CONTENTS

APPENDIX A: Terms of reference

A.1 In exercise of its duty under section 33(1) of the Enterprise Act 2002 (the **Act**) the Competition and Markets Authority (**CMA**) believes that it is or may be the case that:

(a) arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation, in that:

(i) enterprises carried on by Arçelik A.Ş. (via Ardutch B.V.) will cease to be distinct from enterprises carried on by Whirlpool Corporation (via Whirlpool EMEA Holdings LLC); and

(ii) the condition specified in section 23(1)(b) of the Act is satisfied; and

(b) the creation of that situation may be expected to result in a substantial lessening of competition within a market or markets in the United Kingdom for goods or services, including the supply in the UK of the following products: washing machines, tumble dryers, dishwashers and cooking appliances.

A.2 Therefore, in exercise of its duty under section 33(1) of the Act, the CMA hereby makes a reference to its chair for the constitution of a group under Schedule 4 to the Enterprise and Regulatory Reform Act 2013 in order that the group may investigate and report, within a period ending on 26 March 2024, on the following questions in accordance with section 36(1) of the Act:

(a) whether arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation; and

(b) if so, whether the creation of that situation may be expected to result in a substantial lessening of competition within any market or markets in the United Kingdom for goods or services.

Sorcha O'Carroll
Senior Director, Mergers
Competitions and Markets Authority
11 October 2023

APPENDIX B: Conduct of the inquiry

B.1 On 11 October 2023, the CMA referred the anticipated joint venture between Arçelik A.Ş. (**Arçelik**) and Whirlpool Corporation (**Whirlpool**) (together the **Parties**) for an in-depth phase 2 inquiry.

B.2 We published the biographies of the members of the inquiry group conducting the phase 2 inquiry on our inquiry webpage on 11 October 2023 and the administrative timetable for the inquiry was published on the inquiry webpage on 20 October 2023.

B.3 We invited a wide range of interested parties to comment on the Transaction. These included the Parties' competitors and customers. Evidence was obtained from third parties using written requests. A number of them also provided us with information by video conference calls as well as by responding to supplementary written questions. Evidence submitted during the CMA's phase 1 investigation has also been considered in phase 2.

B.4 We received written evidence from the Parties in the form of submissions and responses to information requests, including internal documents. A non-confidential version of the Parties' initial submission was published on our inquiry webpage on 13 November 2023.

B.5 On 7 November 2023, we published an issues statement on the inquiry webpage setting out the areas on which we envisaged that the phase 2 inquiry would focus. A non-confidential version of the Parties' response to the issues statement was published on our inquiry webpage on 24 November 2023.

B.6 On 27 October 2023 the Parties provided a virtual teach-in for the inquiry group and CMA staff and on 8 November 2023 a 'site visit' with the Parties and their advisers was held at the CMA's London offices and attended by the inquiry group, accompanied by CMA staff.

B.7 We also held separate hearings with each of the Parties on 18 and 19 December 2023.

B.8 Prior to the hearings, we sent the Parties a number of working papers for comment. The Parties were also sent an annotated issues statement, which outlined our emerging thinking prior to their respective main party hearings. The Parties provided comments on our annotated issues statement and working papers on 1 January 2024.

B.9 On 8 February 2024, we published a notice of provisional findings and a summary of our provisional findings report on the inquiry webpage. A non-confidential version of our provisional findings was published on the inquiry webpage on 9 February 2024. Interested parties were invited to comment on this document.

B.10 On 23 February 2024, we published a non-confidential version of the Parties' response to our provisional findings on the inquiry webpage.

B.11 A non-confidential version of our final report has been published on the inquiry webpage.

B.12 We would like to thank all those who have assisted us in our inquiry.

APPENDIX C: Descriptive statistics

C.1 This Appendix provides further detail on the descriptive statistics set out in the Final Report. It covers two main areas:

(a) details on the MDA sales data we have used; and

(b) additional detail on the price range analysis described in chapters 7 and 8.

Data

C.2 In our analysis we used three main types of data:

(a) MDA category level data used to produce category level shares of supply;

(b) model level data used in our price range analysis; and

(c) retail level data, used to assess how competitive conditions vary across customers.

C.3 We describe each of these datasets below.

GfK data

C.4 The Parties provided two datasets based on point-of-sale retail price and volume data acquired from GfK (the '**GfK Data**').

MDA category level dataset

C.5 The first dataset provided by the Parties contained MDA supplier volume and value shares produced by GfK at the brand and MDA category level. The Parties have told us that the GfK Data aims to be representative of total UK MDA category sales. Unless stated otherwise, this data is used to report MDA category level supplier shares.

C.6 The Parties told us that they commonly use the GfK Data for internal purposes and that it is [✂].[1] The data does not include direct business to business sales or non-retail sales, for example to housebuilders. However, the Parties have told us that these sales account for [✂] volumes of their sales.[2] The data does not identify the majority of individual Private Label brands, but it does report aggregate sales of these products.[3] We therefore consider that despite some limitations, the GfK Data

[1] The Parties response to the CMA's request for information (**RFI**).
[2] Kitchen companies account for [✂]% of Arçelik's sales and [✂]% of Whirlpool's sales (by volume). Homebuilding and construction companies account for [✂]% of Arçelik's sales and [✂]% of Whirlpool's sales (by volume). FMN [✂].
[3] The GfK Data refers to Private Label as Tradebrands.

allows us to reliably estimate brand and manufacturer level shares of supply within each of the MDA categories in terms of sales volume and value.

Model level dataset

C.7 The first GfK dataset (described above) does not include sales volume and revenue data at the model level. This additional level of detail is necessary to analyse sales distributions across different price points within MDA categories.

C.8 The Parties provided a second dataset suitable for this analysis based on a combination of GfK Data and their own adjustments. The model-level data which the Parties acquired from GfK [✂].[4]

C.9 We used this dataset as our primary source for the price range analysis. However, given the slightly greater uncertainty surrounding the dataset we also cross checked the results of this analysis against data collected directly from retailers, described below.

Retail level data

C.10 We have also received sales data directly from six large customers of the Parties: [✂], [✂], [✂], [✂], [✂] and [✂]. This data is more granular than the GfK data and includes data from January 2017 up to June 2023.

C.11 We have used the retailer level data to assess how competitive conditions vary across customers, whether this has changed over time, and to cross-check the analysis of GfK Data.

Price range analysis

C.12 The section is structured as follows:

(a) We set out the methodology for the price range analysis;

(b) We set out the results on how sales are distributed across different price ranges, within each MDA category; and

(c) We respond to methodological critiques made by the Parties regarding the price range analysis.

[4] Whirlpool internal document.

Methodology

C.13 We have analysed competition across different price segments using two alternative approaches:

(a) **Fixed price bands:** We have analysed each supplier's volume share within £100 fixed price bands, separately for each MDA category. This analysis provides a visual approximation of the price points at which the sales of different appliances occur, and the price points at which different suppliers' sales are concentrated.

(b) **Price quartiles:** We have segmented each MDA category into price quartiles, where each quartile represents a quarter of sales volumes in the respective category.

C.14 These two approaches are complementary and provide a good indication of the price points at which different suppliers are currently competing. For example, the fixed price bands approach has the benefit of being methodologically straightforward and easily interpretable. However, there may be relevant variation within a given price band that is obscured by this approach.[5] The price quartiles approach helps to address this, by using price ranges that are determined by actual sales, thereby covering slightly different ranges. A drawback of the quartiles approach is that some of the price ranges can be relatively small in absolute terms, whereas others can be very large.

Results

Washing machines

C.15 Table C.1 presents the results of the fixed price band analysis for washing machines. The Table shows that washing machine sales were spread over a wide price range (from around £200 to over £900), albeit the large majority ([80-90]% of units) were sold within the £200 to £500 range.

C.16 In 2022, the Parties' sales were concentrated in the £200-300 and £300-400 price bands, and collectively the Parties accounted for almost half ([40-50]%) of all units sold below £400. Private Label brands and Haier Group accounted for the large majority of other sales in this price range, with Private Label being particularly prevalent in the £200 to £300 range.

