Terms of reference and conduct of the inquiry

Terms of reference

1. On 2 September 2011 the OFT sent the following reference to the CC:

    1. In exercise of its duty under section 33(1) of the Enterprise Act 2002 ('the Act') to make a reference to the Competition Commission ('the CC') in relation to an anticipated merger the Office of Fair Trading ('the OFT') 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 or under the control of Anglo American PLC will cease to be distinct from enterprises carried on, by or under the control of Lafarge S.A.; and

            (ii) the value of the turnover in the UK of the enterprises being taken over exceeds £70 million; and

        (b) the creation of that situation may be expected to result in a substantial lessening of competition within any market or markets in the UK for goods or services, including each of : (i) the supply of all aggregates; (ii) the supply of primary aggregates; (iii) the supply of crushed rock; (iv) the supply of rail ballast; (v) the supply of asphalt; (vi) the supply of ready-mixed concrete (including as a result of input foreclosure in relation to the supply of bulk grey cement); and (vii) the supply of bulk grey cement (including the supply of bulk grey cement through co-ordinated effects concerns).

    2. Therefore, in exercise of its duty under section 33(1) of the Act, the OFT hereby refers to the CC, for investigation and report within a period ending on 16 February 2012, 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 UK for goods or services.

Office of Fair Trading
2 September 2011

Conduct of inquiry

2. On 2 September 2011, we posted on our website an invitation to comment on the proposed JV and notices inviting views were placed in *Construction News* and *Building Magazine* on 22 September 2011. We also published on our website biographies of the members of the Group conducting the inquiry.

3. We invited a wide range of interested parties to comment on the proposed JV. These included suppliers and customers of the main parties, competitors and potential competitors for the supply of aggregate, cement, asphalt and RMX, relevant trade associations (including the Mineral Products Association and British Aggregates Association) and government departments.

4. We sent detailed questionnaires to major competitors (Aggregate Industries, Cemex and Hanson), independent competitors (including cement importers), large purchasers of bagged cement, suppliers and purchasers of HPL (including power stations), and purchasers of rail ballast (including Network Rail). Evidence was also obtained through further written requests. Data on cement, asphalt, aggregate and RMX sites and volumes was purchased from BDS Marketing Research Ltd.

5. We also held 14 hearings with selected third parties, including the major competitors, independent competitors, cement importers and customers (including purchasers of cement, asphalt, HPL and rail ballast).

6. Non-confidential submissions from third parties and summaries of hearings can be found on our website.

7. We commissioned GfK-NOP to carry out a survey of the main parties' customers for aggregates, asphalt, RMX and cement, and competitors for the supply of aggregates, asphalt and RMX (excluding the major competitors and their subsidiaries). The results of the survey were published on the CC website.

8. We received written evidence from the main parties, and a non-confidential version of their main submission is on our website. We also held hearings with Lafarge on 18 January 2012 and with Anglo American on 19 January 2012.

9. On 11 October 2011, we published an issues statement on our website, setting out the areas of concern on which the inquiry would focus.

10. On 13 and 14 October, members of the Inquiry Group, accompanied by staff, visited a number of aggregate quarries, RMX facilities and a cement plant owned by the main parties.

11. In the course of our inquiry, we sent to Anglo American, Lafarge and other parties some working papers and extracts from those papers for comment.

12. We would like to thank all those who have assisted in our inquiry so far.

13. A non-confidential version of the provisional findings report has been placed on the CC website.

Extensions to the inquiry

14. On 12 October 2011 we extended the period of the reference because the main parties had been unable to supply information and documents specified by us in a notice issued under section 109 of the Act.

15. Upon receiving the required information to our satisfaction, we ended the period of extension on 31 October 2011. The period within which the report on the reference was to be prepared and published was revised to end on 6 March 2012.

16. On 21 November 2011 we issued a notice of extension due to the scope and complexity of the inquiry. This further changed the statutory deadline to 1 May 2012. A revised administrative timetable was published on 22 November 2011, replacing the initial timetable published on 22 September 2011.

Tarmac and Lafarge financial performance

1. This appendix sets out an overview of the historic financial performance of Tarmac and Lafarge, the respective UK construction materials businesses of Anglo American and Lafarge Group which will be contributed to the proposed JV.

Tarmac's financial performance

2. Table 1 sets out an overview of Tarmac's historic financial performance between FY07 and FY10 by product category.

TABLE 1 **Tarmac's historic financial performance, years ended 31 December FY07 to FY10**

	2007		*2008*		*2009*		*2010*	
	£m	*% split*	*£m*	*% split*	*£m*	*% split*	*£m*	*% split*
Gross revenues								
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Adjustments*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total gross revenues†	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	£m	*Margin*	*£m*	*Margin*	*£m*	*Margin*	*£m*	*Margin*
Prime gross margin (PGM)‡								
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Adjustments*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total PGM	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Contribution‡								
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Adjustments*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total contribution	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac EBITDA	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Operating cash flows	[✂]§	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Anglo American and CC analysis.

*[✂]
†[✂]
‡[✂]
§[✂]
Note: N/A = not applicable, with the exception of footnote §.

3. [✂]

4. [✂]

5. Commenting on Tarmac's FY10 performance, Anglo American in its FY10 annual report stated that:

> In the [Tarmac] UK Quarry Materials businesses, volumes remained at similar levels to 2009, but unusual weather patterns resulted in a greater degree of seasonal variation over the year. Tarmac's work to maximise operational efficiency continues ... The 2011 outlook remains relatively weak for the construction sector as a whole, but underlying fundamental demand remains and will turn to orders when economic conditions are more conducive to construction activity.[1]

6. [✂][2]

7. [✂]

8. [✂][3]

Lafarge's financial performance

9. Table 2 sets out Lafarge's financial performance from FY08 to FY10.

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[1] Anglo American 2010 Annual Report.
[2] [✂]
[3] [✂]

TABLE 2 **Lafarge's overall historic financial performance, FYE 31 December 2008 to 2010**

	2008		*2009*		*2010*	
	£m	*% split*	*£m*	*% split*	*£m*	*% split*
Gross revenues						
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Paving	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Other	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Adjustments*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	£m	*Margin*	*£m*	*Margin*	*£m*	*Margin*
Gross profit†						
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Paving	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Other	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Adjustments	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
EBITDA‡						
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Paving	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Other	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Adjustments	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

Note: N/A = not applicable.
*Adjustments include other revenues (eg rental income from non-operational land and property), combination adjustments relating to the Lafarge's business units, and elimination of intra-Lafarge balances and inter-segment revenues.
†Gross profit is calculated after deducting cost of goods sold and depreciation. Cost of goods sold primarily comprises manufacturing variable and fixed costs (which include raw material, fuel and power costs and variable costs associated with inventory movements), freight costs and depreciation.
‡EBITDA is calculated by deducting selling and administrative expenses, as well as deducting the financial element of pensions (ie interest cost and return on assets) from gross profit, but adding back depreciation which has already been deducted from gross profit. These pension finance costs were –£[✂] in FY08, –£[✂] in FY09, and –£[✂] in FY10. Selling and administrative expenses generally comprise personnel costs and Lafarge Group costs and recharges.

10. Lafarge's product mix over the period from FY08 to FY10 remained broadly stable. Cement revenues made up the largest share of Lafarge's gross revenues accounting for between [✂] and [✂] per cent of total gross revenues over the period, followed by aggregates with a share of between [✂] and [✂] per cent.

11. In FY09, Lafarge's total gross revenues [✂] by [✂] per cent from £[✂] million in FY08 to £[✂] million, with a [✂] seen across all of its products, with both RMX and cement seeing the [✂] of [✂] and [✂] per cent respectively, in particular cement was adversely impacted by deteriorating economic conditions from FY08 onwards

which reduced demand from the construction sector. Over this period, Hanson, Tarmac and Cemex were internalizing their sourcing of cement, which further reduced Lafarge's cement gross revenues due to reduced external cement sales to these companies.

12. The [✂] seen in FY09 appears to have [✂] as Lafarge's gross revenues in FY10 [✂] across all its major product categories (aggregates, asphalt, RMX and cement), in particular asphalt gross revenues [✂] by [✂] per cent, whilst aggregates [✂] by [✂] per cent. RMX and cement gross revenues in FY10 [✂] but remained broadly in line with FY09 levels. Growth in FY10 gross revenues was largely driven by increases in revenues from aggregates and asphalt linked to major road schemes from the Government's fiscal stimulus, which contributed to a combined revenue uplift of around £[✂] million.

13. Whilst cement accounted for [✂] per cent of Lafarge's FY10 gross revenues, it accounted for [✂] per cent of Lafarge's gross profit,[4] largely due to the high number of sites within the Aggregates & Concrete division which [✂] (Lafarge's definition of gross profit includes variable and fixed manufacturing costs). Lafarge's gross profit moved in line with gross revenue trends, [✂] by [✂] per cent in FY09 before [✂] by [✂] per cent in FY10. Lafarge's gross margin over this period [✂] from [✂] per cent in FY08 to [✂] per cent in FY10, largely driven by lower volumes which led to a relatively [✂]. We note that gross margin was also [✂] by a significant [✂] in RMX gross margin from [✂] per cent in FY08 to [✂] per cent in FY10. Had RMX gross margin remained at FY08 levels (ie [✂] per cent), then all things being equal, Lafarge's overall gross margin would have [✂] to [✂] per cent in FY10. Gross margin for the other products [✂], albeit cement gross margin [✂] in FY09 from [✂]

[4] Gross profit is calculated after deducting from revenues the cost of goods sold and depreciation. Cost of goods sold primarily comprises manufacturing variable and fixed costs (which include raw material, fuel and power costs and inventory/stock movements), freight costs and depreciation.

to [✂] per cent, before [✂] to [✂] per cent in FY10, largely due to an increase in the selling price for cement.

14. After [✂] in FY09 by [✂] per cent, EBITDA[5] [✂] by [✂] per cent in FY10, with FY10 EBITDA margin [✂] from [✂] to [✂] per cent, which was [✂] FY08 EBITDA margin of [✂] per cent.

[5] EBITDA is calculated after deducting selling and administrative expenses (comprising personnel costs and Lafarge Group costs and recharges) and the financial element of pensions (ie interest cost and return on assets) from gross profit.

Tarmac and Lafarge relevant JVs

1. This appendix sets out:

   (a) a brief description of a number of noteworthy JVs for Tarmac and Lafarge in aggregates, asphalt, RMX and cement; and

   (b) a full list of Tarmac's and Lafarge's JVs and partnership arrangements (see Tables 1 and 2 respectively) in aggregates, asphalt, RMX and cement (as applicable), together with details of their ownership structure, business activities, the role of the JV partners in their management and in the appointment of the JV board (if applicable).

2. [✂]

Tarmac's JVs and partnership arrangements

Tarmac's aggregates JVs

3. Tarmac has [✂] JVs or partnership arrangements which produce and/or supply aggregates.[1] Tarmac told us that these arrangements 'enable Tarmac to share the fixed cost investment required for the extraction and production of aggregates'. The following arrangements are noteworthy:

   (a) Tarmac's activity in rail ballast aggregates[2] arises through its [✂] JV with Hanson called Midland Quarry Products Limited[3] (MQP), which employs [✂] staff[4] and generated gross revenues of £[✂] million in FY10. MQP is involved in the production of aggregates and asphalt. Tarmac also sells a small quantity of rail ballast outside of MQP from time to time. [✂] Tarmac told us that MQP was

[1] [✂]
[2] OFT decision document under section 22 of the Enterprise Act 2002 (2 September 2002).
[3] [✂]
[4] [✂]

operated as an autonomous JV from Tarmac and Hanson on an arm's length basis.

(b) Tarmac also has another [✂] JV with Hanson in relation to aggregates, through North Tyne Roadstone Limited, which Tarmac told us was an autonomous fully-functional JV with its own production, sales and distribution capabilities, which was currently not active.

(c) Tarmac also has two JVs with Lafarge:

(i) Hepplewhite Quarries and Plant Hire Limited, for the production of aggregates (Tarmac holds [✂] per cent, Lafarge [✂] per cent), which operates one quarry in County Durham and whose volumes are purchased [✂]; and

(ii) R H Roadstone Limited [✂], a procurement JV, which purchases limestone from Hanson for on-selling to Tarmac and Lafarge. [✂]

(d) Tarmac's other noteworthy JVs in aggregates include, among others:

(i) [✂] JVs with Cemex in relation to the production of marine aggregates in the Isle of Wight and Liverpool;

(ii) a [✂] JV with Aggregate Industries in relation to the production of limestone and other aggregates; and

(iii) a [✂] JV with Brett Aggregates (Shepperton Aggregates JV), a production-only JV which produces aggregates for sale to [✂].

Tarmac's asphalt JVs

4. In relation to asphalt, Tarmac has the following JV/partnership arrangements with Lafarge:

(a) [✂] production-only JVs in relation to asphalt:

(i) Elstow Asphalt Limited in Bedfordshire; which operates an asphalt plant located within Lafarge's rail depot at Elstow [✂]; and

(ii) Harlow Asphalt Limited in Essex, which operates an asphalt plant in Harlow [✂].

(b) In relation to National Contracting, [✂]. This arrangement also has its own JV with Connect Plus (M25) Limited for road maintenance services for the M25 Life Cycle Maintenance. [✂]

Tarmac's RMX JVs

5. Tarmac has [✂] JV [✂] in relation to RMX through C & H Quickmix Limited (a [✂] JV with UK construction company, R G Carter), which Tarmac told us operated on an autonomous fully-functional basis and produced and distributed RMX products.

Tarmac's cement JVs

6. Tarmac does not have any JV or partnership arrangements in relation to its cement activities.

Summary table of Tarmac's JVs

7. Table 1 sets out all Tarmac's JVs in aggregates, asphalt and RMX, together with details of each JV's ownership structure, its activities, the role of the JV partners in its management, and how the JV board is appointed (if applicable).

TABLE 1 **Tarmac's JVs in aggregates, asphalt and RMX**

JV name	*Ownership structure %*	*JV activities*	*Role of JV partners in management*	*Details of JV board appointments*
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]

Source: Anglo American.

Lafarge's JVs and partnership arrangements

Lafarge's aggregates JVs

8. Lafarge has the following noteworthy JV arrangements in place in relation to aggregates:

   (a) As mentioned in paragraph 3*(c)* above, Lafarge has two JVs with Tarmac in relation to the production and/or supply of aggregates.

   (b) Lafarge is active (through its 50 per cent participation in GRS (Bagging) Limited) in the bagging of aggregates.

   (c) Lafarge has a [✂] JV with Westminster Gravels Limited in relation to dredging of marine sand and gravel aggregates and operation of two marine aggregates wharves in Hampshire. A small amount of these unprocessed marine aggregates are sold to France.

   (d) Lafarge has a JV (Brett Lafarge Limited), which operates an aggregates quarry at Fairlop in Essex and historically operated a second quarry at Marks Warren in Essex (now closed).

Lafarge's asphalt JVs

9. As mentioned in paragraph 4 above, Lafarge has two JVs with Tarmac in relation to asphalt production, and a partnership arrangement with Tarmac in relation to its asphalt surfacing services. Lafarge has no other JVs in relation to its asphalt production.

Lafarge's RMX JVs

10. Lafarge has no JV or partnership arrangements in respect of its RMX production activities.

Lafarge's cement JVs

11. Whilst Lafarge has no JVs or partnership arrangements in relation to its cement production activities, it has a JV with Readymix Plc (which is 61 per cent owned by Cemex's ultimate parent company and its subsidiaries) in Island Cement Limited, which is used as a facility to import and trade cement on the Isle of Man.

Summary table of Lafarge's JVs

12. Table 2 sets out all Lafarge's JVs and partnership arrangements in aggregates, asphalt and cement, together with details of each JV's ownership structure, its activities, the role of the JV partners in its management, and how the JV board is appointed.

TABLE 2 **Lafarge's JVs in aggregates, asphalt and cement**

JV name	*Ownership structure (%)*	*JV activities*	*Role of JV partners in management*	*Details of JV board appointments*
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

Details of structure of Tarmac and Lafarge

1. This appendix sets out:

   (a) details of the structure of Tarmac's UK Regions business (ie its operations in aggregates, asphalt and RMX); and

   (b) product flow diagrams illustrating the vertical integration model for each of Tarmac and Lafarge, and the flow of products between Tarmac's and Lafarge's upstream and downstream operations, including the volumes involved in FY10.

Structure of Tarmac's UK Regions business

Aggregates

2. Tarmac produces and supplies land-based primary aggregates (ie sand, gravel and crushed rock), from its 105 aggregates quarries[1] in the UK, which are operated by its four geographical regions:

   (a) Central: [✂] quarries;

   (b) North & Scotland: [✂] quarries;

   (c) South East: [✂] quarries; and

   (d) West: [✂] quarries.

Asphalt

3. Tarmac operates [✂] fixed[2] asphalt sites (ie sites where aggregates and a viscous binding agent[3] are heated and mixed together to produce asphalt), which are operated by its four geographical regions:

   (a) Central: [✂] sites;

   (b) North & Scotland: [✂] sites;

[1] Quarrying operations involve not only the extraction of material (rock) but also include the crushing and screening process required to make the rock suitable for onward use.
[2] The sites listed include some which have been mothballed. Some sites also include more than one asphalt plant. [✂]
[3] Bitumen is typically used as the viscous binding agent.

(c) South East: [✄] sites; and

(d) West: [✄] sites.

RMX

4. Tarmac operates [✄] fixed RMX plants,[4] which are operated by its four geographical regions, including one plant which is located on the site of its precast concrete products dedicated to supplying this customer:

(a) Central: [✄] plants;

(b) North & Scotland: [✄] plants;

(c) South East: [✄] plants; and

(d) West: [✄] plants.

Tarmac's and Lafarge's vertically integrated business model

Product flows within Tarmac's business

5. Figure 1 shows a diagram of the product flows between Tarmac's upstream and downstream operations, including details of its internal and external product flows (based on FY10 production volumes).

Product flows within Lafarge's business

6. Figure 2 shows a diagram of the product flows between Lafarge's upstream and downstream operations, including details of its internal and external product flows (based on FY10 production volumes).

FIGURE 1

Tarmac's products and product flows (FY10 volumes)

[✄]

Source: Anglo American.
[✄]

[4] The sites listed include some which are mothballed.

FIGURE 2

Lafarge's products and product flows (FY10 volumes)*

[✂]

Source: Lafarge.
*[✂]

Further details of the history, structure and rationale for the JV

1. This appendix sets out further details of:

   (a) the events leading up to the proposed JV;

   (b) the proposed JV's structure, products and transaction synergies;

   (c) the JV entity's management and strategy; and

   (d) the main parties' rationale for the transaction.

Events leading up to the proposed JV

2. In 2007, Anglo American publicly announced its intention to focus on its core mining business and dispose of its non-core assets, including its international construction materials arm, Tarmac Group, of which Tarmac, its UK construction materials business which will be contributed to the JV, is a part. However, the launch of the marketing phase of the Tarmac Group sale process was delayed, with Anglo American citing weak credit market conditions.

3. [✂]

4. In October 2009, Anglo American reiterated to the market its intention to divest its non-core assets,[1] and in March 2010, Anglo American sold the Tarmac Group's Polish concrete products business, followed by its French and Belgian concrete products businesses in May 2010; its aggregates businesses in France, Germany, Poland and the Czech Republic in September 2010; and its aggregates and RMX business in Romania in November 2011.

5. [✂]

[1] www.angloamerican.com/media/releases/2009pr/2009-10-22.

6. An internal Lafarge Group document considered various structural options for the combination of its UK construction materials businesses with that of Anglo American, and explained the preference for a JV structure:

(a) [✂]

(b) [✂] Anglo American wants to 'exit the building materials industry' [✂].

(c) *A JV between Tarmac and Lafarge:* a JV structure was considered to fulfil both Anglo American's and Lafarge Group's objectives, where Anglo American would exit through an IPO in three or four years 'at a likely significantly better value than today', and Lafarge Group could [✂] without [✂] and benefit from 'significant synergies'.

Structure, products and anticipated synergies of the proposed JV

Structure of the proposed JV

7. Figure 1 shows a simplified diagram of the legal structure of the proposed JV.

FIGURE 1

Legal structure of the proposed JV

[✂]

Source: Anglo American

8. As Figure 1 shows, Anglo American will contribute its Tarmac business[2] (comprising Anglo Industrial Mineral Holdings Limited and Tarmac Group Limited and their respective subsidiaries[3]) and Lafarge Group will contribute its UK Aggregates & Concrete and Cement business divisions (comprising its two principal trading subsidiaries Lafarge Aggregates Limited and Lafarge Cement UK Limited) into a newly incorporated JV company. Anglo American and Lafarge Group will each hold a 50 per cent stake in the proposed JV's share capital.

[2] [✂]

[3] The two parent companies Tarmac Group Limited and Anglo Industrial Minerals Holdings Limited (both ultimately held by Anglo American) hold the group of companies being contributed to the proposed JV (ie Tarmac), and are holding companies with no commercial activities.

9. Whilst Anglo American and Lafarge Group each will hold a 50 per cent stake in the proposed JV's share capital, [✂].[4]

10. In relation to the assets which will not be contributed to the proposed JV:

    (a) Anglo American will not be contributing Tarmac Group's Middle Eastern subsidiaries, TBP[5] and its non-UK assets; and

    (b) Lafarge Group will not be contributing its UK and international gypsum businesses and its freehold interests in the Medway site, for which Lafarge Group will grant the JV a [✂]-year option to enter into a lease agreement.

11. [✂]

12. [✂]

13. [✂]

Products included in the proposed JV

14. Table 1 shows the approximate FY10 revenue breakdown by major product category for each of Tarmac and Lafarge, together with a pro forma FY10 revenue breakdown by major product category for the JV entity.

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[4] Enterprise value is a measure of a company's value, calculated by taking the value of the equity (or market capitalization for a publicly listed company) and adding net debt, minority interest and preferred shares.

[5] TBP is active in the production of heavy building materials, such as blocks, bagged aggregates, binding products, sports surfaces and foundry sands. Tarmac will have a supply agreement with TBP following the proposed JV (TBP is currently supplied by other Tarmac Group companies). It is Anglo American's intention to divest itself of its interest in TBP once an appropriate sale can be agreed.

TABLE 1 **Main parties' FY10 revenue breakdown by major product category**

	Tarmac £m	*Split %*	*Lafarge £m*	*Split %*	*JV entity £m*	*Split %*
Aggregates	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Asphalt surfacing*	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
RMX	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cement	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Main parties. These figures represent consolidated figures whereby revenues from JV were allocated to product lines to give an indication of overall product revenues. The figures for Tarmac and Lafarge in Appendix B are different from the figures in Table 1 since these are based on the management accounts.

*[✂]

15. Table 1 shows that the proposed JV largely has the effect of rebalancing the proportion of cement revenues for each of Tarmac and Lafarge: the proportion of revenues accounted for by cement increases from [✂] to [✂] per cent for Tarmac, and falls from [✂] to [✂] per cent for Lafarge. The effect of the proposed JV on the proportions of revenues accounted for by aggregates, asphalt and RMX for both Tarmac and Lafarge is relatively much smaller.

16. The main parties stated that the proposed JV 'creates a more balanced company that will be better placed to withstand movements in the economic cycle', and that no single product area will account for more than [✂] per cent of the JV's revenues (see Table 1 above). The main parties added that 'the Proposed Transaction will balance the Parties' geographic coverage, resulting in an improved operational footprint'.

17. The main parties stated that 'although vertical combination of Tarmac's larger upstream aggregates and downstream asphalt and RMX operations with Lafarge's larger cement operations will provide a better balance to the merged entity, the JV will continue to be "long" in cement ...'.

Anticipated transaction synergies

18. The main parties expect the proposed JV to generate annual synergies of [✂] with a base case figure of around £60 million (around 29 per cent of the JV entity's combined pro forma FY10 EBITDA of £210 million). The synergies are expected to [✂]. Anglo American told us that it currently expected £60 million to be the minimum value of annual synergies within [✂], with a further £[✂].

19. The £60 million of annual synergies can be broken down into the following categories:[6] [✂].[7]

20. The main parties estimated that the sum of synergies *(b)* and *(c)* ([✂]) related to reductions in variable costs (or marginal cost savings) and therefore are 'efficiencies most capable of being passed on to customers'.

The JV entity's management and strategy

21. [✂]

22. The JV will operate with its own board of directors led by an independent Chairman and executive management teams drawn from both businesses.[8]

23. The minutes of a meeting by the joint integration steering committee (appointed by both Anglo American and Lafarge Group and charged with the responsibility for integrating the two JV businesses) highlighted that the JV entity would have an independent management team, its own operating model and strategy. [✂]

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[6] [✂]
[7] [✂]
[8] Anglo American 2010 Annual Report.

Further details of the main parties’ rationale for the transaction

Anglo American’s rationale

24. As mentioned in paragraph 2 above, it has been Anglo American’s stated intention since 2007 to exit from Tarmac, and the proposed JV enables Anglo American to exit from the JV entity through an IPO exit mechanism (see paragraph 12 above). We also noted that [✂].

