to be small.

Demand for cement

34. Cement is an input into other products, such as RMX, mortar, concrete blocks and pre-cast concrete products. As such, the demand for cement is derived from demand for RMX and concrete products, and ultimately from demand for construction. 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.

35. Though demand for cement has reduced (as a result of the economic downturn), we do not observe that cement demand is volatile. There is a degree of visibility of a proportion of future demand for RMX and concrete products, and ultimately cement, through tendering for large-scale construction projects, which can start several years before the construction project is due to begin. Cement suppliers (or their downstream RMX or concrete products operations) may be approached by construction companies and asked for quotes at the tendering stage, which would give the cement suppliers some visibility over future demand for cement. However, even where cement suppliers are not approached by construction companies at the tendering stage, they may be able to estimate cement needs for the construction projects by reading tender documents, which are sometimes published.

36. Further, the GB cement producers supply RMX and concrete products in addition to cement, and therefore have further insight into shorter-term demand for RMX and concrete products, and therefore cement.
37. These factors suggest that even if demand for cement is not particularly stable over time because of its dependence on the general economic conditions, the GB cement producers may have some insight into (short-term) demand movements, which may therefore improve their ability to coordinate.
38. In addition to the (stability of the) level of demand, it is also important to consider (the stability of) the source of that demand—in other words, customer characteristics. This is covered in more detail in the following subsection.

Customer characteristics and purchasing behaviour

39. The characteristics of customers and their purchasing behaviour will also affect the stability of the market. Coordination will be easier if customers are easily identifiable, have a regular demand for cement and purchase cement frequently.
40. 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.

41. The main characteristics of bulk cement customers, and their purchasing behaviour, are considered in the working paper '[Cement customer switching](#)'. We find that:
- (a) There were 900 customers (with 3,859 delivery sites) of delivered bulk cement across the period 2007 to 2011, with around 600 customers (with around 2,000 delivery sites, of which approximately 45 per cent are owned by the five Majors) active in any given year. The 20 largest customers (in terms of share of total cement volumes over the period 2007 to 2011, including internal sales) accounted for 77 per cent of total volumes, which includes the five Majors accounting for 61 per cent of total volumes. Just over 200 customers purchased 5kt or more of cement per year, and made up 95 per cent of total volumes.
 - (b) The vast majority of customers who were active in December 2011 have been purchasing cement at least since 2007, meaning that demand for cement tends to be long term.⁸ This is particularly the case for large customers (with purchases over 20kt per year), as well as medium-sized customers (with purchases over 5kt per year).
 - (c) Multi-sourcing—around 85 per cent of customers source cement simultaneously from more than one supplier, but this is not true of individual job sites, of which 82 per cent source cement from only one supplier at any one time.
 - (d) The vast majority of cement is purchased at least monthly.⁹ Again, this is particularly true for large- and medium-sized customers.
42. We therefore find that customers for bulk cement are largely fixed outlets with demand for cement which is largely predictable: they tend to purchase cement frequently and customer longevity is high. Although customers with several plants tend to source from more than one cement supplier, there is a high incidence of

⁸ The transaction data only starts in 2007 and therefore we cannot observe the exact year in which customers started purchasing cement where this is prior to 2007.

⁹ The transaction data is only available on a monthly (or quarterly in the case of independent cement importers) basis, and therefore we cannot observe purchases which occur on a fortnightly, or weekly basis—instead these are treated as monthly purchases.

single sourcing at site level and a high frequency of deliveries. These factors would tend to contribute to transparency for customer–supplier relationships. Further, the customer base is relatively concentrated (making monitoring of customer–supplier relationships covering the majority of cement volumes easier), but not fragmented enough that the loss of a single customer would have a severe impact on profits (with exception of major customers and a few larger customers).

43. We have also looked at the characteristics of bagged cement customers, and find that:¹⁰

(a) Cemex had [redacted] customers over the period 2007 to 2011, with [redacted] job sites.

There were between [redacted] and [redacted] active customers in each month, and between [redacted] and [redacted] active job sites, with an average of [redacted] job sites per customer over the period. [redacted] of Cemex’s customers purchased cement in every single month in the period February 2007 to December 2011, and their volumes over the whole period made up [redacted] per cent of Cemex’s total volumes over the period, while [redacted] customers purchased bagged cement in at least [redacted] per cent of months (ie at least [redacted] months), making up [redacted] per cent of total volumes. The top [redacted] customers (by volume purchased over the period February 2007 to December 2011) made up [redacted] per cent of total volumes over the period; the top [redacted] customers made up [redacted] per cent; and the top [redacted] customers made up [redacted] per cent of total volumes.

(b) Hanson had [redacted] customers over the period 2007 to 2011, with [redacted] delivery points. There were between [redacted] and [redacted] active customers in each month, and between [redacted] and [redacted] active delivery points, with an average of [redacted] delivery points per customer over the period. [redacted] of Hanson’s customers purchased bagged cement in every single month in the period January 2007 to December 2011, and their volumes over the whole period made up [redacted] per cent of Hanson’s

¹⁰ We did not analyse Tarmac bagged customers because [redacted].

total volumes over the period, while [X] customers purchased cement in at least [X] per cent of months, making up [X] per cent of total volumes. The top [X] customers (by volume purchased over the period January 2007 to December 2011) made up [X] per cent of total volumes over the period; the top [X] customers made up [X] per cent; and the top [X] customers made up [X] per cent of total volumes.

(c) Lafarge had [X] customers over the period 2007 to 2011, with [X] delivery sites. There were between [X] and [X] active customers in each month, and between [X] and [X] active delivery sites, with an average of [X] delivery sites per customer over the period. [X] of Lafarge's customers purchased bagged cement in every single month in the period January 2007 to December 2011, and their volumes over the whole period made up [X] per cent of Lafarge's total volumes over the period, while [X] customers purchased cement in at least [X] per cent of months, making up [X] per cent of total volumes. The top [X] customers (by volume purchased over the period January 2007 to December 2011) made up [X] per cent of total volumes over the period; the top [X] customers made up [X] per cent; and the top [X] customers made up [X] per cent of total volumes.

44. This shows that, as for bulk cement, customers purchasing bagged cement are fairly concentrated, but not fragmented enough that the loss of a single customer would have a severe impact on profits (apart from very few largest customers), and purchases tend to be frequent.

Additional factors contributing to transparency

45. The high degree of concentration, similarity in costs structures and lack of complexity in the product are likely to result in a high degree of transparency in the cement market. As set out above, there is also likely to be a high degree of transparency in customer allocations (which customers buy from which suppliers, and which

customers switch). In addition to this, there are a number of other structural factors that may facilitate the sharing of, or access to, information, including:

- (a) The GB cement producers are vertically integrated;¹¹ and their downstream operations (mainly RMX) purchase cement from other GB cement producers. This means that each GB cement producer will have up-to-date information on the prices it pays to, and announced price increases sought by, at least the other GB cement producers from whom it purchases cement. In their capacity as cement customers, the GB cement producers may also occasionally (or regularly) seek quotes from those cement producers from whom they do not currently purchase cement, and may therefore have some information on the pricing of those suppliers as well.
- (b) The GB cement producers are engaged in JVs with one another, mainly in relation to their aggregates, RMX and asphalt businesses, though there are also some JVs relating to cement and cementitious products between the Majors. The presence of JVs between cement producers will increase the amount of interaction between them and provide another forum for communication between the GB cement producers and may therefore strengthen their relationships and increase their (awareness of their) mutual interdependence.
- (c) For most of the Majors whose documents we reviewed in the [working paper summarizing the CC's review of internal documents](#), the documents showed that, in the context of cross-sales to one another, and through participation in common business forums (eg CEMBUREAU, the European Cement Association), there are opportunities for senior level business contacts between the Majors—and these opportunities are on occasion taken—which may facilitate transparency in the cement market.¹²

¹¹ In the case of Aggregate Industries, this vertical integration is from aggregates into RMX, rather than from cement into RMX.

¹² Our concern is not that these forums in themselves are aimed at facilitating transparency or anti-competitive activity. Indeed we have seen evidence that some of these forums are highly conscious of the need to avoid such activity, and take formal

46. We asked the GB producers what information they held on their competitors (above that listed in the previous paragraph). The GB cement producers told us that they were all members of common industry associations, such as the Mineral Products Association (MPA), and, as such, they each provided data on production and sales to the MPA on a monthly basis. The MPA then published data on its members' production and sales, including aggregated monthly cement sales and quarterly cementitious and cement sales by channel and region. The GB cement producers therefore have access to monthly data (one month in arrears) on a significant proportion of cement demand, from which they can calculate their own shares of production and sales on a monthly basis.
47. In addition to this, Lafarge told us that [REDACTED].
48. Lafarge told us that, as part of the EU Emissions Trading Scheme (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]
49. In relation to imports, Lafarge told us that [REDACTED].
50. [REDACTED]
51. [REDACTED]
52. Cemex told us that [REDACTED].
53. Tarmac told us that [REDACTED].

steps intended to ensure it does not take place under the formal auspices of those organizations. Our concern is that, in the margins of such industry gatherings, there are repeated opportunities for informal senior level business contacts.

Analysis of competition in the cement market

54. We conducted various analyses to understand the way in which competition takes place in cement. We now summarize this evidence:
- (a) Pricing: how prices are set, price announcement letters, price dispersion and price parallelism.
 - (b) Margins over time.
 - (c) Cross-sales: patterns and pricing.
 - (d) Summary of the study of the 2009 internalization and what it tells us about the way in which cement producers compete.
 - (e) Analysis of cement switching, and what it tells us about the conduct of cement suppliers.

Pricing

55. Cement prices are negotiated with customers, and can depend on a number of factors, including delivery distance, type of cement, size of order, and the customer's bargaining power.
56. Lafarge told us that [REDACTED].
57. Lafarge told us that [REDACTED].
58. 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 Hanson would offer, including: [REDACTED]. Hanson also told us that it had participated in tender processes for bagged cement.

59. Cemex told us that [REDACTED].¹³
60. Tarmac told us that [REDACTED].
61. This evidence shows that each GB cement producer has a large number of pricing points at any point in time, which can be widely dispersed. We have undertaken analysis of the amount of dispersion between the prices to different customers charged by each GB producer, separately for bulk and bagged cement, based on their transaction data (see Appendix 3).
62. In the case of bulk cement, we did the analysis for all external customers, independent customers only, and other Majors only, both for delivered prices and ex-works prices. We restricted the analysis to bulk CEM I sales for comparability purposes. In the case of bagged cement, we show results for independent customers only. We do the analysis for both delivered and ex-works prices. It was not possible to further break down bagged cement (eg by type of cement) due to the nature of transaction data provided.
63. We have undertaken the analysis of price dispersion in order to:
- (a) Assess the feasibility of coordination on prices. In particular, low levels of price dispersion can be consistent with coordination on prices, while coordination *on prices* would be more difficult to introduce and sustain where price dispersion is higher.
 - (b) Further our understanding of how competition takes place in cement. In particular, whether there is a fixed amount of dispersion, which could indicate that there is a maximum dispersion that producers can sustain before customers realize that others get better terms; and whether we see evidence of price

¹³ [REDACTED]

dispersion increasing in periods where the market was more dynamic in respect of customer switching.

64. We find:

- (a) There is significant variation in the prices of bulk cement charged to different customers, even when we control for distance (by looking at ex-works prices). We find that, for the GB producer with the least dispersion in price, there was a range of £[redacted] per tonne (representing [redacted] per cent of the average price of cement) between its highest and lowest prices over the period Q1 2007 to Q4 2011. For the GB producer with the greatest dispersion in price, there was a range of £[redacted] per tonne between its highest and lowest price (representing [redacted] per cent of the average price of cement) over the same period.¹⁴
- (b) In the case of delivered prices of bulk cement to all external customers, price dispersion appears to have increased over time for [redacted], with [redacted] data showing distinct highs in Q1 2009, which was a period of higher switching related to the 2009 internalization of volumes from [redacted]. [redacted] data also shows higher dispersion in 2011, when we observe some changes in [redacted] market shares (see paragraph 112). [redacted] data also shows higher dispersions in Q1 2009, as well as in Q4 2009. [redacted] price dispersion shows peaks in Q1 2008 and Q4 2008, and then decreases over subsequent quarters. Results based on ex-works prices to all external customers are broadly similar for [redacted].
- (c) In the case of delivered prices of bulk cement to independent customers, price dispersion appears to have increased over time for [redacted], with a distinct high in Q1 2009 in the case of [redacted], and across most of 2009 in the case of [redacted]. [redacted] data does not show an upward nor a downward trend, though we do observe higher dispersion in Q1 2009 and Q4 2009. [redacted] data also shows higher dispersion in

¹⁴ Using the difference for prices paid by 90 per cent of customers, ie ignoring the prices paid by the 5 per cent of customers paying the lowest and highest prices to omit any erroneously low or high prices.

early 2011. [X] data shows high dispersion in Q1 2008 and Q4 2008, with a downward trend in dispersion over the period 2009 to 2011. Results based on ex-works prices to Independent customers are broadly similar for [X].

(d) In the case of delivered prices of bulk cement to other Majors, price dispersion is generally lower than that for independent customers. Also, price dispersion in delivered prices to other Majors appears to have increased over time for [X], with higher dispersion observed, among other quarters, in Q1 2009. [X] data shows higher dispersion in Q3 2008 to Q1 2009, as well as in Q4 2009 to Q1 2010. [X] data shows a downward trend in dispersion, with a peak in dispersion in Q1 2009. Results based on ex-works prices to other Majors are broadly similar for [X], while for [X] we no longer observe a peak in dispersion in Q1 2009.

(e) In the case of bagged cement, there is significant variation in both delivered and ex-works prices charged to different customers, though this may be partly due to product mix (such as type of cement, or size of bag), which we are not able to control for. Trends over time are less likely to be affected by product mix (unless there are large changes in the breakdown of sales of bagged cement between different types of bagged cement). These show that dispersion in [X] prices has fallen over the period Q1 2007 to Q4 2011, [X] dispersions have increased over the same period, while [X] dispersion remains similar in 2007 and 2011. We also find that dispersion tends to increase in Q1 for all GB producers, compared with other quarters, which may be related to price increases.

65. A consequence of this dispersion in prices to individual customers is that cement prices paid by individual customers may not be completely transparent to competitors or to other customers, though estimates of cement prices (eg an upper and lower bound) may be possible through information on prices set by cement customers downstream (eg the price of RMX) and also through sales negotiations with existing and potential customers.