C.17 The Table shows that some ([✂]%) of BSH's appliances were sold below £400 but the majority ([✂]%) were sold at higher price points. Price quartile analysis

[5] In washing machines for example, the fixed price bands approach shows that a large proportion of sales are in the £200-300 and £300-400 price ranges. The quartiles approach uses ranges of £0-267 and £267-345, such that the two approaches together provide a more complete picture of where suppliers' sales are located relative to each other.

(see Table C.2) shows that BSH did not have a material share of supply until quartile three, ie, at around £350 and above (whereas the Parties and Private Label brands had large volumes of sales in the first quartile, ie below £267). Samsung sold most of its appliances at price points above those at which the Parties are typically active, ie, above £400.

Table C.1: Distribution of washing machine sales across price ranges, 2022

				2022 estimated volume share (%), by £100 price range		
	100-200	*200-300*	*300-400*	*400-500*	*500-600*	*600+*
Whirlpool	[0-5]	[20-30]	[30-40]	[5-10]	[0-5]	[0-5]
Arçelik	[50-60]	[20-30]	[10-20]	[0-5]	[0-5]	[0-5]
BSH	[0-5]	[0-5]	[10-20]	[10-20]	[10-20]	[30-40]
Private Label	[20-30]	[30-40]	[0-5]	[0-5]	[0-5]	[0-5]
Electrolux	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[10-20]
Haier Group	[0-5]	[10-20]	[20-30]	[10-20]	[10-20]	[0-5]
Hisense	[5-10]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[40-50]	[40-50]	[10-20]
Other	[10-20]	[0-5]	[0-5]	[5-10]	[10-20]	[30-40]
Total	**100**	**100**	**100**	**100**	**100**	**100**
Share of all sales in price range	[0-5]	[30-40]	[20-30]	[20-30]	[5-10]	[5-10]

Source: GfK Data.

Table C.2: Distribution of washing machine sales across price quartiles, 2022

			Volume share (%), by quartile 2022	
	Quartile 1	*Quartile 2*	*Quartile 3*	*Quartile 4*
Price range covered (£)	<267	267-345	345-443	>443
Whirlpool	[10-20]	[30-40]	[10-20]	[0-5]
Arçelik	[20-30]	[20-30]	[10-20]	[0-5]
BSH	[0-5]	[0-5]	[10-20]	[20-30]
Private Label	[50-60]	[5-10]	[0-5]	[0-5]
Electrolux	[0-5]	[0-5]	[0-5]	[0-5]
Haier Group	[0-5]	[20-30]	[20-30]	[5-10]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[30-40]	[30-40]
Other	[0-5]	[0-5]	[5-10]	[10-20]
Total	**100**	**100**	**100**	**100**

Source: GfK Data.

Tumble dryers

C.18 The GfK Data shows that in 2022 the majority ([50-60]%) of tumble dryer sales were in the £300 to £400 price range (see Table C.3).

C.19 Together, the Parties accounted for [40-50]% of all tumble dryers sold in 2022. Most ([70-80]%) of these sales were of tumble dryers which sold for below £400.

C.20 We note that in tumble dryers, price bands all the way to £500 consist almost entirely of sales by the Parties, Private Label brands and Haier Group (plus some 'other' suppliers). Suppliers such as BSH and Samsung do not gain material share until above £500 (quartile 4, see Table C.4). This is at a relatively higher price point than washing machines (above) for example, in which BSH sales start at around £350.

Table C.3: Distribution of tumble dryer sales across price ranges, 2022

	2022 estimated volume share (%), by £100 price range					
	100-200	*200-300*	*300-400*	*400-500*	*500-600*	*600+*
Whirlpool	[0-5]	[0-5]	[20-30]	[20-30]	[10-20]	[0-5]
Arçelik	[0-5]	[0-5]	[30-40]	[10-20]	[20-30]	[0-5]
BSH	[0-5]	[0-5]	[0-5]	[0-5]	[20-30]	[20-30]
Private Label	[0-5]	[90-100]	[10-20]	[10-20]	[10-20]	[5-10]
Electrolux	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Haier Group	[0-5]	[0-5]	[20-30]	[30-40]	[10-20]	[5-10]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[40-50]
Other	[90-100]	[0-5]	[0-5]	[0-5]	[0-5]	[10-20]
Total	**100**	**100**	**100**	**100**	**100**	**100**
Share of all sales in price range	[0-5]	[5-10]	[50-60]	[10-20]	[5-10]	[10-20]

Source: GfK Data.

Table C.4: Distribution of tumble dryer sales across price quartiles, 2022

	Volume share (%), by quartile 2022			
	Quartile 1	*Quartile 2*	*Quartile 3*	*Quartile 4*
Price range covered (£)	<235	235-267	267-356	>356
Whirlpool	[10-20]	[20-30]	[10-20]	[0-10]
Arçelik	[10-20]	[30-40]	[20-30]	[10-20]
BSH	[0-5]	[0-5]	[0-5]	[20-30]
Private Label	[60-70]	[5-10]	[10-20]	[10-20]
Electrolux	[0-5]	[0-5]	[0-5]	[0-5]
Haier Group	[5-10]	[20-30]	[40-50]	[10-20]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[20-30]
Other	[0-5]	[0-5]	[0-5]	[5-10]
Total	100	100	100	100

Source: GfK Data.

Dishwashers

C.21 Dishwasher sales follow a similar distribution to washing machines. The GfK Data shows that [50-60]% of all dishwashers are sold at averages prices in the £200 to £300 range. Around a third of dishwasher sales occur in the £300 to £500 range (see Table C.5).

C.22 Together, the Parties accounted for [30-40]% of all dishwasher sales in 2022. Most of these sales were on appliances sold below £400. As for tumble dryers and washing machines, the main competitors at these price points are Private Label brands and (to a somewhat lesser extent) Haier Group and Electrolux. Samsung and BSH also sell small volumes of appliances ([20-30]% and [10-20]% respectively) in the £300 to £400 range, but the majority of their sales occur at higher price points, where the Parties make far fewer sales.

C.23 Expressed in quartiles (see Table C.6), the Parties have a [30-40]% share in the first quartile (appliances sold below £256), [50-60]% in the second quartile (appliances sold between £256 and £300), [30-40]% in the third quartile (appliances sold between £300 and £415), and [0-5]% in the top quartile (appliances sold above £415).

Table C.5: Distribution of dishwasher sales across price ranges, 2022

	2022 estimated volume share (%), by £100 price range					
	100-200	*200-300*	*300-400*	*400-500*	*500-600*	*600+*
Whirlpool	[0-5]	[10-20]	[20-30]	[0-5]	[0-5]	[0-5]
Arçelik	[50-60]	[30-40]	[10-20]	[5-10]	[0-5]	[0-5]
BSH	[0-5]	[0-5]	[20-30]	[60-70]	[80-90]	[70-80]
Private Label	[0-5]	[40-50]	[10-20]	[5-10]	[0-5]	[0-5]
Electrolux	[0-5]	[0-5]	[5-10]	[0-5]	[5-10]	[0-5]
Haier Group	[0-5]	[0-5]	[5-10]	[0-5]	[0-5]	[0-5]
Hisense	[0-5]	[0-5]	[0-5]	[5-10]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[5-10]	[0-5]	[0-5]
Other	[40-50]	[0-5]	[5-10]	[0-5]	[0-5]	[10-20]
Total	**100**	**100**	**100**	**100**	**100**	**100**
Share of all sales in price range	[0-5]	[50-60]	[20-30]	[10-20]	[5-10]	[5-10]

Source: GfK Data.