25. [✂]

Lafarge’s rationale

26. As part of its rationale for the proposed JV, [✂].

27. This internal Lafarge document also stated that Lafarge’s historic EBITDA performance [✂].[9,10] Lafarge told us that it operated in a high capital-intensive industry and substantial investments had been made, but over the course of the last decade it had not been able to generate sufficient returns on those investments. Lafarge told us that the proposed JV was the ‘best opportunity’ to achieve its objective of significantly improving returns on its assets and considered itself as a ‘long-term player in the UK’.

28. [✂] Lafarge explained that this statement referred to Lafarge’s ability to meet customer demand for the grade of aggregates they required at the lowest cost, which is an ‘important contributor’ to its returns in a relatively capital-intensive industry.

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[9] [✂]
[10] [✂]

Supporting material for the counterfactual assessment

1. This appendix sets out some of the supporting evidence we assessed in relation to the main parties' plans under the counterfactual.

Anglo American's and Tarmac's plans under the counterfactual

2. Prior to Lafarge Group's approach to Anglo American in relation to the proposed JV, [✂].

3. [✂] (see Table 1 below). [✂]

TABLE 1 **ROCE performance for Tarmac Limited,* years ended December FY07 to FY09**

		£ million	
	2007	*2008*	*2009*
Capital employed	[✂]	[✂]	[✂]
Operating profit (before exceptional items)	[✂]	[✂]	[✂]
ROCE (before exceptional items)	[✂]	[✂]	[✂]
Operating profit (after exceptional items)	[✂]	[✂]	[✂]
ROCE (after exceptional items)	[✂]	[✂]	[✂]
Memo: exceptional items	[✂]	[✂]	[✂]

Source: Anglo American.

*Tarmac Limited is a subsidiary of Tarmac which includes TBP. TBP will not be contributed to the proposed JV.

4. [✂]

Lafarge's expansion plans under the counterfactual

5. We set out below our assessment of Lafarge's potential plans for building a new cement plant at Lafarge Group's Medway site in Kent.

6. In relation to the Medway site, for which Lafarge has received planning permission to build a new cement plant, Lafarge told us that it had already invested around £[✂] to

date to obtain and maintain live planning permissions for its Medway site and added that [✂].

7. [✂]

8. There is uncertainty whether Lafarge would have developed a new cement plant at Medway. Lafarge told us that in the most recent Medway project review (conducted in 2008) a minimum of [✂] was estimated to be required to construct Medway and that an additional period of [✂] would be required to carry out tenders and agree contracts. Lafarge added that if it were to reconsider the project again today, there would also be at least an additional [✂] period required to re-evaluate the design of the plant and to update any planning as a consequence of any changes to the design. Therefore, Lafarge estimated that the lead time required to commission the project would be at least [✂].

9. An internal 2011 Lafarge strategy document for cement stated that the probability of capacity extension at its Medway site was [✂] per cent, and that in the short term, investment into additional cement capacity by its competitors was unlikely given the [✂], and that new or additional capacity entering the market was unlikely in the medium term given the uncertainty surrounding EU ETS Phase III. [✂]

Supporting material for product market definition

Product market(s) for cement

1. In this section we present the evidence on:

   (a) substitutability between types of (bulk) cement;

   (b) substitutability between bulk and bagged cement;

   (c) substitutability between domestic and imported cement; and

   (d) market definition in previous OFT and European Commission decisions relating to cement.

Substitutability between types of (bulk) cement

Main parties' views

2. The main parties submitted that there was a single relevant market for all types of grey cement.

3. In relation to the cement input requirements for its downstream applications, Anglo told us that Tarmac delivered CEM I to its RMX plants and purchased other cementitious products (GGBS and a very small amount of PFA) for delivery to its RMX plants for blending at the plant. Tarmac also used a very small amount of CEM II, mainly from external sources.

4. Lafarge told us that in the production of RMX, Lafarge used CEM I, CEM II and CEM III. Table 1 shows the proportion of cement types and cementitious products, by volume, used in Lafarge RMX production in each of the years 2006 to 2010. These figures include the volumes of CEM I, CEM II, CEM III, PFA and GGBS. Lafarge noted that, while the volume of CEM II and CEM III increased from 2006 to 2010, this reflected a move towards these blended cements and away from purchasing CEM I and direct additions separately for its production of RMX.

TABLE 1 **Lafarge cement input requirements for RMX production**

percentage by volume

	CEM I	*CEM II*	*CEM III*	*GGBS*	*PFA*
2006	[✂]	[✂]	[✂]	[✂]	[✂]
2007	[✂]	[✂]	[✂]	[✂]	[✂]
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

5. In relation to supply-side substitution between cement types, Lafarge told us that any cement works which had milling and blending facilities and storage for the cementitious products and the end products could readily switch between different types of grey cement. According to Lafarge, the production of different types of cement was dependent on the particular cement milling, blending and storage capabilities installed at a particular cement works as well as the availability of economic supplies of cementitious products.

Third party views

6. Cemex told us that there was scope for switching between different types of cement in the production of RMX and building products (ie precast concrete and concrete blocks). Tables 2 and 3 show Cemex cement input requirements, by volume and value, for the past three years, for these two applications respectively. For use in its own RMX production, the proportion of CEM I used, by volume, has fallen from [✂] per cent in 2008 to [✂] per cent in 2010, while over the same period the use of CEM II in RMX rose from [✂] to [✂] per cent. In relation to building products, the CEM I input has risen from [✂] to [✂] per cent over the same period.

7. In relation to RMX production, Cemex told us that the majority of customer RMX specifications could be met by most cement types and that over the past five years Cemex RMX production had progressively moved from using predominantly CEM I and CEM III to using predominantly CEM I and CEM II. Cemex told us that this

switching was principally due to the increasing costs of GGBS in Germany which obliged Cemex to turn to a UK source of cementitious products, in particular to PFA.

TABLE 2 **Cemex cement input requirements for RMX production**

	Percentage by volume					*Percentage by value*				
	CEM I	*CEM II*	*CEM III*	*PFA*	*GGBS*	*CEM I*	*CEM II*	*CEM III*	*PFA*	*GGBS*
2008	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

TABLE 3 **Cemex cement input requirements for building products**

	Percentage by volume					*Percentage by value*				
	CEM I	*CEM II*	*CEM III*	*PFA*	*GGBS*	*CEM I*	*CEM II*	*CEM III*	*PFA*	*GGBS*
2008	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

8. In relation to supply-side substitution, Cemex expressed the view that switching production to produce blended cements was easy.

9. Hanson told us that it used GGBS as a substitute nationally for cement. It estimated that cementitious products other than cement (predominantly GGBS) accounted for approximately 40 per cent of the ‘powder’ used in its RMX production. In respect of RMX production, approximately 80 per cent of the cement purchased was then blended with GGBS to create CEM II or CEM III. Hanson indicated that there was limited further scope for it to switch to CEM II and CEM III as approximately 80 per cent of its RMX production already contained other cementitious products. It also noted that in certain situations the substitutability of cement with other cementitious products was limited by RMX customer requirements.

10. Aggregate Industries told us that it purchased CEM I for both its downstream RMX production and concrete product production and that it blended CEM I with PFA or

GGBS as required at its RMX sites and concrete product production facilities. It estimated that approximately [✂] was produced using blended cement.

11. In relation to RMX production, Breedon and Brett also use a combination of cement types and cementitious products.[1] Brett told us that, to produce RMX, it used approximately 30 per cent of (imported) GGBS and 70 per cent of CEM I. Breedon told us that, to produce RMX, it tried to maximize the use of non-CEM I products where possible. Newark Concrete told us that the end-user decided the composition of the RMX and that 95 per cent of their customers wanted CEM II because it was cheaper.[2]

12. In relation to concrete products, [✂] told us that it used CEM I and that the pre-blended CEM II it could buy from Lafarge was not a substitute for CEM I for block making as, while cheaper, it did not have the strength required (too high a proportion of PFA is used). [✂] also told us that it did not have the facilities for making its own 'blended' cement and that it would be too expensive and logistically difficult to build these facilities.[3] [✂] told us that CEM II and CEM III were cheaper but weaker than CEM I and that CEM I was often necessary during winter because it dried faster.[4] Newark Concrete told us that CEM I was used when fast-drying properties were required, for example in laying concrete floor.

13. In relation to the quality of different cementitious products, Breedon commented that PFA quality could be highly variable. Newark Concrete told us that it had found PFA to be better suited to its business than GGBS.

[1] Breedon and Brett are regional producers of aggregates, asphalt, RMX; Brett is also active in cement import.
[2] Newark Concrete is an independent RMX producer.
[3] [✂] is a producer of concrete blocks.
[4] [✂] is a cement importer and is [✂].

14. In relation to the availability of the cementitious products, several third parties noted that PFA was more widely available than GGBS (Hanson is the only source of domestically-produced GGBS). One third party told us that there was no point in using GGBS or CEM III as a substitute to CEM I because the prices of the two products were now comparable.[5]

Survey evidence

15. We commissioned GfK to conduct a survey. As part of this survey, cement customers and RMX competitors were asked a number of questions relating to their purchases of cement and to substitution between the different types of cement.[6] Of the cement customers who participated in the survey,[7] general construction/contractors accounted for 39 per cent, distributors of cement/builder merchants/DIY stores for 27 per cent, concrete product producers for 33 per cent and local authorities 6 per cent.

16. Survey evidence reveals the purchasing patterns of cement customers and of RMX competitors who purchased bulk cement for use in RMX production.[8] Figure 1 shows the types of cement purchased by cement customers and RMX competitors. CEM I was purchased most often: 61 per cent of cement customers, and 78 per cent of RMX competitors, had purchased CEM I in the last 12 months. CEM II has been purchased by 31 per cent of cement customers, and 26 per cent of RMX competitors. In terms of the factors important in deciding which type of cement to purchase, price was quoted the most often, followed by quality of the product (each of which were quoted by over half of cement customers and RMX competitors).

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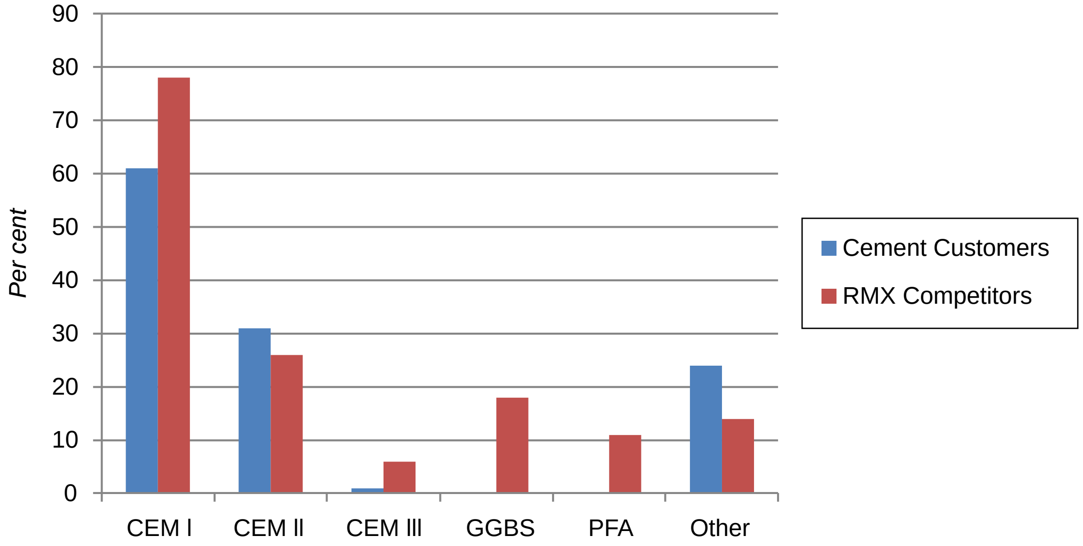
[5] Newark Concrete.
[6] Cement customers were defined as bulk cement customers of the main parties, with the exclusion of RMX producers. RMX competitors included competitors of the main parties in RMX production, which were customers for cement either of the main parties or of third parties. The questionnaires for the cement customers and the RMX competitors were different in parts. As explained, the sample for the cement customer questionnaires was drawn from bulk cement customer lists supplied by the JV parties, and all figures reported are based on all those from this group that answered. Though some of the respondents did not identify themselves as bulk cement purchasers it is assumed that this was an oversight. Bagged cement customers of the main parties were not part of the survey and were sent a specific questionnaire (see paragraph 25).
[7] Base: 67.
[8] Base: 72.

FIGURE 1

Types of cement purchased in the last 12 months



Source: CC based on GfK survey data.

17. Cement customers were asked whether they had switched any of their purchasing from CEM I to CEM II or CEM III in the past three years. 15 per cent of cement customers said that they had done so[9]

18. Respondents to our survey provided data on their ability to switch from CEM I to CEM II or CEM III. 76 per cent of cement customers (excluding merchants)[10] reported that they could not switch away from CEM I. Of these cement customers who could not switch, or could switch one-quarter or less of their purchases, the quality of the product was the main constraint for 41 per cent of customers, while price of the

[9] The main parties considered that the CC had asked customers about their past ability to switch from CEM I to CEM II/III but that the CC had failed to ask customers about their ability to switch from CEM I to CEM II/III following a hypothetical price increase of CEM I. The main parties said that they were surprised by this omission given that the price of a cement product was cited as being the most important factor by cement customers and RMX producers in deciding which cement to purchase. In response, we noted that customers' ability to switch was covered in paragraph 18. Further, asking customers about whether they 'could have switched' should produce an upper bound to switching compared with asking them about whether they 'would have switched in response to a hypothetical price rise'.

[10] Distributors and merchants were excluded from the analysis of the switching questions. Base: all cement customers excluding merchants, 41.

product was cited as a reason for not switching by 10 per cent, and the type of project by a further 10 per cent.[11]

19. RMX competitors had more ability to switch to CEM II or CEM III: 38 per cent of RMX competitors said that they were able to switch some of their CEM I purchases to CEM II or CEM III. Of these, around two-thirds could switch at least half of their purchases from CEM I to CEM II or CEM III.[12] The most prevalent reason for not being able to switch, or not being able to switch more than one-quarter of purchases, was quality of the product (34 per cent), followed by customer request/demand (18 per cent).[13]

20. To summarize, the survey suggests that cement customers other than RMX producers had limited ability to switch from CEM I to CEM II or III, and that few had done so in the past three years (15 per cent). Ability to switch and past switching were higher for RMX producers (38 per cent could switch, and of these two-thirds could switch at least half of their purchases).

Substitutability between bulk and bagged cement

Main parties' views

21. The main parties stated that, although there was no technical difference between bulk and bagged cement in terms of their properties, bulk and bagged cement were differentiated products. In particular, in relation to the sale channel and applications, the main parties told us that:

    (a) bulk cement was used by RMX and concrete product manufacturers which had suitable equipment to handle bulk cement themselves; and

[11] Small base sizes: 31.
[12] Base: all RMX competitors who buy CEM I, 56.
[13] Small base size: 38.

(b) bagged cement was typically supplied to builders' merchants and DIY outlets for resale and use in smaller building projects and DIY activities around the home. Bagged cement was also typically more expensive than bulk, largely reflecting the additional packaging costs.

22. In relation to the types of cement, Lafarge indicated that for both RMX and concrete product customers, bulk CEM I was still the major cement type used, although CEM II and, to a lesser extent, CEM III were gaining increasing importance due to their lower carbon footprint. In contrast, CEM II was the predominant cement type (either PFA- or limestone-based) in the bagged channel.

23. In relation to marketing and branding, Lafarge noted that although brand names were used for bulk cement, the same bulk cement grade supplied by different suppliers was still very much considered by most customers to be generic and highly interchangeable. According to Lafarge, for bagged cement products there was in contrast more differentiation and all suppliers used trade names and logos for their range of bagged products.

24. Overall, the main parties considered that, while there was a degree of supply-side substitutability between bulk and bagged cement (with most suppliers having the equipment in place to supply both forms and the ability to switch relatively quickly), from a demand-side perspective substitutability was limited. Consequently, the main parties submitted that it was appropriate to distinguish between bulk and bagged cement.

Third party views

25. We sent a questionnaire to the 30 largest bagged cement customers of the main parties. Customers who responded to our questionnaire consistently reported that

they sold bagged cement under the producer's brand,[14] and the majority of respondents told us that it was important to them that their supplier/s was/were one of the majors, and/or had a national/multi-regional presence, indicating that cement branding may be important for their customers.

26. In relation to supply-side substitution, both Cemex and Hanson indicated that packing capacity could act as a constraint on switching production between bulk and bagged cement,[15] as did the silo capacity required to feed the packing machines, and the ability to feed the relevant additives that might be required for the bagged product.

Substitutability between domestic and imported cement

Main parties' views

27. The main parties told us that no distinction should be made between imported and domestically-produced cement as, from a demand-side perspective, the two sources were fully substitutable and competed directly with each other. They indicated that this was consistent with previous decisions at both an EU and national level, where the European Commission and the OFT had found domestic and imported cement to be directly substitutable since: *(a)* there were no appreciable quality differences (all cement sold in Great Britain must meet European standards, and UK standards were consistent with European standards); and *(b)* prices for imported and domestically produced cement were similar.

28. The main parties noted that the fact that imports had maintained a significant share of the cement market in Great Britain, despite the recent significant downturn in demand, was consistent with the ability to import cement at a competitive price.

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[14] B&Q, Travis Perkins, Builders Supplies West Coast, Coomers, Gibbs and Dandy, Grafton Merchanting, Grant and Stone, Huws Gray, Jewson, Lawsons Whetstone, National Buying Group, P McDermott.
[15] Cemex noted that packing machinery was relatively inexpensive and most cement manufacturers had such capability.

Third party views

29. Cemex told us that *(a)* there were no material differences in the quality of imported cement; *(b)* security of supply was of decreasing concern due to the continuous construction of import facilities at ports around Great Britain. Hanson told us that there used to be quality differences between imported and UK-produced cement, but the gap had closed. Aggregate Industries told us that there was no evidence of any difference between the quality of imported cement versus domestically produced cement.

30. The evidence from other third parties we contacted is mixed. [✂] and Thomas Armstrong, two cement importers, told us that there were no quality differences between imported and domestically produced cement. Breedon told us that it was concerned over the reliability of supply of imported cement and over the consistency of quality, suggesting that importers would need to quote at least a 5 to 10 per cent lower price than UK cement, in order for Breedon to switch. Concerns over the reliability of supply of imported cement were also expressed by Costain.[16]

Survey evidence

31. Results from the survey we commissioned from GfK suggest that 78 per cent of surveyed cement customers and 68 per cent of surveyed RMX competitors have not used cement importers in the last five years.[17,18] The main reasons given were quality and reliability of supply, but also the non-availability of importers in their area.

[16] Costain Group is a construction and engineering company.
[17] Base: All cement customers (60) and RMX competitors (72) who do not use any importers of cement.
[18] Anglo American noted that because the survey was conducted on customers of Anglo American and Lafarge there may be a selection bias: because the sample of customers is chosen from the main parties, this may understate usage of importers. However, whether there is a selection bias will depend on the use and interpretation of this question. If the question is interpreted for all customers (as opposed to those of the proposed JV), we acknowledge that a bias might be present in relation to the cement customers as these have come from main parties' customer lists. If, on the other hand, the question is being used to interpret what customers of the proposed JV did, we do not believe there is a selection bias problem. The RMX competitor sample was based on both the main parties' customer lists and the BDS competitor database, so we believe there was no selection bias for this group.

Market definition in previous OFT and European Commission decisions relating to cement

32. In previous cases,[19] the OFT has considered bulk cement and bagged cement to be separate product markets, and within these markets, considered all types of cement together.

33. With respect to bulk cement, in the past the OFT has not differentiated between imported and domestic cement[20] on the basis of demand-side substitution.

34. In its most recent decision,[21] the European Commission left open the precise product market definition for cement and for non-clinker materials that are ingredients in blended cements.

35. In a number of decisions,[22] the European Commission has considered grey cement to be a single market which is distinct from the market for white cement.

Product markets for aggregates, asphalt and RMX

36. In this section, we present evidence on:

    (a) aggregate applications;

    (b) product market(s) for aggregates used in construction applications;

    - (i) demand-side substitution between primary and secondary/recycled aggregates;
    - (ii) demand-side substitution between crushed rock, and sand and gravel;
    - (iii) substitutability between grades;

    (c) product market(s) for aggregates used in specialist applications;

    - (i) rail ballast;

[19] Lafarge Cement UK/Port Land Cement Company Ltd 2005; Lafarge Cement UK/West Thurrock Cement Terminal from Castle Cement Ltd.
[20] Lafarge Cement UK/Port Land Cement Company Ltd 2005; Lafarge Cement UK/West Thurrock Cement Terminal from Castle Cement Ltd.
[21] Heidelberg Cement/Hanson (2007).
[22] Lafarge/Blue Circle (2000); Skanska/Scancem (1998); RMC/Rugby (1999).

(ii) high purity limestone (HPL);

(d) product market(s) for asphalt;

(e) product market(s) for RMX; and

(f) market definition in recent OFT and European Commission decisions relating to aggregates.

Aggregate applications

37. Aggregates are primarily used for construction purposes. The main parties estimated that most per cent of aggregates (by volume) are used for construction applications. Table 4 shows the proportion of aggregate usage (by volume) accounted for by each application in Great Britain on average in 2008 to 2010.[23]

TABLE 4 **Aggregate usage by application in Great Britain (% by volume, average 2008–2010)**

Application	*Great Britain usage %*
RMX production	[✂]
Concrete products	[✂]
Asphalt	[✂]
General construction	[✂]
Other (including mortar production, rail ballast, high purity limestone)	[✂]

Source: Anglo American.

[23] Based on BDS estimates. Anglo American submitted that the figures were affected by the geological availability of source materials on a local basis: there is limited availability of crushed rock materials south of the rock line and this means that a lower proportion of use of crushed rock is shown in the figures at the national level.

TABLE 5 **Aggregates uses by application in Great Britain (% by volume, average 2008–2010)**

Application	*Aggregate category*	*Aggregate sub-category*	*Proportion of total aggregate use %*
RMX production	Primary	Crushed rock	[✂]
		Sand & gravel	[✂]
	Secondary		[✂]
	Recycled		[✂]
	Total		[✂]
Concrete products	Primary	Crushed rock	[✂]
		Sand & gravel	[✂]
	Secondary		[✂]
	Recycled		[✂]
	Total		[✂]
Asphalt	Primary	Crushed rock	[✂]
		Sand & gravel	[✂]
	Secondary		[✂]
	Recycled*		[✂]
	Total		[✂]
General construction	Primary	Crushed rock	[✂]
		Sand & gravel	[✂]
	Secondary		[✂]
	Recycled		[✂]
	Total		[✂]
Other (including mortar production, rail ballast and high purity limestone)	Primary	Crushed rock	[✂]
		Sand & gravel	[✂]
	Secondary		[✂]
	Recycled		[✂]
	Total		[✂]

Source: Anglo American.

38. Estimates of the proportions of the different types of aggregate (by volume), by application, in Great Britain, averaged over 2008 to 2010, are shown in Table 5.[24,25] Table 5 shows that, with the exception of general construction, primary aggregates account for over [✂] per cent of the aggregates used in the different applications. In general construction, primary aggregates account for just over half of the aggregates used and recycled aggregates account for about one-third.[26]

[24] Based on BDS estimates.
[25] Totals may not sum to 100 per cent due to rounding.
[26] Asphalt planings are desirable recycled inputs to asphalt production because they contain both aggregates, and more importantly, bitumen. Data on the proportion of recycled aggregates used in asphalt production that consists of asphalt planings is not available.

Product market(s) for aggregates used in construction applications

Demand-side substitution between primary and secondary/recycled aggregates

Main parties' views

39. The main parties submitted that there was a single relevant market for construction aggregates which included primary, secondary and recycled aggregates. This view is based on the argument that there is substantial overlap in functional substitutability of different types of aggregates (ie crushed rock, sand and gravel, secondary and recycled aggregates). The main parties told us that it was the grade of the aggregate (ie fine, coarse or granular) which predominantly determined its suitability for a particular application and not the material from which that type of aggregate was produced or its geological composition. They also told us that, in practice, the customer choice of aggregates would depend on local availability of materials from which secondary and recycled aggregates were produced as well as geological reserves and that this availability in turn determined the relative prices of these aggregates.

40. In particular, the main parties argued that, as secondary and recycled aggregates were cheaper products (due to the fact that they were produced from waste materials and did not attract the aggregate levy), they directly constrained the pricing of primary aggregates. The main parties indicated that the share of supply of aggregates, by volume, accounted for by secondary and recycled aggregates was estimated to be 28 per cent in 2009.[27] They noted that this share had grown from 20 per cent in 2000 and that this growth demonstrated that secondary and recycled aggregates are an important source of competition in the market.