66. However, there is considerable transparency on price increases that are sought by cement suppliers. The four GB cement producers (Cemex, Hanson, Lafarge and Tarmac)—and some other cement suppliers in GB—regularly send out generic letters to their customers informing them of cement price increases (see the working paper '[Analysis of price announcements for bulk cement](#)'). These letters are usually sent out at least once a year, at least a month before the date of the planned increase. We have analysed the price announcement letters for cement in the working paper '[Analysis of price announcements for bulk cement](#)'.
67. We have found that:
- (a) The four GB producers generally announced similar price increases in fairly close succession.
 - (b) Letters are usually sent out around October or November to announce an increase for the following 1 January, though there are also some occasional mid-year price increase announcements. There was one mid-year price increase announcement in 1 August 2008 which was remarkable both for its timing (all producers announced the increase within less than one week of one another—with Hanson announcing the increase first, followed a day later by Cemex and Lafarge) and for the similarity of the increases announced.
 - (c) For the 1 January price increase announcements we analysed (period of 1 January 2006 to 1 January 2012), one particular producer (Lafarge) was the first to announce a price increase in five out of the seven 1 January price announcements analysed, with the other GB producers generally following with similar, or slightly higher, announced increases; whereas Tarmac was either the third or the last producer to announce a price increase in six out of the seven 1 January price increases (but it was first to announce a price increase for January 2010); and

(d) in most cases, the four GB producers were able to increase the average price paid by their customers following a price increase announcement, although announced price increases have not been as successfully translated into actual price increases [REDACTED].

68. We also found evidence that there was a very high degree of transparency in cement price announcement letters. As set out above, the cement GB producers are all integrated into RMX and are, or have been in the past five years, each other's customers for cement. This means that, in their capacity as cement buyers, they receive price announcement letters from their competitors. Our review of internal documents (see the [internal documents working paper](#)) showed that the Majors were monitoring cement pricing very closely including announcements of price increases. Often, price announcement letters are received by the RMX division which then onward circulates the letter to colleagues across business lines, including, where relevant, into the company's cement production/sales business line. Our review of internal documents also suggested that cement producers were often made aware of planned price increases [REDACTED] through the general circulation of information in the market, either because their own customers would inform them that they had been warned of a forthcoming price increase by another cement producer, or because, in their capacity as customers of other cement producers, they would be informed of forthcoming price increases.

69. The four GB producers provided various explanations for sending out these generic price announcement letters, including that they acted as a [REDACTED] for negotiations with customers and that they provided some information to customers for their business planning processes. Whilst these letters may fulfil these purposes, we also note that they may have other effects:

- (a) The letters permit signalling between the GB producers regarding the direction/ range of desired price increases;
- (b) The simultaneity of the price increase letters and their similarity may provide a disincentive for customers to shop around; it may also make customers more willing to accept price increases as it signals to the customer in question that it is not being singled out and that its downstream competitors will be facing similar increases (and therefore signals to the customer that it will not face a cost disadvantage when competing downstream);
- (c) The letters may provide a 'loose focal point' for GB cement producers to indicate to each other the desired level of prices of cement.

Price parallelism

70. To understand the amount of parallelism in prices, the nature of competition between the GB producers, and the extent to which price increase letters can serve as a mechanism to increase transparency in the magnitude, direction and timing of price changes, we analysed the extent of correlation between the GB cement producers' prices. If some or all of the GB producers coordinate, we could expect a high degree of correlation between their prices. This would be particularly the case if the focal point for coordination was prices, or if there are some patterns of price leadership/ price following in the industry (eg through price announcement letters). However, a high degree of correlation between prices can also be consistent with intense competition; for instance if prices increase in the same way due to common cost shocks.
71. We explored the extent of any correlation between the GB cement producers' prices, and we compared the GB producers' prices with those of the cement importers for which we had data (see working paper '[Price parallelism in bulk cement](#)'). Because the four GB producers frequently justify their price increases to customers by citing

increases in their underlying costs, we also analysed the extent to which changes in the GB cement producers' prices were related to changes in their variable costs. If we find that the GB producers' price series are highly correlated, and that the GB producers' price series are highly correlated with their variable costs, this would be consistent with both coordination and intense competition. However, if we find that the GB producers' price series are highly correlated, and that the GB producers' price series are not correlated with their variable costs, this may be inconsistent with intense competition, and could instead be evidence of dampened competition, which may be due to some form of coordination.

72. Figure 2 below shows the average prices of bulk CEM I to independent customers of the different GB cement producers over time. We can see from this chart that average prices of the different GB producers move closely together, and that this is particularly the case until Q1 2009. Between Q1 2007 and Q1 2009, we see average prices of cement increasing, with particularly sharp increases in Q1 2008 and Q1 2009. Prices reach a peak in Q1 2009, except for [X] prices which peak in Q2 2009. After Q1 2009, we see a decline in [X] and [X] average price through to the end of 2009, with prices in late 2009 going back to late 2008 levels. [X] prices reduce somewhat after Q2 2009 (but less than [X] and [X] prices), and [X] prices remain more or less steady through 2009. All of the GB producers' prices remain more or less steady during 2010, to then increase again in early 2011.

FIGURE 2

GB cement producers' quarterly average prices for CEM I for sales to independents, Q1 2007 to Q4 2011

[X]

Source: Data submitted by Cemex, Hanson, Lafarge and Tarmac, and CC analysis.

73. In relation to the price correlation analysis, we found that:

- (a) The GB cement producers' prices were highly correlated with one another. This is consistent both with a high degree of competition between them and with dampened competition between them.
- (b) The GB cement producers' prices were highly correlated with the prices of the cement importers for which we had data. This could be consistent with intense competition between the GB cement producers and importers, particularly if they faced common costs. However, our analysis of cement imports suggested that these are unlikely to face common costs to GB producers, because the cost structures for GB cement production are very different from the costs of importing cement into GB (see the working paper '[Cement imports](#)'). This could also be consistent with dampened competition if the pricing behaviour of cement importers is to price under the pricing umbrella of the GB producers.
- (c) Common movements in the GB cement producers' prices were not fully explained by changes in their variable costs.

74. We also analysed the changes in bagged cement prices over the period 2007 to 2011. Figure 3 shows the quarterly average prices of bagged cement to independent customers. We see similar trends in prices as for bulk cement, with prices rising in Q1 2008 and Q1 2009, to then remain broadly stable in 2009 and 2010, and rising again in 2011.

FIGURE 3

GB cement producers' quarterly average prices for bagged cement sold to independents, Q1 2007 to Q4 2011



Source: CC, based on data provided by Cemex, Hanson, Lafarge Group and Tarmac Group.

Cement margins and profitability

75. Our analysis of profit margins over time is presented in the working paper 'Assessment of cost structures and profit margins'. In relation to the cement division,

we found that the trends in, and amounts of, profit per tonne over time were similar for [X], whilst [X] profit was higher and appeared to follow a different trend from the other cement producing Majors. Variable profit as a percentage of sales remained broadly stable at around [X] per cent for [X] over the last five years. [X] was the only exception, generating margins at close to [X] per cent over the period, which as the lowest-cost cement producer was to be expected.

76. We analyse the evidence on the changes in profit margins against the large changes in demand for cement. In the event of a large reduction in demand, we would expect under most models of competition a drop in variable profit margins.¹⁵ However, we did not observe this: variable profits remained stable between 2007 and 2011.
77. We noted that there was both a shock on demand and a shock on supply between 2007 and 2011:
- (a) demand reduced by 34 per cent between 2007 and 2009, it then increased again in 2010 and 2011; and
 - (b) GB cement production capacity also reduced in the same period, by about [X] per cent between 2007 and 2011.
78. The reduction in cement capacity could act as a counter effect to the reduction in cement demand, in particular if the industry is running at full capacity. In such a case, we could expect that, despite the drop in demand, margins may not fall if the industry is at full capacity after the reductions in cement capacity. We note, however, that this is not the case: there has been sizeable excess production capacity since 2008. In particular, there was very considerable excess production capacity in 2008 and 2009 (see Appendix 1), and despite this, we do not observe a reduction in profit margins in

¹⁵ One notable exception is if there is perfect competition/price taking, in which case margins may be independent of demand conditions because they only reflect the cost conditions. [X], have also pointed out one other model in which this may be the case: increasing marginal costs and demand pivot rather than shift. But in the large majority of cases (downward sloping demand curve and upward sloping supply curve), it is true that margins should reduce when demand falls.

these years ([redacted]). Therefore it does not seem that the stability in margins is explained only by the fact that supply contracted as well as demand.

79. We were told that the main reason for the stability or even increase in variable profit margins in 2009 was that GB cement producers had cut costs in response to the economic downturn. However, we did not see strong evidence that these efficiencies had been competed away and passed on (through lower prices) to cement buyers: indeed, as presented above, the average prices of bulk and bagged cement, though they showed some decline in 2009 compared with Q1 2009 levels (when they reached their peak), remained broadly stable at their late 2008 levels through end of 2009 to end of 2010 (and increased again in 2011). Therefore, we did not see evidence that the efficiencies that were realized through reduction in costs had been passed on to customers through lower prices or lower margins.
80. Taken together, the evidence on margins and capacity suggests to us that cement producers may not have competed as vigorously as we could have expected when they faced significant reduction in demand.
81. We also note that there was a degree of symmetry in capacity responses to the downturn between [redacted] —with each reducing capacity since 2008, and [redacted] reducing capacity most. However, it is difficult to disentangle possible strategic reasons for capacity reductions from genuine operational realities (old plants, near exhausted reserves etc).
82. We are also undertaking an assessment of the profitability of the GB cement producers' cement divisions, and this evidence will be taken into account in our analysis of competition in the cement market.

Cross-sales

83. The Majors have historically sold to, and/or bought from, each other significant amounts of cement. We were told by the Majors that there are three main rationales for Majors purchasing cement from each other:
- (a) if a producer of cement has a shortfall of inputs in a particular location;
 - (b) for logistical reasons, where there are transport cost savings, ie when a Major's RMX or concrete operation is located closer to a competitor's cement plant, it may be cheaper to source from the competitors' plant than from its own plant; and
 - (c) when a producer of cement does not have sufficient capacity to self-supply its RMX operations.
84. We analysed changes in cross-sales between the Majors over time in the working paper '[Cross-sales in bulk cement](#)'. We found that:
- (a) the Majors have historically bought and sold significant amounts of cement from each other;
 - (b) there has been a shift in the Majors' purchases from each other over the period 2007 to 2011 towards greater self-supply, apart from in areas where logistics imply that purchases from other Majors may be more economical;
 - (c) [X] appear to be predominantly net sellers of cement, while [X] are net buyers across the period 2007 to 2011;
 - (d) there can be significant variation in the prices charged to each Major, with [X]; while [X] Majors often pay higher prices than the independents.
85. For most of the Majors whose documents we reviewed in the [internal documents working paper](#), the documents show that cross-sales of cement are very common and provide a high degree of transparency of rivals' cement pricing. Some links are made in the documents between the price paid for cement from another Major and

the price at which cement is sold to that Major (ie an element of reciprocal pricing).

[X] The documents, at face value, suggest some 'efficiency' justifications for cross-sales, ie that cross-sales occur where a rival's cement (or aggregates) plant(s) are located close to the Major's RMX plant(s) such that logistics (haulage) savings may be made by sourcing from the rival's plant(s) rather than self-supplying. It is also clear that cross-sales allow a degree of leverage in commercial negotiations between the Majors in respect of cement and RMX.

2009 internalization

86. Our analysis of the patterns in cross-sales of cement between the Majors over time showed that, in early 2009, one Major (A) internalized a large amount of cement that it had previously been purchasing from another Major (B). Despite this large gain in cement volumes for A (and equivalent loss for B), A's market share remained broadly stable between 2008 and 2009. B's market share did reduce between 2008 and 2009, however, this appears to be mainly to the benefit of [X] and importers. Our analysis of the 2009 internalization was presented in the working paper '[Analysis of the internalization of cement purchases in 2009](#)'.

87. [X]

88. We also noted that the analysis showed that B had attempted to regain market share in cement by targeting many different A-supplied customers, including: [X].

89. This suggested to us that, in so far as stability of market share is a concern, or that B was attempting to retaliate against A, what mattered to B was its overall market share in cement rather than market share on specific segments of the market.

90. [X]

Cement switching analysis

91. We conducted an analysis of switching by bulk cement customers between 2007 and 2011 (working paper ‘[Cement customer switching](#)’). We found that the degree of switching varies greatly across suppliers and across time, but some of our observations include the following:

- (a) End of 2008 and 2009 stand out as years with relatively high levels of switching, reflecting the 2009 internalization event and all the switching of cross-sales and independent customers that followed.
- (b) Some further internalizations occurred also at the end of 2010/beginning of 2011, although on a much smaller scale.
- (c) Importers’ wins are mainly from the top 3 cement suppliers (Lafarge, Hanson and Cemex), while the top 3 are both losing customers to the importers and winning customers from them—this is consistent with an increase in importers’ market share over time.
- (d) Our analysis of annualized data does not reveal any obvious patterns in the switching among the top 3 suppliers, such as matching of wins and losses, though we note that our analysis did not include switching of bagged cement purchases or changes in GGBS purchases. However, we observe evidence consistent with tit-for-tat behaviour among the top 3 suppliers and, to some extent, [REDACTED] when we look at correlations of monthly wins and losses between suppliers.
- (e) There is also no consistent pattern in how switching is greater or smaller than one might expect based on market shares

92. With respect to the relationship between switching and prices, we found the following:

- (a) [REDACTED] of customers that switch achieve lower prices. [REDACTED]

(b) Customers switching in 2007 and 2008 did not achieve price reductions on average, but switching from 2009 onwards resulted in customers paying lower prices after switching on average.

(c) There seems to be a peak in the price dispersion in periods where the switching activity is higher (eg Q1 2009).

93. In relation to coordination, our analysis of switching by bulk cement customers did not provide evidence on whether coordination existed or not. It did show that there were years with much more switching in the market (late 2008 and 2009) and years with very little switching, which could be consistent with periods of stability and instability in coordination. Our analysis of annual switching did not reveal any obvious patterns in the switching among the top 3 suppliers, such as matching of wins and losses. This does not mean that these patterns do not exist, as there are some caveats to our analysis, among which the fact that our analysis does not include switching by bagged cement customers (tit for tat may take place also by increasing bagged sales, as was the case in 2009) or changes in GGBS purchases, and there are also some difficulties in measuring volumes switched per year when switches occur mid or end of year which mean that we cannot directly compare amounts of cement won and lost. We also note that the analysis of switching on a monthly basis did provide some evidence of a degree of matching of wins and losses between the top 3 cement producers, which would be consistent with coordination around market shares.