Table C.6: Distribution of dishwasher sales across price quartiles, 2022

	Volume share (%), by quartile 2022			
	Quartile 1	*Quartile 2*	*Quartile 3*	*Quartile 4*
Price range covered (£)	<256	256-300	300-415	>415
Whirlpool	[0-5]	[20-30]	[20-30]	[0-5]
Arçelik	[30-40]	[20-30]	[10-20]	[0-5]
BSH	[0-5]	[0-5]	[20-30]	[70-80]
Private Label	[60-70]	[20-30]	[5-10]	[0-5]
Electrolux	[0-5]	[5-10]	[5-10]	[5-10]
Haier Group	[0-5]	[5-10]	[5-10]	[0-5]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]
Other	[0-5]	[0-5]	[5-10]	[5-10]
Total	**100**	**100**	**100**	**100**

Source: GfK Data.

Cookers

C.24 Cooker sales are more widely spread out than dishwasher sales, with [70-80]% of sales occurring between £200 and £500 (see Table C.7).

C.25 Together the Parties accounted for [40-50]% of all cooker sales in 2022. Unlike in some other categories, the Parties have a small share among the lowest priced products. However, they accounted for the majority of sales in the £300 to £400 range and almost all sales in the £400 to £500 range. Whirlpool cookers also sell at slightly higher price points than Arçelik cookers.

C.26 The competitor set in cookers differs substantially from that in other appliance categories. Other than the Parties, no branded supplier makes significant sales in the lower price range where a significant volume of sales is accounted for by Private Label brands. In general brands like Haier Group, Samsung or BSH do not sell cookers in any material volume. There are some manufacturers like Glen Dimplex and Middleby that specialise in cookers, but their sales volumes are small and they tend to sell premium appliances at much higher average price points.

C.27 Expressed in quartiles (see Table C.8), the Parties have a [10-20]% share in the first quartile (appliances sold below £321), [50-60]% in the second quartile (appliances sold between £321 and £395), [90-100]% in the third quartile (appliances sold between £395 and £503), and [30-40]% in the top quartile (appliances sold above £503).

Table C.7: Distribution of cooker sales across price ranges, 2022

				2022 estimated volume share (%), by £100 price range		
	100-200	*200-300*	*300-400*	*400-500*	*500-600*	*600+*
Whirlpool	[0-5]	[5-10]	[20-30]	[60-70]	[60-70]	[0-5]
Arçelik	[0-5]	[5-10]	[30-40]	[30-40]	[10-20]	[10-20]
BSH	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Private Label	[90-100]	[70-80]	[30-40]	[5-10]	[10-20]	[5-10]
Electrolux	[0-5]	[0-5]	[0-5]	[0-5]	[10-20]	[10-20]
Haier Group	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Other	[0-5]	[5-10]	[5-10]	[0-5]	[0-5]	[50-60]
Total	**100**	**100**	**100**	**100**	**100**	**100**
Share of all sales in price range	[0-10]	[20-30]	[20-30]	[20-30]	[10-20]	[20-30]

Source: GfK Data.

Table C.8: Distribution of cooker sales across price quartiles, 2022

	Volume share (%), by quartile 2022			
	Quartile 1	*Quartile 2*	*Quartile 3*	*Quartile 4*
Price range covered (£)	<321	321-395	395-503	>503
Whirlpool	[5-10]	[20-30]	[60-70]	[10-20]
Arçelik	[10-20]	[30-40]	[30-40]	[10-20]
BSH	[0-5]	[0-5]	[0-5]	[0-5]
Private Label	[60-70]	[30-40]	[5-10]	[10-20]
Electrolux	[0-5]	[0-5]	[0-5]	[10-20]
Haier Group	[0-5]	[0-5]	[0-5]	[0-5]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]
Other	[10-20]	[0-5]	[0-5]	[30-40]
Total	**100**	**100**	**100**	**100**

Source: GfK Data.

Ovens

C.28 The distribution of ovens is very similar to that of cookers, with around two-thirds of ovens sold at prices between £200 and £500 (see Table C.9).

C.29 Together the Parties accounted for [20-30]% of all oven sales in 2022. As in cookers the Parties' share is relatively small at the very lowest price points, with most of their sales occurring in the £300 to £500 range. The Parties make almost no sales of appliances priced above £500.

C.30 The competitor set is larger in ovens than in cookers. Private Label brands are strong at the entry level but less present in the medium price segment than in other categories. Electrolux, Haier Group and Hisense all sell appliances in the

£300 to £400 range, and BSH achieves significant sales of the £400 to £500 range.

C.31 Expressed in quartiles (see Table C.10), the Parties have a [40-50]% share in the first quartile (appliances sold below £220), [50-60]% in the second quartile (appliances sold between £220 and £322), [20-30]% in the third quartile (appliances sold between £322 and £500). They are [✂] in the top quartile.

Table C.9: Distribution of oven sales across price ranges, 2022

			2022 estimated volume share (%), by £100 price range			
	100-200	*200-300*	*300-400*	*400-500*	*500-600*	*600+*
Whirlpool	[0-5]	[5-10]	[20-30]	[20-30]	[5-10]	[0-5]
Arçelik	[90-100]	[10-20]	[20-30]	[5-10]	[5-10]	[0-5]
BSH	[0-5]	[0-5]	[0-5]	[20-30]	[20-30]	[60-70]
Private Label	[0-5]	[60-70]	[5-10]	[5-10]	[5-10]	[0-5]
Electrolux	[0-5]	[0-5]	[10-20]	[20-30]	[30-40]	[10-20]
Haier Group	[0-5]	[0-5]	[5-10]	[0-5]	[0-5]	[0-5]
Hisense	[0-5]	[0-5]	[5-10]	[5-10]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Other	[0-5]	[0-5]	[5-10]	[0-5]	[10-20]	[10-20]
Total	**100**	**100**	**100**	**100**	**100**	**100**
Share of all sales in price range	[0-5]	[10-20]	[20-30]	[20-30]	[5-10]	[20-30]

Source: GfK Data.

Table C.10: Distribution of oven sales across price quartiles, 2022

	Volume share (%), by quartile 2022			
	Quartile 1	*Quartile 2*	*Quartile 3*	*Quartile 4*
Price range covered (£)	<220	220-322	322-500	>500
Whirlpool	[10-20]	[20-30]	[10-20]	[0-5]
Arçelik	[20-30]	[20-30]	[5-10]	[0-5]
BSH	[0-5]	[0-5]	[30-40]	[60-70]
Private Label	[40-50]	[10-20]	[0-5]	[0-5]
Electrolux	[0-5]	[10-20]	[20-30]	[10-20]
Haier Group	[5-10]	[5-10]	[0-5]	[0-5]
Hisense	[0-5]	[5-10]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]
Other	[0-5]	[5-10]	[5-10]	[10-20]
Total	**100**	**100**	**100**	**100**

Source: GfK Data.

Hobs

C.32 Around two-thirds of hob sales occur in the £200 to £400 range.

C.33 Together the Parties accounted for [10-20]% of all hobs sold in 2022. This combined share is significantly lower than in any other appliance category. Most of the Parties' sales occur in the £200 to £300 range (see Table C.11). However, even in this price band, the Parties collectively account for only around [30-40]% of sales.

C.34 Within the £200 to £300 range, the Private Label brands achieve the greatest share of sales. Electrolux also sell significant volumes in this range and is the

largest producer at slightly higher price points. BSH sales start in the £300 to £400 range and are spread across a wide range of price points.

Table C.11: Distribution of hob sales across price ranges, 2022

	2022 estimated volume share, by £100 price range					
	100-200	*200-300*	*300-400*	*400-500*	*500-600*	*600+*
Whirlpool	[0-5]	[5-10]	[5-10]	[5-10]	[0-5]	[0-5]
Arçelik	[5-10]	[20-30]	[5-10]	[0-5]	[0-5]	[0-5]
BSH	[0-5]	[0-5]	[10-20]	[50-60]	[50-60]	[50-60]
Private Label	[90-100]	[40-50]	[10-20]	[5-10]	[5-10]	[0-5]
Electrolux	[0-5]	[10-20]	[40-50]	[20-30]	[20-30]	[20-30]
Haier Group	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Hisense	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]	[0-5]
Other	[0-5]	[5-10]	[5-10]	[5-10]	[10-20]	[10-20]
Total	**100**	**100**	**100**	**100**	**100**	**100**
Share of all sales in price range	[0-5]	[40-50]	[20-30]	[10-20]	[5-10]	[10-20]

Source: GfK Data.