41. The main parties submitted that demand-side substitutability between secondary, recycled and primary aggregates existed across a range of applications. In relation to

[27] www.mineralproducts.org/sustainability/highlights.html.

general construction uses, they noted that these were the most important end-use applications in terms of aggregates volumes (accounting for approximately half of aggregate use) and that recycled aggregates were an important source of competition to primary aggregates for this application. They also noted that secondary and recycled aggregates were utilized in the production of RMX, asphalt and concrete products.[28] They argued that, despite the share of secondary and recycled aggregates for these applications being typically lower than in the case of general construction uses, this did not reflect the absence of a constraint. They noted that [✂].

42. Anglo also referred to the CC's survey evidence (see paragraphs 43 to 52) noting that:

(a) In the general construction application, which was the largest application in terms of demand for aggregates (around 50 per cent), recycled/secondary aggregates accounted for nearly 50 per cent of aggregates used. Anglo said that this strongly suggested that recycled/secondary aggregates were a feasible alternative to primary aggregates for a significant proportion of customers.

(b) The evidence of actual switching to recycled/secondary aggregates, driven by relative prices, demonstrated that primary aggregates were constrained by recycled/secondary aggregates. Anglo noted that this was evidenced by the fact that around half of surveyed aggregates customers have switched purchases from primary to secondary or recycled aggregates, the main reason being relative prices: either the price of primary increased (41 per cent) or the price of secondary/recycled decreased (20 per cent).

[28] Anglo American provided a number of examples of the use of secondary and recycled aggregates in applications other than general construction.

Survey evidence

43. We commissioned GfK to conduct a survey of customers and competitors of the main parties. One of the aims of the survey was to identify the key drivers of decision-making in relation to the products purchased by customers.

44. For aggregates purchases, three key groups were surveyed:

    (a) aggregate customers(excluding RMX producers and asphalt producers);[29]

    (b) RMX competitors, who purchase aggregates as an input to producing RMX; and

    (c) asphalt competitors, who purchase aggregates as an input to asphalt production.[30]

45. All groups were asked questions on their purchases of aggregates and switching. The results are presented separately for aggregate customers and RMX competitors in the survey.[31]

46. In relation to purchases of aggregates, the GfK survey indicates that 79 per cent of aggregate customers purchased primary aggregates crushed rock, 93 per cent purchased primary aggregates sand and gravel, 49 per cent purchased secondary aggregates and 71 per cent purchased recycled aggregates.[32] The GfK survey data gives an indication of the priorities of aggregates customers when they are purchasing aggregates. Table 6 shows that the decision about which type of aggregate to

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[29] 66 per cent general construction/contractors; 14 per cent distributors/builder merchants/DIY stores; 5 per cent concrete product producers; 5 per cent local authorities. Base: 292. GfK survey

[30] The main parties submitted that the survey results might be biased as the survey included concrete products producers under the aggregate customer group. In particular, they noted that aggregates input requirements by concrete products customers were similar to the requirements by RMX producers in that they typically required coarse and fine aggregates. In contrast, customers demanding aggregates for general construction purposes (eg for use in sub-base/structural fills) typically demanded granular aggregates. The main parties considered that this biased the survey results especially by underestimating the usage of (or the ability to switch to) recycled and secondary aggregates, given that recycled and secondary aggregates were more prominent in the general construction (sub-base and structural fills) segment. Anglo American also noted that there might be other aggregate purchasers included within the aggregate customers group, for example producers of mortar, which could bias the results of the survey. We do not believe that the inclusion of concrete product customers, or any other customers, biases the results as we are reporting results that represent 'all aggregate customers for Tarmac and Lafarge'. We also note that in the survey results related to switching for aggregate customers, limited differentiation was identified according to end use.

[31] Due to the small population size for asphalt competitors, the achieved sample size was very small and results were therefore not statistically robust. We therefore do not consider this category of customer in the review of the survey evidence which follows.

[32] GfK survey.

purchase is often dependent on the project (35 per cent of respondents). It also shows that almost half (47 per cent) of aggregate customers surveyed differentiate between primary, and secondary or recycled aggregates, with these customers reporting the difference between these types to be either very or fairly important.[33]

TABLE 6 **Survey: the importance of type of aggregate when purchasing—aggregate customers**

per cent

	Fairly or very important	*Neither, not very or not at all important*	*Depends on project*
Primary, or secondary or recycled? (base: 252)	47	17	35

Source: GfK survey.

47. In terms of past switching, the survey evidence shows that 49 per cent of aggregates customers surveyed had switched some of their use of aggregates from primary to secondary or recycled aggregates during the last three years[34] and that 61 per cent did so because of the price of the products.[35] For RMX competitors, the proportion of respondents that had switched was much lower at 21 per cent.

48. Aggregate customers and RMX competitors were also asked about their ability to switch their purchases of aggregates between different types of aggregates. 36 per cent of aggregate customers said that they could switch from primary aggregates to secondary or recycled aggregates (Table 7*(a)*). This percentage drops to 28 per cent for smaller companies. For RMX competitors, the proportion of customers who said that they could switch was higher: approximately half of RMX competitors could switch from primary to secondary or recycled.[36]

[33] GfK survey. Base: 252. Only aggregate customers were asked this question and not RMX competitors.
[34] GfK survey. Base: aggregate customers (292); RMX competitors (72).
[35] GfK survey.
[36] GfK survey. Base: aggregate customers excluding merchants, 251; RMX competitors, 72.

TABLE 7*(a)* **Survey: ability to switch from primary to secondary or recycled aggregates (aggregate customers)**

per cent

	Can switch some purchases	*Cannot switch any purchases*	*Don't know*
Aggregate customers (base: 251)	36	59	6

Source: GfK survey.

49. Aggregate customers and RMX competitors who said that they could switch some purchases from primary to recycled or secondary aggregates were also asked about the proportion of purchases that that they thought could be switched; these are shown in Table 7*(b)*. Overall, of the 36 per cent of aggregate customers who could switch from primary to secondary or recycled, over half of these (57 per cent) could switch one-quarter or less of their purchases. For RMX competitors, it was found that, of those who said that they could switch to recycled or secondary aggregates (about half), about one in ten could switch all of their purchases to secondary or recycled. Overall, for RMX competitors, the survey found that 83 per cent of RMX competitors could not switch, or could only switch one-quarter of their purchases or less, from primary to recycled and secondary aggregates[37,38]

TABLE 7*(b)* **Survey: the proportion of aggregates which could be switched—aggregates customers who said that they could switch between different types of aggregates**

per cent

	Three-quarters or all	*Half*	*A quarter or less than one-quarter*
From primary to secondary or recycled (base: 90)	8	29	57

Source: GfK survey.

50. To summarize, the survey data shows that, in the past three years, almost half of aggregate customers switched some purchases to secondary or recycled aggregates

[37] GfK survey. Base: all aggregate customers who could switch between different aggregates, 90.
[38] Anglo American submitted that customers were not asked how they would have reacted in response to a change in prices. Given that the survey makes clear that price is a key factor, and that switching has occurred in the past primarily due to price reasons, Anglo considered that Table 7b is likely to underestimate substantially the scope for switching following a change in relative price*.* In response, we noted that customers' ability to switch is covered in paragraph 48. Asking customers about whether they 'could have switched' should produce an upper bound to switching compared with asking them about whether they 'would have switched in response to a hypothetical price rise'.

(but we do not know how much they switched), and that the main motivation for this switching was price. This would therefore suggest that, for some purchases by these customers, secondary or recycled aggregates are a substitute for primary aggregates. However, the ability of aggregate customers to switch from primary to secondary or recycled aggregates appears more limited than past switching data reveals: about one in three aggregate customers said that they could switch some purchases, but the proportion of purchases that can be switched by those customers are generally low (one-quarter or less).

51. For RMX competitors, past switching to recycled aggregates has been more limited (only 21 per cent switched some purchases to secondary or recycled in the past three years). About half of RMX competitors could switch some purchasing, but proportions that they can switch are very low. Overall, 83 per cent of RMX competitors cannot switch any, or can switch only one-quarter or less, of purchases to recycled aggregates.

52. Aggregate customers who said that they could not switch, or said that they could only switch one-quarter or less of purchases, were asked for the reasons why they could not switch more. The main reason which was quoted was (lack of) availability of the product (27 per cent of respondents), followed by customer requests (20 per cent), type of work (14 per cent) and quality of product (14 per cent).[39]

Third party views

Substitution between primary and secondary/recycled for general construction uses

53. Aggregate Industries told us that secondary and recycled aggregates tended to be substitutes for primary aggregates in low-specification applications (such as sub-base). Hanson said that there was a trend towards increasing the use of secondary

[39] GfK survey. Base: All aggregate customers who could not switch or switch less than 25 per cent, 51.

and recycled aggregates compared with primary and noted that the technical ability to use secondary and recycled was improving. Cemex told us that, with the exception of some applications, there was a high degree of substitutability between secondary and recycled and primary aggregates. Breedon told us that there was more substitutability for less high-specification applications.[40] Costain told us that while recycled aggregates could be used as alternatives to the primary aggregates, specifications were sometimes so tight that a specific product had to be used and that was often a primary aggregate. In some cases, Costain was able to use a combination of 90 per cent primary product and 10 per cent recycled product without affecting engineering qualities, but blending the two together added to costs.[41]

54. Regarding the availability of secondary and recycled aggregates, Hanson, Cemex, Breedon and Allen Newport suggested that this was limited, such that these aggregates were available only in certain markets.[42]

Substitution between primary and secondary/recycled for RMX production

55. Third party views indicate that as inputs to RMX, there is limited or no substitutability between secondary or recycled aggregates and primary aggregates for reasons including:

(a) blending primary and secondary aggregates increases cost;

(b) different grades of crushed rock and sand and gravel are used in particular proportions, and secondary and recycled aggregates are not suitable;[43] and

(c) concerns regarding the quality of recycled aggregates, and a lack of technical resources to test recycled aggregates and ensure they meet the customer requirements.

[40] Breedon is a multi-regional supplier of aggregates, asphalt and RMX.
[41] Costain is a construction and civil engineering company.
[42] Allen Newport is an independent supplier of aggregates and RMX.
[43] Hillhouse Quarry. Hillhouse is a supplier of heavy building materials and contract surfacing. Hillhouse also noted that secondary or recycled aggregates can only be used where specification allows.

56. Aggregate Industries noted that china clay by-products from Devon and Cornwall (a type of secondary aggregate) were used almost as complete substitutes for primary aggregates across all applications (eg block manufacture, RMX etc).

Substitution between primary and secondary/recycled for asphalt production

57. A few third parties indicated that there was some scope for demand-side substitution between recycled and primary aggregates in asphalt production. For example, asphalt planings recovered when roads are resurfaced, are attractive as an input to asphalt production because they contain both bitumen (which is expensive) and aggregates. The Highways Agency expressed the view that as an input to asphalt production, secondary and recycled aggregates was a major growth area. Breedon and Costain, however, suggested that switching from primary to secondary or recycled aggregates was difficult due to the tight specification of the final asphalt products.

Substitution between primary and secondary/recycled for production of concrete products

58. Besblock told us that recycled aggregates were not a good substitute for primary aggregates for making concrete products because the use of recycled aggregates would result in a weaker finished product, there was not enough recycled aggregate around to be viable and because it was difficult to use (recycled) aggregates which already contained cementitious material.

59. Cemex told us that it used [✂] aggregates in its production of concrete products.

Other evidence

60. We have considered the following data.

61. The share (by volume) of secondary and recycled aggregates in total aggregates supplied has risen since around 2000, from 20 per cent to approximately 28 per cent, but has remained almost constant between 2008 and 2010.

62. In relation to the aggregate uses by application, as shown in Table 5, primary aggregates account for [✂] per cent of the total aggregate requirement by volume in general construction uses; this proportion increases to [✂] per cent in RMX production, [✂] per cent in concrete product production and [✂] per cent in asphalt production. The figures presented in Table 5 are averages over the period 2008 to 2010. We note that looking at data for each year there is no growth trend in the use of secondary/recycled aggregates as opposed to primary aggregates in the last three years. Also, looking at a breakdown of data by region, we observe some regional variability in the primary/secondary/recycled aggregate input requirements by application (consistent with some variation in the local availability of these products), but the overall picture does not change substantially.

63. We finally note that the main parties' own aggregate input requirements by application and by region do not show any substantially greater use of secondary and recycled aggregates in each application compared to the average market figures. The main parties' data show some regional variation in the proportion of secondary and recycled aggregates combined and in the split between these two. In relation to RMX production, Tarmac data for 2010 show that secondary and recycled aggregates account at most for [✂] per cent of the total aggregate input requirement (Wales), while Lafarge [✂]. In relation to asphalt production, Tarmac data for 2010 show that secondary and recycled aggregates account at most for [✂] per cent of

the total aggregate input requirement (East Midlands and Yorkshire & the Humber), while the highest figure for Lafarge is [✂] per cent ([✂]).[44]

Demand-side substitution between crushed rock and sand and gravel

Main parties' views

64. The main parties submitted that crushed rock and sand and gravel aggregates were used interchangeably depending upon the grade required and local availability. To support their argument, they showed the regional variation in the use of crushed rock and sand and gravel for their own RMX production. The main parties also submitted that crushed rock and sand and gravel were used interchangeably in concrete product production depending upon regional availability and that this was demonstrated by an analysis of their external aggregate sales to concrete product customers.

65. Anglo noted that the GfK survey results indicated that 'The price of crushed rock increasing was the main reason for switching from crushed rock to sand and gravel and that the main reason for switching from sand and gravel to crushed rock was an increase in the price of sand and gravel'. Anglo submitted that this was evidence that the aggregate types constrained each other effectively, they were functionally substitutable and purchasers were sensitive to their relative prices.

Survey evidence

66. We asked aggregate customers and RMX competitors[45] a number of questions on purchasing of different types of primary aggregates and on switching between crushed rock and sand and gravel. Aggregate customers were asked about the importance for them of an aggregate being crushed rock or sand and gravel when

[44] Anglo American noted that it was likely that the main parties tended to use more primary aggregates than recycled/secondary aggregates than 'non-integrated' RMX and asphalt producers due to the main parties' vertical integration (ie they can self-supply primary aggregates). For non-integrated customers, self-supply was not an option and decisions of which type of aggregates to use would depended more heavily on availability and price.

[45] Asphalt producers were also part of the survey but the sample size is too small to infer results.

purchasing aggregates. 44 per cent said that it was fairly or very important, and 43 per cent said that this depended on the project (Table 8).[46,47]

TABLE 8 **Survey: the importance of type of aggregate when purchasing—aggregates customers**

per cent

	Fairly or very important	*Neither, not very or not at all important*	*Depends on project*
Sand and gravel, or crushed rock? (base: 247)	44	12	43

Source: GfK survey.

67. Aggregate customers and RMX competitors were also asked whether they had switched between crushed rock and sand and gravel in the past three years. Only 7 per cent of aggregates customers had switched from crushed rock to sand and gravel (base: 230), and 12 per cent had switched from sand and gravel to crushed rock (base: 197). Past switching by RMX competitors was more prevalent though still low: 13 per cent of RMX competitors said that they had switched from crushed rock to sand and gravel in the past three years, and 21 per cent said that they had switched from sand and gravel to crushed rock.[48] We noted that the low levels of past switching between crushed rock and sand and gravel may be largely due to lack of availability due to geological constraints.

68. Aggregate customers and RMX competitors were asked about their ability to switch between sand and gravel and crushed rock. The large majority of customers said that they could not switch from crushed rock to sand and gravel aggregates, or from sand and gravel to crushed rock. The proportion of RMX competitors who said that they could switch between the two was higher: about half said that they could switch from

[46] GfK survey. Base: All Aggregate customers, excluding merchants, who purchase each product, 247.
[47] The main parties noted a potential bias due to the inclusion of concrete product producers in the aggregate customer group (see footnote 30).
[48] GfK survey.

crushed rock to sand and gravel, but two-fifths said they could switch from sand and gravel to crushed rock (Table 8*(a)*).[49,50]

TABLE 8*(a)* **Survey: ability to switch between crushed rock and sand and gravel aggregates (aggregate customers)**

per cent

	Can switch some purchases	*Cannot switch any purchases*	*Don't know*
From crushed rock to sand and gravel (base: 197)	13	82	6
From sand and gravel to crushed rock (base: 230)	16	76	8

Source: GfK survey.

69. Aggregate customers and RMX competitors who said that they could switch were asked the proportion of purchases that they could switch. Base sizes for the responses to these questions are very small because of the low numbers saying that they could switch; however, it appears that about half of those who could switch from crushed rock to sand and gravel could switch one-quarter or less, and half could switch more than one-quarter.[51]

70. Finally, customers who said that they could not switch or could only switch one-quarter or less of their purchases were asked for the reasons why they could not switch more. The main reason for not being able to switch more purchases from crushed rock to sand and gravel was customer requests, followed by availability of product. The main reasons for not being able to switch more purchases from sand and gravel to crushed rock were customer request and quality of product.[52]

Other evidence

71. In relation to RMX production, the partial substitutability between crushed rock and sand and gravel for RMX uses was confirmed in other evidence we examined.

[49] GfK survey.
[50] Lafarge submitted that customers were not asked how they would have reacted in response to a change in relative prices and this can understate the scope to switch between these inputs (see footnote to paragraph 49).
[51] GfK survey.
[52] GfK survey.

Tarmac aggregate input requirement data show that it uses [✂] per cent crushed rock and [✂] per cent sand and gravel on average in Great Britain (though there is considerable regional variation) in their own downstream production of RMX in 2010.[53] Lafarge corresponding proportions for Great Britain in 2010 are [✂] per cent crushed rock and [✂] per cent sand and gravel, but again there is significant variation across regions. Cemex data show that it used approximately [✂] per cent sand and gravel and [✂] per cent crushed rock in RMX production in 2010.[54]

72. In relation to asphalt production, Tarmac data show that it used [✂] per cent crushed rock, and [✂] per cent sand and gravel in its downstream asphalt production on average in Great Britain in 2010,[55] while Lafarge data show that it uses [✂] per cent crushed rock and [✂] per cent sand and gravel in asphalt production on average in Great Britain in 2010.[56] Hanson estimated that [✂] per cent of aggregates used in its asphalt production were crushed rock.

73. Evidence we received from asphalt producers suggested that there was limited scope for these customers to substitute to sand and gravel aggregates.[57] Cemex told us that sand could be a viable substitute for fine crushed rock in asphalt production.

Substitutability between grades

74. From a demand-side viewpoint, all the evidence we have received suggests that different grades (ie coarse or fine aggregates) are unlikely to be easily substitutable. In the GfK survey, we asked RMX competitors if they could switch between different grades of aggregates. Of the RMX competitors surveyed, only about three in ten said

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[53] [✂] given by secondary aggregates.
[54] Recycled and secondary accounted for [✂] per cent.
[55] Recycled and secondary aggregates accounted for [✂] per cent and [✂] per cent respectively.
[56] Recycled aggregates accounted for [✂] per cent.
[57] Cemex; Breedon Aggregates.

that they could switch some purchases from coarse to fine, and about two in ten said that they could switch from fine to coarse.[58,59]

Main parties' views on supply-side substitution

75. The main parties submitted that, for market definition purposes, there should be no distinction between different grades of aggregate. Their reasons are that *(a)* producing one particular grade of crushed rock inevitably means producing several other grades (in particular, coarse and granular); and *(b)* by crushing, screening and blending different products there is significant scope to make different grades. Anglo noted that the cost of producing coarse aggregates are typically higher than those associated with the production of granular products, since there is further processing to crush and separate the different stone sizes; this will leave approximately 70 per cent of material which is not of the specified size. Any further processing such as crushing or screening involves incurring additional costs. Lafarge told us that within a crushed rock quarry there is some scope to flex production towards producing smaller aggregate grades by sending the larger size fractions back through the crusher network. However, with demand for coarse aggregates generally stronger than that for fine grades, most of Lafarge's crushed rock quarries are operated so as to maximize the proportion of coarse graded material.

Third party views on supply-side substitution

76. Cemex told us that switching between coarse and fine materials within one site (ie using different machinery) was limited because the end product was largely determined by the geological characteristics of the site. Coarse material could be turned into fine aggregates, but might have different performance characteristics when compared with naturally sourced aggregates of the same grade. Cemex also

[58] GfK survey. Base: 72.
[59] Anglo American noted that fine and coarse aggregates can only be used in a certain proportions in RMX production and switching between grades is limited from a demand perspective.

explained that coarse crushed rock could achieve similar performance characteristics to natural sand and gravel if it was graded using screens, placed through additional crushing processes or blended with naturally-occurring sand and gravel.

77. Hanson told us that it was possible to adjust screening and crusher settings to increase or decrease production of certain grades, but this depended on the infrastructure at the site, the inherent geology and the fact that the overall balance of production must keep waste and by-product to a minimum. Hanson said that for every tonne of a specific product that was quarried, a further four tonnes of other grades was produced, some of which might not be easily sold. Hanson noted that in many but not all cases, fine aggregates produced from crushed rock were a by-product of the production of single-sized and graded aggregates and that in these cases the cost attributed to their production was lower than the cost at sand and gravel units.

78. Breedon suggested that changes in the production profile could usually be achieved with a change in the plant configuration which required significant costs. Hillhouse Quarry told us that producing fine from coarse aggregates was not really an option as it was very energy intensive and lots of dust (ie material with very fine particles) was produced.

Product markets for aggregates used in specialist applications

Product market for rail ballast

Main parties' view

79. The main parties submitted that, on the basis that rail ballast was treated as a separate market (as in the OFT decision), they would agree that this market was national in scope. They noted, however, that rail ballast represented only a part of the

output of the quarries from which it was produced, reflecting the multiple product grades that were necessarily produced.

Third party views

80. Network Rail told us that there were no substitutes for rail ballast (in particular within secondary and recycled aggregates), due to its technical characteristics and the critical importance of safety in this application.

81. Network Rail told us that there was some limited use of recycled rail ballast, from high speed high traffic rail lines to low speed low traffic lines, but recycled rail ballast comprised a small proportion of the total demand so it did not constrain the price of (new) rail ballast.

82. Network Rail estimated that a [✂] per cent increase in the price of rail ballast would not alter its total demand for the product, which was driven by engineering and safety standards.

Product market(s) for high purity limestone

Main parties' view

83. The main parties told us that they disagreed with the OFT decision when this suggested that high purity limestone for FGD applications might represent a separate market from high purity limestone for the other uses. The main parties argued that high purity limestone was a primary product, interchangeable for a number of different applications. Any aggregate producer with a quarry with reserves of limestone with a purity level of 95 per cent or more could produce high purity limestone for most applications. The main parties submitted that, even if a specific grade of high purity limestone was used for FGD applications, on the basis of supply-side substitutability different grades could be easily produced by the same producer, and therefore high

purity limestone should be considered a single relevant market, without further distinction by application.

Third party views

84. Two customers of chemical stone used for FGD told us that there was no scope to substitute a different product for high purity limestone because FGD equipment was designed and calibrated precisely for a specific chemical specification of high purity limestone, and that modifications to accommodate a different specification, if possible at all, would incur high capital costs.[60]

85. Customers who purchase high purity limestone as an input to animal feed generally told us that they could switch to alternative products/specifications.[61]

86. One customer who purchases high purity limestone as an input to iron production (sinter) told us that the specification was very precise and that they could not easily substitute a different product.[62]

Product market(s) for asphalt

Main parties' views

87. The main parties submitted that there was a single product market for the production and supply of asphalt. In particular they noted that, since the production of all specifications of asphalt involved essentially the same raw materials and occurred at the same plant, there was complete supply-side substitutability between each specification. The main parties also noted that suppliers of asphalt also competed with suppliers of other surfacing materials (such as block paving and concrete) for certain applications.

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[60] E.ON; [✂].
[61] BOCM Pauls; Noble Foods; Frank Wright.
[62] Tata Steel.

88. In relation to 24/7 plants, the main parties argued that there was no separate market for 24/7 plants because there was a spectrum of possible operating permissions. In particular: *(a)* often 24/7 plants are subject to other constraints (eg restrictions on noise or traffic) levels which de facto prevent them from operating round the clock; and *(b)* non-24/7 plants often have (or can get) planning permission to work during the night on certain limited number of occasions per year or to work other times outside normal hours.

89. In relation to mobile plants, Lafarge told us that mobile plants could produce the same range of asphalt specifications as fixed plants.[63] As they were typically deployed for single large contracts, they were usually configured to produce large tonnages of one material at a time rather than being optimized for frequent changes between product types. Planning restrictions almost always restrict mobile asphalt plants to supply only the contract for which they are erected, rather than other local customers, but it is possible for contractors to hire mobile asphalt plants from companies in order to fulfil a contract or project. Lafarge also indicated that, ordinarily, mobile asphalt plants are used for larger projects (ie those requiring 50,000 tonnes or more of asphalt, such us highways jobs, airport and airfield projects) because there are some costs associated with the initial set up and deployment of these plants. Lafarge told us that it has also used mobile asphalt plants to service specific projects that are outside an area that is economically and practically serviceable from a fixed plant. Anglo expressed similar views and in particular noted that there are no specific types of jobs that cannot be supplied using a mobile plant.