94. Comparing diversion to importers to diversion between the GB cement producers was also difficult in our analysis because we only have transaction data from three independent importers, and our analysis would therefore not be able to pick up switching to and from the other GB importers. Our analysis of [redacted], [redacted] and [redacted] own win and loss records provided an indication of diversion to GB importers that were

not included in our analysis, and it showed that in some instances, diversion to these importers is similar or higher than to the three importers included in our analysis. We noted in this respect the data provided by [REDACTED] on its estimates of where it had lost and won customers from in 2007 to 2011, which showed relatively high diversion between [REDACTED] and cement importers, in particular in 2011 where the large majority of volumes won and lost by [REDACTED] was to/from independent importers.

95. With regard to the relationship between switching and prices, and considering the market as a whole, we found that customers who switched had achieved lower prices on average from 2009, whereas this was not the case prior to 2009 (there were some small increases in prices after switching on average). We also note that the period prior to Q1 2009 was a period with large increases in average prices of cement, whereas prices remained broadly stable from 2009 onwards. Taken together, this suggested to us that customers who had switched are likely to have experienced lower price increases (prior to 2009) or price reductions (after 2009) compared with customers who did not switch. This suggested to us that switching was likely to be a more effective discipline on price paid by an individual customer, and that customers who did not switch were not benefiting from the relatively lower prices of those who did. The fact that there were peaks in the amount of price dispersion in periods where switching activity is higher also suggested that the customers who did not switch were not benefiting from the switching activity of others.

Review of whether the conditions for coordination are likely to be met

96. In the previous sections, we set out the main characteristics of the cement market, including structural factors as well as conducts and outcomes from competition observed. We now assess, based on that evidence, whether the conditions for coordination presented in paragraph 7 above are likely to be met.

Ability to agree and monitor the terms of coordination

97. Firms must need to be able to agree and monitor the terms of coordination or have sufficient awareness of each other and be able to anticipate each other's reaction.
98. We have found a number of factors that contribute to transparency in the cement market:
- (a) The market is highly concentrated, which means that firms are likely to have high awareness of each other's actions.
 - (b) The environment in which cement producers compete is not particularly complex: cement is a largely homogenous product which can be transported over large distances; there is a large amount of stability in the customer base for cement; there are only a limited number of cement plants in GB and high barriers to entry into GB cement production; the production processes for cement are largely similar and the cost structures of the various cement producers are also relatively similar.
 - (c) The GB cement producers are engaged in various JVs with each other, are members of the same trade associations and, more importantly, purchase and/or sell cement to each other. All of these factors are likely to increase transparency in the market and provide channels for communication between the GB cement producers.
 - (d) There is a high amount of transparency on own-market shares on a monthly basis (through MPA data), and on annual production by plant and yearly market shares by plant through EU-ETS data.
99. In relation to prices, although prices paid by individual customers from competitors cannot be directly observed because they are individually negotiated, there appears to be a degree of transparency in prices because information on cement prices can be gathered through discussions with customers and some prices are directly

observed because cement producers are either customers or suppliers of each other. Moreover, there is considerable transparency in the price increase announcements of the cement producers.

100. Therefore we think that coordination, if it is or has been occurring, is likely to evolve mainly around market shares, but may be supplemented with the information on prices which can be gathered through discussions with customers and in the context of cross-sales, as well as through price announcement letters. We now review whether there is sufficient transparency to allow producers to monitor terms of coordination based on market shares.

101. As set out above, the MPA published data on monthly GB cement production and sales of cement by GB cement producer, with a one-month lag. Combined with data on its own sales and production, this information enables each GB producer to calculate its own monthly share of GB production and monthly share of sales by GB producers. This information does not enable the calculation of shares including imports, and does not show to which other supplier share has been lost in the event of a loss. Therefore in order to monitor deviations, GB producers would need to complement information on monthly share with other information. Monitoring of a producer's own wins and losses of customers, and of who these customers have switched to, would enable a distinction to be made between a change in market share due to deviation by another specific cement producer, a change due to switching to the competitive fringe, and a change due to a customer simply requiring more cement in a given month (which would not represent a deviation from the coordinated outcome). In addition, a degree of monitoring of prices (some information on prices charged by competitors can be gathered from customers and potential customers as part of the sales negotiation process) may also help cement suppliers to detect whether a deviation has occurred.

102. Knowledge of downstream RMX conditions through each GB producer's own RMX business (for example, the identity of the RMX producers who have won or lost large projects) will also increase the amount of information available to help distinguish between reductions in market share due to a deviation and reductions in volumes due to a particular producer's customers not having performed well in a particular period.
103. In order to be able to monitor customer allocations (wins and losses), and for this information to be a reliable indicator of stability of own market share, a number of conditions need to be satisfied:
104. The characteristics of cement customers and the way in which they purchase cement, as set out above in paragraphs 41 to 44, facilitate monitoring of wins and losses of customers:
- (a) Customers tend to purchase cement from fixed locations and the customer base for cement is stable over time, which means that it will be easy to detect, when a job site ceases purchasing, that this is due to switching (rather than, for instance, going out of business, or because the customer happens not to need cement for a particular time period).
 - (b) Customers purchase cement very regularly, with deliveries usually occurring at least once a month but possibly more often, which means that switching is likely to be detected rapidly (no long lead time before finding out that a customer has switched).
 - (c) Customers tend to single-source for a given job site, which also makes it easier to detect switching.
 - (d) Although cement producers have a large number of customers at any given time (the average number of bulk cement customers per year for the period 2007 to 2011 was: [redacted] for Tarmac, [redacted] for Cemex, [redacted] for Hanson and [redacted] for Lafarge),

there are many very small customers so that the top 50 to 100 customers of each GB cement producer would account for the large majority of their bulk cement sales. Therefore the number of customers that need to be monitored may be manageable in practice.

(e) It will often be possible to find out, when a customer has switched, which supplier it has switched to, through contacts with customers (customers will often tell their existing supplier which other supplier they are switching to), as well as through observations as to which supplier is subsequently seen to be making deliveries to the customer and the downstream presence of the GB producers (who will have, through this means, some direct presence in local downstream markets).

105. We note that, for most of the Majors whose documents we reviewed in the [internal documents working paper](#), the documents indicate a close monitoring of own market share (on a month-by-month basis and sometimes at a regional level) and that the preservation of market share appears to be a metric of business performance (in some documents, we see references to maintaining market stability or similar). The documents indicate the monitoring of customers and volumes won/lost and use this information to adjust (monthly) estimates of market share on an ongoing basis. [REDACTED]
106. Our analysis of the 2009 internalization event also suggested that [REDACTED].
107. We also examined whether some of the outcomes we observed were consistent with coordination based on market shares. If there is coordination on market shares, we would expect to observe market shares which are relatively stable over time, at least within the coordinating firms. We analysed trends in market shares in paragraphs 20 to 29 and found that, although [REDACTED] had each seen a reduction in their share between 2007 and 2011, this was mainly to the benefit of [REDACTED] and importers.

108. We would also expect, if there is coordination on market shares, that market shares are not particularly volatile (ie do not show large movements from one period to the next), though occasional periods of volatility in market shares could be indicative of periods of instability in coordination (eg if deviation and punishment has occurred). We would also expect a negative autocorrelation in changes in market shares on a monthly basis. In other words, if the share of Producer A increases relative to other producers in one month, we expect that if there is coordination around market shares, the share of Producer A will reduce in the following months (assuming that one month is a sufficient time for producers to react to any changes in their market share). We also expect that if there is a large change in the relative share of one of the producers compared with another in one month (for example, due to deviation: Producer A gaining share of Producer B), this will be followed by a large change in the opposite direction in the following period (ie Producer B regaining share from Producer A).
109. We therefore analysed changes in monthly market shares of the GB cement producers relative to each other to assess the volatility of shares and the degree of negative autocorrelation in changes in own market shares (note that this analysis concentrates on relative shares of GB producers, ie importers are not included).
110. Figures 4 to 7 show the changes in monthly shares of Lafarge, Cemex, Hanson and Tarmac relative to each other. The first observation is that changes in monthly markets are usually small, within plus or minus [X] percentage point [X], [X] and [X] shares in most months, and within plus or minus [X] percentage points for [X] market share in most months.
111. We also observe that it is often the case that a month with an increase in share is followed by a month with a reduction in share, and vice versa, which is consistent

with coordination based on market share stability. We also see that, in instances where there was a particularly large increase or decrease in share in one month, the following month is also characterized by a particularly large change in market share in the opposite direction. This could be indicative of periods of deviations with subsequent retaliation.

112. Two time periods are particularly noticeable because of the larger changes in market shares observed:

(a) December 2010/January 2011: In December 2010, [X] share increases by [X] percentage points, while [X] share reduces by [X] percentage points and [X] share reduces by [X] percentage points. A month later, in January 2011, we see [X] share increasing by [X] percentage points, [X] share reducing by [X] percentage points and [X] share remaining about 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. Major B loses a large amount of share in January 2009 ([X] percentage points); it then takes several months for Major B to recover part of its market share ([X] percentage points over February to April 2009). Then, in May 2009, we see Major A regaining market share ([X] percentage points), both from Major B and [X] (B's share reduces by [X] percentage point in May 2009 and [X] share reduces by [X] in May 2009), and in June 2009 we see the reverse (Major B and [X] each increase share by [X] percentage point in June 2009 and Major A loses [X] percentage points share in June 2009).

113. 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 3). 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 relative market shares 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 4

Lafarge: monthly changes in market shares (per cent)



Source: CC based on Lafarge, Hanson, Tarmac and Cemex transaction data.

FIGURE 5

Cemex changes in market shares (per cent)



Source: CC based on Lafarge, Hanson, Tarmac and Cemex data.

FIGURE 6

Hanson changes in market shares (per cent)



Source: CC based on Lafarge, Hanson, Tarmac and Cemex data.

FIGURE 7

Tarmac changes in market shares



Source: CC based on Lafarge, Hanson, Tarmac and Cemex data.

114. We also calculated the own correlation in market share changes of each GB cement producer. So, for instance, for [✂], we calculated the correlation between changes in market share in Month t, and changes in market share in the following month, over the period January 2007 to December 2011. If there is coordination on market shares, we expect these correlation coefficients to be negative (indicating that an increase in market 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 market share; 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 to fully recover market share following a deviation. Moreover, there are some underlying trends in market shares over time ([redacted] reduction and [redacted] increase) which will influence the correlation coefficients.

115. The results are summarized in Table 6 below. We found negative correlation coefficients in own market share changes for all GB cement producers, which is consistent with coordination on market shares. The coefficients were larger (in absolute value) for [redacted] and [redacted], less so for [redacted] and [redacted]. This is likely to be due to the fact that [redacted] and [redacted] share has been more stable overall over the period, whereas [redacted] share reduced (so that overall reductions in share exceeded overall increases month to month) and [redacted] share increased.

116. We also calculated the correlation between change in share in a given month and the total change in the following two months, and this increased the negative correlation except in the case of [redacted].

TABLE 6 Auto-correlation in changes of market shares—monthly basis

	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>
Correlation between change in market share in month t and change in following month	[redacted]	[redacted]	[redacted]	[redacted]
Correlation between change in market share in month t and sum of change in market share in two months following	[redacted]	[redacted]	[redacted]	[redacted]

Source: GB cement producers and CC analysis.

Note: 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).

Switching analysis

117. Coordination on market shares is an indirect mechanism to limit the amount of competition between cement producers and achieve prices above competitive levels.

A large amount of customer switching between cement producers may undermine the effectiveness of this form of coordination, as high switching will generate instability in market shares, making it more difficult for firms to reach a coordinated equilibrium. To the extent that switching events are associated with suppliers undercutting each other's prices in order to win back customers, then this could to some extent offset the adverse effects of coordination (ie stable market shares may be achieved but prices may be eroded if there is high switching).

118. Our analysis of switching was not conclusive. We found some periods of relatively high switching (late 2008 and 2009), and periods of relatively low switching (2010 and 2011). This could imply that coordination, if it existed, was not as successful in late 2008 and 2009 as it was in 2010 and 2011, and could also indicate that there may have been a breakdown in any coordination in late 2008 and 2009.

Internal stability

119. In order for coordination to be sustainable, firms must find it in their individual interests to adhere to the coordinated outcome: they must lack an incentive, or have a positive disincentive, to compete because they appreciate how each other will react (CC draft guidelines, paragraph 233). We now consider whether there are mechanisms through which internal stability may be achieved in the cement market.

Mechanism for internal stability

120. In a coordinated outcome, it is often in a firm's short-term interest to deviate from the terms of coordination in order to increase profits unilaterally. However, if such deviation results in lower profits in the future because of the reaction of the other members of the coordinating group, a firm may be deterred from deviating.

121. Our analysis of parties' internal documents, of the 2009 internalization event and of changes in monthly market shares over time suggests that cement producers often react to the loss of a customer to another cement producer by targeting customers from the same cement producer in order to regain market share in response. Our review of internal documents also suggested that the expectation of retaliation (through this mechanism) was sometimes taken into consideration by cement producers in their sales decisions. We now consider whether such strategies may be effective at deterring deviation. We first consider how deviations in cement are likely to take place and how profitable these are likely to be, to understand whether tit-for-tat strategies are likely to be a sufficient deterrent to prevent deviations.

Deviations in cement

122. The incentive to deviate from coordinated outcomes by increasing sales above coordinated levels will depend on how profitable such a strategy can be. This depends on (a) the amount of additional sales or share a deviator will be able to capture; (b) the speed at which such deviation will be detected by competitors; and (c) if and when a deviation has been detected, the consequences for profits of any subsequent punishment period.

123. As set out above, prices for cement are negotiated individually by customers and there are no 'posted prices' for cement which would be easily accessible to customers. This affects the way in which deviation in cement can take place and the feasibility of any 'large-scale deviation' which is commonly considered in the economic literature. Deviation from coordinated outcomes could take place by:

(a) 'targeted' deviation: a cement producer wishing to increase volumes above coordinated levels may need to approach a number of customers of other producers with low price offers in order to make these customers switch, or

(b) deviation by announcing price increases substantially lower than competitors (including, for instance, announcing a price reduction or no price increase, or announcing a delayed price increase¹⁶).

124. The latter strategy would be likely to be very transparent to competitors. Competitors are usually made aware of price increase letters very quickly—either because they receive these letters directly as customers of each other (though one would expect that if a cement producer deviated in that way, it would refrain from sending such a letter to other GB cement producers), or because a GB cement producer’s own customers will inform the producer that they have received a price letter which is more competitive and use this as a leverage in negotiations. It therefore seems unlikely that a cement producer would deviate in this way: the speed at which such deviation would be detected would likely mean that any profits from such deviation would be short-lived at best, as other cement producers would be quick to react by lowering their prices to existing customers to prevent them from switching (thus resulting in a no-win outcome for all: lower prices and not much effect on increased volumes for the deviator).