Table C.12: Distribution of hob sales across price quartiles, 2022

	Volume share (%), by quartile 2022			
	Quartile 1	*Quartile 2*	*Quartile 3*	*Quartile 4*
Price range covered (£)	<148	148-214	214-348	>348
Whirlpool	[0-5]	[10-20]	[5-10]	[0-5]
Arçelik	[20-30]	[10-20]	[5-10]	[0-5]
BSH	[0-5]	[0-5]	[20-30]	[50-60]
Private Label	[60-70]	[20-30]	[5-10]	[5-10]
Electrolux	[0-5]	[20-30]	[30-40]	[20-30]
Haier Group	[0-5]	[0-5]	[0-5]	[0-5]
Hisense	[0-5]	[5-10]	[0-5]	[0-5]
Samsung	[0-5]	[0-5]	[0-5]	[0-5]
Other	[5-10]	[10-20]	[5-10]	[10-20]
Total	**100**	**100**	**100**	**100**

Source: GfK Data.

Response to methodological concerns raised by the Parties

C.35 The Parties have submitted that competition for MDAs does not focus on price alone.[6] For example, the Parties presented research showing that both cost and energy efficiency are important considerations when purchasing MDAs.[7]

C.36 The Parties have also told us that the pricing analysis fails to accurately reflect the way manufacturers compete with each other, the way negotiations between retailers and manufacturers are conducted, and the way consumers compare different products.[8] The Parties submitted that:

(a) It is not correct to think of suppliers as only competing with each other in particular price ranges. Instead, suppliers compete across a continuum of

[6] Parties, [✂].
[7] Parties, [✂].
[8] Parties' initial submission, 24 October 2023, paragraphs 1.11-1.12.

prices, with products at any price point constrained by appliances above and below it.[9]

(b) Trade customers negotiate prices over an entire range of MDAs with a large number of MDA suppliers simultaneously. Any attempt to raise prices in one segment can be punished by a retailer's ability to move volumes to another brand in other segments.[10]

(c) Price range analysis does not accurately reflect the competitor sets that consumers consider when making their purchasing decisions and so any price-segmentation is arbitrary.

C.37 We agree with the Parties that price range analysis cannot fully capture the nature of competition within MDA categories and that it would be incorrect to view price quartiles or ranges as individual markets. The boundaries drawn between price ranges are necessarily somewhat arbitrary and products priced at the top of one range are especially likely to be viewed by customers and consumers as alternatives to those priced at the bottom of the next range.

C.38 However, as reflected in the internal documents and third party evidence set out in chapter 7, the evidence we have assessed shows that price is important to customers and consumers, and this analysis is therefore meaningful in analysing closeness of competition (considered in the round alongside other evidence).

C.39 We note that quartiles can in some cases cover a narrow price range (in absolute terms), but this reflects the fact that in practice many MDA appliance sales occur within a narrow band (eg with the £200 to £300 range being particularly large in terms of sales volumes). There is a relatively short tail of volumes sold below these prices, and a very long tail at the top end of the distribution (from around £500 upwards). We have carried out analysis based on both fixed price bands, and price quartiles, which we consider provides a meaningful comparison of the strength of each supplier at different price points. In combination the fixed price band and price quartile analysis shows a consistent picture within each of the MDAs we have considered.

C.40 We further note that most of the evidence used in our competitive assessment (except for price range analysis) refers to competition generally and does not require us to conclude on the relative importance of various competitive parameters.

[9] Parties' initial submission, 24 October 2023, paragraphs 1.11.1 and 7.2.
[10] Parties' initial submission, 24 October 2023, paragraph 1.12.2. Parties, [✂].

APPENDIX D: Consumer demand for dishwashers

Introduction

D.1 This Appendix sets out our econometric estimation of diversion ratios for dishwashers in the UK using a consumer demand model. For our analysis, we use data obtained from [✂]. [✂].

D.2 The reason our econometric analysis focuses on dishwashers is that Whirlpool told us that the [✂].[11] As a result, the estimation of a consumer demand model, which uses historic data, would likely be more informative for our assessment of dishwashers than for other MDA categories, in respect of which Whirlpool submitted that there would [✂] absent the Transaction.

D.3 The remainder of this Appendix is structured as follows.

(a) We first describe the data used to estimate the consumer demand model.

(b) Then the section titled Demand Model provides a technical overview of the demand model.

(c) Next, the section titled Estimation and Identification describes the method of estimation we use.

(d) Following this, we present our results.

(e) Finally, we discuss the sensitivity of our results.

Data

D.4 For the period January 2017 to June 2023, we requested point-of-sale data from a number of retailers. This included monthly sales revenues and volumes for each dishwasher sold in the period, and information on product characteristics for each dishwasher.

D.5 For the reasons noted in paragraph D.1 above, [✂]. [✂].

D.6 In cleaning the data, we took a number of steps:

(a) First, we restricted our analysis to a subset of the data collected. Specifically, some product characteristics were only partially reported. As a result, we restricted our analysis to characteristics that were reported in at least 90% of

[11] Whirlpool's counterfactual paper.

models, were most likely important to consumers based on consumer research and contained sufficient variation between models.[12]

(b) Second, we dropped products where there were missing characteristics. This led to the removal of 4.7% of observations, which collectively accounted for 3.1% of total sales in the sample.

D.7 Overall, the final dataset contained data at the model level in each month. [✂], the dataset [✂].[13]

D.8 Whilst we have used data from a [✂] retailer, we note that conditions of competition vary across retailers (eg in terms of the number and strength of different brands, and the share of online/offline sales). In particular, we note that the final sample of the data differs from the dishwasher market as a whole in the following ways:

(a) The Parties have a [✂] combined share of supply in this data than in the dishwasher market as a whole.

(b) The share of Private Label (including exclusive) brands is [✂] in the data than in the dishwasher market as a whole.

(c) The data contains a [✂] of brands and models than most other retailers.

D.9 Therefore, the data may not be fully representative of the dishwasher market as a whole. We have accounted for this limitation when interpreting this analysis and in the weight we have placed on these results alongside the other evidence considered in our competitive assessment.

Demand model

D.10 In this section, we introduce the demand model that we use as the basis for our estimation. The demand model provides a framework that links economic theory to our estimation. We explain our choice of demand model and the implications it has for the interpretation of its results.

D.11 Dishwashers are durable goods used for multiple years once purchased. Recognising this, consumers will take account of a number of factors relating to the future when they purchase a new dishwasher. While consumers consider the upfront cost of buying a dishwasher, they also consider its expected future running

[12] For example, we dropped indicator variables for the dishwasher having a drying cycle or containing adjustable racks. These as these are present in all modern dishwashers.
[13] [✂].

costs (repairs and energy costs), the availability of a manufacturer warranty, and the product's expected lifetime.[14]

D.12 The first issue we have considered is whether consumers are likely to engage in inter-temporal substitution – ie trading off whether to purchase today or at some point in the future – to a significant degree. Such behaviour has the potential to create links in consumer demand over time which can complicate the modelling of consumer demand.[15] However, [✂] consumer research indicates that the key features of consumer and firm behaviour that can give rise to demand dynamics appear not to be prominent in the dishwasher industry.

D.13 First, consumers do not appear to strategically time dishwasher purchases.[16] Instead, most consumers make a purchase soon after beginning their search for a new appliance. Although it applies to a wider set of MDAs than dishwashers, research commissioned by Whirlpool finds that British consumers spend [✂] shopping for their new MDA appliance, and [✂]% take no more than [✂].[17] In line with these findings, we do not introduce the option value of delaying purchases into our demand model.