Survey evidence and third party views

90. As part of the GfK survey, we surveyed asphalt customers on their purchases of asphalt and switching behaviour. In relation to 24/7 plants, the survey shows that

[63] Lafarge has three mobile asphalt plants.

over the last 12 months, respondents purchased on average 37 per cent of their asphalt requirements from sites with permission to operate 24/7, and 63 per cent from sites without the permission to operate 24/7. Of those which purchased some of their requirements from 24/7 sites, 20 per cent of respondents regarded it as essential to use a 24/7 site, 13 per cent said they preferred to use a 24/7 site, and 67 per cent said that they did not need to use a 24/7 site.[64]

91. The Highways Agency told us that there were more 24/7 plants than in the past, and that the market was more competitive as a result, and Hillhouse Quarry told us that all asphalt competitors, including themselves, had 24/7 plants.

92. In relation to mobile asphalt plants, the evidence from third parties is consistent with the views expressed by the main parties and suggests that mobile plants are economically viable only for very large projects due to the very high costs involved.[65]

Product market(s) for RMX

Main parties' views

93. The main parties submitted that there is a single relevant market for the supply of RMX. They argued that since different grades (or specifications) of RMX were produced from the same primary ingredients, combined in different proportions, and freely available additives, there was supply-side substitutability between the different grades of RMX which can be produced at the RMX plant.

94. In relation to volumetric trucks, the main parties submitted that these should be considered to form part of the RMX market. The main parties told us that volumetric trucks produced the same RMX product as was produced from fixed and site plants and that they understood that concrete produced by volumetric trucks was capable of

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[64] GfK survey. Base: all asphalt customers (270).
[65] Breedon Aggregates; Hanson.

ISO certification and/or the Quality Scheme for Ready Mixed Concrete (QSRMC) on the same basis as concrete produced from fixed and mobile plants. The main parties also stated that approximately three-quarters of volumetric trucks were owned by small companies which owned/operated up to three vehicles and that the large national RMX suppliers were not generally involved in volumetric operations.

95. In relation to site plants, the main parties submitted that RMX produced at the customer site forms part of the same relevant market as RMX produced at fixed plants. The main parties argued that there was complete demand-side substitutability between site-plant and fixed-plant-produced RMX, so even on large jobs customers usually had the choice of procuring RMX from fixed plant suppliers rather than having a dedicated site plant. For all but the very largest projects, it was usual for customers simply to request RMX and for the concrete supplier to make the decision to offer a site plant solution or supply from a fixed plant or plants.

Survey evidence and third party views

96. As part of the GfK survey, we surveyed RMX customers on their purchases of RMX and switching behaviour. Evidence from this survey suggests that, in the last 12 months, 87 per cent of RMX customers purchased RMX from a fixed plant, 14 per cent of RMX customers purchased some RMX from site plants, and 55 per cent of customers purchased RMX from volumetric trucks.[66]

97. In relation to volumetric trucks, third parties told us that the proportion of RMX produced using volumetric trucks had increased in recent years, and said that it

[66] GfK survey. Totals above 100 per cent because customers may have purchased RMX from different sources. Base: all RMX customers excluding merchants, 238.

represented approximately 9 to 10 per cent of the UK RMX market,[67] which was consistent with BDS estimates.

98. Third parties consistently indicated that volumetric trucks were suitable for small volume jobs and were not competitive for larger volume jobs.[68]

99. The majority of third parties we contacted also considered that volumetric trucks produced a product that was of a poorer quality, in particular it did not meet high specification requirements and was characterized by lower strength.[69] The exceptions were Cemex, which considers that volumetric trucks provided a good quality and service, and Allen Newport, which told us that it was not aware of quality issues with concrete produced using volumetric trucks. Hillhouse Quarry told us that RMX and concrete from volumetric trucks were essentially the same product. However, volumetric trucks tended to be used only where specification was not a key consideration and there was no requirement that the work be carried out under QSRMC or BSI accreditation.

100. One third party also told us that the price per m3 of volumetric trucks is usually higher, noting that volumetric trucks are normally supplied by independents and that the prices charged by the national RMX producers are always better.[70]

101. In relation to site plants, third parties consistently told us that RMX site plants were suitable only for very large projects of several years' duration because of the high investment cost involved. Hanson said that it owned 20 RMX site plants, but it only used them if the project was very large (40,000–50,000 m^3). Hanson said that the distinction between site plants (mobile sites) and static plants was not clear cut as it

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[67] Aggregate Industries/Holcim; Allen Newport.
[68] Hillhouse Quarry; Newark Concrete; Allen Newport; Breedon; Aggregate Industries; The Asphalt Works; Hanson.
[69] Costain Group; Aggregate Industries/Holcim; The Asphalt Works; Newark Concrete.
[70] The Asphalt Works.

currently had ex-mobile plants which would now be considered as static plants. Breedon indicated that the threshold for using RMX site plants was for projects over 100,000 m^3. Aggregate Industries suggested that RMX site plants are suitable only for very large volumes/projects.

Market definition in recent OFT and European Commission decisions relating to aggregates

102. Table 9 presents a short review of the relevant market definitions adopted by the OFT and DG Comp in recent decisions relating to aggregates.

TABLE 9 **OFT and DG Comp findings on product market definition in aggregate cases**

	Findings/decision	*Rationale*
OFT		
Aggregate Industries Ltd/Atlantic Aggregates Ltd and Stone Haul (02.03.2009)	Secondary aggregates separate product market	Pricing evidence and third party comment
Aggregate Industries Ltd/Foster Yeoman Ltd (20.11.2006)	All aggregates, ie primary, secondary and recycled	Degree of substitutability
Midland Quarry Products Ltd/Hanson Quarry Products Europe—Griff Quarry (27.09.2004)	All aggregates, ie primary, secondary and recycled	Degree of substitutability
European Commission		
Eurovia/Tarmac COMP/M.5803 (10.06.2010)	Secondary aggregates not substitutes for primary aggregates across whole range of applications. Within primary aggregates, differentiated between crushed rock, and sand and gravel	Limited substitutability in some applications, eg asphalt
Heidelberg Cement/ Hanson COMP/M.4719 (07.08.07)	Precise product market left open	Alternative definitions did not give rise to competition concerns
Cemex/RMC COMP/M.3572 (08.12.2004)	Precise product market left open	Alternative definitions did not give rise to competition concerns
Anglo American/Tarmac COMP/M.1779 (13.01.2000)	Primary aggregates as a single relevant market	Subdividing was not relevant for the case
Hanson/Pioneer COMP/M.1827 (24.03.2000)	Primary aggregates as a single relevant market	Subdividing was not relevant for the case

Source: CC.

Price-concentration analysis

Introduction

1. This appendix presents the results of the price-concentration analysis (PCA) for four product groups—grey cement (hereafter 'cement'), RMX, asphalt and aggregates. The aim of the analysis is to determine the effect to which local competition from rivals constrains pricing of particular products in these product groups, all else equal.

2. The analysis primarily relies on transactions data supplied by the main parties for the period 2007 to 2010.

3. We find statistically significant price effects of competition among the main parties for some products in aggregates and asphalt. In asphalt, for certain products, the effects are of magnitudes up to 0.5 per cent per additional competing plant. In aggregates, for certain products, the effects are of magnitudes up to 3 per cent per additional competing plant. No effects of any substantive statistical significance are found for RMX and cement.

4. Results for the PCA are based on regression techniques, which estimate coefficients from average patterns in the data, conditional on all the controls included in the model(s). These average patterns will in general be largely determined by the areas of the sample space where the preponderance of the data are collected. Sometimes an investigator wants to form a predicted outcome at data points towards the 'edges' of the sample space, ie at data points where one or more explanatory variables, although accurately measured, take on unusually high or low values. Predicted outcomes at such data points will be less reliable than predictions at observations closer to the 'middle' of the sample space. In such cases, where the data point is not typical of the whole sample, information from the regression analysis can be com-

bined with information from other sources to further inform the analysis. Certain local areas discussed elsewhere in the provisional findings in the unilateral effects analysis of primary aggregates are a case in point. These local areas are those where, as a consequence of the merger, fascia counts within the catchment area would fall from three to two or from two to one. Such areas are relatively atypical in the aggregates data. [✂][1]

Data

5. For calendar years 2007 to 2010, the main parties supplied data on all domestic shipments (sales) of all products in each of the four product groups.[2] Each record in these 'transactions' data sets shows the quarterly volume and value of shipments of a given product from a given facility (depot or production works) to a given customer at a given job site.[3] Aggregating to the annual level and dividing value by volume gives us a job-site and customer-specific annual average price for shipments of the particular product from the given facility. The raw data contains information for both internal and external sales, but our analysis focuses on external sales only.

6. Information on the locations of plants of all operators in these markets comes from responses to our data requests, sent to the two main parties and three other major operators (Cemex, Hanson and Aggregate Industries (Holcim)). Auxiliary data on the demographics and economic characteristics of local areas under study comes from the ONS and other public sources.

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[1] A main party commented that, given the large sample sizes in our regression analysis, an 8 per cent subsample would still represent a reasonable number of observations, possibly in the thousands, depending on the product in question. While this is true, the point made in the text is simply that there are many more observations outside this subsample, and these other observations will tend to have a proportionately larger effect on the regression estimates than the subsample of 8 per cent.

[2] In main parties' records, each product group is divided into product subcategories, which are further divided into narrowly defined products, which can number in the hundreds. We use the subcategories as the most basic unit of analysis for defining samples. For brevity in this appendix we refer to these product subcategories as 'products' (even though in practice each sub-category might group a number of distinct but related narrowly-defined product types). Within each product group, the data provided by main parties was (by request of the CC) restricted to those customers who purchased at least £10,000 worth of materials from that product group during the period 2007 to 2010.

[3] Job site location is only identified for delivered sales. In order to define a distance to job site for all observations, for collected sales we set the job location to be the location of the supplying site (ie the place of shipment).

Product definition

7. In setting up the data for analysis, we had to consider appropriate definitions of products within each product group. This is a challenging task. At one extreme stands RMX, where the number of possible different product types is effectively infinite, because each batch of RMX is made to order, with the constituent quantities of sand, cement, water, aggregates and other additives varying on continuous scales according to a customer's precise specification. Aggregates and asphalt occupy a middle ground, where at the finest levels of classification there are scores or hundreds of different product types. Simplest to classify is cement, where a standard product, CEM I, comprises the majority of shipments, although beyond this principal subcategory there is an array of other types classified as CEM II, CEM III and CEM IV.

8. After extensive discussions with parties and their advisers, and consideration of the requirements of our methodology, we decided to analyse a single product category for each of cement and RMX. For cement, we chose Bulk-CEM I, a clearly-defined product type, accounting for the majority of the main parties' cement sales, and for RMX, we chose to aggregate into a single category all generic (ie non-specialist) mixes, which are typically supplied by any standard RMX plant and which do not require special means of application.[4] For each of asphalt and aggregates, we used the main parties' own classification systems to choose a few top-selling categories from sets of 30 or 40 broad subcategories which in each case cover the whole of their respective product spaces.

[4] A main party noted that both specialist and generic RMX products could be produced from the same RMX plants, and that these products differed mainly in terms of input requirements (typically through the addition of admixtures) and properties (eg strength gain rates, setting times, durability).

Basic model

9. The data records annual shipments of each product from each plant to each job site, over a four-year period.[5] Some job sites appear only once in the data for any given product, while others may appear in all four years. Job sites are naturally grouped by the plant from which they sourced the product, since they tend to source from nearby facilities. Over the period of the data each plant typically ships to scores or hundreds of nearby job sites.

10. For each product under consideration, our econometric methodology consists of a single price equation which we estimate by Ordinary Least Squares (OLS). Let *i* denote a job site, let *j* denote a shipping plant, and let *t* denote the year.[6] Let P_{ijt} denote the average price of the product when shipped from *j* to *i* in year *t*. Our estimating equation takes the form:

$$P_{ijt} = CHARACS_{ijt}\ \alpha + DIST_{ij}\ \beta + (DIST_{ij})^\wedge 2\ \ \gamma + COMP_{ijt}\ \delta + \varepsilon_{ijt} \quad . \qquad (1)$$

11. Here $CHARACS_{ijt}$ represents a set of variables summarizing the characteristics of job-site *i* and plant *j* in year *t*. These could include:

- the identity, size and type of the customer at *i*;
- an indicator for the geographic region (eg Government Office Region (GOR) or similar planning region) in which the job site is located;
- demographic and economic characteristics of the area around the job site, such as population and unemployment;
- a year indicator, possibly varying by region, representing year-to-year changes in overall economic conditions across a broad area; and
- whether the order was delivered or collected.

[5] Henceforth in this appendix ‘plant’ will be used to refer to any shipping facility as recorded in the data, whether depot or production works. In the case of cement, this includes also import terminals. We will use the term ‘works’ when we need to refer to a site of actual production, rather than storage or trans-shipment (eg Tarmac’s Tunstead works, for cement).
[6] Unusually, different customers may operate at the same job site. Our approach distinguishes between such customers, treating shipments to each as different observations. As stated, the estimating equation (1) supposes that there is a single customer at each job site, but the notation is easily modified to take account of the few cases where this is not true.

12. In principle *CHARACS* could also include factors specific to the plant, such as production costs. In our approach, such effects are all accounted for by including plant-specific ‘fixed effects’, and therefore we do not need to give them separate consideration.

13. The variable $DIST_{ij}$ is simply the distance from plant *j* to job-site *i*. In most cases this is a simple radial (‘straight-line’) distance, although in some cases we have a (more accurate) road distance instead. We include a quadratic (squared) term for *DIST* to allow for the fact that distance may affect price in a non-linear manner.

14. In the results to follow, we measure price as an ex-works price, ie excluding costs of haulage from the shipping facility (whether depot or works) to the job site. It might be thought that the ex-works price to a given job site would not vary with distance (since haulage costs have been deducted), and that therefore the variable *DIST* may be excluded from equation (1). In fact, our results are strongly indicative of an ex-works price that declines in distance, which is consistent with some theories of spatial price discrimination.

15. The term $COMP_{ijt}$ in equation (1) comprises the competition measures (CMs), which are indicators of the proximity of job-site *i* to rival sources of supply, ie to alternatives other than plant *j*. The CMs can be measured in different ways. For example, one way is to count fascia (ie the number of different competitors, not the number of different competitor plants) within a certain distance of a location, while another way is to count plants. A third way might measure distances to nearest rival plants of given types, rather than counting the numbers of such plants within set distances.

16. As our base specification, we adopt here a ‘distance-band’ approach, which measures local competition by counting the numbers of nearby rival plants, but

allows the effects of such rival plants to vary according to their distance from the reference location. Specifically we classify rival plants into three concentric distance bands: an inner band ('Band 1'), representing competition from the nearest rivals, an intermediate band ('Band 2'), and an outermost band ('Band 3'). Rival plants located outside Band 3 are assumed to have no effect on local pricing of the product in question.

17. A related question concerns the reference location with respect to which these distance bands are to be defined: should this be the job site or the plant? In retail contexts it is common to use the storefront (ie the 'plant') as the reference location. This is because in such contexts it is implicitly assumed that the store cannot charge different prices to different customers based on their home location. However, in the present case the data clearly indicates that different customers may pay different prices for the same product from the same plant. Some of these price differences appear to be related to a customer's location, suggesting that firms in these markets have the ability to vary prices according to the specific characteristics of individual customers. Therefore we choose to centre the CMs on the job site, rather than on the plant.

18. Finally, the term ε_{ijt} in equation (1) is a random error term, representing all the things that affect prices at job site i in period t but which we cannot measure.

Estimation approach and the endogeneity problem

19. In estimating equation (1) the aim is to answer the question: 'All else held equal, what is the effect of more local competition on price?' If the estimation is performed correctly, such effect(s) will be represented by the parameters in δ, ie by the coefficients on the CMs in $COMP_{ijt}$. A well-known problem which any valid approach must address is that of potential *endogeneity* in the CMs. This refers to the possibility

that an observed correlation in the data between price P_{ijt} and $COMP_{ijt}$ might arise simply because both variables are affected by some unobserved third factor, eg by unobserved features of the local market, such as local construction activity. That is, the observed correlation might not represent a causal effect of *COMP* on price, because the observed controls (*CHARACS*, *DIST*) included in (1) do not hold ‘all else equal’—there may be unobserved factors, implicitly included in the random error ε_{ijt} , which are relevant to both P_{ijt} and $COMP_{ijt}$ and which therefore confound the relationship between those two variables.

20. In the present analysis our approach to this problem is to include an extensive set of time-varying plant-specific ‘fixed effects’ among the regressors in (1). These are indicator variables (dummy variables) which absorb all factors affecting price that are specific to a plant (and which are therefore shared by all job sites served by that plant). Such factors notably include the plant’s production costs, but they also extend to influences such as the level of local construction activity. Furthermore we allow these indicator variables to vary arbitrarily from year to year, to capture the fact that, for example, there may be unmeasurable idiosyncrasies in the way production costs for specific plants vary over time.

21. Since the fixed effects absorb all plant-wide influences on costs, by including such effects we are estimating the price-concentration relationship simply on the basis of the within-plant variation in P_{ijt} and $COMP_{ijt}$, ie on the basis of the deviations in those variables from their common mean at plant *j*. In an intuitive sense, with this approach we take an arbitrary plant *j*, and compare prices at a job site on one side of the plant, which may have few alternative sources, with prices at a job site on the other side, which may have more alternatives. If prices at the latter site are lower, we conclude that competition reduces prices.

22. In reaching any such conclusion, we would be assuming that the unobserved factors affecting both P_{ijt} and $COMP_{ijt}$ (referred to above in paragraph 19) are captured by the plant-specific fixed effects. We argue that this is a reasonable assumption in the present case since there are various restrictions on the locations of rival plants which prevent such locations being responsive to micro-level features of local demand which might affect prices. This is obviously true in the case of aggregates, for example, where the locations of plants (quarries, and sand and gravel pits) are mainly determined by geology. In the case of cement, the locations of works are also influenced by geology (sources of limestone), while the locations of rail-linked depots and import terminals face their own constraints, namely access to rail lines and port facilities, which are not necessarily related to the micro-structure of local demand faced by customers of a cement plant. Although asphalt and RMX plants are more mobile, these also would face location constraints in terms of planning restrictions etc. Furthermore there are many such plants spread around the study area, and their deliveries travel very short distances, meaning that customers are clustered fairly closely around each plant. Hence the fixed effects for these plants absorb local variations in demand and production costs (which might affect both price and *COMP*) at quite a fine level of geographic detail.[7]

Construction of competition measures

23. As noted above, for each product group we calculate CMs by counting numbers of rival plants within three concentric distance bands, centred on the job site. Choice of the distance cut-offs defining these bands is somewhat arbitrary, in that economic theory does not give any precise guidance. Rather we choose cut-offs according to intuitive criteria, with reference to the nationwide distribution of delivery distances for each particular product.

[7] In other words, at the micro level, plant locations are influenced by various factors such as those referred to above (geology, planning, rail access, etc) which can be assumed to be orthogonal to (ie unrelated to) the unobserved components of demand that affect prices.

24. For each product group, we take as our reference threshold a distance approximately representing the 80th percentile of the distribution of all delivered shipments in that product group. In cement, for example, this distance is around 100 miles, whereas in asphalt it is around 22.5 miles.[8] We use this 80th-percentile distance to define the cut-off between Bands 2 and 3, thereby dividing the region around a job site into a core group of locations from where competition is most likely (ie Bands 1 and 2), and an outer fringe from where competition may be weaker. Where *x* is the 80th-percentile distance, we set the outer edge of Band 3 at a distance of 1.5x, a fairly generous criterion designed to encompass any plant which might conceivably serve as an alternative source of supply for the reference job site. We set the cut-off between Bands 1 and 2 at a distance of 0.5x, which is again an arbitrary choice serving to split the set of core alternative suppliers into a group of quite close substitutes and a group of more general alternatives.

25. At any particular job site, the constraint placed by alternative suppliers on the pricing of, for example, Lafarge may depend on how far away the Lafarge plant is. To allow for this possibility, we interact counts of rival plants in Band 1 with a dummy variable for the presence of a plant of the own company (Lafarge, for example) in Band 1. This is a simple and parsimonious way of allowing for the possibility that the effect, on Lafarge's price, of an extra rival nearby may depend on the distance to Lafarge's nearest plant. More complex ways of capturing this effect might be considered, but this simple specification serves as a first approximation. If the interaction with the

[8] These 80th-percentile reference distances were calculated in early versions of the CC's work on unilateral effects for primary aggregates, asphalt and RMX, and were subject to minor revisions in later work. Such minor revisions are of no particular import for the PCA analysis, since the choice of cut-offs between two distance bands is any case arbitrary. Here we thus continue to employ the earlier values for the 80th percentiles.

own-plant dummy is not statistically significant, this may be taken as an indication that any such 'nearby own plant' effect on the CMs is not substantial.[9]

Accounting for customer size

26. Our price measures often reveal clear evidence of discounts for large customers. Therefore it is necessary to control for customer size in the price-concentration regressions. To determine the size of a customer of, say, Lafarge, we first calculate from the transactions data the customer's annual purchases of all products in the product group from Lafarge, for each of the four years 2007 to 2010. We then divide each year's distribution of customer annual purchases into quintiles, and construct a dummy variable for each quintile. This gives 5 x 4 = 20 dummy variables in total. In the regressions one dummy variable for each year must serve as the 'omitted category'. In each case we take this to be the lowest quintile, for the smallest customers, so that the estimated coefficients on the dummies for the other quintiles all show price effects relative to these smallest customers.

27. We also consider that the very largest customers may receive specific price deals, on top of what they already receive by virtue of being in the top quintile of the size distribution. For each product group we therefore construct dummies for up to ten of the largest customers.[10] [✂] For flexibility, where there are sufficient number of observations, we allow these customer-specific dummies to vary by year.

Cement

28. The analysis for cement, for both Lafarge and Tarmac, focuses on annual average prices for Bulk-CEM I sold to external customers. Almost all such orders are

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[9] In introducing this interaction variable we do not constrain the estimates in any way—we just allow the data to show whether or not the interaction is significant. As well as this interaction term, the model also includes as a separate regressor the distance between the job site and the shipping plant.

[10] If the sample size is small (eg for Tarmac-Cement), we only construct customer-specific dummies for a couple of the top customers.

delivered to the customer. Nevertheless we include the few collected orders in the regression samples, in each case with a separate indicator variable to capture any differences in the average price for such orders. To calculate the CMs for such orders, we assume that the ‘job site’ is located at the plant gate (which is where the order was collected).[11]

29. Table 1 shows summary statistics for selected variables from the regression for Lafarge-Cement, while Tables 2*(a)* and 2*(b)* show the regression results. In this and in all other regressions, the annual average price is the ex-works price, ie (total value of shipments – total haulage costs)/(total volume of shipment), where the haulage cost deducted is that reported for each order in the transactions data. The price is in undeflated £ per tonne, but the year dummies in the regressions allow for any effects of inflation.

30. Outliers appear when average prices are calculated in this manner, eg examples of extremely low prices. These can arise, for example, from coding errors in the raw data, or because a refund from a previous year’s shipment was carried over to this year’s shipment value. To guard against the influence of such outliers, in all regressions for all product groups we trim the top 5 per cent and bottom 5 per cent of observations from the price distribution. We also trim observations exhibiting outliers on other variables, such as on *DIST* or on the demographic variables.[12]

31. The prices for Lafarge-Cement include all rebates and discounts, ie these are subtracted from the total value of shipments before calculation of the average price in the preceding paragraph. (Shipment values have not been adjusted for some minor components such as charges for waiting time and returned loads.)

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[11] For delivered orders we include road deliveries only, discarding a handful of deliveries by rail.
[12] We trim outliers in this way because the Ordinary Least Squares regression technique is known to be sensitive to such observations.

32. The distance bands used in constructing CMs for cement are: 0–50 miles (Band 1), 50–100 miles (Band 2) and 100–150 miles (Band 3).

33. The CMs must take into account not only distances to alternative sources of supply (via the distance-band construction), but also differences in the types and ownership of those alternatives. For cement, we construct separate CMs for four types of rival plant: *(a)* rail-linked depots, *(b)* cement works of the other main party, *(c)* cement works of the other majors (ie Hanson and Cemex, since Aggregate Industries (Holcim) has no cement works in the UK), and *(d)* import terminals.[13] With three distance bands for each type of rival, this gives 4 x 3 = 12 different CMs. As noted above in paragraph 25, for flexibility we also interact each Band 1 count of rival plants with a dummy for a nearby own plant. Since there are four such Band 1 counts in cement, we therefore have 16 CMs in total.[14]

34. Table 1 shows, for Lafarge-Cement, summary statistics for the 12 distance-band counts for the different types of rival, and for the nearby-own-plant dummy which is to be interacted with the Band 1 counts.

35. For cement, three customer types are recorded in the transactions data: concrete products, RMX and other. Table 1 indicates that in the Lafarge-Cement regression sample these types respectively account for 20, 69 and 11 per cent of observations.