125. It is more likely that any deviations from a coordinated outcome would take place by one cement producer targeting customers of other cement producers in order to induce these customers to switch. Such deviation could be relatively small-scale, though it could be large-scale if a very large cement customer were approached and successfully won from another cement producer. In this respect, the more concentrated the customer base, the larger the incentives to deviate:

(a) If demand for cement is fragmented, in order to deviate, a cement producer may need to approach a relatively large number of customers to get sufficient profits from deviation. This makes it more costly to deviate, and also increases the risk

¹⁶ This happened on one occasion (early 2010).

that deviation will be detected quickly as some of the customers may inform their existing supplier that they have been approached by a competitor.

(b) If on the other hand there are some very large customers, this will make demand for cement lumpier and inducing one of these large customers to switch may be sufficient to generate high one-off gains from deviation.

126. Even if the customer base is not very fragmented, another factor which could increase incentives to deviate is if customers enter into long-term exclusive contracts with suppliers, so that cement producers bid in a given time for a large amount of demand over time (and therefore gains from one-off deviations may be increased). We note that such contracts are a rare occurrence in the cement market.
127. We analysed the concentration in the customer base for cement in the 'Cement customer switching' working paper. Table 7 shows the 20 largest bulk cement customers, their total purchases in 2007 to 2011, as well as their share in proportion of total bulk cement sales. We see a high concentration if we include the Majors own RMX businesses: the Majors account between them for around 60 per cent of all bulk cement purchases. However, if we exclude the Majors, the largest independent customers do not account for a large proportion of purchases of cement ([X] per cent for the largest, [X]).
128. Even if some customers are very large, they would generally have many different sites purchasing cement, and would switch at site level rather than for their entire demand because of geographical constraints, so it is unlikely that a deviator would be able to capture the entire demand of a large multi-site customer.

TABLE 7 Top 20 bulk cement customers over 2007 to 2011

[X]

129. Data on concentration of bagged cement customers was presented above (paragraph 43), and shows a higher degree of concentration in the customer base for bagged cement.
130. Because deviations from coordinated outcomes are likely to take place by targeting individual customers of competitors, and because, apart from the Majors themselves, most cement customers do not account for a large proportion of purchases of cement, the potential gains from one-off deviations may be relatively limited. We also note that the larger the customers targeted by the deviator (in order to maximize any gains from deviation), the faster any such deviation is likely to be detected by competitors, as GB cement producers are likely to monitor closely their largest customers.
131. Another possible deviation strategy would be deviation through RMX business: lowering the prices of RMX to final consumers in order to increase a GB producer's share in integrated RMX business and indirectly thereby increase that producer's cement sales at the expense of other producers' cement sales. We consider such deviation strategies (and corresponding punishment strategies) in a separate subsection below.

Punishment/deterrent strategies

132. In order for coordination to be sustainable, cement producers must lack an incentive to deviate from coordinated outcomes, because of the expected reaction from others to such deviation. There must therefore be a mechanism by which the profits of the deviator are reduced once a deviation has been detected. There is a relationship between the type and strength of punishment required and the type and strength of deviation strategies: the higher the potential profits from deviation, the larger the cost

on the deviator needs to be in a punishment period to provide sufficient disincentive to prevent further deviations from occurring.

133. Given that prices are individually negotiated with customers in the cement market, and that deviations are more likely to occur at relatively small scale by approaching individual customers of other cement suppliers, a 'tit-for-tat' strategy of punishment may be sufficient to deter deviations in many cases.

Tit-for-tat strategies

134. A tit-for-tat strategy can be described as follows:
- (a) Deviation: Firm A deviates by gaining X amount of volume from Firm B, by setting low prices to one or several of Firm B's customers in period t.
 - (b) Tit for tat: Firm B retaliates by setting low prices to Firm B's customers, gaining total volumes of Y from Firm A.
135. Tit-for-tat strategies may not work if a deviator can capture a very large share of the market in the period of deviation. However, in the cement market where deviations are likely to be relatively small-scale in most cases, retaliation based on regaining the equivalent amount of volumes from the deviator may be sufficient to prevent deviations:
- (a) In the period of deviation, the deviator gets additional profits through increased volumes though at lower margins than on previous sales (because of the need to reduce price in order to attract customers from competitors).
 - (b) In subsequent periods, the deviator's total volume sales will go back to coordinated levels (or reduce if the punishment exceeds the deviation), but margins will be lower.

136. We can see that, if any additional profit from deviations can be reduced by equivalent action in subsequent periods by competitors, profits from deviation may be short-lived.

Other possible deterrent mechanisms

137. The vertical integration of cement producers may provide further opportunities to impose costs on any deviator. Here we consider two additional mechanisms to impose costs on a deviator:

(a) changes in the amount or terms of cross-sales; and

(b) deviation and punishment through RMX prices.

Changes in the amount or terms of cross-sales

138. As set out above, there have been large changes in the extent of cross-sales since 2009. We also found that some of the changes in cross-sales had been defensive: for instance, in 2009, when Major A internalized purchases from Major B, Major B reacted by internalizing its own purchases as well as increasing sales to [REDACTED] and [REDACTED]. This suggested to us that changes in the extent of cross-sales could be used to react as a retaliation mechanism.

139. [REDACTED] the pricing of cross-sales may also be used as a mechanism to retaliate against deviations. [REDACTED]

140. We also found some evidence of changes in cross-sales being used as a mechanism to signal to a potential a competitor that a deviation has been detected in our review of internal documents: [REDACTED].

Deviation and punishment through RMX prices

141. Another possible mechanism for deviation and punishment is through the downstream RMX operations of the GB producers: if Firm A reduces the price of RMX it charges to its RMX customers, and if this results in increased sales of RMX by Firm A to the detriment of other RMX operators, this may increase Firm A's internal sales of cement and thereby result in an increase in Firm A's sales. However, this can only be successful if a number of conditions are satisfied, and deviating in this manner 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 (extent to which cement costs reduction result in lower RMX price).
 - (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.
 - (c) The extent to which the integrated RMX producers of cement producer 1 compete directly with RMX producers of cement 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. The highly localized nature of RMX markets is likely to reduce the effectiveness of deviating through reducing internal prices of cement.
 - (d) Moreover, a GB producer will only be able to increase its cement market share in this way if, in the areas where it has RMX operations, it is competing with RMX plants supplied by competing GB producers. If it is competing with RMX plants served by its own cement operations, this may not change market shares.
142. 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 RMX customers who are currently supplied by competing suppliers, reducing the incentives to deviate in this way. The same reasoning applies to punishment through lowering of RMX prices: such a mechanism is likely to be a less effective and less immediate way of retaliating against any possible deviations in cement. However, on the other hand, punishment through RMX prices may be more effective in terms of having a very narrow focus, ie on a specific geographic area where a specific competitor may have operations, and therefore with less risk of 'price leakage' or inadvertent punishment of non-deviators.

Accidental punishment and/or erosion of prices

143. The amount of information available to cement producers may not be perfect, and a risk factor that may generate instability in coordination is incorrect or accidental punishment when no deviation has actually occurred. Given the amount of information available to cement producers on their monthly share of GB production and the feasibility of monitoring customer switching, as well as the presence of the GB producers on the downstream markets enabling the gathering of information on downstream demand conditions and large projects, such risks may be relatively low. Indeed, by monitoring both share of production and switching, the GB producers should be able to find out, when they have experienced a reduction in their monthly production share, whether this is due to a loss of customers to other GB producers (which could be considered as a deviation requiring action) or whether it is due to loss of customers to fringe players (importers) or due to their own customers not performing well in downstream markets.

External stability

144. Coordination needs to be externally sustainable, in that coordination is unlikely to be undermined by competition from outside the coordinating group or from the reactions of customers.

Entry into GB cement production

145. If barriers to entry are low, the threat of entry by non-coordinating firms will tend to undermine coordination. Our analysis of the barriers to entry into GB cement production was set out in the working paper '[Barriers to entry and expansion](#)'. We found that there were high barriers to entry into GB cement production, and that new entry into GB cement production was unlikely to be attractive.

Cement imports

146. The other source of cement supplied in GB, other than the cement which is produced in GB, is cement imported into GB. The constraint from imports of cement was considered in the '[Cement imports](#)' working paper. We found that, while there is evidence that the GB producers regard imported cement as a competitive threat, the ability of cement imports to undermine coordination (if it exists) may be limited because:

- (a) GB cement producers have a substantial cost advantage over cement importers in competing for customers at the margins;
- (b) the higher costs faced by cement importers create incentives for them to price their cement just below the price of GB produced cement; and
- (c) the GB cement producers consider, and in some cases take, specific steps to undermine the viability of imported cement, such as applying pressure to cut off cement supplies to independent importers, purchasing import terminals and targeting lower-priced cement selectively at customers of cement importers.

147. The more recent internal documents we have reviewed suggest that importers of cement are closely monitored and, in some cases, steps are taken to react against this threat which may go beyond simply competing on price/better service etc, including: [✂].
148. We also did an analysis of the cost structures of cement importers in the working paper on the assessment of cost structures and profit margins. In this working paper, using P&L data from four independent importers, we analysed whether the independent cement importers had any cost disadvantage when competing against the GB producers' cement divisions. We did this by comparing each cement importer's unit total costs (as measured by total cost by tonne sold) against the average ex-works market price of cement produced in GB (as measured by unit net revenues from external sales of the Majors' cement divisions). We found that for the cement importers we covered, their unit total costs were generally higher than the average ex-works price of domestically produced cement, such that even before taking into account a cement importer's own required margin, the cement importer had a cost disadvantage in competing against the price of domestically produced cement.
149. We also considered whether the high degree of vertical integration by the GB cement producers may create a barrier to expansion for independent cement importers. The potential market available to independent cement importers has reduced over time as the major cement producers have integrated vertically into RMX production and increasingly supplied their RMX plants with their own cement, making the addressable market smaller. This smaller market may be less attractive to new importers and limit the ability of existing importers to expand. Our analysis of cement purchases showed that, over the period 2007 to 2011, 61 per cent of all purchases of bulk cement in GB were by the vertically integrated downstream operations of the

Majors. This means that the potential market available to independent cement importers is limited to the remaining 40 per cent of bulk cement purchases.

Cement buyers

150. Another possible way in which coordination could be undermined is because of the reactions of customers: if certain buyers possess buyer power, they may be able to limit the ability of GB cement producers to coordinate.
151. However, because prices of cement are individually negotiated and show dispersion, the fact that some buyers may be able to exert a degree of buyer power may not necessarily undermine coordination, though it may mean that coordinated prices are eroded for some customers with large buyer power.
152. This may imply that certain buyers (such as the larger independent RMX operators— [X] and [X], and the large bagged cement purchasers—national builder merchant chains) may be able to protect themselves against price increases. However, because of the price discrimination in cement, ability of certain cement buyers to exert a degree of buyer power is unlikely to undermine the ability of GB cement producers to coordinate on sales of cement to other buyers.

Conclusions on the conditions for coordination

153. Overall, therefore, it appears that the conditions for coordination to emerge are likely to be met, in relation to the ability to reach and monitor coordination, the existence of a mechanism for internal sustainability and the external sustainability of coordination.
154. We have considered how vertical integration by the GB cement producers into RMX production may affect ability and incentives to coordinate in various sections above, and found that vertical integration is a factor that is likely to facilitate coordination in

the cement market. Appendix 4 of this working paper sets out in more detail our assessment of whether coordination is likely to be facilitated by vertical integration compared with a counterfactual where there is no such vertical integration.

The mechanism for coordination

155. Based on the analysis above, we therefore consider that coordination in the cement market, if it has been occurring, could be based on the following mechanism:

- (a) Coordination on shares of cement production as well as customer allocations between Lafarge, Cemex and Hanson with no coordination directly on prices as these are individually negotiated.
- (b) Coordination is likely to be on overall production of cement, including both bagged and bulk cement and the different types of cement.
- (c) Signalling of desired direction of prices of cement through price announcement letters; with Lafarge often acting as the leader in setting the levels of price increases.
- (d) Another possible way of signalling the desired level of prices for cement is through cross-sales and members of the coordinating group accepting the purchase of cement at high prices from each other (thereby signalling that the prices they charge to themselves, and to their customers are also high—otherwise they would not be willing to pay high prices to other cement suppliers).
- (e) The presence of cross-sales and pricing for such cross-sales may also offer opportunities for side payments or for re-establishing market shares when these have changed (eg if Producer A's share has increased compared with B, it then increases volumes of cement purchased from B, or reduces the price of cement sold to B).
- (f) Monitoring of adherence to the coordinated outcome through monitoring of own market share on a monthly basis, using information from the MPA supplemented by monitoring of customers won and lost and whom they were won/lost from, as

well as information on prices of cement gathered from cement customers and through cross-sales.

(g) Prevention of deviation: given the fact that prices are individually negotiated, any deviations from coordination are most likely to take place by a firm approaching individual customers of other members of the coordinating group with low cement prices in order to induce these customers to switch. Such attempts at deviation could be punished through the following mechanisms:

- (i) Internalization: although not necessarily a credible punishment mechanism in all cases (because of low volumes of cross-sales currently in place), small-scale internalization may be sufficient for Firm A to signal to Firm B that an attempt at deviating has been detected (if Firm A purchases some cement from Firm B); If Firm A does not purchase cement from Firm B but sells cement to Firm B, another mechanism to signal that a deviation has been detected may be for Firm A to increase cement prices to Firm B, or to renegotiate on rebates.
- (ii) 'Tit for tat': if Firm A loses share to Firm B, Firm A will regain at least the equivalent amount of volumes from Firm B. This will quickly result in unchanged market shares but lower average prices (because of the need to offer lower prices to induce customers to switch), and therefore may cancel out benefits from deviations obtained by Firm A.
- (iii) Other possible punishment mechanisms: The extensive multi-market contact of the GB cement producers (eg in GGBS, aggregates, RMX and asphalt) may provide further opportunities for punishing deviations.

156. We consider that, if coordination exists, there is no reason why it should not relate to several product markets (bulk and bagged cement, and possibly GGBS). In relation to the distinction between bulk and bagged cement, although we consider these to be in different product markets due to the lack of demand-side substitution between

them, from the production point of view they are largely interchangeable. With respect to GGBS, we note that, even if GGBS is not the core product on which coordination may take place, retaliation in the event of deviation could encompass GGBS [X] increasing prices of GGBS to other GB cement producers. In addition, it is possible that the threat of [X] importing GGBS to sell to independent customers may also be an additional mechanism to prevent [X] from deviating in cement.