D.14 Second, in a survey of the retailer's customers, approximately [✂]% of respondents cite the replacement of a (partially) broken dishwasher as the reason for purchase. Only [✂]% of respondents stated that the motivation behind their dishwasher purchase was to upgrade their existing model.[18] Separate research commissioned by Whirlpool supports this. In this survey, only [✂]% of respondents purchase a new appliance to upgrade their existing unit.[19]

D.15 Given that few purchases are upgrades, we focus our demand model on consumers who are purchasing replacement or new dishwashers. The benefit of this is that we do not need to incorporate demand dynamics into the model to recover the substitution patterns of consumers.[20]

D.16 In line with the above and given that the goal of our analysis is to understand substitution between dishwashers, we use a static discrete choice modelling

[14] See chapter 7.
[15] Dynamic models are typically used to study industries where products of set characteristics are falling in price over time not just due to sales eg LCD TVs or smartphones.
[16] In the context of durable goods, the academic literature has estimated demand for other durable goods markets where there are heterogenous consumer preferences over new product innovations, anticipated price dynamics, consumers strategically timing purchases, and the possibility of some consumers continually upgrading on existing products. A selection of examples includes Nair (2007) (Video games), Conlon (2010) (LCD TVs), Schiraldi (2011) (Automobile replacement), and Gowrisankaran and Rysman (2012) (Digital Cameras).
[17] Whirlpool [✂].
[18] Response to the CMA's phase 2 data request.
[19] Whirlpool [✂].
[20] Formally, it means we do not need to keep track of a consumer's existing stock of dishwashers. Instead, when upgrades are excluded, we can assume that consumers current and (discounted) expected future utility is earned at the time of purchase (Conlon 2010).

framework to estimate demand for dishwashers.[21] Within this large class of models, our baseline model uses the two-level nested logit demand model.[22]

Two-level nested logit demand model

Overview

D.17 The two-level nested logit demand model has been widely used in the academic literature to explore antitrust issues.[23,24] In this class of demand models, products that share a selected characteristic are grouped together in nests.

D.18 Including nests in a demand model relaxes restrictive market-share-based substitution patterns implicit in the workhorse aggregate logit demand model. Specifically, it allows for the possibility that consumers perceive products to be closer substitutes when they belong to the same nest.

D.19 Consumer substitution patterns can be further relaxed by combining multiple layers of nests. The cost of this flexibility is that it places a hierarchical structure on a consumer's decision process. However, the consistency of the assumed nesting structure with utility maximising consumers can be tested with the data. The assumed two-level nesting structure in our baseline specification is shown in Figure D.1.

(a) First, consumers making a purchase choose a built-in (BI) or free-standing (FS) dishwasher. This choice defines the upper level of the nesting structure.

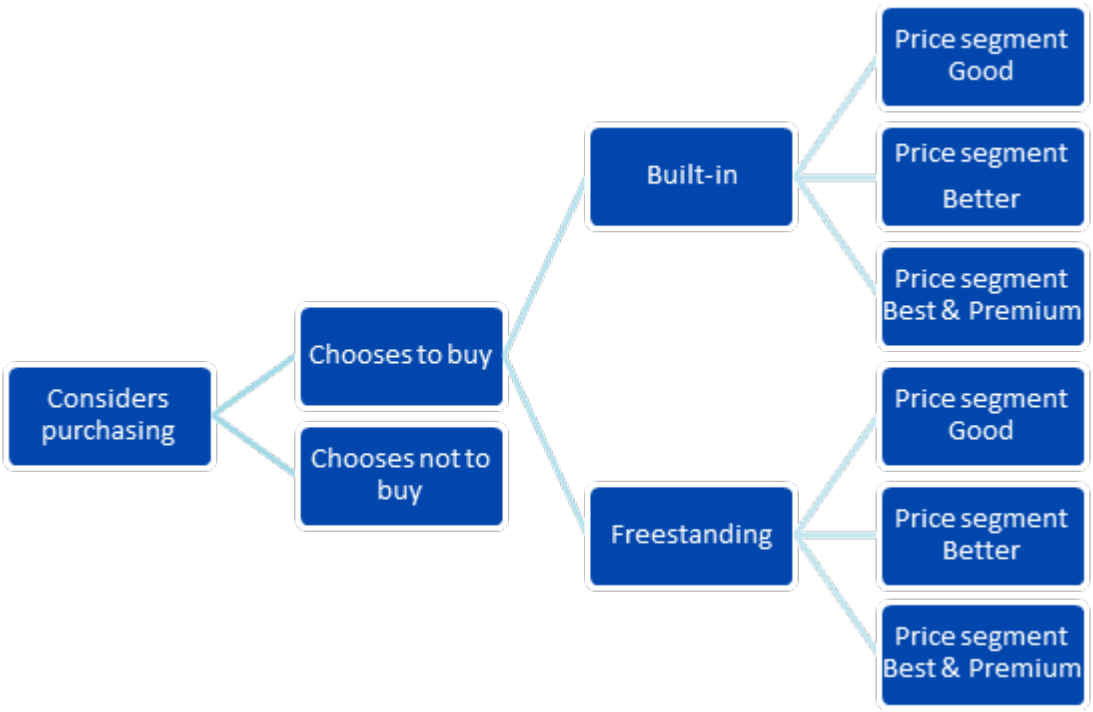
(b) Second, having chosen the type of dishwasher, consumers next choose a price segment. In line with the approach taken in GfK market reports and [✂], each MDA category is partitioned into ‘Good’, ‘Better’, ‘Best’ and ‘Premium’ price segments.[25] In our econometric analysis, we use a price index to classify dishwashers of the same type into 'Good’, 'Better,' 'Best and

[21] If, for example, our goal was to measure consumer responses to changing energy costs, then formally modelling the dynamic demand interactions between appliance efficiency labels and expected energy costs would likely motivate a more complicated dynamic model.
[22] Other recent academic studies analysing demand for mass domestic appliances markets have used a static framework to model demand (Houde and Myers (2021), Montag (2023)).
[23] Brenkers and Verboven (2006) use a two-level nested logit to quantitatively evaluate market boundaries in the European car market, Björnerstedt and Verboven (2016) use it to simulate price effects of a merger of two competing Swedish analgesics manufacturers.
[24] More generally when there is sufficient variation in the data it is possible to use a random coefficients logit model (RCL) see Chapter 1 and 2 of Ho et al (2021) for a review of the recent literature. In this case we choose a nested logit model instead as the qualitative evidence suggested a clear partition in the error structure. Further the large number of products compared to the relatively small number of markets can make identifying random coefficients more difficult.
[25] For example see: FMN or Arçelik’s internal document or Whirlpool’s internal document.

Premium' (B&P) categories.[26,27] The choice of price segment defines the lower level of the nesting structure.

(c) Finally, having chosen the type of dishwasher and then a price segment, consumers choose their preferred dishwasher.

Figure D.1: Consumer's decision tree when purchasing a dishwasher



Source: CMA analysis.

D.20 The remainder of this section describes the model in more detail. We begin by briefly providing a technical description of the baseline specification of the two-level nested logit model. Our exposition closely follows Mansley et al. (2019).

Model

D.21 The model assumes each consumer decides whether to purchase a dishwasher each month. If so, they purchase dishwasher j at the price p_{jt} from the set of J_t of dishwashers sold in month t. If not, the consumer is said to have chosen the 'outside good' denoted by $j = 0$.[28]

D.22 In the upper-level model of the nesting structure, the set of dishwashers sold each month is partitioned into $g \in \mathcal{G} := \{BI, FS, 0\}$. Group $g = 0$ denotes the consumer's

[26] In our baseline analysis we use three segments. We discuss the sensitivity of our results to alternative segmentation definitions in the final section.
[27] Like GfK, we define a monthly price index for each type of dishwasher: built-in and freestanding. The price index benchmark of 100 is set equal to the average price of each type of dishwashers sold in that month. The price index for each dishwasher is defined by the ratio of its price to the benchmark price. For example, if the average price for built-in dishwashers is £400, then another built-in dishwasher costing £300 in the same month has a price index of 75.
[28] Choosing the 'outside good' is shorthand for the consumer's decision to spend all of their income on other goods.

decision not to make a purchase in that month, and option $j = 0$ is its sole member. The lower level of the nesting structure further partitions groups of built-in or free-standing dishwashers into $h \in \mathcal{H} := \{Good, Better, B\&P\}$ price segments.