36. For Lafarge-Cement we estimate two regressions: one on the full sample, and one on a subsample which excludes the five largest customers. Estimated coefficients on the controls for these regressions are shown as Models 1 and 2 in Table 2*(a)*, while

[13] We include grinding stations in the count of rail-linked depots.

[14] A qualification applying to this interaction with the nearby-own-plant dummy is that the dummy is only ‘switched on’ when the nearby own plant is an import terminal or works, not a rail-linked depot or grinding station. This allows for the possibility that (once the costs of rail transport are factored in) import terminals and works may have lower marginal costs of shipping product than rail-linked depots.

coefficients on the CMs are shown in Table 2*(b)*. The full sample size is 3,810, but excluding the five largest customers reduces the sample size to 2,172.

37. Both regressions include a full set of plant-year effects—see paragraph 20 above. As noted in paragraph 27, Model 1 (the full regression) also includes dummies for specific large customers—some time constant, some time varying. Model 2 includes time-constant dummies for four large customers who remain in the regression sample. Both models also include year-varying dummies for the customer's region (South-East, West Midlands, etc).[15] Coefficients on the plant, specific-large-customer, and region effects are not shown in Table 2*(a)* for brevity.

38. In Table 2*(a)*, both models show that the ex-works price declines in the distance to the job site, but at a decreasing rate (since the quadratic term is positive in both cases). Model 1, for example, implies that a job site at the average distance of 54 miles from the shipping plant would receive a discount of about £3.80 per tonne (relative to a job site at the plant gate), or about 5 per cent of the average price for Lafarge's Bulk-CEM I. Ex-works prices that decline in distance-to-customer are consistent with spatial price discrimination. Such theories of price discrimination posit that a firm would charge lower ex-works prices to customers who are located further away, because for such customers the total economic surplus of the transaction is reduced by the cost of shipping the product to the job site.[16]

39. The dummies on the size quintiles in Table 2*(a)* show substantial quantity discounts for large customers. For example, Model 1 indicates that in 2007 a customer in the top (fifth) size quintile on average received a discount of £9.22 per tonne relative to

[15] The job site is not always located in the same region as the shipping plant. Therefore the region-year effects are not collinear with the plant-year effects.
[16] We emphasize that the argument here refers to prices net of haulage costs. Once haulage costs are included, the *total* price would of course be higher to job sites which are further away.

customers in the bottom quintile.[17] Quantity discounts were less substantial in 2009/10 than in 2007/08. Discounts for customers in the fourth quintile were both statistically and quantitatively significant in the earlier period, but apparently disappeared in the latter two years. Customers in the fifth quintile still received significant discounts in 2009/10, but of a smaller size than earlier.[18]

40. For Model 1, Table 2*(b)* shows that none of the CMs are significant at the 1 per cent or 5 per cent levels, and only one is significant at the 10 per cent level. Thus there is essentially very limited evidence of competitive constraints on prices from this regression.

41. The estimated competition effects in Model 1 may be heavily influenced by the large customers, with the five largest alone accounting for almost half the observations in the sample. To investigate the extent to which the results are influenced by these customers, Model 2 re-estimates the model after dropping the observations for the five largest. Table 2*(b)* shows a slight increase in the significance of the CMs after this change, with import terminals in Band 2 now having a negative effect on price, significant at the 5 per cent level. Overall, however, the evidence for competitive constraints on price from these regressions is weak.

42. Summary statistics and regression results for Tarmac-Cement are shown in Tables 3, 4*(a)* and 4*(b)*.

[17] This is an average discount accruing to all customers in the top quintile. As noted previously, the model also includes dummies specific to the very largest customers, allowing them to receive additional discounts (or even surcharges) on top of this base effect of £9.22. For brevity, these additional customer-specific dummies are not shown in Table 2*(a)*.

[18] For unknown reasons, in 2009 consumers in the second quintile apparently paid £5.15 per tonne *more* than the smallest customers. The reason for this counterintuitive result is unknown. Apart from this aberration, those size effects which are statistically significant are in line with the expectation that large customers pay no more than small customers.

43. [✂][19]

44. [✂][20]

45. [✂] (compared with the figure of £3.80 for Lafarge—see paragraph 38 above).

46. [✂] The Lafarge regressions also showed the smallest quantity discounts in 2009—see paragraph 39.

47. Estimated competition effects for Tarmac-Cement are shown in Table 4*(b)*. These effects show little evidence of competitive constraints on price, since only one of the coefficients is significantly negative, and then only at the 10 per cent level.

48. In view of the relatively small sample size, we do not attempt to run for Tarmac a version of the model which excludes the largest customers.

Cement—alternative specifications

49. In comments on the PCA, the main parties' adviser suggested that in alternative specifications of the Lafarge-Cement regressions there was a statistically significant competitive effect from importers. These alternative specifications rely on redefining the CMs for import terminals. In our current base model (Model 1 in Tables 2*(a)* and 2*(b)*), the import-terminal counts (IMPORTTERMBAND1, etc) include import terminals of all operators other than Lafarge. Therefore the terminals of the major operators Cemex, Hanson and Aggregate Industries (Holcim) are counted along with the terminals of 'independent' importers such as Dudman and Titan. The adviser suggested redefining these variables so that they just counted terminals of 'pure'

[19] [✂]
[20] [✂]

importers—Aggregate Industries (Holcim) and the independents—which had no works in the UK.

50. We reran Model 1 for Lafarge-Cement with redefined counts of import terminals. We considered two versions, depending on whether Aggregate Industries (Holcim) is counted as a 'major' or a pure importer. In the first version, we follow the adviser's suggestion and count Aggregate Industries (Holcim) as a pure importer along with the independents. As the interactions between the Band-1 CMs and the nearby-Lafarge-dummy were not singly or jointly significant, we dropped those interactions—if anything, this should raise the statistical significance of the remaining CMs.

51. In this version, the coefficients on the counts of pure importers in Bands 1, 2 and 3 are respectively –0.94, –0.70 and –0.53, significant at the 10, 10 and 5 per cent levels, respectively. The joint test of all three coefficients together does not show statistical significance (p-value = 0.18).

52. In the second version, we do not count Aggregate Industries (Holcim) as a pure importer, but include its import terminals in the works counts for Other Majors, ie in the variables OTHMAJORWKBAND1, etc. For parsimony, we again drop the interactions between the Band-1 counts and the nearby-Lafarge dummy. The coefficients on the counts of importers in Bands 1, 2 and 3 are now respectively –0.79, –0.44 and –0.48, but only the last is statistically significant, and then only at the 10 per cent level. The joint test of all three coefficients together again does not show statistical significance (p-value = 0.25).[21]

53. The conclusion from these alternative specifications is that there is some evidence of a competitive effect from import terminals when the terminals of Cemex and Hanson

[21] Neither version shows an improvement in the statistical significance of the importer terms when IMPORTTERMBAND1 and IMPORTTERMBAND2 are collapsed into a single variable.

are excluded. However, without other modifications to the model the statistical significance of the effect is not strong, and almost disappears if Aggregate Industries (Holcim) is not counted as a ‘pure’ importer.

54. The main parties’ adviser also proposed additional specifications, aimed at measuring competition along a single dimension, rather than along multiple dimensions which classified rivals by ownership and type of facility. In one proposal, this dimension is a count of all rival facilities within 100 miles; in a second, it is a count of all rival fascia within 100 miles.[22] The adviser reported that negative price effects were observed, significant both statistically and in magnitude, when competition was measured in this way.

55. Specifically, in the plant-count approach, the adviser found that, all else equal, job sites with two or fewer rival plants within 100 miles paid £3 to £4 per tonne more for Lafarge Bulk-CEM I than sites with three or more such rivals. In the fascia-count approach, the adviser found that job sites with two or fewer rival fascia within 100 miles paid £3 to £5 per tonne more than sites with three or more such rival fascia.

56. [✂][23,24]

RMX

57. For RMX, the regression sample covers main parties’ external sales of all generic mixes over 2007 to 2010. As noted above in paragraphs 7 and 8, we treat all such mixes as a single product category.

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[22] In each case the adviser allowed for flexibility in the effect of the plant count, or fascia count, by creating dummies for the count as it takes on the values 0, 1, 2, 3, 4 etc.

[23] [✂]

[24] [✂]

58. The distance bands for the CMs in RMX are defined as: 0–4 miles (Band 1), 4–8 miles (Band 2) and 8–12 miles (Band 3). To construct the CMs, we divide rival plants into three groups: *(a)* plants of the other main party, *(b)* plants of the other majors (Hanson, Cemex, Aggregate Industries (Holcim)), and *(c)* all other plants, labelled 'Independents'.

59. Table 5 shows summary statistics for Lafarge-RMX. Customer types for Lafarge-RMX are 'aggregates', covering aggregate merchants and producers (about 2 per cent of the regression sample); 'construction', covering various construction categories such as building and civil engineering contractors (about 67 per cent); 'cash sales', representing customers that do not hold an account with the supplier and for which further information is not generally available (about 15 per cent), and 'other' (about 16 per cent). The average ex-works price for generic RMX is £64.79 per cubic metre and the average distance from plant to job site is just under 6 miles.

60. Table 6*(a)* shows estimated coefficients on the controls for Lafarge RMX. A significant distance effect is again seen, implying that on a job site at the average distance from the plant the supplier receives £2.27 per cubic metre less than from a site at the plant gate. Statistically significant quantity discounts for the largest firms are also present, although these are a smaller proportion of the average price of the product than for cement.

61. Table 6*(b)* shows estimated competition effects for Lafarge-RMX. The sample size for the regression is large, around 58,000. Despite this large sample size, no statistically significant competitive constraint is seen from Tarmac's RMX plants. Some statistically significant effects are observed with respect to competition from other rivals, although the signs of these effects (ie whether the price effect is positive or negative) are not always consistent with each other or with economic intuition. For

example, when there is no Lafarge plant in Band 1, the presence of an extra Other-Major rival in Band 1 is estimated to increase price by 14.6p per cubic metre, significant at the 5 per cent level. But when a Lafarge plant is present in Band 1, the same Other-Major rival is estimated to reduce price by 12.6p per cubic metre (= 27.2 – 14.6), significant at the 1 per cent level. Counter-intuitive positive price effects are also seen for Other-Majors in Band 3, and Independents in Bands 1 and 3.

62. Reasons for such contradictory results are not immediately clear. We would note, however, that in all cases the magnitude of the estimated effect of an additional rival plant is rather small—around 25p per cubic metre at most, which is less than 0.5 per cent of the average price for Lafarge-RMX. The conclusion is that there is little evidence of substantial price effects of competition for Lafarge-RMX.

63. Table 7 shows summary statistics for Tarmac-RMX, while Tables 8*(a)* and 8*(b)* show regression results. [✂]

64. [✂][25]

65. [✂]

66. Table 8*(b)* suggests that any effects of local competition on Tarmac's RMX price are quite weak. Most of the coefficients on the CMs are not statistically significant. Of those which are statistically significant, two are counterintuitively positive, but are not large enough in magnitude to cast serious doubt on the model specification. Larger in magnitude is a negative effect—of about 24p per additional rival—from independents in Band 1. This effect is only present when there is not also a Tarmac plant in Band 1 (since the effect of INDEPENDENTBAND1 is almost completely cancelled out by the

[25] [✂]

interaction with the nearby-Tarmac dummy). As it represents less than 0.5 per cent of Tarmac's average ex-works price, it is still quite small in magnitude.

Asphalt

67. For asphalt, for each main party we run the analysis on two top-selling products: [✂]. The distance bands for the CMs in asphalt are defined as: 0–11.25 miles (Band 1), 11.25–22.5 miles (Band 2), and 22.5–33.75 miles (Band 3). As for RMX, we divide rival plants into three groups: *(a)* plants of the other main party, *(b)* plants of the other majors (Hanson, Cemex, Aggregate Industries (Holcim)), and *(c)* all other plants, labelled 'Independents', or 'Others'. There are about 20 asphalt plants in the regression samples for Lafarge, [✂].

68. For Lafarge-Asphalt, the two products studied are Binder Course and Wearing Course, which respectively account for around 32 and 30 per cent of Lafarge's total revenues from external asphalt sales in Great Britain over 2007 to 2010.

69. Table 9 presents summary statistics for the Lafarge-Binder Course regression, while Table 10 presents summary statistics for Wearing Course. Two of Lafarge's asphalt plants in the data are existing JVs with Tarmac. [✂][26]

70. Job sites for Lafarge asphalt are classified into eight different customer-type categories—summary statistics for these are not shown in Tables 9 and 10 for brevity, but the categories are shown with the estimated coefficients on the controls in Table 11*(a)*. (The omitted category in the regressions is Builders' Merchants.) In the regression sample for Wearing Course, for example, the top four categories of job site are Surfacing Private Sector (43 per cent), Building Contractors (18 per cent), Others (12 per cent), and Civil Engineering Contractors (9 per cent).

[26] [✂]

71. A non-trivial proportion of Lafarge's asphalt shipments are collected orders. Furthermore, delivered and collected orders of Lafarge-Asphalt have quite different price distributions, not just in terms of their means but also in their variances. This suggests some difference in the underlying mechanisms determining prices for the two different types of order. The CMs are more accurate with respect to delivered than collected orders (since the true job site for collected orders is not known). Therefore for Lafarge-Asphalt we restrict the regressions to delivered orders only, giving a sample size of about 6,000 or 7,000.

72. Table 11*(a)* again shows a significant distance effect on price, with suppliers receiving £1.66 less for Binder Course and £1.56 less for Wearing Course than from a job site located at the average distance of about 13.5 miles from the plant, compared with average prices in the range £40 to £50. Quantity discounts are infrequently observed for these Lafarge asphalt products. No quantity discounts are seen for Wearing Course, and for Binder Course they are only seen in 2007 and 2008. Moreover in some cases, for unknown reasons, prices that increase in quantity are observed instead.[27]

73. Estimated competition effects for Lafarge's Binder and Wearing Course are shown in Table 11*(b)*. Most of the CMs are not statistically significant. However, for both products, statistically significant negative effects are observed for competition from Tarmac, in Bands 2 and 3. Two of these coefficients are significant at the 1 per cent level, one at the 5 per cent level, and one at the 10 per cent level. The magnitudes of

[27] Coefficients on the specific-large-customer dummies are not shown in Table 11*(a)* for brevity, but these reveal substantial quantity discounts for certain such specific customers in certain years. In keeping with the overall effects for customers in the top quintile, any such discounts tend to be largest in 2007/08.

these estimated effects are, however, small, being at most around 25p per extra plant, or about 0.5 per cent of the average price of the relevant product. [28]

74. [✄] Tables 12 and 13 show summary statistics for the two products, while Tables 14*(a)* and 14*(b)* show regression results. For consistency with Lafarge, the samples for these regressions are again restricted to delivered orders only.[29]

75. [✄]

76. [✄]

77. [✄]

Aggregates

78. In aggregates, we study prices for three top-selling products for Lafarge, and four top-selling products for Tarmac. In each case, the products studied include at least one crushed-rock (CR) product and one sand-and-gravel (S&G) product.

79. Distance bands for aggregates are 0 to 11.25 miles (Band 1), 11.25 to 22.5 miles (Band 2) and 22.5 to 33.75 miles (Band 3). As for asphalt and RMX, we divide rival plants into three groups: *(a)* plants of the other main party, *(b)* plants of the other majors (Hanson, Cemex, Aggregate Industries (Holcim)), and *(c)* all other plants, labelled ‘Independents’, or ‘Others’.

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[28] [✄]
[29] Also, for Tarmac the customer-type variable is replaced with a sale-type variable, for the reasons discussed for the RMX case in paragraph 64.

80. For Lafarge, the products studied are, in CR, H3 Sub-base, and, in S&G, Sharp Sand and Clean 6–50mm. These are the three top-selling Lafarge aggregates products over the period of the data, together accounting for about 50 per cent of revenues.

81. There are about 27 Lafarge plants shipping the CR product H3 Sub-base in our regression sample, while of the S&G products there are, for example, about 50 Lafarge plants shipping Sharp Sand. These numbers indicate that, for geological reasons, certain types of aggregate can only be produced by certain plants. This has a bearing on the calculation of the CMs, which are supposed to capture the availability of alternative sources of supply of each product. For a CR product, for example, it would be misleading to count as a rival plant an aggregates facility which only produces S&G. To allow for this, for each of the CR products studied, for both main parties, we count a rival plant in the CMs if and only if it produces some CR products. For each S&G product studied, we count a rival plant in the CMs if and only if it produces some S&G products.

82. Tables 15, 16*(a)* and 16*(b)* show summary statistics and regression results for the Lafarge CR product, H3 Sub-base. The mean ex-works price is £11.40 per tonne and the mean distance to the job site is 12 miles. The distance effect shown with the controls in Table 16*(a)* represents a reduction of 59p per tonne on ex-works prices for a job site located at the average distance. The same table shows that quantity discounts for size quintiles appear to be negligible until 2010, when some significant discounts appear.

83. Among the competition effects shown in Table 16*(b)*, rivalry from Tarmac does not appear to be significant. On the other hand, there appears to a constraint from the CR plants of other majors. In Band 1, each of these plants is estimated to reduce Lafarge’s price by about 65p per tonne, significant at the 1 per cent level, whether or

not there is also a Lafarge plant nearby. Competition from these plants in Band 2 also has an effect, reducing price by 24p per tonne, significant at the 5 per cent level.

84. Summary statistics for the Lafarge S&G products, Sharp Sand and Clean 6–50mm, are in Tables 17 and 18. Mean prices and distances are similar to those for H3 Sub-base.

85. Estimates of the coefficients on the controls, for both S&G products, are in Table 19*(a)*. The predicted reductions in prices for a job site 12.5 miles from the plant are 87p and £1.04 per tonne, for Sharp Sand and Clean 6–50mm respectively. For both products, statistically significant quantity discounts are observed for customers in the top quintile, although these disappear in 2009 for Clean 6–50mm, and in 2009 and 2010 for Sharp Sand.

86. The effects of competition from Tarmac, shown in Table 19*(b)*, are weak. For both products there is a statistically significant reduction of about 5p for each extra Tarmac plant in Band 3. A one-standard-deviation change in *TARMACPLBAND3* is (about) two extra plants—see Tables 17 and 18—which would imply a price reduction of around 1 per cent.

87. For Clean 6–50mm, consistent with the estimates for H3 Sub-base, there is a somewhat stronger negative effect of 16p per tonne per plant from other majors in Band 1 (when there is no nearby Lafarge plant).

88. In summary, for Lafarge aggregates there is weak evidence of local competition constraining prices, with the most constraint, if any, coming from other majors.

89. [✂][30]

90. Summary statistics and regression results for the CR products are in Tables 20, 21, 22*(a)* and 22*(b)*, while those for the S&G products are in Tables 23, 24, 25*(a)* and 25*(b)*. [✂]

91. [✂]

92. [✂][31]

93. [✂][32]

94. [✂]

95. [✂][33]

96. In summary, for Tarmac aggregates there is more evidence of price constraints from local competition than for Lafarge aggregates, but only for the two CR products do these constraints appear to come from Lafarge. (This is not to rule out the possibility that constraints from Lafarge might be present for other S&G products which we have not considered here.) For those two products, the effect of one extra nearby Lafarge plant on Tarmac's price is a reduction of no more than 3.5 per cent.

Tarmac crushed rock—an alternative specification and a simulation

97. We considered alternative specifications of the CMs for Tarmac's CR products, which is where the most significant competitive effects between the main parties were

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[30] [✂]
[31] [✂]
[32] [✂]
[33] [✂]

found. Specifically, for each product we considered a version of the base model in which the influence of competition is measured just as a fascia count, of all rival fascia in Bands 1, 2 and 3. This CM will be a single count in each of the two regressions, incorporating fascia of all CR plants operated by competitors.

98. We count plants of independents (ie plants other than those of the other main party, or the three other majors) as a single fascia. Since fascia of the three other majors are enumerated separately, the maximum number of rival fascias is five. [✂]

99. For the same products, we also considered a simulation in which an extra Lafarge plant is simultaneously added to each of Bands 1, 2 and 3. To motivate this experiment, a point of comparison is the standard deviation of the total number of Lafarge plants in Bands 1, 2 and 3. [✂][34]

100. The results are shown in Table 26. [✂]

101. [✂]

[34] [✂]

TABLE 1 **Summary statistics for price-concentration regressions (selected variables), Lafarge-Cement**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Bulk-CEM I net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for DELIVERED	Delivered/collected	[✂]	[✂]	[✂]	[✂]
Dummy for RMX	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for 'other' type	Customer type	[✂]	[✂]	[✂]	[✂]
POPN	Population within 50 miles of job site (m)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 50 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 50 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
RAILDEPBAND1	No of rivals' rail-linked depots and grinding stations in Band 1	[✂]	[✂]	[✂]	[✂]
RAILDEPBAND2	No of rivals' rail-linked depots and grinding stations in Band 2	[✂]	[✂]	[✂]	[✂]
RAILDEPBAND3	No of rivals' rail-linked depots and grinding stations in Band 3	[✂]	[✂]	[✂]	[✂]
IMPORTTERMBAND1	No of rivals' import terminals in Band 1	[✂]	[✂]	[✂]	[✂]
IMPORTTERMBAND2	No of rivals' import terminals in Band 2	[✂]	[✂]	[✂]	[✂]
IMPORTTERMBAND3	No of rivals' import terminals in Band 3	[✂]	[✂]	[✂]	[✂]
TARMACWKBAND1	No of Tarmac works in Band 1	[✂]	[✂]	[✂]	[✂]
TARMACWKBAND2	No of Tarmac works in Band 2	[✂]	[✂]	[✂]	[✂]
TARMACWKBAND3	No of Tarmac works in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORWKBAND1	No of works of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORWKBAND2	No of works of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORWKBAND3	No of works of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Lafarge IT or works	Dummy for Lafarge import terminal or works in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of Bulk-CEM I. No of observations = 3,810. Band 1 = 0–50 miles; Band 2 = 50–100 miles; Band 3 = 100–150 miles. The third customer type is concrete products, the omitted category in the regression.

TABLE 2*(a)* **Price-concentration regressions, Lafarge-Cement (coefficients on controls)**

	Model 1 *OLS (Fixed effects)*		*Model 2* *OLS (Fixed effects), excluding largest customers*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
DIST	–0.081***	(0.011)	–0.066***	(0.016)
DIST squared/1,000	0.19***	(0.065)	0.11	(0.08)
Dummy for DELIVERED	2.86***	(0.74)	4.42***	(1.03)
Dummy for RMX	1.06**	(0.51)	1.19*	(0.64)
Dummy for 'Other' type	2.38***	(0.81)	2.57***	(0.89)
Log(POPN)	–1.88***	(0.56)	–2.43***	(0.86)
UNEMP	0.13	(0.33)	0.87**	(0.43)
MEDWAGE	0.33	(0.42)	0.13	(0.65)
2nd size quintile, 2007	0.26	(2.05)	0.48	(2.03)
3rd size quintile, 2007	–1.02	(2.14)	–0.59	(2.13)
4th size quintile, 2007	–4.90***	(1.81)	–4.69***	(1.77)
5th size quintile, 2007	–9.22***	(1.84)	–8.97***	(1.88)
2nd size quintile, 2008	–2.99	(2.08)	–2.68	(2.09)
3rd size quintile, 2008	–3.01*	(1.81)	–3.17*	(1.73)
4th size quintile, 2008	–6.01***	(1.54)	–5.86***	(1.48)
5th size quintile, 2008	–10.64***	(1.52)	–10.74***	(1.51)
2nd size quintile, 2009	5.15***	(1.51)	4.55***	(1.57)
3rd size quintile, 2009	2.24	(1.41)	2.33*	(1.39)
4th size quintile, 2009	2.65*	(1.38)	2.27*	(1.35)
5th size quintile, 2009	–3.50**	(1.35)	–3.68***	(1.35)
2nd size quintile, 2010	4.19	(2.54)	3.57	(2.49)
3rd size quintile, 2010	2.38	(2.05)	2.13	(2.19)
4th size quintile, 2010	–0.68	(1.77)	–0.99	(1.90)
5th size quintile, 2010	–6.78***	(1.61)	–7.66***	(1.81)
No of observations	3,810		2,172	
R^2	0.67		0.58	

Source: CC analysis.