157. We also consider that vertical integration into RMX production is likely to be an important factor in the mechanism for coordination identified above:
- (a) The increase in vertical integration by the GB cement producers is likely to act as a barrier to entry and expansion into the cement market by fringe players (see paragraph 149).
 - (b) Vertical integration increases considerably the amount of transparency in the market, in particular because it provides the opportunity and logistical justification for cross-sales of cement between the GB cement producers (increasing price transparency, both through price announcement letters but also because the price that Producer B accepts to pay from Producer A conveys information on the price it charges itself internally and to other customers) but also through better information on downstream demand conditions.
 - (c) The presence of cross-sales can also provide a means for GB cement producers to rebalance market shares (by increasing or reducing cross-sales when necessary), to signal that deviations have been detected through internalization or changes in the terms of cross-sales, and may also provide opportunities for side payments.

Incentives to coordinate

158. We now analyse the incentives of the GB producers to adhere to such coordination, in order to conclude whether such coordination is likely to take place.

159. First of all we note that the incentive to coordinate in cement is likely to be high: cement is a relatively homogeneous product which can be transported over large distances. This lack of differentiation implies that competition between cement producers on prices could be strong and lead to low returns (particularly in times of excess capacity).
160. The incentive to adhere to coordination of each GB cement producer will depend on the size of potential profits from deviation to each producer compared with the costs from retaliation, and how these compare with the profits from coordination. This is likely to vary for each producer depending on:
- (a) its relative efficiency;
 - (b) its overall market share;
 - (c) the amount of spare capacity available to this producer; and
 - (d) its degree of vertical integration and exposure to external market sales.
161. The analysis of the cost structures of the GB cement producers showed that these were broadly similar, particularly between [REDACTED], and therefore we do not consider further whether differences in efficiencies of the GB cement producers may impact incentives to coordination.
162. However, there are asymmetries between the GB producers in terms of market share, amount of available spare capacity and degree of vertical integration, and we analyse now how these may affect the ability to reach coordination. Table 8 shows, for each cement producer in GB, its share of GB cement production, its total spare clinker capacity, its total internal sales and total external sales in 2011.

TABLE 8 Capacity share, production share, internal/external sales split and spare capacity of the GB cement producers in 2011

	<i>per cent</i>					
	<i>GB clinker capacity share</i>	<i>GB production share 2011</i>	<i>Total internal sales 2011</i>	<i>Total external sales 2011</i>	<i>Spare clinker capacity in 2011</i>	<i>Spare clinker capacity in % of total clinker capacity</i>
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]

Source: GB cement producers—all cement products including bagged and bulk. Tarmac sales to TBP counted within internal sales.

163. We see that there are some differences between the GB cement producers in terms of their total share of capacity and of production, total spare capacity and the split of their sales between external and internal sales:

- (a) Lafarge is the largest cement producer in terms of capacity and production share, [X].
- (b) Hanson and Cemex are both medium-sized GB producers, [X].
- (c) Tarmac is the smallest GB producer in terms of capacity and production share; [X]). Its internal cement sales, [X] represent the vast majority of its sales ([X] per cent).

164. These asymmetries in capacity, market shares, degree of vertical integration and amount of spare capacity mean that different cement producers may have different incentives to coordinate and may therefore impact the internal sustainability of coordination.

Asymmetries in market shares

165. At first glance, market share asymmetries may make coordination more difficult to achieve, because a firm with a lower market share may have more to gain from a deviation (larger potential for an increase in sales if it deviates) and less to lose from retaliation (because its profits from coordination will be lower with a smaller share,

and therefore the difference between coordination profits and retaliation profits is lower). We note, however, that this assumes that the smaller firm has equivalent capacity to the larger firm and is therefore able to capture a large part of the market if it deviates. However, the reason for the asymmetries in market shares in cement is likely to be largely due to differences in production capacities: As set out in Ivaldi et al (2003),¹⁷ the relevant question to assess the impact of asymmetries in market shares on coordination is why market shares are asymmetric, and how these factors impacts coordination.

166. Differences in production capacities are likely to be the main factor explaining the differences in market shares: we note from Table 8 above that production shares are very similar to capacity shares, and that [X] actually has a production share which is slightly below its capacity share (suggesting it is withholding production more than the other cement producers). The incentives on [X] and [Y] to deviate will therefore be limited by their total cement capacity, and are likely to be similar, in that respect, to the incentives of [X]. In other words, the fact that production shares are aligned with capacity shares should minimize any asymmetries in the incentives to deviate between [X] and [Y].
167. Moreover, as set out above, there is recent economic literature which emphasizes the role of leadership in facilitating coordination: Mourariev and Rey (2011) show that price leadership can facilitate coordination when prices are set sequentially rather than simultaneously.^{18,19} Harrington (2012) explores how simple strategies based on price leadership and price matching by followers can lead to an understanding on tacit coordination.²⁰ Ganslandt, Persson and Vasconcelos (2012) show that a degree

¹⁷ Ivaldi, Jullien, Rey, Seabright, Tirole, 'The Economics of Tacit Collusion: Final report for DG Competition, European Commission', March 2003: http://ec.europa.eu/competition/mergers/studies_reports/the_economics_of_tacit_collusion_en.pdf.

¹⁸ Mourariev and Rey (2011), 'Collusion and leadership', *International Journal of Industrial Organisation*.

¹⁹ Mourariev and Rey (2011) also contained a review of EC cartel decisions, and found that price leadership features in 16 out of 49 cases they reviewed.

²⁰ Harrington (2012), 'A theory of tacit collusion', working paper, John Hopkins University.

of asymmetry in the size of firms can help coordination if there are some costs to coordinating (such as the costs of monitoring and of buying out or otherwise excluding potential entrants), because the leader may be large enough compared with others to have an additional incentive to cover the costs of coordination.²¹

168. Therefore, we thought that the asymmetry in market shares and production capacity in the cement market, which gives Lafarge a position as a market leader, may in fact be a factor which could facilitate coordination in the cement market. We analyse in more detail the leadership role of Lafarge below.

Asymmetries in amount of vertical integration and exposure to ‘external cement sales’: how does this affect internal sustainability?

169. One of the effects of vertical integration into RMX is likely to be that sales to own RMX operations are more secure than sales to external customers: whereas external customers may switch providers in the event of a change in relative prices, internal sales are unlikely to respond to the same dynamics.
170. Consider the following hypothetical example: Suppose Firm A’s costs of producing cement increase relative to Firm B, and that as a consequence Firm A’s prices of cement increase relative to B. What will be the effect of this on Firm A’s sales?
- (a) External sales: likely to reduce as some customers may switch to Firm B.
- (b) Internal sales: Firm A is unlikely to switch to Firm B for internal sales so internal volumes will remain with Firm A. There may be some reduction in internal volumes in so far as the increase in the cost of cement to Firm A’s internal RMX business may result in a loss of sales by these internal RMX business, however, this effect is likely to be much less strong and less immediate than the effect on external cement sales, because cement is only one of the inputs into RMX—final

²¹ Ganslandt, Persson, Vasconcelos (2012), ‘Endogenous mergers and collusion in asymmetric market structures’, *Economica*.

price of RMX will also depend on other inputs (crucially, aggregates) so overall increase in RMX price will be softened. In addition, RMX demand may depend on many other factors than price—crucially location but also service levels. So for instance, even if the price of Firm B RMX increases relative to others, the impact on volumes may not be strong because an RMX producer will retain a strong advantage for any customers located close by.

171. For these reasons, it is likely that the effect of an increase in the price of cement on cement sales by Firm A will be softened if Firm A has large internal sales. This has consequences on the profits from coordination and deviation/punishment of vertically integrated firms.
172. The larger the amount of sales to external customers, and the more a firm will have to lose during a phase of retaliation because it cannot rely as much on 'guaranteed sales' to internal businesses. In addition, a firm which has high external sales is also likely to be more affected by deviations by others. At the other extreme, a firm which would sell all cement internally could only be punished through downstream RMX prices, which as explained above is likely to be a less immediate and effective punishment mechanism.

Role of Lafarge

173. As set out above, Lafarge is the largest cement producer in GB (in terms of capacity and market share) [X]. Overall, therefore, Lafarge is likely to be the cement producer which bears the highest risks in case of deviation by others: [X]. This may mean that any coordination, if it exists, may rely on Lafarge establishing a strong reputation for retaliation against other producers to prevent deviations (it has every incentive to do so this given that it benefits most from coordination because of its large market share). This may also imply that any coordination may not be as

effective and stable compared with a situation where all producers had similar degrees of vertical integration.

174. The fact that Lafarge would benefit most from coordination (as the largest cement producer), as well as is likely to bear the highest risks in case of deviation [REDACTED] is likely to provide Lafarge with the incentive to take a leadership role in any coordination (such as leadership in price announcements, as well as in close monitoring and punishment of any deviations). It is also likely to give Lafarge the incentive to take on any costs of coordination, such as the costs of holding excess capacity and the costs of accommodating the growth of the competitive fringe (in terms of market share loss). In this respect, we noted that there was evidence that Lafarge had a leadership role in the cement market, which could facilitate coordination:

(a) As set out above, we found that Lafarge was often the first to announce price increases to its customers.

(b) We also found that Lafarge [REDACTED].

(c) There was also evidence that Lafarge's market share had reduced [REDACTED] which suggested that Lafarge may have taken most of the costs of accommodating the growth of the fringe and which would be consistent with Lafarge aiming to maintain stability in the market.

(d) Our analysis of cross-sales showed that, despite large reductions in cross-sales [REDACTED], Lafarge remained a large seller of cement to each of the other GB majors (with the exception of [REDACTED]) in 2011, selling over [REDACTED] per year to [REDACTED]. This is likely to provide Lafarge with some leverage towards the other cement producers, and also provide a means for Lafarge to signal to [REDACTED] and [REDACTED], through change in terms of supplies, when a deviation has been detected. The fact that Lafarge continues to sell cement to all other Majors also means that any price increase

letters sent by Lafarge would be communicated to all other Majors in their quality of customer.

Role of Hanson and of Cemex

175. Hanson and Cemex are both medium-sized cement producers, [REDACTED].

176. [REDACTED]

177. Cemex and Hanson are likely to have strong incentives to adhere to any coordination: they benefit strongly from coordination due to their size, can be punished in the event of a deviation because of their [REDACTED] external sales of cement, and can punish others due to the fact that [REDACTED]. Our review of internal documents also suggested that [REDACTED] behaviours in the market (replying to loss of customers by retaliating against the producer responsible, strategic objectives of market share stability and price announcement behaviour, among others) were consistent with some form of coordination between [REDACTED].

Role of Tarmac

178. Tarmac is in a very different position to Lafarge, Hanson and Cemex: it has the lowest market share and production capacity, and is the producer with the highest degree of vertical integration: [REDACTED]. Tarmac also appears to have the most modern and most efficient cement plant in GB (see working paper on assessment of cost structures and profit margins), [REDACTED]. Tarmac is also different because, [REDACTED], its cement division contributes only [REDACTED] per cent to its consolidated profits, which may imply that it has different profit drivers to the other three GB cement producers.

179. Tarmac told us that, as a result of its very high degree of vertical integration and its strategy to self-supply cement, it only sells cement to external customers on an

opportunistic basis, when the margins achieved on external sales exceeds any loss of margin due to having to purchase cement from other GB cement producers in order to be able to sell the cement externally.

180. As a result of this high degree of vertical integration, and of Tarmac incentives of selling externally only when the margin is high enough to compensate for having to buy from other GB producers, we see that:
- (a) Tarmac is likely to be difficult to punish: its low external sales means that, if it increases share compared with the other GB cement producers, it will be difficult to target Tarmac due to its low external sales volumes; and
 - (b) Tarmac is also unlikely to have an incentive to undermine any existing coordination: it will only sell cement when the price is sufficiently high, and it has limited ability to significantly increase sales of cement to external customers because of its high internal sales.
181. On balance, it therefore seems appropriate to consider Tarmac as a fringe cement player which lacks both the incentive and the ability to significantly undermine coordination. We also note that the evidence from the price announcement letters as well as the evidence from the analysis of price correlation shows that the pricing behaviour of Tarmac is aligned with that of the other cement producers.

Role of Aggregate Industries

182. Aggregate Industries is the only GB Major without GB cement production capability. It imports cement from its parent company (Holcim) into GB, and also buys [REDACTED] of cement in GB ([REDACTED]). We considered the role of Aggregate Industries as an importer of cement, and its ability to constrain prices in GB, in the '[Cement imports](#)' working paper.

183. We found that, though Aggregate Industries is [REDACTED], Aggregate Industries imports cement predominantly for internal use ([REDACTED] imports are used internally). In addition, Aggregate Industries also buys [REDACTED] cement from the GB producers, [REDACTED]. Overall, Aggregate Industries purchased [REDACTED] of cement in 2011, of which [REDACTED] were [REDACTED] and [REDACTED] were purchased from [REDACTED], and [REDACTED] were purchased from [REDACTED].
184. Aggregate Industries is therefore in a unique position: it has [REDACTED] for cement [REDACTED].
185. We also reviewed evidence on the prices charged for cement by the other GB Majors to Aggregate Industries in the working paper '[Cross-sales in bulk cement](#)' and how these compared with the prices to independents, controlling for distance and size of customer. [REDACTED] We therefore focus here on the prices charged by [REDACTED] and [REDACTED] to Aggregate Industries. We found that:
- (a) the average price charged to [REDACTED] until Q1 2009; since Q2 2009 the average price charged by [REDACTED]; and
 - (b) the average price charged by [REDACTED] between Q1 2007 and Q4 2011.
186. This evidence strongly suggests that Aggregate Industries, [REDACTED], is able to [REDACTED]. However, we note that Aggregate Industries external sales of imported cement are very low, which suggests that Aggregate Industries' [REDACTED] imports are unlikely to be a constraint on the prices of cement charged by GB producers on customers other than Aggregate Industries.
187. We also note that the fact that Aggregate Industries [REDACTED] purchases of cement from GB producers may act as a disincentive for Aggregate Industries to sell cement to independent customers, as the GB cement producers could react to this by increasing the price of cement charged to Aggregate Industries. Our review of

Aggregate Industries' internal documents also [REDACTED]. Our review of internal documents [REDACTED].

188. We also analysed the role of Aggregate Industries at the time of the large internalization of purchases [REDACTED] in early 2009. As set out in the working paper 'Analysis of the internalization of cement purchases', [REDACTED], at the same time as the internalization was taking place, contributing to the rebalancing of [REDACTED] and [REDACTED] relative market shares. [REDACTED], that [REDACTED] targeted Aggregate Industries quite aggressively at the time, and that [REDACTED]. Our review suggested that Aggregate Industries switched to [REDACTED] because it was in its own interests to do so, and not because of any concerns regarding maintaining stable market shares in the cement market.
189. Overall, the evidence suggests that Aggregate Industries [REDACTED], but that it does not constrain the GB cement prices to other buyers, because it only sells small amounts of its cement to external customers, and does not have the incentive to increase imports to independent customers because [REDACTED] and because the GB cement producers could retaliate by increasing prices to Aggregate Industries. [REDACTED] Aggregate Industries [REDACTED] its presence would not appear to prevent Lafarge, Cemex and Hanson coordinating on sales of cement to other GB cement customers.