D.23 The conditional indirect utility of consumer i buying dishwasher j in price-segment h of type g in month t is

$$u_{ijt} = \delta_{jt} + \varepsilon_{ijt}(\sigma_1, \sigma_2)$$

where δ_{jt} is the mean utility common to all consumers and $\varepsilon_{ijt}(\sigma_1, \sigma_2)$ is a random component of utility specific to each consumer that depends on nesting parameters, σ_1 and σ_2.

D.24 In addition to price, the mean utility depends on observed and unobserved (to the econometrician) characteristics of dishwashers.

$$\delta_{jt} := x_{jt}\beta + \alpha p_{jt} + \xi_{jt}$$

In the data observed dishwasher characteristics, x_{jt}, include the dishwasher brand, whether it is built-in or free-standing, its dimensions, the noise level during operation, the presence of an electronic display, and the availability of a quick-wash function.

D.25 The unobserved characteristics, ξ_{jt}, captures all other dishwasher features observed by consumers, but that are not present in the data. For example, because we only partially record each dishwasher's energy efficiency ratings observed by consumers at the time of purchase, we include them in ξ_{jt}.[29]

D.26 The second term in the utility function, $\varepsilon_{ijt}(\sigma_1, \sigma_2)$, contains random consumer-specific components of utility that follow the standard distribution used in nested logit models.[30] The nesting parameters, σ_1 and σ_2, capture unobserved correlations in consumer's utility across products in the same price segment and dishwasher type, respectively.

D.27 When σ_1 high (ie, gets closer to 1), then dishwashers in the same price segments are closer substitutes to one another than to dishwashers in other price segments. When σ_2 is high, built-in dishwashers are closer substitutes to each other than to free-standing dishwashers.

[29] Since 1 March 2021, UK retailers must use the new A-G scale on dishwashers' energy-efficiency labels. Prior to that a different scale (A+++ to G) was used. Because our sample covers the period before and after the implementation of the new regulation, the data contains a mixture of both energy scales. Rather than introduce measurement error, we choose to capture the effect of energy labels on current and expected future utility in ξ_{jt}.

[30] Formally $\varepsilon_{ijt}(\sigma_1, \sigma_2)$ follows a generalised extreme value distribution.

D.28 The parameters also provide a means of checking the consistency of the estimated model with standard microeconomic theory. If $1 \geq \sigma_1 \geq \sigma_2 \geq 0$, then the model is consistent with utility-maximising behaviour. If σ_1 or σ_2 are negative, then the model is inconsistent with utility maximisation. If, however, $\sigma_1 > 1$ or $\sigma_2 > \sigma_1$ then the model is only consistent with utility maximisation from some values of the explanatory variables affecting mean utility.[31]

Estimation and identification

D.29 Our goal is to estimate the parameters of the demand model: α, β, σ_1, and σ_2. To estimate model parameters, the purchase probabilities implied by the model, $s_j(\delta_t, \sigma)$, are matched to the share of consumers that bought dishwasher j, s_{jt}, in each month. That is, $s_{jt} = s_j(\delta_t, \sigma)$.

D.30 Estimation is complicated by the fact that unobserved characteristics, ξ_{jt}, enter the purchase probability nonlinearly through mean utility, δ_{jt}. However, following Berry (1994) and Verboven (1996), the model can be made tractable for estimation by inverting the demand system.

D.31 Substituting in the expression for the mean utility, $\delta_{jt} = x_{jt}\beta + \alpha p_{jt} + \xi_{jt}$ into the inverted system of purchase probabilities provides an estimation equation:

$$\ln \frac{s_{jt}}{s_{0t}} = x_{jt}\beta + \alpha p_{jt} + \sigma_1 \ln \bar{s}_{j|hgt} + \sigma_2 \ln \bar{s}_{h|gt} + \xi_{jt}$$

where, in month t,

(a) s_{jt} is the share of consumers that bought dishwasher j

(b) s_{0t} is the share of consumers that chose not to buy a dishwasher (the share of the 'outside good')

(c) $\bar{s}_{j|hgt}$ is the share of units of dishwasher j sold in price segment h of dishwasher type g

(d) $\bar{s}_{h|gt}$ is the share of price segment h in dishwasher type g

D.32 In our baseline specification, in line with the approach taken by Brenkers and Verboven (2006), we allow for more flexibility in the nesting structure parameters. Specifically, the nesting parameter in the lower level of the model is allowed to

[31] If σ_1 or σ_2 are negative, then the model is inconsistent with utility maximisation. If, however, $\sigma_1 > 1$ or $\sigma_2 > \sigma_1$ then the model is only consistent with utility maximisation from some values of the explanatory variables affecting mean utility. (Train (2009), chapter 4, page 88).

vary across price segments.[32] This allows for heterogeneity in the substitution of consumers between different nests.

D.33 In our main specification, we add month and brand interacted with year-fixed effects. Month-fixed effects control for seasonality in dishwasher purchases. Brand interacted with year fixed effects allow us to control changes in brand offerings every year (ie new warranties) and the effect of changes in annual brand marketing spending alongside any changes in consumer perception of each brand.

D.34 Using shares calculated from the data and an assumption on the size of the outside good and treating ξ_{jt} as the econometric error term, the parameters in the inverted choice probabilities equation can be estimated using OLS. However, the estimated parameters under OLS are likely to be biased.

D.35 The price coefficient, α, is biased when firms, like consumers, observe ξ_{jt} prior to setting prices. Firms are likely to factor in the value consumers place on unobserved (to the econometrician) product attributes when setting prices. For example, if ξ_{jt} is large and positive because the average consumer perceives that dishwasher j is 'high quality,' then the price setting firm may seek to increase its price. The resulting correlation between prices and ξ_{jt} creates an endogeneity problem.

D.36 In addition to prices, the two nest shares $\ln \bar{s}_{j|hgt}$ and $\ln \bar{s}_{h|gt}$ are by construction also correlated with ξ_{jt}. As a result, they, too, are endogenous. To address endogeneity concerns, we use instrumental variables regression to identify the parameters.

Instruments

D.37 As is common in static discrete choice models, we assume that the product characteristics of the dishwasher j are uncorrelated with the error term. We have three sets of instrumental variables.

D.38 First, in line with the approach of Björnerstedt and Verboven (2016), our instrumental variables include counts of the number of all other and rivals' products overall, by type of dishwasher, by price segment, and by type of dishwasher and price segment. When we allow for nesting parameters to vary across price segments, the instruments varying with the lowest level of the nesting

[32] In this case, the estimation equation is

$$\ln \frac{s_{jt}}{s_{0t}} = x_{jt}\beta + \alpha p_{jt} + \sum_{h \in \mathcal{H}} \sigma_{1h}\, 1[j \in h] \ln s_{j|hgt} + \sigma_2 \ln s_{h|gt} + \xi_{jt}$$

In practice it in implemented is interacting the 'good', 'better' and 'best and premium' dummy variable with the price segment market share term.

structure are interacted with a factor variable assigning the dishwasher to its price segment.

D.39 Second, we also include Gandhi and Houde (2020) 'differentiation' instruments based on the noise produced by the dishwasher. Differentiation instruments use local and quadratic functions of product characteristics, which serve as exogenous measures of differentiation.[33] To construct these instruments, for each product pair (j,k), we first compute the difference $d_{jkt} = x_{kt} - x_{jt}$ in noise between each pair of models. Then, for the local differentiation instruments, we count the number of own and rival products within a standard deviation of product j. For the quadratic versions, we sum the squared difference over own and rival products.[34]

D.40 Finally, we also include an additional instrumental variable whose goal is to capture changes in the cost of metal used in the production of dishwashers. Specifically, we lag the monthly ONS PPI metal input cost index by six months and interact it with the size dimensions (height and width) of the dishwashers.[35]

Market Size

D.41 To facilitate estimation, we need an estimate of the number of potential buyers (the size of the market) in each month to compute s_{jt} and s_{0t}. However, this is not directly observed in the data, and the market size must be calibrated prior to estimation.