Note: See Table 2*(b)* for notes and for coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 2*(b)* **Price-concentration regressions, Lafarge-Cement (coefficients on competition measures)**

	Model 1 OLS (Fixed effects)		*Model 2 OLS (Fixed effects), excluding largest customers*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
RAILDEPBAND1	0.38	(0.72)	1.05	(1.07)
RAILDEPBAND1*(Dummy for nearby Lafarge IT or works)	0.27	(0.47)	0.00	(0.71)
RAILDEPBAND2	–0.04	(0.42)	0.27	(0.59)
RAILDEPBAND3	–0.09	(0.33)	0.19	(0.47)
IMPORTTERMBAND1	–0.53	(0.40)	–0.91	(0.70)
IMPORTTERMBAND1*(Dummy for nearby Lafarge IT or works)	–0.07	(0.21)	–0.13	0.37
IMPORTTERMBAND2	–0.46*	(0.25)	–0.86**	0.39
IMPORTTERMBAND3	–0.23	(0.19)	–0.38	(0.30)
TARMACWKBAND1	–2.50	(2.81)	–5.13*	(3.04)
TARMACWKBAND1*(Dummy for nearby Lafarge IT or works)	2.23	(2.41)	3.37	(2.43)
TARMACWKBAND2	–1.15	(1.28)	–1.08	(1.97)
TARMACWKBAND3	–0.56	(0.65)	–0.98	(0.88)
OTHMAJORWKBAND1	0.47	(0.70)	0.46	(0.97)
OTHMAJORWKBAND1*(Dummy for nearby Lafarge IT or works)	–0.08	(0.60)	0.96	(0.81)
OTHMAJORWKBAND2	0.57	(0.42)	1.08*	(0.65)
OTHMAJORWKBAND3	–0.04	(0.32)	0.25	(0.48)
No of observations	3,810		2,172	
R^2	0.67		0.58	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Excluded customer-type category is Concrete Products. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Model (2) excludes the five largest customers, retains time-constant dummies for four other large customers. See Table 2*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 3 **Summary statistics for price-concentration regressions (selected variables), Tarmac-Cement**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Bulk-CEM I net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for DELIVERED	Delivered/collected	[✂]	[✂]	[✂]	[✂]
Dummy for RMX	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for 'Other' type	Customer type	[✂]	[✂]	[✂]	[✂]
POPN	Population within 50 miles of job site (m)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 50 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 50 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
RAILDEPBAND1	No of rivals' rail-linked depots and grinding stations in Band 1	[✂]	[✂]	[✂]	[✂]
RAILDEPBAND2	No of rivals' rail-linked depots and grinding stations in Band 2	[✂]	[✂]	[✂]	[✂]
RAILDEPBAND3	No of rivals' rail-linked depots and grinding stations in Band 3	[✂]	[✂]	[✂]	[✂]
IMPORTTERMBAND1	No of rivals' import terminals in Band 1	[✂]	[✂]	[✂]	[✂]
IMPORTTERMBAND2	No of rivals' import terminals in Band 2	[✂]	[✂]	[✂]	[✂]
IMPORTTERMBAND3	No of rivals' import terminals in Band 3	[✂]	[✂]	[✂]	[✂]
LAFARGEWKBAND1	No of Lafarge works in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEWKBAND2	No of Lafarge works in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEWKBAND3	No of Lafarge works in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORWKBAND1	No of works of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORWKBAND2	No of works of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORWKBAND3	No of works of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac works	Dummy for Tarmac works in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of Bulk-CEM I. No of observations = 661. Band 1 = 0–50 miles; Band 2 = 50–100 miles; Band 3 = 100–150 miles. The third customer type is Concrete Products, the omitted category in the regression.

TABLE 4*(a)* **Price-concentration regressions, Tarmac-Cement (coefficients on controls)**

	Model 1 OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
DIST	–0.069***	(0.026)
DIST squared/1,000	0.061	(0.17)
Dummy for DELIVERED	2.99*	(1.68)
Dummy for RMX	2.03**	(0.99)
Dummy for 'Other' type	–0.86	(0.83)
Log(POPN)	3.53**	(1.58)
UNEMP	0.51	(1.20)
MEDWAGE	–0.47	(1.28)
2nd size quintile, 2007	–0.54	(1.52)
3rd size quintile, 2007	0.72	(1.20)
4th size quintile, 2007	–0.83	(1.12)
5th size quintile, 2007	–5.62***	(0.95)
2nd size quintile, 2008	–1.12	(1.21)
3rd size quintile, 2008	0.63	(1.14)
4th size quintile, 2008	0.48	(1.15)
5th size quintile, 2008	–5.10***	(1.30)
2nd size quintile, 2009	1.43	(2.66)
3rd size quintile, 2009	4.48	(3.05)
4th size quintile, 2009	–0.18	(2.30)
5th size quintile, 2009	–0.23	(2.60)
2nd size quintile, 2010	–3.20	(2.02)
3rd size quintile, 2010	–2.38	(1.85)
4th size quintile, 2010	–3.67**	(1.60)
5th size quintile, 2010	–5.68***	(1.72)
No of observations	661	
R^2	0.62	

Source: CC analysis.

Note: See Table 4*(b)* for notes and for coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 4*(b)* **Price-concentration regressions, Tarmac-Cement (coefficients on competition measures)**

	Model 1 OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
RAILDEPBAND1	–1.11	(1.04)
RAILDEPBAND1*(Dummy for nearby Tarmac works)	0.58	(0.96)
RAILDEPBAND2	0.02	(0.51)
RAILDEPBAND3	–0.22	(0.36)
IMPORTTERMBAND1	–0.04	(0.57)
IMPORTTERMBAND1*(Dummy for nearby Tarmac works)	–0.29	(0.50)
IMPORTTERMBAND2	–0.12	(0.38)
IMPORTTERMBAND3	0.12	(0.19)
LAFARGEWKBAND1	–0.24	(1.10)
LAFARGEWKBAND1*(Dummy for nearby Tarmac works)	–0.50	(1.26)
LAFARGEWKBAND2	–1.34*	(0.72)
LAFARGEWKBAND3	0.67*	(0.39)
OTHMAJORWKBAND1	–0.24	(1.06)
OTHMAJORWKBAND1*(Dummy for nearby Tarmac works)	–0.67	(1.02)
OTHMAJORWKBAND2	–0.79	(0.63)
OTHMAJORWKBAND3	–1.04	(0.70)
No of observations	661	
R^2	0.62	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Excluded customer-type category is Concrete Products. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, time-constant dummies for two large customers. See Table 4*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 5 **Summary statistics for price-concentration regressions (selected variables), Lafarge-RMX**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for RMX net of haulage costs (£/cubic metre)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for DELIVERED	Delivered/collected	[✂]	[✂]	[✂]	[✂]
Dummy for ‘Other’ type	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for ‘Cash Sales’	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for ‘Construction’	Customer type	[✂]	[✂]	[✂]	[✂]
POPN	Population within 4 miles of job site (’000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 4 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 4 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND1	No of Tarmac plants in Band 1	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND2	No of Tarmac plants in Band 2	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND3	No of Tarmac plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Lafarge plant	Dummy for Lafarge plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of generic RMX. No of observations = 58,552. Band 1 = 0–4 miles; Band 2 = 4–8 miles; Band 3 = 8–12 miles.

TABLE 6*(a)* **Price-concentration regressions, Lafarge-RMX (coefficients on controls)**

	Model 1 *OLS (Fixed effects)*	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
DIST	–0.429***	(0.027)
DIST squared/1000	7.415***	(1.381)
Dummy for DELIVERED	–11.420***	(0.326)
Dummy for 'Other' type	1.531***	(0.247)
Dummy for 'Cash Sales'	6.859***	(0.255)
Dummy for 'Construction'	0.261	(0.237)
Log(POPN)	–0.823***	(0.172)
UNEMP	0.133**	(0.057)
MEDWAGE	0.041	(0.062)
2nd size quintile, 2007	0.754***	(0.218)
3rd size quintile, 2007	0.603***	(0.204)
4th size quintile, 2007	0.257	(0.195)
5th size quintile, 2007	–0.328*	(0.187)
2nd size quintile, 2008	–0.198	(0.260)
3rd size quintile, 2008	–0.048	(0.257)
4th size quintile, 2008	–0.465**	(0.237)
5th size quintile, 2008	–1.574***	(0.222)
2nd size quintile, 2009	–0.509	(0.387)
3rd size quintile, 2009	–0.741**	(0.358)
4th size quintile, 2009	–0.958***	(0.343)
5th size quintile, 2009	–1.672***	(0.323)
2nd size quintile, 2010	0.481	(0.315)
3rd size quintile, 2010	–0.011	(0.295)
4th size quintile, 2010	–0.158	(0.284)
5th size quintile, 2010	–1.071***	(0.271)
No of observations	58,552	
R^2	0.5029	

Source: CC analysis.

Note: See Table 6*(b)* for notes and for coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 6*(b)* **Price-concentration regressions, Lafarge-RMX (coefficients on competition measures)**

	OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
TARMACPLBAND1	0.084	(0.113)
TARMACPLBAND1*(Dummy for nearby Lafarge plant)	–0.220	(0.141)
TARMACPLBAND2	0.087	(0.078)
TARMACPLBAND3	–0.028	(0.058)
OTHMAJORPLBAND1	0.146**	(0.065)
OTHMAJORPLBAND1*(Dummy for nearby Lafarge plant)	–0.272***	(0.073)
OTHMAJORPLBAND2	0.045	(0.038)
OTHMAJORPLBAND3	0.073**	(0.029)
INDEPENDENTBAND1	0.254**	(0.113)
INDEPENDENTBAND1*(Dummy for nearby Lafarge plant)	–0.138	(0.125)
INDEPENDENTBAND2	–0.018	(0.051)
INDEPENDENTBAND3	0.097**	(0.041)
No of observations	58,552	
R^2	0.5029	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded customer-type category is Aggregates. See Table 6*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 7 **Summary statistics for price-concentration regressions (selected variables), Tarmac-RMX**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for RMX net of haulage costs (£/cubic metre)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for DELIVERED	Delivered/collected	[✂]	[✂]	[✂]	[✂]
Dummy for CONSUMABLE	Sale type	[✂]	[✂]	[✂]	[✂]
Dummy for FINISHED PRODUCT	Sale type	[✂]	[✂]	[✂]	[✂]
Dummy for 'RESALE'	Sale type	[✂]	[✂]	[✂]	[✂]
Dummy for 'RAW MATS. AGGREGATES'	Sale type	[✂]	[✂]	[✂]	[✂]
Dummy for 'RAW MATS. OTHER'	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 4 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 4 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 4 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of RMX. No of observations = 104,001. Band 1 = 0–4 miles; Band 2 = 4–8 miles; Band 3 = 8–12 miles.

TABLE 8*(a)* **Price-concentration regressions, Tarmac-RMX (coefficients on controls)**

	OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
DIST	–0.702***	(0.019)
DIST squared/1,000	13.883***	(1.064)
Dummy for DELIVERED	–9.992***	(0.190)
Dummy for CONSUMABLE	–4.225	(14484)
Dummy for FINISHED PRODUCT	–1.912	(4517)
Dummy for 'RESALE'	0.501	(8722)
Dummy for 'RAW MATS. AGGREGATES'	–0.787	(4939)
Dummy for 'RAW MATS. OTHER'	0.651	(16922)
Log(POPN)	–0.340***	(0.106)
UNEMP	–0.011	(0.040)
MEDWAGE	0.041	(0.036)
2^{nd} size quintile, 2007	0.723***	(0.202)
3^{rd} size quintile, 2007	0.382*	(0.197)
4^{th} size quintile, 2007	0.014	(0.189)
5^{th} size quintile, 2007	–1.542***	(0.183)
2^{nd} size quintile, 2008	0.827***	(0.241)
3^{rd} size quintile, 2008	0.544**	(0.229)
4^{th} size quintile, 2008	–0.415*	(0.218)
5^{th} size quintile, 2008	–1.813***	(0.214)
2^{nd} size quintile, 2009	0.096	(0.305)
3^{rd} size quintile, 2009	0.018	(0.286)
4^{th} size quintile, 2009	–0.041	(0.281)
5^{th} size quintile, 2009	–1.507***	(0.267)
2^{nd} size quintile, 2010	0.330	(0.300)
3^{rd} size quintile, 2010	0.128	(0.279)
4^{th} size quintile, 2010	–0.681**	(0.267)
5^{th} size quintile, 2010	–2.692***	(0.261)
No of observations	104,001	
R^2	0.5579	

Source: CC analysis.

Note: See Table 8*(b)* for notes and coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 8*(b)* **Price-concentration regressions, Tarmac-RMX (coefficients on competition measures)**

	OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
LAFARGEPLBAND1	–0.089	(0.128)
LAFARGEPLBAND1*(Dummy for nearby Tarmac plant)	–0.198	(0.136)
LAFARGEPLBAND2	–0.111*	(0.059)
LAFARGEPLBAND3	–0.062	(0.045)
OTHMAJORPLBAND1	0.060	(0.046)
OTHMAJORPLBAND1*(Dummy for nearby Tarmac plant)	–0.053	(0.047)
OTHMAJORPLBAND2	0.076***	(0.028)
OTHMAJORPLBAND3	0.059***	(0.020)
INDEPENDENTBAND1	–0.238***	(0.082)
INDEPENDENTBAND1*(Dummy for nearby Tarmac plant)	0.233***	(0.092)
INDEPENDENTBAND2	–0.035	(0.038)
INDEPENDENTBAND3	0.052	(0.029)
No of observations	104,001	
R^2	0.5579	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded sale-type category is Concrete Purchases. See Table 8*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 9 **Summary statistics for price-concentration regressions (selected variables), Lafarge-Asphalt-Binder Course**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Binder Course net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
POPN	Population within 11.25 miles of job site (million)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
JVTARMAC	Dummy for shipments to Tarmac from Lafarge-Tarmac Asphalt JVs	[✂]	[✂]	[✂]	[✂]
TARMACBAND1	No of Tarmac plants in Band 1	[✂]	[✂]	[✂]	[✂]
TARMACBAND2	No of Tarmac plants in Band 2	[✂]	[✂]	[✂]	[✂]
TARMACBAND3	No of Tarmac plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORBAND1	No of other-major plants in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORBAND2	No of other-major plants in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORBAND3	No of other-major plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHERSBAND1	No of plants of others in Band 1	[✂]	[✂]	[✂]	[✂]
OTHERSBAND2	No of plants of others in Band 2	[✂]	[✂]	[✂]	[✂]
OTHERSBAND3	No of plants of others in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Lafarge plant	Dummy for Lafarge plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of Binder Course. No of observations = 7,824. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 10 **Summary statistics for price-concentration regressions (selected variables), Lafarge-Asphalt-Wearing Course**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Wearing Course net of haulage costs (£/tonne)	47.4	6.8	36.9	83.6
DIST	Distance to job site (miles)	13.5	9.5	0	58.3
POPN	Population within 11.25 miles of job site (million)	0.76	0.55	0.11	3.5
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	6.6	1.7	2.9	10.7
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	11.6	1.2	8.6	15.2
JVTARMAC	Dummy for shipments to Tarmac from Lafarge-Tarmac Asphalt JVs	0.0003	0.0172	0	1
TARMACBAND1	No of Tarmac plants in Band 1	0.52	0.77	0	3
TARMACBAND2	No of Tarmac plants in Band 2	1.51	1.29	0	8
TARMACBAND3	No of Tarmac plants in Band 3	2.84	1.89	0	10
OTHMAJORBAND1	No of other-major plants in Band 1	1.48	1.26	0	7
OTHMAJORBAND2	No of other-major plants in Band 2	3.52	2.10	0	12
OTHMAJORBAND3	No of other-major plants in Band 3	5.34	2.84	0	14
OTHERSBAND1	No of plants of others in Band 1	0.47	0.92	0	6
OTHERSBAND2	No of plants of others in Band 2	1.33	1.67	0	12
OTHERSBAND3	No of plants of others in Band 3	2.03	1.89	0	10
Dummy for nearby Lafarge plant	Dummy for Lafarge plant in Band 1	0.61	0.49	0	1

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, delivered orders only. No of observations = 6,776. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 11*(a)* **Price-concentration regressions, Lafarge-Asphalt (coefficients on controls)**

	Model 1 Binder Course OLS (Fixed effects)		*Model 2 Wearing Course OLS (Fixed effects)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
DIST	–0.15***	(0.02)	–0.16***	(0.03)
DIST squared/1,000	2.03***	(0.58)	3.30***	(0.85)
Dummy for building contractors	0.18	(0.30)	–0.49	(0.55)
Dummy for cable/utility contractors	–0.10	(0.40)	2.19**	(0.92)
Dummy for civil eng contractors	–0.51**	(0.23)	–0.78	(0.54)
Dummy for groundworker	0.27	(0.33)	–1.00*	(0.55)
Dummy for local authorities	0.42	(0.62)	2.52***	(0.85)
Dummy for surfacing private sector	–1.61***	(0.28)	–2.33***	(0.55)
Dummy for other type	3.06***	(0.45)	4.01***	(0.56)
Log(POPN)	–0.27*	(0.15)	–0.03	(0.28)
UNEMP	–0.03	(0.07)	–0.06	(0.11)
MEDWAGE	0.003	(0.085)	–0.04	(0.17)
2nd size quintile, 2007	–0.25	(0.72)	1.06	(1.39)
3rd size quintile, 2007	0.56	(0.68)	0.49	(1.35)
4th size quintile, 2007	–1.28*	(0.69)	–0.27	(1.37)
5th size quintile, 2007	–1.72**	(0.66)	–0.80	(1.29)
2nd size quintile, 2008	0.79	(0.72)	0.26	(1.13)
3rd size quintile, 2008	0.90	(0.63)	1.65	(1.18)
4th size quintile, 2008	0.33	(0.55)	2.07*	(1.01)
5th size quintile, 2008	–1.45***	(0.52)	–0.07	(1.09)
2nd size quintile, 2009	0.99	(0.70)	1.35	(1.14)
3rd size quintile, 2009	1.35	(0.82)	–0.32	(1.03)
4th size quintile, 2009	1.21	(0.76)	1.10	(0.96)
5th size quintile, 2009	0.62	(0.73)	0.24	(0.87)
2nd size quintile, 2010	0.26	(0.50)	2.31	(1.52)
3rd size quintile, 2010	1.26**	(0.51)	3.00**	(1.42)
4th size quintile, 2010	1.20**	(0.47)	4.06***	(1.53)
5th size quintile, 2010	1.24**	(0.50)	2.44	(1.54)
No of observations	7,824		6,776	
R^2	0.46		0.42	

Source: CC analysis.

Note: See Table 11*(b)* for notes and for coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 11*(b)* **Price-concentration regressions, Lafarge-Asphalt (coefficients on competition measures)**

	Model 1 Binder Course OLS (Fixed effects)		*Model 2 Wearing Course OLS (Fixed effects)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
JVTARMAC	2.26*	(1.14)	–4.03	(6.06)
TARMACBAND1	–0.15	(0.12)	–0.22	(0.19)
TARMACBAND1*(Dummy for nearby Lafarge plant)	0.10	(0.15)	0.04	(0.28)
TARMACBAND2	–0.11*	(0.06)	–0.27***	(0.10)
TARMACBAND3	–0.13***	(0.04)	–0.16**	(0.07)
OTHMAJORBAND1	0.12	(0.13)	0.06	(0.17)
OTHMAJORBAND1*(Dummy for nearby Lafarge plant)	–0.07	(0.09)	0.00	(0.14)
OTHMAJORBAND2	0.06	(0.06)	0.08	(0.10)
OTHMAJORBAND3	0.01	(0.03)	0.05	(0.04)
OTHERSBAND1	–0.03	(0.09)	–0.12	(0.16)
OTHERSBAND1*(Dummy for nearby Lafarge plant)	0.01	(0.09)	0.16	(0.14)
OTHERSBAND2	–0.09	(0.06)	0.00	(0.10)
OTHERSBAND3	–0.06	(0.05)	–0.03	(0.06)
No of observations	7,824		6,776	
R^2	0.46		0.42	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Excluded customer-type category is Builders Merchants. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for five largest customers, time-constant dummies for five other large customers. See Table 11*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 12 **Summary statistics for price-concentration regressions (selected variables), Tarmac-Asphalt-Binder Course**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Binder Course net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for RESALE or RAW MATS AGGS	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of asphalt. No of observations = 46,040. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 13 **Summary statistics for price-concentration regressions (selected variables), Tarmac-Asphalt-Hardstone &Slag**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for SC Hardstone & Slag net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for RESALE or RAW MATS AGGS	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of asphalt. No of observations = 20,967. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 14*(a)* **Price-concentration regressions, Tarmac-Asphalt (delivered) (coefficients on controls)**

	Binder Course OLS (Fixed effects)		*SC Hardstone & Slag OLS (Fixed effects)*	
Dependent variable	WORKSPRICE			
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
DIST	–0.183***	(0.008)	–0.136***	(0.013)
DIST squared/1,000	1.972***	(0.162)	1.404***	(0.295)
Dummy for RESALE or RAW MATS AGGS	–0.086	(0.551)	5.109*	(2.896)
Log(POPN)	–0.340***	(0.101)	–0.771***	(0.171)
UNEMP	0.075**	(0.039)	0.030	(0.065)
MEDWAGE	0.230***	(0.037)	0.366***	(0.066)
2nd size quintile, 2007	0.963**	(0.440)	1.942**	(0.875)
3rd size quintile, 2007	1.073**	(0.419)	0.815	(0.813)
4th size quintile, 2007	0.443	(0.409)	1.056	(0.780)
5th size quintile, 2007	–1.670***	(0.399)	–1.254*	(0.763)
2nd size quintile, 2008	0.234	(0.419)	1.555*	(0.920)
3rd size quintile, 2008	0.027	(0.394)	1.237	(0.866)
4th size quintile, 2008	–0.277	(0.377)	1.466*	(0.831)
5th size quintile, 2008	–2.855***	(0.359)	–0.834	(0.815)
2nd size quintile, 2009	1.151**	(0.527)	0.937	(1.350)
3rd size quintile, 2009	0.817	(0.519)	1.966	(1.254)
4th size quintile, 2009	0.229	(0.480)	2.400**	(1.227)
5th size quintile, 2009	–1.759***	(0.460)	–0.014	(1.206)
2nd size quintile, 2010	1.570**	(0.650)	2.414**	(1.187)
3rd size quintile, 2010	1.564***	(0.604)	3.003***	(1.140)
4th size quintile, 2010	0.628	(0.573)	2.932***	(1.123)
5th size quintile, 2010	–1.225**	(0.561)	0.246	(1.086)
No of observations	46,040		20,967	
R^2	0.4241		0.3440	

Source: CC analysis.

Note: See Table 14*(b)* for notes and coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 14*(b)* **Price-concentration regressions, Tarmac-Asphalt (delivered) (coefficients on competition measures)**

	Model 1 Binder Course OLS (Fixed effects)		*Model 2 SC Hardstone & Slag OLS (Fixed effects)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
LAFARGEPLBAND1	–0.010	(0.117)	–0.002	0.183
LAFARGEPLBAND1*(Dummy for nearby Tarmac plant)	0.015	(0.133)	–0.072	(0.214)
LAFARGEPLBAND2	0.050	(0.058)	–0.140	(0.090)
LAFARGEPLBAND3	0.018	(0.046)	–0.109	(0.067)
OTHMAJORPLBAND1	–0.111**	(0.046)	0.200**	(0.085)
OTHMAJORPLBAND1*(Dummy for nearby Tarmac plant)	0.025	(0.043)	–0.069	(0.080)
OTHMAJORPLBAND2	–0.043**	(0.022)	0.033	(0.037)
OTHMAJORPLBAND3	–0.018	(0.014)	0.039	(0.026)
INDEPENDENTBAND1	–0.261***	(0.049)	–0.341***	(0.076)
INDEPENDENTBAND1*(Dummy for nearby Tarmac plant)	0.046	(0.065)	0.145	(0.102)
INDEPENDENTBAND2	–0.022	(0.025)	0.056	(0.044)
INDEPENDENTBAND3	–0.011	(0.018)	–0.001	(0.034)
No of observations	46,040		20,967	
R^2	0.4241		0.3440	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded sale-type category is Finished Products. See Table 14*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 15 **Summary statistics for price-concentration regressions (selected variables), Lafarge-CR-H3 Sub-base**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for H3 Sub-base net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for CASHSALES	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for CONSTRUCTION	Customer type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND1	No of Tarmac plants in Band 1	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND2	No of Tarmac plants in Band 2	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND3	No of Tarmac plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Lafarge plant	Dummy for Lafarge plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 4,856. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 16*(a)* **Price-concentration regressions, Lafarge-CR-H3 Sub-base (coefficients on controls)**

	OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
DIST	–0.050***	(0.008)
DIST squared/1,000	0.059	(0.240)
Dummy for 'OTHER' type	0.233***	(0.065)
Dummy for CASHSALES	2.418***	(0.172)
Dummy for CONSTRUCTION	0.070	(0.065)
Log(POPN)	–0.433***	(0.147)
UNEMP	–0.005	(0.050)
MEDWAGE	0.268***	(0.078)
2nd size quintile, 2007	0.390***	(0.133)
3rd size quintile, 2007	0.128	(0.134)
4th size quintile, 2007	0.168	(0.132)
5th size quintile, 2007	–0.171	(0.126)
2nd size quintile, 2008	–0.024	(0.197)
3rd size quintile, 2008	0.139	(0.167)
4th size quintile, 2008	0.041	(0.160)
5th size quintile, 2008	–0.125	(0.153)
2nd size quintile, 2009	0.336	(0.210)
3rd size quintile, 2009	0.320	(0.215)
4th size quintile, 2009	0.112	(0.199)
5th size quintile, 2009	–0.110	(0.179)
2nd size quintile, 2010	–0.643**	(0.304)
3rd size quintile, 2010	–0.407	(0.303)
4th size quintile, 2010	–0.897***	(0.283)
5th size quintile, 2010	–1.426***	(0.279)
No of observations	4,856	
R^2	0.7453	

Source: CC analysis.