Overall effects of the mechanism of coordination

190. The mechanism which we set out is based on cement producers limiting competition between them, as a result of the recognition of their mutual interdependence, by mitigating any incentives to increase volumes and market shares. Such a mechanism, if it is effective, is likely to dampen any price competition between GB producers and therefore result in higher average prices for cement than if GB cement producers actively sought to increase market shares.

191. We also considered the effect of such coordination on the differential in prices between independents and Majors. [✂]
192. Therefore, we do not think that the aim of coordination in cement, if it exists, is to increase the prices paid by independent customers relative to prices paid by the integrated RMX operations of the Majors. Rather, we think that the aim of coordination, if it exists, is likely to be to raise the ultimate price of cement paid by GB cement users—whether this cement is ultimately sold through independent RMX and concrete producers, independent merchants or through the vertically integrated arms of the GB cement producers.
193. [✂]

Conclusions

194. We have reviewed the evidence on the structure of the cement market, the conducts observed and some of the outcomes of competition in the cement market. We have found that the cement market is characterized by high concentration, a significant degree of transparency, frequent interactions between the main cement producers and a lack of complexity in the competitive environment. These factors, taken together, suggest that the GB cement producers are likely to have strong awareness of each other's actions and may be able to anticipate each other's future actions, which could lead to strategic interdependence in the competitive behaviour of the cement suppliers and a degree of coordination.
195. In addition to this, we have seen evidence of behaviour by some GB producers based on the maintenance of stable market shares, and, when faced with loss of market share, retaliation by recovering market share from the competitor to whom it was lost ('tit-for-tat' strategies). Such types of behaviour could lead to coordinated

outcomes, with market shares as the focal point for coordination. We therefore analysed whether the conditions for coordination were likely to be met, with market shares as the focal point for such coordination, and found that these conditions were largely met. We also found that it is likely to be in the interests of Lafarge, Cemex and Hanson to adhere to such coordination, whereas Tarmac is likely to be a fringe player. Furthermore, Lafarge's position as the largest cement producer, [X], is likely to give it strong incentives to take a leadership role in any coordination—and in particular to take on the costs of coordination (including the costs of accommodating the growth of fringe cement suppliers).

196. Overall, the likely effects of such form of competition are likely to result in higher prices of cement in GB. Though certain buyers (such as [X] and some of the larger bulk and bagged cement buyers) may be able to exert a degree of buyer power and resist price increases, the exercise of such power may not benefit customers of cement more generally because of the high degree of price discrimination in the market.

Coordinated effects in cement: capacity in cement

Relevance of analysis of capacity

1. Capacity analysis is an important aspect of the analysis of the ability to and incentives for coordination:

(a) *Spare capacity affects ability to deviate and to punish.* Capacity constraints affect both the ability to deviate and to punish: A capacity constrained firm has less to gain from undercutting its rivals; however, capacity constraints also limit firms' ability to punish deviators. There are no generalizations that can be made on the impact of spare capacity on ability to coordinate given this ambiguous effect.¹ In the absence of general results, it is difficult to form any predictions on the amount of spare capacity required for coordination to be sustainable: we would expect that producers will need some spare capacity to punish deviators in order for coordination to occur,² but that very large excess capacity will make coordination harder to sustain if it causes producers to produce below minimum efficient capacity utilization as the incentives to increase production would then be very strong. The amount of spare capacity necessary in order to have a credible punishment threat depends on several factors, including the form of punishment (eg if firms can target customers of the deviator to punish it, this requires less spare capacity than if they can only punish through market-wide price reductions).

(b) *Spare capacity also affects the sustainability of coordination by affecting the alignment of incentives to coordinate.* Compared with a situation where all firms face the same capacity constraints, increasing the capacity of one firm only both increases the first firm's incentive to undercut the others and limits these other

¹ See Ivaldi, Jullien, Rey, Seabright and Tirole, *The Economics of Tacit Collusion—Final Report for the DG Competition*, March 2003, p41.

² If capacity is scalable, firms may be able to deviate and punish by increasing their capacity. For cement, costs and timings of increases in capacity will preclude this in most cases, though in some instances if there is mothballed capacity this may be a possibility.

firms' ability to punish such deviations. Overall, therefore, introducing asymmetries in capacity constraints may hinder sustainability of coordination. Ivaldi et al (2003) find that, if a firm has higher capacity, to induce the firm to coordinate, it will be necessary to give the firm a higher market share (and indeed, they show that the best way to prevent firms from deviating from coordination in case of asymmetric capacities is to allocate market shares which are proportional to production capacities). Therefore, an analysis of the distribution of excess capacity among players, and of how market shares relate to total capacity, is relevant to our analysis of the sustainability of coordination in the cement market.

2. We note here that there is no single measure of total capacity to produce cement. The ability of a cement producer to increase production above current levels will vary depending on the timeframe considered: the longer the timeframe, 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). The relevant timeframe for analysis of incentives to deviate and punish is a matter of judgement, but given that deviations are likely to be detected quickly in cement (because deliveries to RMX operators are likely to be weekly, and monthly data on market shares is available enabling monitoring), it seems relevant to consider firms' ability to expand production within a relatively short time frame: the ability to expand production within three to four months seems like a reasonable starting point.
3. Related to the timeframe, there will also be different costs for expanding production above a given level. For instance, re-instating mothballed capacity will entail costs above the existing variable costs of production. Similarly, increasing cement production by grinding imported clinker may also entail different costs from producing

additional GB clinker. In terms of thinking about ability to punish and deviate, it seems more relevant to look at the ability to increase production within the existing costs structure, rather than by incurring substantial additional costs.

4. The remainder of this appendix is organized as follows: 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 utilization for 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

5. 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).
6. Cement can be produced in GB either:
 - (a) by producing clinker in GB and then grinding the clinker into cement: or
 - (b) by importing clinker into GB and grinding the imported clinker in GB grinding plants.
7. 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.
8. 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.^{3,4}

9. 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].

10. 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). In addition, as set out above, it would be incorrect to assume that cement capacity was the same as milling capacity if there was insufficient clinker capacity to feed that milling capacity.

11. 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 shut downs, and possible seasonality though this may not affect clinker too much), which mean that

³ [REDACTED] noted that this would not necessarily be the case and would depend on the price at which clinker can be bought.

⁴ [REDACTED] told us that it was not the transport and logistics costs which make clinker imports more costly, but the associated costs of storage and grinding mills.

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.

12. 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 interesting, rather than percentages of spare capacity by plant.

Cemex

13. 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 below 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 re-opened 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— <i>replaced by Tilbury</i>	[X]
Tilbury	Grinding plant	Opened in Q3 2009	[X]

Source: CC, based on Cemex data.

14. 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.

15. 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 sustainably operate two kilns 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.

16. 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].

17. 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.

18. The annex sets out how we calculated total capacity for clinker and cement at Cemex's plants. Results are summarized in Table 2. Note that, in Table 2, 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***

	<i>tonnes</i>							
	<i>Total clinker capacity</i>	<i>Total clinker production</i>	<i>Amount of spare clinker capacity</i>	<i>Clinker utilization ratio %</i>	<i>Total cement capacity</i>	<i>Total cement production</i>	<i>Amount of spare cement capacity</i>	<i>Cement utilization ratio %</i>
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).

Notes:

1. 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.
2. We also exclude from analysis capacity at Barrington from 2009 as we understand the plant was closed from Q4 2008.

19. 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**

	<i>tonnes</i>					
	<i>Clinker capacity</i>	<i>Clinker production</i>	<i>Clinker utilization ratio %</i>	<i>Cement capacity</i>	<i>Cement production</i>	<i>Cement utilization ratio %</i>
Rugby	[X]	[X]	[X]	[X]	[X]	[X]
South Ferriby	[X]	[X]	[X]	[X]	[X]	[X]
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.

Note: 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.

Hanson

20. 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**

	<i>Type of facility</i>	<i>Status in 2012</i>	<i>Approximate clinker capacity in 2011</i>
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 kilns (Kiln 7)—kilns 5 and 6 were decommissioned in 2005	Open—some grinding mills mothballed	[X]

Source: CC based on Hanson data.

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

22. Hanson told us that there is a difference between mothballing a kiln and mothballing a grinding mill. In the case of a mothballed kiln, Hanson told us that it is 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 has been mothballed, Hanson told us that it was substantially easier to restart a mothballed mill (and that mothballed grinding/milling capacity has therefore been included in the effective capacity figures).
23. [✂]
24. 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 told us 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.
25. The detailed assumptions used by Hanson to calculate its cement and clinker capacities are presented in the annex, 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>tonnes</i>							
	<i>Clinker Capacity</i>	<i>Clinker production</i>	<i>Spare clinker capacity</i>	<i>Clinker utilization %</i>	<i>Cement capacity</i>	<i>Cement production</i>	<i>Spare cement capacity</i>	<i>Cement utilization %</i>
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 Hanson data.

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

26. Table 6 below 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 [X] in terms of clinker production, whereas clinker utilization at [X] ([X] per cent utilization). [X]

TABLE 6 Hanson capacity and utilization by plant in 2011

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

Source: CC based on Hanson data.

Lafarge

27. Lafarge currently has 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. Lafarge also has a number of depots with blenders which have not been added to this table (Dewsbury, Seaham, Theale, West Thurrock), because these do not provide any additional cement production capacity.

TABLE 7 Lafarge cement plants

<i>Plant</i>	<i>Type of facility</i>	<i>Status in 2012</i>	[X]
Aberthaw	Cement plant	Open	[X]
Cauldon	Cement plant	Open	[X]
Dunbar	Cement plant	Open	[X]
Hope	Cement plant	Open	[X]
Barnstone	Grinding/blending plant for packed cement	Open	[X]
Westbury	Depot/possible 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	Open but not as a cement clinker plant	[X]
Northfleet	Cement plant; closed in March 2008	Closed	[X]

Source: CC based on Lafarge data.

28. 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.
29. In addition, Lafarge also closed down clinker production at Barnstone in 2006. Lafarge told us [X].
30. We set out in the annex the assumptions used by Lafarge to calculate clinker and cement capacity. [X] This would suggest either that [X].

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

	tonnes							
	Clinker capacity	Clinker production	Spare clinker capacity	Clinker utilization %	Cement capacity	Cement production	Spare cement capacity	Cement utilization %
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 Lafarge data.

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

31. Table 9 shows Lafarge capacity and capacity utilization for each clinker producing plant in 2011. We see that clinker utilization is highest [X] and [X] utilization is also relatively high [X], and [X] utilization is lowest [X]. In terms of cement utilization, the utilization rates are [X], and we see that [X] are close to full capacity in terms of cement production. However, we also think that additional clinker could be produced at [X] and ground elsewhere ([X]), so we think that clinker utilization is a better measure of cement capacity for Lafarge.

TABLE 9 Lafarge capacity and utilization by plant, 2011

	Clinker capacity	Clinker production	Clinker utilization %	Cement capacity	Cement production	Cement utilization %
Aberthaw	[X]	[X]	[X]	[X]	[X]	[X]
Cauldon	[X]	[X]	[X]	[X]	[X]	[X]
Dunbar	[X]	[X]	[X]	[X]	[X]	[X]
Hope	[X]	[X]	[X]	[X]	[X]	[X]
Other facilities production					[X]	
Total	[X]	[X]	[X]	[X]	[X]	[X]

Source: CC, based on Lafarge data.

Tarmac

32. 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],⁵ and had a nameplate capacity of [redacted] tonnes per day of clinker.

33. Tarmac told us that in April 2008, [redacted] was invested to increase K1's cement capacity to [redacted] tonnes per year ([redacted] tonnes of clinker per day).
34. Tarmac did not explain how it had calculated cement capacity at Tunstead.⁶ 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 taking into assuming [redacted] days' maintenance time and a [redacted] per cent performance factor.⁷

⁵ Tarmac told us that K1 [redacted].

⁶ Note that 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.

⁷ These assumptions are based on the assumptions made by Lafarge, Hanson and Cemex for calculating clinker capacity, as set out in the annex. Given that 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

					tonnes	
	Cement production	Annual cement capacity	Utilization based on nameplate capacity %	CC estimated cement capacity*	Spare cement capacity using CC est capacity	Utilization based on CC est capacity %
2001	[X]	[X]	[X]	[X]	[X]	[X]
2002	[X]	[X]	[X]	[X]	[X]	[X]
2003	[X]	[X]	[X]	[X]	[X]	[X]
2004	[X]	[X]	[X]	[X]	[X]	[X]
2005	[X]	[X]	[X]	[X]	[X]	[X]
2006	[X]	[X]	[X]	[X]	[X]	[X]
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]

Source: CC, based on Tarmac data.

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

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

Overall GB cement capacity

35. 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 the annex 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 the annex, 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.

36. Table 11 summarizes the total clinker capacity of each of the GB producers over time. Lafarge clinker capacity reduced by [X] per cent between 2007 and 2011, Hanson clinker capacity reduced by [X] per cent, [X] per cent, and Tarmac cement capacity increased by [X] per cent.

TABLE 11 Clinker capacity in GB, 2001 to 2011

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

Source: Parties' data.

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

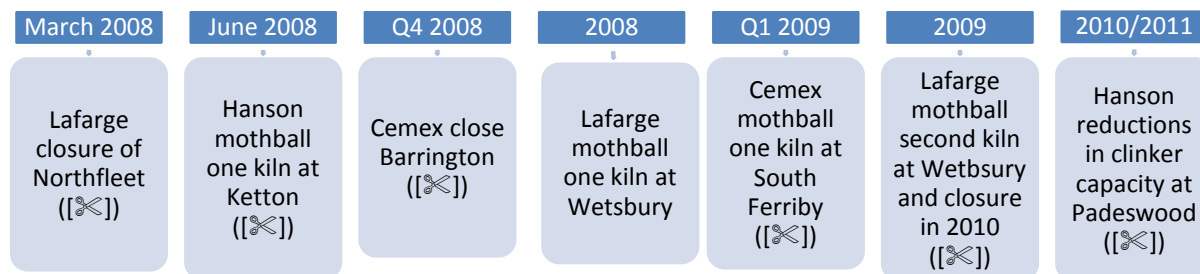
†Tarmac cement capacity (Tarmac did not provide clinker capacity estimates).

37. Table 12 below sets out the timing of the reductions in clinker capacity since 2007.

[REDACTED] Lafarge and Hanson each took steps to reduce capacity in 2008. [REDACTED] In the case of [REDACTED] and [REDACTED], but the mothballing of kilns by Hanson in 2008, the mothballing by Cemex in 2009, and the Lafarge mothballing of Westbury starting in 2008 and ending in 2010 with the closure of Westbury were, according to the firms, [REDACTED].