D.42 We calculate market size from replacement demand. Replacement demand is equal to the number of households that currently own a dishwasher whose appliance requires replacement each year. Our estimate of the replacement demand in each year is given by the product of estimates of the number of UK households in each year, the percentage of households owning a dishwasher, and the dishwasher replacement rate.[36] The total market size for dishwashers in each year is calculated by assuming that replacement demand accounts for [✂]% of total dishwasher demand.[37] We note that our results are robust to changes to this assumption.

[33] As noted by Conlon and Gortmaker (2020), differentiation IVs typically outperform standard 'BLP instruments' based on sums or averages of own and rival product characteristics.
[34] See Gandhi and Houde (2020) or Conlon and Gortmaker (2020) for details.
[35] ONS PPI Index input group – C23TC25 (accessed by the CMA on 28 November 2023).
[36] The number of households is based on CMA analysis of ONS data. The percentage of households that currently own a dishwasher is assumed to be [✂]%. This the average of AMDEA's estimate and [✂]. Finally, the replacement rate for dishwashers is approximated by 1/(expected dishwasher lifetime). We assume that the expected dishwasher lifetime is [✂] years. This represents a midpoint between RBB Economics' estimate that dishwasher are expected to last [✂] years (Parties submission on competition at low-mid price points) and AMDEAs research suggesting that UK consumers replace appliances every 10 to 15 years. All websites cited in this footnote were accessed by the CMA on 22 January 2024.
[37] Response to the CMA's phase 2 data request.

D.43 We make two final adjustments to compute market size each month. First, [✂].[38] Second, [✂].

Estimation results

D.44 In this section, we present the results of our estimation and show the estimated brand-level diversion ratios. The robustness of our results to alternative assumptions is described in the section on sensitivities below.

D.45 Table D.1 contains our estimation results. To place our preferred specification into context, we present the output of several model specifications. Specifically, the first column shows the results of the biased OLS logit model. Subsequent columns show (nested) logit models with increasingly flexible nesting structures. These are all estimated using instrumental variables. Each column represents a different specification. In each case, the dependent variable is the difference between the logged product market share and the logged share of the outside good in a period. The covariates are presented in rows. Where no coefficient is presented, that covariate was not included in the specification. Finally, in all specifications, we include fixed effects for month and brand interacted with year.

[38] [✂].

Table D.1: Estimation results

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	OLS Logit	*IV Logit*	*1-level Nested Logit with nest for built-in and free-standing*	*2-level Nested Logit*	*2-level Nested Logit with flexible nesting parameters [Main Specification]*
Price (000's)	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
σ_1 (Lower-level nesting parameter)			[✂] [✂]	[✂] [✂]	
σ_2 (Upper-level nesting parameter)				[✂] [✂]	[✂] [✂]
σ_1 (On good segment)					[✂] [✂]
σ_1 (On better segment)					[✂] [✂]
σ_1 (On best and premium segment)					[✂] [✂]
Noise (Db)	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Height (cm)	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Width (cm)	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Presence of an electronic display	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Presence of quick wash setting	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Indicator for if the model is built-in	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Constant	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]
Month FE	✓	✓	✓	✓	✓
Brand x Year FE	✓	✓	✓	✓	✓
Adjusted R^2	[✂]	[✂]	[✂]	[✂]	[✂]
Number of $\delta_{jt}'s$	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CMA analysis [✂].
Note: [✂].

D.46 The results in Table D.1 imply that consumers are price-sensitive in relation to dishwashers.[39] With the exception of column 4, across specifications, the values of the nesting parameters are consistent with utility maximization and suggest that there is a strong degree of substitution within nests. Additionally, the most flexible two-level nested logit specification (column 5) supports the conclusion that there is some heterogeneity in the intensity of substitution across price segments.

D.47 The parameter estimates are also generally of the expected size and sign. The exception to this is the sign on the indicator if the dishwasher has an electronic display.

D.48 As part of the estimation results, we also were able to check common diagnostic tests of the instruments used. The results of these tests indicate that the

[39] Across all products the estimated mean own price elasticity is [✂] with a median own price elasticity of [✂]. 25th and 75th percentiles are [✂] and [✂] respectively.

instruments used are relevant with a strong rejection of the standard weak instrument tests.[40]

Diversion ratios

D.49 An advantage of the econometric analysis is that we can use its results to measure the closeness of competition between products using diversion ratios.

D.50 Diversion ratios are widely used in the academic literature to measure the closeness of competition between two products.[41] The diversion ratio from good j to k asks: if we raise the price of good j, what fraction of the consumers who substitute away from j switch to k? This is useful because it quantifies the degree, or closeness, of substitution between two goods.

D.51 In a differentiated product market, diversion ratios are proportional to the share-weighted ratio of the cross-to-own price elasticity:

$$DR_{jk} = -\frac{e_{jk}\, s_k}{e_{jj}\, s_j}$$

where e_{jk} is the price elasticity of demand for product k given a change in the price of product j. Of the specifications in Table D.1 above, only diversion ratios in the aggregate logit model (columns 1 and 2) coincide with those implied by market shares.[42]

D.52 Using estimated parameters from our main specification, we compute diversion ratios between each dishwasher model in each month using estimated own and cross-price elasticities.[43] We then aggregate these diversion ratios across months and to the brand level.[44] Table D.2 shows the estimated aggregate diversion ratios between the Parties' brands and rival brands.

[40]The lowest weak instruments test statistic is 236.9 for price. P-values <0.01 for Wu-Hausman and Sargan tests.
[41] See Conlon and Mortimer (2021).
[42] Note this is because of the IIA property of logit (McFadden 1973). In these specifications the logit diversions, matches that implied by market share when market shares adjusted for the outside good are used.
[43] See Mansley et al (2019) for the formulas use to compute diversion ratios in the 2-level nested logit model.
[44] Brand and time aggregated elasticities are computed using a weighted average of monthly product level diversion ratios using monthly volumes at the brand level as weights. See Werden and Froeb (1994) for a discussion of the computation of aggregate diversion ratios across multiple products.

Table D.2: Estimated aggregate diversion ratios in 2022 from the Parties' brands to rival brands

%

From \ To	*Beko*	*Indesit*	*Hotpoint*	*Whirlpool*	*Bosch*	*Haier Group Brands**	*Hisense*	*Private Label & Exclusive brands*
Beko	-	[5-10]	[10-20]	[0-5]	[10-20]	[5-10]	[5-10]	[5-10]
Indesit	[20-30]	-	[10-20]	[0-5]	[10-20]	[5-10]	[5-10]	[0-5]
Hotpoint	[20-30]	[5-10]	-	[0-5]	[10-20]	[5-10]	[5-10]	[0-5]
Whirlpool	[20-30]	[5-10]	[10-20]	-	[10-20]	[5-10]	[5-10]	[0-5]

Source: CMA analysis [✂].

**Haier Group brands include Baumatic, Candy, Hoover, Fisher & Paykel, and Haier.*

Note: Only rival brands whose diversion ratios are above [0-5]% are included in the Table.