Note: See Table 16*(b)* for notes and coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 16*(b)* **Price-concentration regressions, Lafarge-CR-H3 Sub-base (coefficients on competition measures)**

	Model 1 OLS (Fixed effects)	
Dependent variable	WORKSPRICE	
	Coeff	*se*
Explanatory variables		
TARMACPLBAND1	0.099	(0.062)
TARMACPLBAND1*(Dummy for nearby Lafarge plant)	–0.059	(0.060)
TARMACPLBAND2	0.014	(0.031)
TARMACPLBAND3	0.014	(0.019)
OTHMAJORPLBAND1	–0.643***	(0.173)
OTHMAJORPLBAND1*(Dummy for nearby Lafarge plant)	–0.016	(0.137)
OTHMAJORPLBAND2	–0.243**	(0.109)
OTHMAJORPLBAND3	–0.078	(0.061)
INDEPENDENTBAND1	–0.016	(0.043)
INDEPENDENTBAND1*(Dummy for nearby Lafarge plant)	0.150**	(0.062)
INDEPENDENTBAND2	–0.019	(0.018)
INDEPENDENTBAND3	–0.042***	(0.014)
No of observations	4,856	
R^2	0.7453	

Source: CC analysis.

Note: Standard errors clustered by 25km X 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded customer-type category is Aggregates. See Table 16*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 17 **Summary statistics for price-concentration regressions (selected variables), Lafarge-SG-Sharp Sand**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Sharp Sand net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for CASHSALES	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for CONSTRUCTION	Customer type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND1	No of Tarmac plants in Band 1	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND2	No of Tarmac plants in Band 2	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND3	No of Tarmac plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Lafarge plant	Dummy for Lafarge plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 4,432. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 18 **Summary statistics for price-concentration regressions (selected variables), Lafarge-SG-Clean 6˜50mm**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Clean 6–50mm net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for CASHSALES	Customer type	[✂]	[✂]	[✂]	[✂]
Dummy for CONSTRUCTION	Customer type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (decimal fraction)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND1	No of Tarmac plants in Band 1	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND2	No of Tarmac plants in Band 2	[✂]	[✂]	[✂]	[✂]
TARMACPLBAND3	No of Tarmac plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Lafarge plant	Dummy for Lafarge plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Lafarge transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 5,839. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 19*(a)* **Price-concentration regressions, Lafarge-SG (coefficients on controls)**

	Sharp Sand OLS (Fixed effects)		*Clean 6–50mm OLS (Fixed effect)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
DIST	–0.088***	(0.013)	–0.110***	(0.010)
DIST squared/1,000	1.456***	(0.285)	2.144***	(0.270)
Dummy for 'OTHER' type	0.916***	(0.123)	0.256***	(0.100)
Dummy for CASHSALES	2.905***	(0.281)	3.143***	(0.141)
Dummy for CONSTRUCTION	0.677***	(0.084)	–0.052	(0.074)
Log(POPN)	0.084	(0.142)	0.226*	(0.127)
UNEMP	0.044	(0.065)	–0.029	(0.048)
MEDWAGE	0.096*	(0.052)	0.054	(0.062)
2nd size quintile, 2007	0.088	(0.339)	–0.086	(0.177)
3rd size quintile, 2007	–0.437	(0.317)	–0.184	(0.186)
4th size quintile, 2007	–0.311	(0.313)	–0.247	(0.169)
5th size quintile, 2007	–0.624**	(0.306)	–0.515***	(0.154)
2nd size quintile, 2008	–0.104	(0.296)	0.538**	(0.264)
3rd size quintile, 2008	–0.022	(0.289)	0.125	(0.238)
4th size quintile, 2008	–0.311	(0.255)	–0.045	(0.221)
5th size quintile, 2008	–0.695***	(0.247)	–0.424**	(0.215)
2nd size quintile, 2009	–0.361	(0.539)	0.363	(0.303)
3rd size quintile, 2009	–0.139	(0.496)	0.618**	(0.292)
4th size quintile, 2009	–0.482	(0.500)	0.232	(0.267)
5th size quintile, 2009	–0.759	(0.484)	–0.407	(0.256)
2nd size quintile, 2010	0.412	(0.438)	0.403	(0.389)
3rd size quintile, 2010	0.453	(0.395)	–0.065	(0.349)
4th size quintile, 2010	0.009	(0.381)	–0.748**	(0.334)
5th size quintile, 2010	–0.383	(0.371)	–1.382***	(0.323)
No of observations	4,432		5,839	
R^2	0.3592		0.4453	

Source: CC analysis.

Note: See Table 19*(b)* for notes and coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 19*(b)* **Price-concentration regressions, Lafarge-SG (coefficients on competition measures)**

	Sharp Sand OLS (Fixed effects)		*Clean 6–50mm OLS (Fixed effect)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
TARMACPLBAND1	0.008	(0.080)	0.009	(0.076)
TARMACPLBAND1*(Dummy for nearby Lafarge plant)	–0.015	(0.078)	–0.045	(0.079)
TARMACPLBAND2	–0.023	(0.030)	–0.033	(0.025)
TARMACPLBAND3	–0.049**	(0.022)	–0.049***	(0.018)
OTHMAJORPLBAND1	–0.059	(0.059)	–0.160***	(0.074)
OTHMAJORPLBAND1*(Dummy for nearby Lafarge plant)	–0.003	(0.059)	0.050	(0.074)
OTHMAJORPLBAND2	–0.019	(0.022)	–0.031	(0.022)
OTHMAJORPLBAND3	–0.015	(0.018)	0.001	(0.015)
INDEPENDENTBAND1	0.013	(0.044)	0.071*	(0.041)
INDEPENDENTBAND1*(Dummy for nearby Lafarge plant)	–0.050	(0.043)	–0.061	(0.043)
INDEPENDENTBAND2	0.015	(0.019)	0.017	(0.017)
INDEPENDENTBAND3	0.017	(0.014)	0.004	(0.011)
No of observations	4,432		5,839	
R^2	0.3592		0.4453	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded customer-type category is Aggregates. See Table 19*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 20 **Summary statistics for price-concentration regressions (selected variables), Tarmac-CR-Roadstone**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Roadstone net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 43,957. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 21 **Summary statistics for price-concentration regressions (selected variables), Tarmac-CR-Graded40mm**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Graded 40mm net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 20,125. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 22*(a)* **Price-concentration regressions, Tarmac-CR (coefficients on controls)**

	Roadstone OLS (Fixed effects)		Graded 40mm OLS (Fixed effect)	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
DIST	–0.122***	(0.003)	–0.129***	(0.007)
DIST squared/1,000	1.686***	(0.066)	2.110***	(0.147)
Dummy for 'OTHER' type	0.083	(0.164)	0.167*	(0.090)
Log(POPN)	–0.137***	(0.027)	–0.129**	(0.065)
UNEMP	0.010	(0.012)	0.126***	(0.031)
MEDWAGE	0.003	(0.010)	–0.072***	(0.026)
2nd size quintile, 2007	0.015	(0.055)	0.056	(0.150)
3rd size quintile, 2007	–0.014	(0.053)	0.044	(0.135)
4th size quintile, 2007	–0.195***	(0.050)	–0.295**	(0.131)
5th size quintile, 2007	–0.563***	(0.048)	–0.840***	(0.124)
2nd size quintile, 2008	–0.025	(0.065)	–0.120	(0.205)
3rd size quintile, 2008	–0.149**	(0.060)	–0.198	(0.193)
4th size quintile, 2008	–0.426***	(0.055)	–0.523***	(0.186)
5th size quintile, 2008	–0.746***	(0.053)	–1.246***	(0.181)
2nd size quintile, 2009	–0.003	(0.087)	0.220	(0.254)
3rd size quintile, 2009	–0.172**	(0.082)	0.052	(0.238)
4th size quintile, 2009	–0.311***	(0.078)	–0.433*	(0.230)
5th size quintile, 2009	–0.536***	(0.075)	–1.024***	(0.222)
2nd size quintile, 2010	0.142*	(0.077)	0.385*	(0.232)
3rd size quintile, 2010	0.007	(0.070)	–0.075	(0.211)
4th size quintile, 2010	–0.262***	(0.068)	–0.563***	(0.196)
5th size quintile, 2010	–0.510***	(0.066)	–0.930***	(0.191)
No of observations	43,957		20,125	
R^2	0.5532		0.4622	

Source: CC analysis.

Note: See Table 22*(b)* for notes and coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 22*(b)* **Price-concentration regressions, Tarmac-CR (coefficients on competition measures)**

	Roadstone OLS (Fixed effects)		Graded 40mm OLS (Fixed effect)	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
LAFARGEPLBAND1	–0.127***	(0.026)	–0.138*	(0.074)
LAFARGEPLBAND1*(Dummy for nearby Tarmac plant)	–0.073***	(0.024)	–0.070	(0.066)
LAFARGEPLBAND2	–0.100***	(0.011)	–0.095***	(0.034)
LAFARGEPLBAND3	0.001	(0.008)	0.043*	(0.023)
OTHMAJORPLBAND1	–0.013	(0.015)	–0.091***	(0.035)
OTHMAJORPLBAND1*(Dummy for nearby Tarmac plant)	–0.042***	(0.015)	0.029	(0.037)
OTHMAJORPLBAND2	–0.024***	(0.007)	–0.054***	(0.014)
OTHMAJORPLBAND3	0.002	(0.005)	–0.022**	(0.011)
INDEPENDENTBAND1	–0.016	(0.010)	0.036	(0.027)
INDEPENDENTBAND1*(Dummy for nearby Tarmac plant)	0.018*	(0.009)	–0.050*	(0.026)
INDEPENDENTBAND2	0.003	(0.004)	0.031***	(0.010)
INDEPENDENTBAND3	0.016***	(0.003)	0.035***	(0.008)
No of observations	43,957		20,125	
R^2	0.5532		0.4622	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded sale-type category is Finished Products. See Table 22*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 23 **Summary statistics for price-concentration regressions (selected variables), Tarmac-SG-Gravel**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Gravel net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 13,769. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 24 **Summary statistics for price-concentration regressions (selected variables), Tarmac-SG-Concrete Sand**

Variable	*Description*	*Mean*	*Std dev*	*Min*	*Max*
WORKSPRICE	Annual average price for Concrete Sand net of haulage costs (£/tonne)	[✂]	[✂]	[✂]	[✂]
DIST	Distance to job site (miles)	[✂]	[✂]	[✂]	[✂]
Dummy for 'OTHER' type	Sale type	[✂]	[✂]	[✂]	[✂]
Log POPN	Log population within 11.25 miles of job site ('000)	[✂]	[✂]	[✂]	[✂]
UNEMP	Average unemployment rate in areas within 11.25 miles of job site (%)	[✂]	[✂]	[✂]	[✂]
MEDWAGE	Average median wage, all professions, in areas within 11.25 miles of job site (£)	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND1	No of Lafarge plants in Band 1	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND2	No of Lafarge plants in Band 2	[✂]	[✂]	[✂]	[✂]
LAFARGEPLBAND3	No of Lafarge plants in Band 3	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND1	No of plants of other majors in Band 1	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND2	No of plants of other majors in Band 2	[✂]	[✂]	[✂]	[✂]
OTHMAJORPLBAND3	No of plants of other majors in Band 3	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND1	No of independent plants in Band 1	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND2	No of independent plants in Band 2	[✂]	[✂]	[✂]	[✂]
INDEPENDENTBAND3	No of independent plants in Band 3	[✂]	[✂]	[✂]	[✂]
Dummy for nearby Tarmac plant	Dummy for Tarmac plant in Band 1	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Based on Tarmac transaction data, 2007–2010. Unit of observation is a customer/job-site/year/shipping-facility combination, for shipments of aggregates. No of observations = 11,399. Band 1 = 0–11.25 miles; Band 2 = 11.25–22.5 miles; Band 3 = 22.5–33.75 miles.

TABLE 25*(a)* **Price-concentration regressions, Tarmac-SG (coefficients on controls)**

	Gravel *OLS (Fixed effects)*		*Concrete Sand* *OLS (Fixed effect)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
DIST	–0.130***	(0.007)	–0.090***	(0.008)
DIST squared/1,000	2.086***	(0.138)	0.992***	(0.175)
Dummy for 'OTHER' type	0.222***	(0.076)	0.195	(0.140)
Log(POPN)	0.326***	(0.075)	0.050	(0.079)
UNEMP	–0.004	(0.031)	–0.045	(0.033)
MEDWAGE	0.037	(0.027)	0.011	(0.028)
2nd size quintile, 2007	0.080	(0.212)	0.083	(0.229)
3rd size quintile, 2007	–0.105	(0.201)	0.131	(0.224)
4th size quintile, 2007	–0.234	(0.198)	0.071	(0.214)
5th size quintile, 2007	–0.981***	(0.189)	–0.648***	(0.208)
2nd size quintile, 2008	0.115	(0.201)	–0.019	(0.225)
3rd size quintile, 2008	0.391**	(0.183)	0.034	(0.202)
4th size quintile, 2008	–0.179	(0.176)	–0.332*	(0.188)
5th size quintile, 2008	–0.920***	(0.166)	–0.726***	(0.188)
2nd size quintile, 2009	–0.088	(0.280)	0.437	(0.299)
3rd size quintile, 2009	–0.110	(0.260)	0.220	(0.269)
4th size quintile, 2009	–0.352	(0.250)	–0.160	(0.260)
5th size quintile, 2009	–0.966***	(0.240)	–0.731***	(0.250)
2nd size quintile, 2010	0.232	(0.350)	0.293	(0.324)
3rd size quintile, 2010	–0.069	(0.334)	0.080	(0.305)
4th size quintile, 2010	–0.617*	(0.321)	–0.523*	(0.304)
5th size quintile, 2010	–1.107***	(0.315)	–0.777***	(0.294)
No of observations	13,769		11,399	
R^2	0.3644		0.4424	

Source: CC analysis.

Note: See Table 25*(b)* for notes and coefficients on the competition effects. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 25*(b)* **Price-concentration regressions, Tarmac-SG (coefficients on competition measures)**

	Gravel *OLS (Fixed effects)*		*Concrete Sand* *OLS (Fixed effect)*	
Dependent variable	WORKSPRICE		WORKSPRICE	
	Coeff	*se*	*Coeff*	*se*
Explanatory variables				
LAFARGEPLBAND1	–0.071*	(0.037)	–0.018	(0.040)
LAFARGEPLBAND1*(Dummy for nearby Tarmac plant)	0.096**	(0.045)	0.126***	(0.045)
LAFARGEPLBAND2	0.040**	(0.017)	0.036**	(0.017)
LAFARGEPLBAND3	–0.030**	(0.014)	0.013	(0.015)
OTHMAJORPLBAND1	–0.099***	(0.037)	–0.040	(0.042)
OTHMAJORPLBAND1*(Dummy for nearby Tarmac plant)	–0.075**	(0.037)	–0.110**	(0.044)
OTHMAJORPLBAND2	–0.135***	(0.012)	–0.084***	(0.015)
OTHMAJORPLBAND3	–0.066***	(0.011)	–0.045***	(0.013)
INDEPENDENTBAND1	–0.054*	(0.029)	–0.028	(0.029)
INDEPENDENTBAND1*(Dummy for nearby Tarmac plant)	–0.003	(0.027)	0.054*	(0.029)
INDEPENDENTBAND2	–0.041***	(0.012)	0.006	(0.014)
INDEPENDENTBAND3	–0.013	(0.009)	–0.015	(0.010)
No of observations	13,769		11,399	
R^2	0.3644		0.4424	

Source: CC analysis.

Note: Standard errors clustered by 25km x 25km grid square. Following effects are included, not shown for brevity: customer-region effects by year, shipping-facility effects by year, year-varying dummies for four largest customers, time-constant dummies for five other large customers. Excluded sale-type category is Finished Products. See Table 25*(a)* for coefficients on the controls. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 26 **Simulation from price-concentration regressions (all three bands), Tarmac-CR**

Product	*CM*	*Coefficient/ implied price effect £*	*Statistically significant level*	*Price effect %*
Graded 40mm	Lafarge band 1	–0.138	*	–1.3
	Lafarge band 1*Tar band 1	–0.070		–0.7
	Lafarge band 2	–0.095	***	–0.9
	Lafarge band 3	0.043	*	+0.4
	Price effect (if Tar band 1)	**–0.261**	*******	**–2.5**
	Price effect (if no Tar band 1)	**–0.191**	*****	**–1.8**
Roadstone Sub–base	Lafarge band 1	–0.127	***	–2.1
	Lafarge band 1*Tar band 1	–0.073	***	–1.2
	Lafarge band 2	–0.100	***	–1.6
	Lafarge band 3	0.001		+0.0
	Price effect (if Tar band 1)	**–0.299**	*******	**–4.8**
	Price effect (if no Tar band 1)	**–0.225**	*******	**–3.7**

Source: CC analysis.

Note: Based on price-concentration regressions for Tarmac crushed rock products. The price effect is from adding one extra Lafarge plant in each of the three bands. The significance level of the total price effect is for the linear combination of the relevant competition measures (eg for the linear combination: Lafarge band 1 + Lafarge band 1*Tar band1 + Lafarge band 2 + Lafarge band 3). *** p<0.01, ** p<0.05, * p<0.1.

Local competitive analysis for primary aggregates, asphalt and RMX

Introduction

1. In this appendix we present the local competitive analysis we have performed in relation to primary aggregates, asphalt and RMX and we discuss the main parties' views on this analysis. Annex 1 includes the list of the possible problem areas identified and the list of the problem areas (with the main parties' plants in these areas); Annex 2 shows the maps of the problem areas. In the appendix, we describe our:

   (a) analytical framework;

   (b) approach to the catchment area analysis and our findings on possible problem areas; and

   (c) approach to the local area assessment and our findings on problem areas.

Analytical framework

2. The objective of our analysis was to identify local areas where the JV might cause a competition problem.

3. There were four steps to our analysis:

   (a) first, to identify an appropriate measure to delineate the catchment area;

   (b) second, to identify local areas in which the parties' plants and or depots overlap;

   (c) third, through the use of filter(s), to identify which of the local areas (or plants) identified in the second step are possible problems; and

   (d) fourth, through more detailed analysis, to identify any problem areas (and plants in these areas).

4. The catchment area analysis focused on the following product markets (see paragraphs 5.21 to 5.37 and 5.42 to 5.50 of the main body and Appendix G) and product segments:

(a) primary aggregates[1] as well as crushed rock[2] and sand and gravel products;

(b) asphalt (fixed and mobile plants); and

(c) RMX (fixed and site plants).

5. Constraints from 'outside the markets' have been considered in the competitive assessment on a case by case basis (see paragraphs 41 to 142). These constraints include:

(a) secondary/recycled aggregates; and

(b) volumetric trucks.

Catchment area analysis

Approach

Catchment area

6. For each product considered, we used transaction data for 2010 provided by the main parties to compute the average distance (in a straight line) within which 80 per cent of a site's external sales volumes were delivered. We computed the average distance for products from all Tarmac and all Lafarge plants separately (including plants belonging to JVs between Tarmac and other parties and Lafarge and other parties, where these were present in the transaction data). We included all active, mothballed or closed sites, and rail-linked depots, that delivered volumes in 2010. For RMX, we excluded site plants from the average distance calculation, as these

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[1] We excluded from our analysis specialist types of primary aggregates, including rail ballast, HPL, high PSV, aglime, dolomite, and other non-construction aggregates, as they typically are transported over longer distances, ie the geographic market is not local for these products.

[2] See previous footnote.

plants are located at the customer site and do not generally serve other customers[3] (see paragraph 18).

7. In computing the average distance, we only included data on sales that were delivered to the customer. Transaction data provided by the main parties did not include the locations of customers collecting their orders from the production site and thus we could not consider these customers in computing the catchment area.

8. For each site belonging to each main party, we first computed the distance over which 80 per cent of external sales volume was delivered. We then averaged these figures across all sites to calculate the average distance over which 80 per cent of external sales volume was delivered for each main party. We weighted each site's distance by the total volume delivered by the site to derive a weighted average distance across all Tarmac's and all Lafarge's sites separately. We computed individual averages for each rail-linked depot, as products distributed from depots can be transported over shorter distances due to the additional transport costs they incur (ie the transport cost from the originating quarry to the depot).

9. For each product, we distinguished between sites located in urban areas and sites located in non-urban areas in order to capture the variation in delivered distances.[4] We found that sales delivered from sites located in urban areas were more likely to be transported over shorter distances than those from non-urban sites due to traffic congestion as well as to the proximity of demand centres. Thus we computed a weighted average distance across urban and non-urban sites separately. In addition, for asphalt and RMX, which are perishable products, we looked separately at sites

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[3] The same would apply to asphalt mobile plants, but Tarmac does not own any mobile asphalt plant and Lafarge did not own any in [✄].

[4] Urban area refers to ONS Census areas with population greater than 10,000 people. The site location was matched with the ONS Census areas in order to determine whether the company's site was located in an urban or non-urban area. We also classified as urban those sites that were less than 1 mile away from an urban area with population in excess of 10,000 people.

located in Greater London and computed a separate weighted average distance for these sites. We found that sales delivered from sites located in Greater London were more likely to be transported over shorter distances because of greater traffic congestion.

10. For all products, we also computed the weighted average distances within which 70 per cent and 90 per cent of external sales volumes were delivered in order to test the sensitivity of our catchment areas. The results are shown in Tables 1 to 3. We also looked at the 95 per cent confidence interval for the means as a robustness check for the weighted average distance.[5]

TABLE 1 **Weighted average distance by supplier and area type for primary aggregates, crushed rock and sand and gravel products**

		Lafarge			*Tarmac*		
Product category	*Company*	*70%*	*80%*	*90%*	*70%*	*80%*	*90%*
Primary aggregates	Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Non-urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Crushed rock	Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Non-urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Sand & gravel	Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Non-urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
All aggregates	Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Non-urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CC calculations based on data provided by the main parties.

Note: Due to rounding, the mean can show up as being outside of the confidence interval.

11. Across all aggregate products, Lafarge has significantly [✂] delivery distances than Tarmac for the sites located in urban areas. With respect to sites located in non-urban areas, Lafarge's sites have [✂] delivery distances than sites belonging to

[5] A 95 per cent confidence interval is a range of values for a variable of interest that if the sample were taken 100 times then in 95 cases the true estimate of the variable would lie within this range. The upper and lower levels are called the confidence limits.

Tarmac except for sand and gravel aggregates where both main parties deliver over [✂].

TABLE 2 **Weighted average distance by supplier and area type for asphalt**

		Lafarge			*Tarmac*		
Product category	*Company*	*70%*	*80%*	*90%*	*70%*	*80%*	*90%*
Asphalt	Greater London	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Non-Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CC calculations based on data provided by the main parties.

[✂]
Note: Due to rounding, the mean can show up as being outside of the confidence interval.

12. For asphalt, the delivery distance for Lafarge's sites is [✂] than the distance delivered by Tarmac's sites for sites located either in urban or non-urban areas. In Greater London, sites belonging to Tarmac deliver asphalt over a [✂] distance than do sites belonging to Lafarge.

TABLE 3 **Weighted average distance by supplier and area type for RMX**

		Lafarge			*Tarmac*		
Product category	*Company*	*70%*	*80%*	*90%*	*70%*	*80%*	*90%*
RMX	Greater London	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	Non-urban	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
	CI	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CC calculations based on data provided by the main parties.

Note: Due to rounding, the mean can show up as being outside of the confidence interval.

13. For RMX, the average delivery distances by Lafarge from its sites are [✂] than those for Tarmac.

14. The parties said that we had failed to establish an economic basis upon which to apply different average radials for Lafarge and Tarmac sites, and that our approach would be likely to give rise to anomalies where, for example, a Tarmac site might be said to constrain a Lafarge site but not vice versa. The parties also argued that

different average delivery distances for Lafarge and Tarmac did not justify the use of different catchment areas as delivery distances were likely to be affected by 'network density effects', where a supplier has several sites in an area giving scope to supply a job from the nearest site.

15. The parties also stated that it was inappropriate to define different radials for sites in urban and non-urban areas, and sites in the Greater London area. The parties argued that the shorter delivery distances observed for sites in urban areas reflected the fact that these sites were closer to the sources of demand rather than because of an intrinsic difficulty in competing over greater distances. The fact that an urban site typically delivered over shorter distances than a non-urban site did not mean that an urban site could not compete over the same distance as a non-urban site.