FIGURE 1

Timeline of reductions in cement capacity since 2007



Source: CC based on data from Lafarge, Hanson and Cemex.

38. Table 12 below 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.⁸ It is therefore more meaningful to compare 2007 with 2011. We see that

⁸ The way in which Parties calculated overall yearly capacity in event of mid-year closures is not always consistent.

[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] per cent 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 parties' data.

39. 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 parties' data.

40. If we look at shares of cement capacity⁹ 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	[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 parties' data.

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

Availability of spare capacity

42. Chart below 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.¹⁰

43. [X]

44. [X]

⁹ In this table, cement capacity shares are as re-calculated by the CC in the annex: ie capacity to grind cement based on GB clinker production capacity.

¹⁰ [X] told us that annual capacity was allocated evenly against the months the plant was open, [X] 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

[REDACTED]

Source: CC based on data from Lafarge, Hanson, Cemex and Tarmac.

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

45. Hanson had [REDACTED], and [REDACTED] per cent of total GB clinker production).
46. 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.
47. 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 the Chart above only shows 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].
48. 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:
[✂]
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):
[✂]
3. [✂]
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:
[✂]
5. Using these assumptions, Table A1 sets out Cemex's calculations of its total clinker and cement capacity, as well as utilization rates, for 2001 to 2011.

TABLE A1 **Cemex data on total clinker and cement capacity and utilization, 2001 to 2011**

	<i>tonnes</i>						
	<i>Total clinker capacity</i>	<i>total clinker production</i>	<i>Total amount of spare clinker capacity</i>	<i>Clinker utilization ratio %</i>	<i>Total cement capacity</i>	<i>Total cement production</i>	<i>Cement utilization %</i>
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.

6. [X]

TABLE A2 **CC calculations of Cemex capacity, excluding mothballed and closed capacity**

	<i>tonnes</i>						
	<i>Total clinker capacity</i>	<i>total clinker production</i>	<i>Total amount of spare clinker capacity</i>	<i>Clinker utilization ratio %</i>	<i>Total cement capacity</i>	<i>Total cement production</i>	<i>Cement utilization %</i>
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.

Note:

1. 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.
2. We also exclude from analysis capacity at Barrington from 2009 as we understand the plant was closed from Q4 2008.

7. [X]

8. We note that the average amount of clinker required to produce one 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 Parties' capacity to produce CEM I as a more comparable measure of cement capacity. However, Parties told us that it was not possible to estimate capacity to produce CEM I and therefore the data they provided did not enable us to do that calculation.

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 approximative 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 A3 CC calculations of Cemex cement capacity based on GB clinker capacity

	<i>tonnes</i>						
	<i>Total clinker capacity</i>	<i>Total clinker production</i>	<i>Clinker utilization ratio %</i>	<i>Clinker/cement conversion rate</i>	<i>Total cement capacity</i>	<i>Total cement production</i>	<i>Cement utilization ratio %</i>
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 × (365days – 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] 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 × (365days – Planned maintenance time).

13. The reliability coefficient is assumed to be [X] per cent for the mills,¹¹ and the planned maintenance time is [X] hours per year (ie [X] days per year).

14. We note that Hanson excluded mothballed kiln capacity from its total clinker capacity calculations, which we think it appropriate given the costs and times to re-establish a mothballed kiln. Table A4 shows Hanson data on its clinker and cement capacity in GB for 2001 to 2011.

TABLE A4 Hanson clinker and cement capacity and utilization, 2001 to 2011

	<i>tonnes</i>							
	<i>Clinker capacity</i>	<i>Clinker production</i>	<i>Spare clinker capacity</i>	<i>Clinker utilization %</i>	<i>Cement capacity</i>	<i>Cement production</i>	<i>Spare cement</i>	<i>Cement utilization %</i>
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 Hanson data.

¹¹ [X]

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 two 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 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 A5 below.

TABLE A5 CC calculations of Hanson cement capacity based on GB clinker capacity

	<i>Clinker capacity</i>	<i>Clinker production</i>	<i>Clinker utilization %</i>	<i>Cement production</i>	<i>Clinker to cement ratio</i>	<i>Cement capacity based on clinker capacity</i>	<i>Spare cement</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.

Lafarge

17. Lafarge told us that it had a theoretical clinker capacity which it used to benchmark plants across the Lafarge Group. Lafarge told us that this raised a number of issues, since the theoretical capacity might not be achievable in practice as a result, for example, of the effect of seasonality, alternative fuels and product mix. Lafarge told us that the equation it used to calculate theoretical clinker capacity was the following: Rated TPD (plant's best seven-day run tonnage for clinker) × 365 days × [redacted] performance factor × [redacted] 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. [redacted]. Hanson also account for a reliability coefficient of [redacted] per cent on average, and Lafarge a [redacted] per cent performance factor. Cemex do not account for these, but their plant capacity is defined as [redacted] so likely already takes into account the performance/reliability factor used by Lafarge and Hanson.
20. However, we note that Hanson has applied [redacted], despite Hanson having plants which are newer than Lafarge. We think therefore that [redacted]. 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 only provided data 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 [redacted] per cent performance factor and allowed for [redacted] 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.

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. 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. [X] retained fairly stable market shares over the period 2007 to 2011, while [X], and [X], lost some share to [X] 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 vs 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.
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 Group and Tarmac Group) 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, [X] share of production has increased from [X] per cent in 2001 to [X] per cent in 2011; [X] share has fallen from [X] to [X] per cent over the same period; [X] share has fallen from [X] to [X] per cent over the period; and [X] share has increased from [X] to [X] 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, [X] share remained fairly constant over the period, increasing from [X] per cent in 2007 to [X] per cent in 2011; [X] share remained at [X] per cent in both 2007 and 2011; [X] share reduced somewhat over the period, from [X] per cent in 2007 to [X] per cent in 2011; and [X] share increased over the period from [X] per cent 2007 to [X] per cent in 2011.

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

	Volume of grey cement produced in GB (tonnes)				Shares of GB production (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
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: Cemex, Hanson, Lafarge Group and Tarmac Group, 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. [X] share of production of cement and GGBS has increased from [X] per cent at the beginning of the period to [X] per cent in 2011; [X] share has fallen from [X] to [X] per cent; [X] share has fallen from [X] per cent in 2007 to [X] per cent in 2009, before increasing to [X] in 2011; and [X] share has increased from [X] to [X] per cent over the period.

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

	Volume of grey cement and GGBS produced in GB				Shares of GB production (%)			
	Cemex	Hanson	Lafarge	Tarmac	Cemex	Hanson	Lafarge	Tarmac
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: Cemex, Hanson, Lafarge Group and Tarmac Group, 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 Group and Tarmac Group), 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] 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	AI	[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 Group, Tarmac Group, Aggregate Industries, 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	AI	[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 Group, Tarmac Group, Aggregate Industries, 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 which provided data to us on their regional sales ([REDACTED]). Regional sales by the other importers are not available.¹
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 East Midlands 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>AI</i>	[REDACTED]	[REDACTED]	[REDACTED]
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 Group, Tarmac Group, AI, [REDACTED], [REDACTED] and [REDACTED], and CC analysis.

¹ This means that for some regions, the shares will be relative shares of those suppliers for which we have data, rather than market shares.

TABLE 6 Market shares in East Midlands 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>AI</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 Group, Tarmac Group, AI, [X],[X] and [X], 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, [X], [X] (and [X] to a smaller degree) have grown their market shares over the period, mainly at the expense of [X] whose share [X] from around [X] per cent in 2008 to around [X] per cent in 2011. By the end of the period, [X] is the third largest seller of cement in East of England, after [X] and [X].

TABLE 7 Sales volume of cement in East of England 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>AI</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 Group, Tarmac Group, AI, [X],[X] and [X], and CC analysis.

TABLE 8 Market shares in East of England 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>AI</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 Group, Tarmac Group, AI, [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 North-East 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>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], and CC analysis.

TABLE 10 Market shares in 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>AI</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 Group, Tarmac Group, AI, [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 North-West by GB producers and four importers, all grey cement, Q1 2008 to Q4 2011, tonnes

	<i>tonnes</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], and CC analysis.

TABLE 12 Market shares in North-West 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>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], 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, [X] is by far the largest seller of cement in Scotland, though its share has fallen somewhat over the period, while [X] and [X] 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

	<i>tonnes</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], and CC analysis.

TABLE 14 Market shares in Scotland 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>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], 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, [X], [X] and [X] have increased their market shares over the period, mainly at the expense of [X] and [X].

TABLE 15 Sales volume of cement in South-East 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>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], and CC analysis.

TABLE 16 Market shares in South-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>AI</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 Group, Tarmac Group, AI, [X],[X] and [X], 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, [X] has increased its share, mainly at the expense of [X]. [X] 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 [X].

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

	<i>tonnes</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>AI</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 Group, Tarmac Group, AI, [X] and [X], and CC analysis.

TABLE 18 Market shares in South-West 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>AI</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 Group, Tarmac Group, AI, [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

	<i>tonnes</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>AI</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 Group, Tarmac Group, AI, [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

	<i>per cent</i>							
	<i>Cemex</i>	<i>Hanson</i>	<i>Lafarge</i>	<i>Tarmac</i>	<i>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], 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, [X] has increased its market share over the period, mainly at the expense of [X].

TABLE 21 Sales volume of cement in West Midlands 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>AI</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 Group, Tarmac Group, AI, [X], [X] and [X], and CC analysis.

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

per cent

	Cemex	Hanson	Lafarge	Tarmac	AI	[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 Group, Tarmac Group, AI, [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 the West Midlands, 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

tonnes

	Cemex	Hanson	Lafarge	Tarmac	AI	[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 Group, Tarmac Group, AI, [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>AI</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 Group, Tarmac Group, AI, [], [] 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 Group and Tarmac Group) 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 Feb 2007 to [] per cent in Dec 2011; [] relative share reduced somewhat over the period, from [] per cent in February 2007 to [] per cent in December 2011; and [] 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 (tonnes)				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 Group and Tarmac Group, 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 (tonnes)				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 Group and Tarmac Group, 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 (tonnes)				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 Group and Tarmac Group, 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 (tonnes)				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 Group and Tarmac Group, 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

	Bulk CEM I volume sold to independent customers by GB producers (tonnes)				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 Group and Tarmac Group, 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 (tonnes)				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 Group and Tarmac Group, 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 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. In its latest guidelines for market investigations, the CC states that it is likely to regard any market with an HHI in excess of 2,000 as highly concentrated.²
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.

² www.competition-commission.org.uk/assets/competitioncommission/docs/2012/consultations/market_guidelines_annexes.pdf.

TABLE 32 HHI and inverse HHI based on sales volume of all cement, Q2 2007-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.

Cement price dispersion

1. 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 do the analysis separately for bulk and bagged cement. In the case of bulk cement, we do the analysis for all external customers, independent customers only, and other Majors only, both for delivered prices and ex-works prices [✂]. We restricted the analysis to bulk CEM I sales for comparability purposes. In the case of bagged cement, we show the analysis for independent customers only, though we note that the results are equivalent for all external customers, because sales of bagged cement to other Majors are very low. We do the analysis for both delivered and ex-works [✂].¹

2. We have undertaken the analysis of price dispersion in order to:
 - (a) Assess the feasibility of coordination on prices. In particular, low levels of price dispersion can be consistent with coordination on prices, while coordination on prices would be more difficult to introduce and sustain where price dispersion is higher. Further, changes in price dispersion over time can be associated with beginnings, or endings, of periods of coordination.
 - (b) To further our understanding of how competition takes place in cement. In particular, whether there is a fixed amount of dispersion which could indicate that there is a maximum dispersion that producers can sustain before customers realize that others get better terms; and whether we see evidence of price dispersion increasing in periods where the market was more dynamic in respect of churn.

¹ It was not possible to break down bagged cement sales by type of cement, as the transaction data does not contain further subcategorization of bagged cement.

3. We find:

- (a) There is significant variation in the prices of bulk cement charged to different customers, even when we control for distance (by looking at ex-works prices). We find that delivered prices charged to the majority of independent customers vary within £[§] per tonne for Cemex, Hanson, Lafarge and Tarmac over the period 2007 to 2011, or [§] per cent when represented as a proportion of the average price.²
- (b) In the case of bulk prices to all external customers, price dispersion appears to have increased over time for [§], [§] and [§], with [§] and [§] data showing distinct highs in Q1 2009, which was also a period of higher switching related to [§] internalization of volumes from [§] to internal. [§] data also shows higher dispersions in Q1 2009, as well as in Q4 2009. [§] price dispersion shows peaks in Q1 2008 and Q4 2008, and then decreases over subsequent quarters. Results are similar whether we look at ex-works prices or delivered prices.
- (c) In the case of bulk prices to independent customers, price dispersion appears to have increased over time for [§] and [§], with a distinct high in Q1 2009 in the case of [§], and across most of 2009 in the case of [§]. [§] data does not show an upward nor a downward trend, though we do observe higher dispersion in Q1 2009 and Q4 2009. [§] data shows high dispersion in Q1 2008 and Q4 2008, with a downward trend in dispersion over the period 2009 to 2011. Results are similar whether we look at ex-works prices or delivered prices.
- (d) In the case of bulk prices to other Majors, price dispersion is generally lower than that for independent customers. Also, price dispersion in delivered prices to other Majors appears to have increased over time for [§] and [§], with higher dispersion observed, among other quarters, in Q1 2009. [§] data shows higher dispersion in Q3 2008 to Q1 2009, as well as in Q4 2009 to Q1 2010. [§] data

² Using the difference between P95 and P5, which captures the majority of customers, but would omit any erroneously low or high prices.

shows a downward trend in dispersion, with a peak in dispersion in Q1 2009, if we look at delivered prices, though the peak does not appear on the basis of ex-works prices.

(e) In the case of bagged cement, there is significant variation in both delivered and ex-works prices charged to different customers, though this may be partly due to product mix (such as type of cement, or size of bag), which we are not able to control for. Trends over time are less likely to be affected by product mix (unless there are large changes in the breakdown of sales of bagged cement between different types of bagged cement). These show that dispersion in [redacted] prices has fallen over the period Q1 2007 to Q4 2011, [redacted] and [redacted] dispersions have increased over the same period, while [redacted] dispersion remains similar in 2007 and 2011. We also find that dispersion tends to increase in Q1 for all GB producers, compared with other quarters, which may be related to price increases.

Methodology

4. 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-works 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]
5. 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 [X], [X] observations in the case of [X], and [X] observations in the case of [X].