D.53 Table D.2 shows the following:

(a) The aggregate diversion ratio to the other merging Party's brands lies between [20-30%].[45]

(b) The estimated diversion ratios from the Parties' main brands to Bosch are [10-20%].[46]

(c) The diversion ratios to all other rival brands are lower. For example, the diversion ratio to the combined brands of the Haier Group is [5-10%].[47]

D.54 Table D.2 presents estimates of aggregate diversion ratios across all months in 2022. However, the diversion ratio depends on relative prices, and these are subject to monthly fluctuations in the data.[48]

D.55 To highlight the monthly variation in diversion, Figure D.2 below shows the six largest diversion ratios from Beko (left panel) and Hotpoint (right panel) to other brands in each month of 2022.[49] In both panels, each brand has its own marker symbol that plots the diversion ratio from the Parties' brand to rival brands against the difference between their average price in each month of 2022.[50]

D.56 Figure D.2 provides some additional context to the results in Table D.2. Specifically, they demonstrate that:

(a) Combined, the Parties' brands have the largest diversion ratios. For example, in the left panel, adding Hotpoint and Indesit, we see that the two largest Whirlpool brands have a combined diversion from Beko consistently in the

[45] The estimated diversion ratios are higher than what would be implied by market shares. This is consistent with the fact that many of the Parties' products are in similar price segments and have similar characteristics.
[46] The diversion to all BSH group brands (ie including Neff and Siemens) is slightly higher: [10-20]% from Beko, Hotpoint or Indesit – the Parties' main brands in the UK dishwashers market.
[47] No individual Haier Group brand has a diversion ratio greater than [0-5]%.
[48] We note in other cases where diversion ratios are used it may also be useful to additionally consider the diversion ratios at other levels of disaggregation for example between individual products.
[49] The right panel is qualitatively similar for Indesit – Whirlpool's other large dishwasher brand.
[50] In the figures the x-axis is the average monthly price of the destination brand to the origin brand. A point on the red line at 0 thus indicates no difference in the average price between the two-brands in a given month.

range of 20-30%. In the right panel, diversion from Hotpoint to Beko is between [20-30] and [20-30]%.

(b) Diversion to Bosch from both Beko and Hotpoint is high relative to other brands and diversion to Bosch from the Parties' largest dishwasher brands increases when Bosch's price falls relative to Beko and Hotpoint's price.

(c) Like Bosch, diversion to Hisense tends to increase when its price falls relative to Beko and Hotpoint's prices. In some months, diversion to Hisense is as high as [10-20%].

(d) The largest Private label and Exclusive brand tends to be priced below the Beko and Hotpoint and can have as much as [10-20]% diversion in some months.

Figure D.2: Monthly diversion ratios from Beko and Hotpoint in each month of 2022

[✂]

Source: CMA calculations [✂].

D.57 As noted in the data section above, for both the results in Table D.2 and Figure D.2, these results need to be interpreted in the context of the composition of dishwashers in the data we use compared to the dishwasher market as a whole. For example, assuming that the estimated model generalises to all consumers in the dishwasher market then:

(a) Diversion ratios between the Parties may be overstated because the Parties [✂] in the data than in the dishwasher market as a whole.

(b) Diversion ratios to Private Label brands from the merging parties are likely to be understated because [✂] in the data than in the rest of the market for dishwashers.

Sensitivity analysis

D.58 To ensure the robustness of our results, we carried out a number of sensitivity checks. Across sensitivities, the estimated diversion remained stable, with around 20-30% diversion between the Parties.

D.59 First, an advantage of using a structural model to estimate diversion is that we can check how the results match data that was not used in the estimation. We use a standard model of firm competition to estimate the margins that would be

consistent with our parameter estimates.[51] The brand-level margins for 2022 predicted by this exercise were, on average, close to [✂]%.[52] [✂].[53]

D.60 Second, a key assumption of the model structure is the definition of the price segments used. In the specifications in Table D.1, we calculated the price segments using an unweighted average price by type of dishwasher (built-in or free-standing) to define the price index. We assign dishwashers to the 'Good' price segment if their value in the price index is at most 70, to 'Better' if its price index is above 70 but no higher than 100, and to 'Best & Premium' otherwise.

D.61 As discussed above, there is no definitive, unique definition of price segments. Alternative definitions may include using a sales-weighted average price as a basis for the price index, using four price segment nests (separating best and premium), and/or changing the threshold definitions.[54]

D.62 For our sensitivity analysis, we recalculated our results using a range of alternative definitions. In each case, diversion results remained similar. [55] This gives us confidence in the robustness of our results to alternative model structures and price segment definitions.

D.63 Additionally, we checked our model specification by changing the order of the nested logit so that price segments are the upper nest and built-in-free standing is a lower nest. In this case, the estimated parameters were inconsistent with the random utility model suggesting this is not a credible alternate specification.[56]

D.64 Third, we have also conducted sensitivity checks concerning the size of the outside good. The size of the outside good is an important assumption as they are accounted for in the calculation of the market shares we use in both the estimation of parameters and the calculation of diversion ratios.

D.65 To check the robustness of our assumption on the size of the outside good, we artificially increased the size of the outside good by assuming new purchases are a large fraction of demand without decreasing replacement demand. We estimated the model where the replacement rate was [✂]% of market size (compared to

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[51] Formally we use the first order conditions of a static differentiated Bertrand model with a 'passive' retailer. The retailer is labelled as passive because they charge a fixed mark-up over wholesale price. In this case, knowing the retailer's mark-up, suppliers de facto set retail prices when choosing wholesale prices. Combined with average brand-retailer wholesale prices in 2022, the output of the demand model is used in the resulting first order conditions to compute brand-level wholesale margins. Wholesale prices are derived from CMA calculations using [✂] and [✂].
[52] These margins were calculated without VAT on price.
[53] Arçelik internal document; Whirlpool internal document.
[54] For example, from a lower benchmark price calculated using a sales-weighted average price for each dishwasher type in each month, we redefine 'Good' to include all dishwashers with a price index up to 90. If not, the group becomes overly sparse. In addition we consider alternative differences between thresholds (ie 20, not 30).
[55] The results for the main brands Indesit, Beko, and Hotpoint are materially unchanged. Diversions from Whirlpool are more sensitive due to its low market share.
[56] Additionally, we attempted to use a random coefficients model. Due to the large number of products and relatively few markets, there was insufficient variation to identify random coefficients in this setting without further aggregation of products.

[✂]% in the baseline). While estimates of demand parameters changed, the diversion results are consistent with the results presented in the section above.[57]

D.66 Finally, we checked various technical estimation choices. For example, we checked separate brand and year fixed effects, product fixed effects, a shorter time horizon, and alternative lags for our cost instrument. In sensitivities where the estimated model remained consistent with random utility maximisation the estimated results remained stable.

D.67 Overall, our sensitivity checks provide reassurance of the robustness of our results. However, a limitation of many of the sensitivities is that they largely check the internal validity of the model. Regarding the ability to extrapolate our findings [✂] to the whole market, we note the possible limitations of the data used (see paragraph D.8).

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[57] Difference is less than [✂] percentage points in all cases expect for the diversion between Whirlpool and Bosch which is around [✂] percentage points larger in both cases where the market size is increased.

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Glossary

the Act	The Enterprise Act 2002
Arçelik	Arçelik A.Ş.
Arçelik Target Business	Arçelik's European MDA and SDA businesses
Ardutch	Ardutch B.V.
Beko Europe	Beko Europe B.V.
CMA	The Competition and Markets Authority
Continuation Scenario	Whirlpool submitted that the Continuation Scenario is the approach to its EMEA MDA business that would have been pursued absent a sale
Contribution agreement	The agreement executed on 16 January 2023 between Whirlpool, Beko Europe, Arçelik, Ardutch B.V. and Whirlpool EMEA Holdings LLC
EEA	European Economic Area
EMEA	Europe, Middle East and Africa
GfK Data	The two datasets provided by the Parties based on point-of-sale retail price and volume data acquired from GfK
The **inquiry group**	The group of CMA panel members
MDA	Major domestic appliances
MDA category	Washing machines, tumble dryers, dishwashers, cookers, ovens and hobs are each an **MDA category**
MDA4	Washing machines, tumble dryers, dishwashers and cooking appliances – product categories combined.
The Merged Entity	The future of Arçelik and Whirlpool together
OEM	Original equipment manufacturer

Party	Arçelik and Whirlpool are each a **Party**
The **Parties**	Arçelik and Whirlpool
Private Label brands	Private label products are manufactured by a third-party but sold under a retailer's (or other customer's) own brand name
SDA	Small domestic appliances
SLC	Substantial lessening of competition
The **Transaction**	The joint venture between Arçelik and Whirlpool
UK	United Kingdom
Whirlpool	Whirlpool Corporation
Whirlpool Target Business	Whirlpool's EMEA MDA business