6. Next we dropped any transactions where ex-works prices were zero or negative: [X] observations for [X], [X] observations for [X], and [X] observations for [X] in the case of bulk cement; and [X] observations for [X], [X] observations for [X], and [X] observations for [X] in the case of bagged cement.
7. 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 [X] observations for [X], [X] observations for [X], and [X] observations for [X] in the case of bulk cement; and [X] observations for [X], [X] observations for [X] and [X] observations for [X] in the case of bagged cement. [X] 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.
8. 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-works prices (as defined in paragraph 4) where data was available, in order to control for the impact of delivery distances.
9. 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

10. Table 1 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 1 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Note: [X]

11. In addition to the standard deviation shown in Table 1, we have calculated four additional statistical measures of dispersion, as shown in Table 2. [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 2 **Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011**

	<i>£ per tonne</i>			<i>Coefficient of variation</i>
	<i>Inter-percentile ranges</i>			
	<i>P75–P25</i>	<i>P95–P5</i>	<i>P99–P1</i>	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Notes:

1. [X]
2. 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

12. Table 3 shows some quarterly statistics for delivered prices paid by Cemex's independent customers of Bulk CEM I, including the mean and standard deviation.

[X]

TABLE 3 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 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Note: [X]

13. Table 4 shows four additional measures of price dispersion. [X]

TABLE 4 Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Notes:

- [X]
- 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

14. Table 5 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 5 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 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Note: [X]

15. Table 6 shows four additional measures of price dispersion. [X]

TABLE 6 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Notes:

1. [X]
2. 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

16. Table 7 shows some quarterly statistics for delivered prices paid by Cemex’s independent customers of bagged cement, including the mean and standard deviation. [X]

TABLE 7 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 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Note: [X]

17. Table 8 shows four additional measures of price dispersion. [X]

TABLE 8 Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]

Source: Cemex data and CC analysis.

Notes:

1. [X]

2. 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

18. Table 9 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 9 **Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011**

	<i>£ per tonne</i>									<i>Number of observations</i>
	<i>Mean</i>	<i>Standard deviation</i>	<i>P1</i>	<i>P5</i>	<i>P25</i>	<i>P50</i>	<i>P75</i>	<i>P95</i>	<i>P99</i>	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

19. In addition to the standard deviation shown in Table 9, we have calculated four additional statistical measures of dispersion, as shown in Table 10. [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 10 Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

20. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 11 shows that [X].

21. Similarly, Table 12 shows that [X].

TABLE 11 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

TABLE 12 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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

22. Table 13 shows some quarterly statistics for delivered prices paid by Hanson's independent customers of bulk CEM I, including the mean and standard deviation.

[X]

TABLE 13 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

23. Table 14 shows four additional measures of price dispersion, based on the statistics in Table 13. [X]

TABLE 14 Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

24. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. [X]
25. Similarly, Table 16 shows that [X].

TABLE 15 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to independent customers, Q1 2007 Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

TABLE 16 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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 other Majors

26. Table 17 shows some quarterly statistics for delivered prices paid by Hanson's other Major customers of bulk CEM I, including the mean and standard deviation. [X]

TABLE 17 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

27. Table 18 shows four additional measures of price dispersion, based on the statistics in Table 17. [X]

28. The table also shows that [X].

TABLE 18 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

29. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with similar results. Table 19 shows that [X].

30. Similarly, Table 20 shows that [X].

TABLE 19 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

TABLE 20 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

Bagged cement sold to independent customers

31. Table 21 shows some quarterly statistics for delivered prices paid by Hanson's independent customers of bagged cement, including the mean and standard deviation. [X]

TABLE 21 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

32. Table 22 shows four additional measures of price dispersion, based on the statistics in Table 21. [X]

TABLE 22 Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

33. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. [X]

TABLE 23 Mean, standard deviation, percentiles and number of observations, ex-works prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Hanson data and CC analysis.

TABLE 24 **Statistical measures of dispersion, ex-works prices for bagged cement sold to independent customers, Q1 2007 Q4 2011**

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

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Bulk CEM I sold to all external customers

34. Table 25 shows some quarterly statistics for delivered prices paid by Lafarge's external customers of bulk CEM I, including the mean and standard deviation.⁵ [X]

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 25 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

35. In addition to the standard deviation shown in Table 25, we have calculated four additional statistical measures of dispersion, as shown in Table 26. [X]

TABLE 26 Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

36. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 27 shows that [REDACTED]

37. Similarly, Table 28 shows [REDACTED].

TABLE 27 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Lafarge data and CC analysis.

TABLE 28 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[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

38. Table 29 shows some quarterly statistics for delivered prices paid by Lafarge's independent customers of bulk CEM I, including the mean and standard deviation.

[X]

TABLE 29 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

39. Table 30 shows four additional measures of price dispersion, based on the statistics in Table 29. [X]

TABLE 30 Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

40. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 31 shows that [X].

41. Similarly, Table 32 shows that [X].

42. [X]

TABLE 31 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

TABLE 32 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to independent customers, Q1 2007-Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

Bulk CEM I sold to other Majors

43. Table 33 shows some quarterly statistics for delivered prices paid by Lafarge's other Major customers of bulk CEM I, including the mean and standard deviation. [X]

TABLE 33 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

44. Table 34 shows four additional measures of price dispersion, based on the statistics in Table 33. [X]
45. The table also shows that [X].

TABLE 34 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

46. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with similar results. Table 35 shows that [X].

47. Similarly, Table 36 shows that [X].

TABLE 35 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to other Majors, Q1 2007 Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

TABLE 36 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

Bagged cement sold to independent customers

48. Table 37 shows some quarterly statistics for delivered prices paid by Lafarge's independent customers of bagged cement, including the mean and standard deviation. [X]

TABLE 37 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

49. Table 38 shows four additional measures of price dispersion, based on the statistics in Table 37. [X]

TABLE 38 **Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

	<i>£ per tonne</i>			<i>Coefficient of variation</i>
	<i>Inter-percentile ranges</i>			
	<i>P75–P25</i>	<i>P95–P5</i>	<i>P99–P1</i>	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

50. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 39 shows the standard deviation, while Table 40 shows the inter-percentile ranges and the coefficient of variation.

TABLE 39 Mean, standard deviation, percentiles and number of observations, ex-works prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Lafarge data and CC analysis.

TABLE 40 Statistical measures of dispersion, ex-works prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

Tarmac

Bulk CEM I sold to all external customers

51. Table 41 shows some quarterly statistics for delivered prices paid by Tarmac's external customers of bulk CEM I, including the mean and standard deviation.⁶ [X]⁷

TABLE 41 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

52. In addition to the standard deviation shown in Table 41, we have calculated four additional statistical measures of dispersion, as shown in Table 42. [X]

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 working paper; however, we would not expect the removal of six observations to significantly change most of these results.

TABLE 42 Statistical measures of dispersion, delivered prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

53. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 43 shows that [X].
54. Similarly, Table 44 shows that [X].

TABLE 43 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

TABLE 44 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to external customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

Bulk CEM I sold to independent customers

55. Table 45 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 45 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne								Number of observations	
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95		P99
Q1 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

56. Table 46 shows four additional measures of price dispersion, based on the statistics in Table 45. [REDACTED]

TABLE 46 Statistical measures of dispersion, delivered prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

57. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 47 shows that [X].

58. Similarly, Table 48 shows that [X].

TABLE 47 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

TABLE 48 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

Bulk CEM I sold to other Majors

59. Table 49 shows some quarterly statistics for delivered prices paid by Tarmac's other Major customers of bulk CEM I, including the mean and standard deviation. [X]

TABLE 49 Mean, standard deviation, percentiles and number of observations, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

60. Table 50 shows four additional measures of price dispersion, based on the statistics in Table 49. [X]

61. The table also shows that [X].

TABLE 50 Statistical measures of dispersion, delivered prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

62. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), and have obtained different results. Table 51 shows that [X].
63. Similarly, Table 52 shows that [X].

TABLE 51 Mean, standard deviation, percentiles and number of observations, ex-works prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

TABLE 52 Statistical measures of dispersion, ex-works prices for bulk CEM I sold to other Majors, Q1 2007 to Q4 2011

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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

64. Table 53 shows some quarterly statistics for delivered prices paid by Tarmac's independent customers of bagged cement, including the mean and standard deviation. [REDACTED]

TABLE 53 Mean, standard deviation, percentiles and number of observations, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2007	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2008	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2009	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2010	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q1 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q2 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q3 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Q4 2011	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Tarmac data and CC analysis.

65. Table 54 shows four additional measures of price dispersion, based on the statistics in Table 53. [REDACTED]

TABLE 54 **Statistical measures of dispersion, delivered prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

	£ per tonne			Coefficient of variation
	Inter-percentile ranges			
	P75–P25	P95–P5	P99–P1	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

66. We have repeated the same analysis for ex-works prices (as defined in paragraph 4), with the same results. Table 55 shows [X] Table 56 shows [X].

TABLE 55 **Mean, standard deviation, percentiles and number of observations, ex-works prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

	£ per tonne									Number of observations
	Mean	Standard deviation	P1	P5	P25	P50	P75	P95	P99	
Q1 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Q4 2011	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Tarmac data and CC analysis.

TABLE 56 **Statistical measures of dispersion, ex-works prices for bagged cement sold to independent customers, Q1 2007 to Q4 2011**

	<i>£ per tonne</i>			<i>Coefficient of variation</i>
	<i>Inter-percentile ranges</i>			
	<i>P75–P25</i>	<i>P95–P5</i>	<i>P99–P1</i>	
Q1 2007	[X]	[X]	[X]	[X]
Q2 2007	[X]	[X]	[X]	[X]
Q3 2007	[X]	[X]	[X]	[X]
Q4 2007	[X]	[X]	[X]	[X]
Q1 2008	[X]	[X]	[X]	[X]
Q2 2008	[X]	[X]	[X]	[X]
Q3 2008	[X]	[X]	[X]	[X]
Q4 2008	[X]	[X]	[X]	[X]
Q1 2009	[X]	[X]	[X]	[X]
Q2 2009	[X]	[X]	[X]	[X]
Q3 2009	[X]	[X]	[X]	[X]
Q4 2009	[X]	[X]	[X]	[X]
Q1 2010	[X]	[X]	[X]	[X]
Q2 2010	[X]	[X]	[X]	[X]
Q3 2010	[X]	[X]	[X]	[X]
Q4 2010	[X]	[X]	[X]	[X]
Q1 2011	[X]	[X]	[X]	[X]
Q2 2011	[X]	[X]	[X]	[X]
Q3 2011	[X]	[X]	[X]	[X]
Q4 2011	[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.

The role of vertical integration: does it facilitate coordination in the cement market?

Introduction

1. We have considered how vertical integration may affect ability and incentives to coordinate in various sections above. In this appendix, we summarize and expand our consideration of whether coordination is likely to be facilitated by vertical integration compared with a counterfactual where there is no such vertical integration. Specifically, we analyse how vertical integration is likely to impact on each of the following conditions for coordination, compared with a counterfactual where there is no such vertical integration:
 - (a) ability to agree and monitor terms of coordination;
 - (b) internal sustainability; and
 - (c) external sustainability.

Ability to agree and monitor the terms of coordination

2. Compared with the counterfactual, vertically integrated cement producers have more points of contact with each other by virtue of their RMX operations. These include the cross-sale of cement to one another's downstream RMX operation 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 producer's understanding of cement pricing, demand conditions and supply relationships.
3. In the counterfactual, a non-integrated 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.

4. However, this knowledge of rivals' cement sales may be enhanced by ownership of an RMX operation.

5. Firstly, it may be difficult for a cement producer to detect cheating behaviour if it was limited to 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 by 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 incorporate many local RMX markets;
 - (b) 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.

6. 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.

7. 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 by which it was undercut. However, by also being active in the RMX market a cement producer may gain further insight to the price/volume that the lost customer

was supplied. This may be inferred through the intensity of competition between the 'lost' RMX customer and intensity of competition with it in the RMX market.

8. 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. Separately identifying cheating behaviour from changes in RMX competition would also be difficult given that RMX competition is inherently local and independent RMX operators can be strong local competitors.
9. With regard to the latter point, internal documents from the parties 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.
10. Therefore, even without RMX coordination, simply having an RMX operation could appear to improve their 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

11. In the counterfactual where cement producers are not integrated, profits attained from deviating on collusion 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.
12. To illustrate this, consider 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.

13. 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 downstream operations and increase RMX sales (so as to indirectly lead 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 (extent to which cement costs reduction result in lower RMX price);
 - (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;
 - (c) the extent to which the integrated RMX producers of cement producer 1 compete directly with RMX producers of cement 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 offering is likely to reduce the effectiveness of deviating through reducing internal prices of cement.

14. 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, reducing the incentives to deviate in this way.
15. Therefore, the profits available from deviating may be lower if—as is the case today—a significant proportion of RMX outlets are vertically integrated with other cement producers. Cheating may similarly be more easily detected if concentrated among a smaller number of independent cement customers who can more easily be monitored.
16. 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 producer deviates by lowering prices to independent RMX producers, 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. There may also be scope for cement suppliers to try to commit to high cement internal prices. 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 to each other in reciprocal arrangements. 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

17. The arguments set out above in relation to incentives to deviate would 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 undetermined effects on the internal sustainability of coordination as it reduces both incentives to deviate and to punish.

18. 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)¹ 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

¹ Volker and White, 'Do Vertical Mergers Facilitate Upstream Collusion?', *American Economic Review*, September 2007; Vol 97(4).

result of these effects in an unintegrated industry is to facilitate upstream collusion (at least with respect to initial vertical integration).

19. [REDACTED] submitted that punishing deviation in the RMX market was not possible due to the transitory nature of RMX contracts themselves. A producer would not be able to target a specific RMX producer's customers and an attempt to do this may inadvertently punish another member of the colluding group. [REDACTED]
20. With respect to repatriation as a punishment mechanism, [REDACTED]. Similarly Hanson observed that there was no evidence that majors have reverted to supplying each other after repatriating volumes.
21. Internal documents from the vertically integrated firms provide a detailed account of how cross-sales provided cement producers with a credible punishment mechanism. This included using internalization of cement purchases as a punishment mechanism. As explained in the working paper on the 2009 internalization event, internalization appears to have been driven in part by the shock of lower and less certain demand for cement. 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

22. The best alternative to cement sold by the GB cement producers is imported cement. Cement producers could unilaterally try to deter independent importers from entering the GB market via below-cost selling. They could also coordinate to jointly punish RMX customers purchasing from independent importer. Depending on the viability of imported supply, such tactics may be costly.

23. However, via ownership of RMX operations (accounting for around 70 per cent of RMX supply), the cement producers may be able to deny importers an important route to market. For instance, a Lafarge document states that [✂].

24. This may 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 prevent an importer from gaining a foothold in the local market.