16. We did not agree that we should use the same average distance for both of the main parties and for all of their plants. First, averages can hide differences between suppliers and areas. As shown in Tables 1 to 3, the confidence intervals around the means are fairly narrow indicating little variation in the averages of individual sites of the main parties. This suggests that using averages for all the sites of the main parties is not misleading. Further, the differences in the averages for Tarmac and Lafarge and their associated confidence intervals suggests that it could have been misleading to combine the averages of Lafarge and Tarmac. Secondly, there are reasons to expect competition to take place over a shorter distance in urban areas due to slower travel speeds due to traffic congestion. This can have an impact on costs for low-valued products such as aggregates and can have an impact in other ways for asphalt and RMX as these products are perishable.

17. With regard to RMX, the parties argued that site plants should be excluded from the catchment area radial calculations and radial shares of production as they are set up

to supply a specific customer and not the general market. The parties also high-lighted that site plants can be deployed to serve a customer anywhere.

18. We calculated the radial distances for RMX including and excluding site plants and found very little difference between the two. For the purposes of assessing catch-ment area radials, we used a radial calculated excluding site plants (see paragraph 6). When considering radial shares of production, RMX site plants were included. We considered that site plants are in competition with fixed plants for customers. Suppliers assess whether to supply a customer with fixed or mobile plants depending not only on the size of the job but also on the fixed plants they have available in the local area. We also note that the location and size of site plants are considered on a case by case basis in the assessment of possible problem areas.

Filters

19. The methodology used for the catchment area analysis is aimed at reflecting the results of our PCA (see Appendix H). It combines two approaches, which in turn use different filters.

20. For primary aggregates, asphalt and RMX (for which the PCA generally showed either significant price effects of less than 0.5 per cent per nearby plant, or no significant coefficients) we adopted a plant-centred approach and we selected as possible problem areas those overlap areas where there was a fascia reduction from two to one, from three to two or from four to three (where the 'fourth' competitor's share of production volume was lower than 5 per cent). These rules were to account for the possibility that the PCA results might not accurately predict the price effects in areas with these fascia changes due to the JV. This filter is referred to as 'fascia reduction' filter in what follows.

21. For the two Tarmac crushed rock products for which the PCA showed significant price effects of around 1 per cent or over per nearby plant (ie roadstone sub-base and graded 40mm max),[6] we adopted a customer-centred approach and we selected as possible problems Tarmac and Lafarge plants which were in the radials of customer sites. These filters are referred to as 'PCA' filters in what follows.

22. We centred radials on all Tarmac customer sites which received a delivery of either of the two crushed rock products in 2010. We used a radial distance of 22.5 miles, as used in the PCA, to assess the likely competitors that could supply each customer site. Rail-linked depots were included in the analysis using the individual depot radii calculated in the plant centred analysis (see paragraph 8) and used in the PCA.

23. At this stage we applied what we considered to be a conservative filter to identify possible problem sites. We considered all Tarmac and Lafarge sites which produced crushed rock in the radials where there was overlap between the main parties to be possible problem sites. In each customer site radial we defined an overlap using the following criteria:

(a) There was at least one Tarmac plant/depot selling either roadstone sub-base or graded (40mm max) (see footnote to paragraph 26 below).

(b) There was at least one Lafarge plant producing crushed rock.

24. After identifying possible problem Tarmac and Lafarge sites as described above, we centred on each of these Tarmac and Lafarge sites and selected, as possible problem areas, only those where there was an overlap between the JV partners.

25. The results of our filters are discussed in the next section.

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[6] [✄]

Possible problem areas

26. Table 4 provides a summary of the number of possible problem areas identified by each filter (ie fascia reduction and PCA filters) for primary aggregates, crushed rock and sand and gravel products.[7]

TABLE 4 **Summary of possible problem areas for primary aggregates, crushed rock and sand and gravel products**

		Fascia reduction									*PCA Roadstone sub-base and graded 40mm max*		
		2 to 1			*3 to 2*			*4 to 3*					
	Total overlap areas	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*
Primary aggregates	102	0	0	0	0	0	0	0	0	0			
Crushed rock	37	0	0	0	0	0	0	0	0	0	37*	52	131
of which depots											5	7	8
Sand & gravel	60	1	1	1	1	1	1	1	1	4			

Source: CC calculations on data provided by the main parties.

*One of the possible problem areas identified by this filter was also identified as a possible problem by the fascia reduction filter.
Notes:
1. Total overlap areas: areas in which both Lafarge's and Tarmac's plants are present (within the radial).
2. Possible problem areas: number of areas in note 1 in which the filter applies.
3. L and T: number of Lafarge's and Tarmac's plants which fall within the possible problem areas.

27. For primary aggregates, we identified a total number of 102 overlap areas (out of a total of 160 areas considered). The equivalent numbers for crushed rock and sand and gravel were 37 (out of 87) and 60 (out of 102) respectively.

28. Using the fascia reduction filter, we identified possible problem areas for sand and gravel products. In particular, we identified:

(a) one area in which the JV would result in a fascia reduction from two to one with Lafarge and Tarmac each operating one plant in the area;

(b) one area in which the JV would result in a fascia reduction from three to two with Lafarge and Tarmac each operating one plant in the area; and

[7] With regard to the PCA filters, we selected as possible problems plants/depots which had sold roadstone sub-base or graded (40mm max) in 2010 for Tarmac, and crushed rock sites for Lafarge. In the local area assessment we have only considered those Tarmac plants which produced either of the two products, Lafarge sites which produced crushed rock and depots.

(c) one area where the JV would result in a fascia reduction from four to three with the production share of the third party being lower than 5 per cent. Lafarge operates one plant in the area while Tarmac operates four plants.

29. Applying PCA filters, we identified a total of 37 areas that are possible problems and are centred on sites or depots which produce/sell crushed rock.[8] One of these areas is also identified as a possible problem by the fascia reduction filter. Five of these areas are centred on depots. There are a total of 52 Lafarge plants (of which seven Lafarge plants are in areas centred on depots) and 131 Tarmac plants (of which eight Tarmac plants are in areas centred on depots) in these 37 possible problem areas.[9]

30. Table 5 provides a summary of the number of possible problem areas identified by the fascia reduction filter for asphalt products.

TABLE 5 **Summary of possible problem areas for asphalt**

		Fascia reduction								
		2 to 1			*3 to 2*			*4 to 3*		
	Total overlap areas	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*
Asphalt	37	0	0	0	2	3	3	0	0	0

Source: CC calculations based on data provided by the parties.

Notes:
1. Total overlap areas: areas in which both Lafarge's and Tarmac's plants are present (within the radial).
2. Possible problem areas: number of areas in note 1 in which the filter applies.
3. L and T: number of Lafarge's and Tarmac's plants which fall within the possible problem areas.

31. For asphalt, we identified 37 overlap areas out of a total of 87 areas considered. Two of these areas are identified as possible problems due to a three to two fascia

[8] The 37 areas are 'unique' in the primary aggregates market, ie each area is characterized by a unique set of competitors in terms of identity and plants/depots active in primary aggregates. Considering crushed rock only, out of 37 areas, 29 areas around plants are unique and 4 around depots are unique.
[9] These plants are not unique and one plant could be present in more than one area. The unique number of plants present in these 37 areas is 13 for Lafarge and 38 for Tarmac.

reduction. There are three Lafarge plants and three Tarmac plants operating in these two areas.[10]

32. Table 6 provides a summary of the number of possible problem areas identified by the fascia reduction filter for RMX products.

TABLE 6 **Summary of possible problem areas for RMX**

		Fascia reduction								
		2 to 1			*3 to 2*			*4 to 3*		
	Total overlap areas	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*	*Possible problem areas*	*L*	*T*
RMX	133	2	2	2	6	6	7	0	0	0

Source: CC calculations based on data provided by the main parties.

Notes:
1. Total overlap areas: areas in which both Lafarge's and Tarmac's plants are present (within the radial).
2. Possible problem areas: number of areas in note 1 in which the filter applies.
3. L and T: number of Lafarge's and Tarmac's plants which fall within the possible problem areas.

33. For RMX, we identified a total of 133 overlap areas out of a total of 257 areas considered. In particular:

(a) Two of these areas were identified as possible problems due to a two to one fascia reduction. In these areas there are two Lafarge plants and two Tarmac plants.

(b) We identified six areas where the JV resulted in a fascia reduction from three to two. There are a total of 13 plants in these areas with six plants belonging to Lafarge and seven plants belonging to Tarmac.[11]

Local areas assessment

Approach

34. In our assessments we took account of the views of the main parties, the location of the plants and depots of the main and third parties, the location of the customer sites

[10] These numbers reflect the unique number of plants present in the two possible problem areas.
[11] These plants are not unique and one plant could be present in more than one possible problem area. The unique number of plants present in these eight possible problem areas is six for Lafarge and seven for Tarmac.

of the main parties and the shares of production held by the main and third parties in each local area. Shares of production were considered in relation to the primary aggregates market as well as in relation to the crushed rock and sand and gravel segments and the wider aggregates product group, which also includes secondary and recycled aggregates. We considered all these factors in combination in order to reach a conclusion on whether or not there was a competition problem in any given area.

35. We sent the main parties a list of the possible problem areas (and sites) and asked for their views. We constructed maps of the local areas showing the locations and types of the plants of the main and third parties and the location and size of customer sites of the main parties. We sent these to the main parties. The main parties made a number of general points on the possible problem areas, all of which we considered in our local assessment. According to the main parties:

(a) In looking at volumes, we should focus on external and not internal volumes as internal volumes had a limited impact on competition for supply to third parties.

(b) Where appropriate, we should take into account the importance of demand outside the catchment area. Even though some plants were located in the same catchment area, the locations of these plants might mean that they competed for different customer sites due the location of the sites relative to the major conurbations.

(c) Where appropriate, we should consider competitive constraints exerted by competitors of the JV that were located outside of the radials, in particular where those competing sites outside of the radial were well placed to serve a demand centre that would be the main source of jobs for one of the parties' sites located within the radial in question.

(d) Where appropriate, we should consider any relevant topographical features in the local competitive assessment, for example instances where different sites located

in the same radials were effectively serving different markets due to the presence of a river or an estuary.

(e) Where appropriate, we should consider the fact that some sites were mothballed which might result in little effective overlaps currently in certain local areas.

(f) Remaining companies, many of which had substantial excess capacity, would continue to constrain the JV.

(g) Secondary and recycled aggregates would continue to constrain the JV, in particular for the supply of roadstone sub-base material to general construction, this being the end-use for which the major part of recycled aggregate was used. Volumetric trucks would also continue to impose a competitive constraint for the supply of RMX.

(h) Existing RMX site plants should be excluded from the local radial analysis since competition between fixed plants and site plants occurs only during the competitive tender stage. Once a site plant had been set up it did not compete in the local area to serve the general market.

36. Our response to these points is as follows:

(a) We did not agree that we should focus on internal volumes as the parties have the ability to switch between internal and external volumes.

(b) We took account of locations of customer sites in our local assessment.

(c) We took account of locations of plants in our local assessment.

(d) We took account of topographical features in our local assessment and in one case for not considering an area in the local assessment.[12]

(e) We considered mothballed plants. We include those that produced output in 2010 as they could be reopened in the short term.

[12] Dumbarton Concrete was not found to be a problem because the two relevant plants do not compete as they are separated by the Clyde Estuary.

(f) We took account of constraints from competitors' plants in calculating our shares of production.

(g) We took account of constraints from secondary and recycled aggregates in calculating shares of production. We note, however, that the evidence provided to us by the main parties on the extent of the constraints that secondary and recycled aggregates imposed on primary aggregates in specific local areas tended to be that such types of aggregates were available in certain local areas and not on the extent to which they constrained primary aggregates.[13] For this reason, we attached more weight to the constraints between primary aggregates.

(h) Our response to this point is in paragraph 18.

37. We used production shares as opposed to market shares as we had more comprehensive and comparable data for the former. A possible disadvantage with using production shares is that production in a local area may not be sold in the same local area.[14] On the other hand, production shares could be seen as indicating the potential strength of a firm in a local area as its production may show its ability and potential to compete for sales in this local area.

38. In its assessment the OFT used a market share threshold approach to identify local overlap areas where there was no realistic prospect of competition concerns arising. The thresholds used were 33 per cent share for aggregates and a 40 per cent for asphalt and RMX.[15] The 40 per cent figure is referred to in the Guidelines as being used in previous OFT decisions where products are undifferentiated.[16] The OFT considered a threshold level lower than 40 per cent appropriate for aggregates for the following reasons: *(a)* differing levels of closeness of competition may exist

[13] Such evidence could be primary aggregates being replaced by secondary and/or recycled aggregates or prices of primary aggregates responding to sales being lost or potentially lost to secondary and/or recycled aggregates.
[14] Market shares are shares of sales in the market. The data available did not allow us to distinguish, for both the main parties and competitors, between sales from a specific plant which remained in the local area and sales in a different area.
[15] Source: ME/5007/11, paragraphs 151, 171 and 200.
[16] Guidelines, paragraph 5.3.5.

between suppliers located in different positions within a given radial, thereby meaning that suppliers are geographically differentiated; *(b)* transport costs indicate a significant cost differential between differently located production sites; and *(c)* the parties' gross margins in the supply of aggregates are high.[17]

39. The Guidelines note that when products are undifferentiated, unilateral effects are more likely where: the market is concentrated; there are few firms in the affected market post-merger; the merger results in a firm with a large market share; and there is no strong competitive fringe of firms.[18] The Guidelines further note that market shares of firms in the market, both in absolute terms and relative to each other, can give an indication of the potential extent of a firm's market power. The combined market shares of the merger firms, when compared with their respective pre-merger market shares, can provide an indication of the change in market power resulting from a merger. In horizontal mergers in markets involving undifferentiated products, unilateral effects are more likely where the merger results in a firm with a large market share.[19] We examined the approach taken by the OFT to market share thresholds in detail. We noted that, in relation to market shares, the Guidelines explain that previous OFT decisions in mergers in markets where products are undifferentiated suggest that combined market shares of less than 40 per cent will not often give the OFT cause for concern over unilateral effects.[20] However, to the extent that the OFT uses and relies on market shares, the Guidelines note that it will normally not have regard to market share and concentration thresholds on anything other than the narrowest market that satisfies the hypothetical monopolist test.[21] The

[17] Source: ME/5007/11, paragraph 7.
[18] Guidelines, paragraph 5.4.4.
[19] Guidelines, paragraph 5.3.4.
[20] Guidelines, paragraph 5.3.5.
[21] Guidelines, paragraph 5.3.5.

OFT noted that catchment areas were likely to be no wider than the narrowest market satisfying the hypothetical monopolist test.[22]

40. For the reasons set out in paragraph 6.11 of the main body, we adopted an approach to the construction of filters and the identification of possible problem areas not based on market share thresholds. However, as explained in paragraph 6.16 of the main body, we considered shares of production, together with other evidence, in our more detailed local assessment. In particular, we decided not to pursue possible problem areas with combined shares of production of less than 33 per cent. As a result, 13 primary aggregate areas dropped out of our analysis and are not discussed in our local assessment.[23] Taking account of all the factors set out in paragraph 6.16 of the main body, we found a competition problem in the remaining 23 areas, of which 19 areas are centred on plants and 4 are centred on depots. We found two problem areas for asphalt and seven for RMX.

Problem areas—asphalt

41. In this section we look at the possible problem areas for asphalt identified by the filters and we identify the areas we find to be problems and give our reasons for our decision.

Area centred on Lafarge Higham plant (East Anglia)

42. Table 7 summarizes catchment area information and Table 8 shows the main parties' number of asphalt plants and shares of asphalt production in that local area.[24] Annex 2, Figure 1, shows a map of the area.

[22] Source: ME/5007/11, paragraph 138.
[23] In total, 16 areas were dropped. Five plants (and their associated areas) were dropped as they did not produce roadstone sub-base (or graded 40mm). Two of these areas had shares of less than 33 per cent and are therefore part of the 13 dropped areas; three areas had shares over 33 per cent and area additional to the 13 dropped areas.
[24] As explained in paragraph 4, both fixed and mobile asphalt plants in the local area are included.

TABLE 7 **Summary information for area centred on Lafarge Higham**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 tonnes*
Fascia reduction 3 to 2	Non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 8 **Lafarge and Tarmac number of plants and shares of production in area centred on Lafarge Higham**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

43. The main parties indicated that the fascia reduction would be four to three in a 30-mile radial. They said that the [✂]. Therefore they argued that there was currently no overlap between the parties with sales from this plant.

44. In our analysis we have included production from plants (in 2010) that are now moth-balled (see paragraph 36*(e)*). We believe that these plants should be included in our analysis as they have only recently been mothballed and, more importantly, production from these mothballed plants can be restarted in the short term. We considered that the JV share of production at [60–70] per cent would raise competition concerns and therefore we found this to be a problem area.

Area centred on Lafarge Wivenhoe plant (South-East)

45. Table 9 summarizes catchment area information and Table 10 shows the main parties' number of asphalt plants and shares of asphalt production in that local area. Annex 2, Figure 2, shows a map of the area.

TABLE 9 **Summary information for area centred on Lafarge Wivenhoe**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 tonnes*
Fascia reduction 3 to 2	Non-urban; quarry-based	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 10 **Lafarge and Tarmac number of plants and shares of production in area centred on Lafarge Wivenhoe**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

46. The main parties said that there were a number of competitors in this area which would continue to constrain the parties post-JV, and that based on a 30-mile radial the fascia reduction post-JV would be six to five.

47. We considered the main parties' views but decided that with a share of production of [90–100] per cent the JV would reduce rivalry and therefore would not be constrained, leading to a worsening of its offering to customers. We therefore found this to be a problem area.

48. We therefore identified two problem areas for asphalt:

(a) the area centred on Lafarge Higham; and

(b) the area centred on Lafarge Wivenhoe.

Problem areas—RMX

49. In this section we look at the possible problem areas for RMX identified by the filters and we identify the areas we find to be problems and give our reasons for our decision.

Area centred on Tarmac Greenock Concrete plant (Scotland)[25]

50. Table 11 summarizes catchment area information and Table 12 shows the main parties' number of RMX plants and shares of RMX production in that local area.[26] Volumetric operators are not present in this local area. Annex 2, Figure 3, shows a map of the area.

TABLE 11 **Summary information for area centred on Tarmac Greenock Concrete**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics (no of trucks)*
Fascia reduction 2 to 1	Urban	[✂]	[✂]	None

Source: CC estimates based on main parties' and third parties' data.

TABLE 12 **Lafarge and Tarmac number of plants and shares of production in area centred Tarmac Greenock Concrete**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

51. The main parties said that the fascia reduction would be three to two in a 10-mile radial.[27] They said that competitors would continue to constrain the JV post-completion.

52. We considered the main parties' views but decided that the JV share of production at [90–100] per cent would raise competition concerns and therefore we found this to be a problem area.

Area centred on Lafarge Greenock plant (Scotland)

53. Table 13 summarizes catchment area information and Table 14 shows the main parties' number of RMX plants and shares of RMX production in that local area.

[25] The catchment area centred in Tarmac Greenock Concrete largely overlaps with the catchment area centred in Lafarge Greenock (see next section). However, the set of competitors and the main parties' plants in the two areas are (partly) different.
[26] Both fixed and site RMX plants in the local area are included. Volumetric trucks are considered separately when appropriate.
[27] The main parties also noted that the Clyde Estuary falls between Greenock and Dumbarton, and therefore these two plants are not in competition. We noted that, using the radials we calculated, this remark was relevant for the area centred in Lafarge Greenock plant, but not for the area centred in Tarmac Greenock Concrete.

Volumetric operators are not present in this local area. Annex 2, Figure 4, shows a map of the area.

TABLE 13 **Summary information for area centred on Lafarge Greenock**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics no of trucks*
Fascia reduction 3 to 2	Urban	[✂]	[✂]	None

Source: CC estimates based on main parties' and third parties' data.

TABLE 14 **Lafarge and Tarmac number of plants and shares of production in area centred on Lafarge Greenock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

54. The main parties said that the fascia reduction would be three to two in a 10-mile radial. Similarly to the area centred on Tarmac Greenock Concrete, they said that competitors would continue to constrain the JV post-completion.

55. We considered the main parties' views but decided that the JV share of production at [80–90] per cent would raise competition concerns and therefore we found this to be a problem area.

Area centred on Tarmac Selby Concrete plant (Yorkshire & Humberside)

56. Table 15 summarizes catchment area information and Table 16 shows the main parties' number of RMX plants and shares of RMX production in that local area. Volumetric operators are not present in the local area. Annex 2, Figure 5, shows a map of the area.

TABLE 15 **Summary information for area centred on Tarmac Selby Concrete**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics no of trucks*
Fascia reduction 2 to 1	Urban	[✂]	[✂]	None

Source: CC estimates based on main parties' and third parties' data.

TABLE 16 **Lafarge and Tarmac number of plants and shares of production in area centred on Tarmac Selby Concrete**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

57. The main parties said that the fascia reduction would be three to two in a 10-mile radial and noted that Cemex Goole plant is located at the edge of the 10-mile radius from Tarmac Selby. They said that competitors would continue to constrain the JV post-completion.

58. We considered the main parties' views but decided that the JV share of production at [90–100] per cent would raise competition concerns and therefore we found this to be a problem area.

Area centred on Tarmac Lincoln Concrete plant (East Midlands)

59. Table 17 summarizes catchment area information and Table 18 shows the main parties' number of RMX plants and shares of RMX production in that local area. Table 19 includes volumes produced by volumetric trucks. Annex 2, Figure 6, shows a map of the area.

TABLE 17 **Summary information for area centred on Tarmac Lincoln Concrete**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics no of operators/trucks*
Fascia reduction 3 to 2	*Urban*	[✄]	[✄]	1 operator/1 truck

Source: CC estimates based on main parties' and third parties' data.

TABLE 18 **Lafarge and Tarmac number of plants and shares of production in area centred on Tarmac Lincoln Concrete**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 19 **Lafarge, Tarmac and volumetrics' shares of production in area centred on Tarmac Lincoln Concrete**

Shares of production (%)			
Lafarge	*Tarmac*	*JV*	*Volumetrics*
[✂]	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

60. The main parties said that the fascia reduction would be three to two in a 10-mile radial. The main parties said that there were significant constraints imposed by competing quarry-based operators (including Cemex Whisby plant and, although marginally outside the radial, Breedon Norton Bottoms), in addition to volumetric operators in this local area. They argued that competitors would continue to constrain the JV post-completion.

61. We considered the main parties' views but decided that the JV share of production, excluding volumetric trucks, at [50–60] per cent, would raise competition concerns. If we included volumetric trucks, the JV share of production was [50–60] per cent, which in our view still raised competition concerns. We therefore found this to be a problem area.

Area centred on Lafarge Scunthorpe plant (Yorkshire & Humberside)

62. Table 20 summarizes catchment area information and Table 21 shows the main parties' number of RMX plants and shares of RMX production in that local area. Table 22 includes volumes produced by volumetric trucks. Annex 2, Figure 7, shows a map of the area.

TABLE 20 **Summary information for area centred on Tarmac Scunthorpe**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics no of operators/trucks*
Fascia reduction 3 to 2	Urban	[✂]	[✂]	1 operator/2 trucks

Source: CC estimates based on main parties' and third parties' data.

TABLE 21 **Lafarge and Tarmac number of plants and shares of production in area centred on Tarmac Scunthorpe**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 22 **Lafarge, Tarmac and volumetrics' shares of production in area centred on Tarmac Scunthorpe**

Shares of production (%)			
Lafarge	*Tarmac*	*JV*	*Volumetrics*
[✄]	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

63. The main parties said that the fascia reduction would be three to two in a 10-mile radial. They said that there were significant constraints imposed by strong competition from Cemex Scunthorpe plant, in addition to competition from a volumetric operator which was a strong player in this particular area and tended to travel further. They argued that competitors would continue to constrain the JV post-completion.

64. We considered the main parties' views but decided that the JV share of production, excluding volumetric trucks, at [70–80] per cent, would raise competition concerns. If we included volumetric trucks, the JV share of production was [60–70] per cent, which in our view still raised competition concerns. We therefore found this to be a problem area.

Area centred on Lafarge Northallerton plant (Yorkshire & Humberside)

65. Table 23 summarizes catchment area information and Table 24 shows the main parties' number of RMX plants and shares of RMX production in that local area. Volumetric operators are not present in the local area. Annex 2, Figure 8, shows a map of the area.

TABLE 23 **Summary information for area centred on Lafarge Northallerton**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics no of operators/trucks*
Fascia reduction 3 to 2	Non-urban	[✂]	[✂]	None

Source: CC estimates based on main parties' and third parties' data.

TABLE 24 **Lafarge and Tarmac number of plants and shares of production in area centred on Tarmac Scunthorpe**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

66. The main parties noted that Tarmac's plant at Thirsk was 9.6 miles away, while Cemex Catterick plant was located 9.9 miles away from Lafarge's plant at Northallerton. The main parties said that these plants were located in a rural area serving low levels of demand and that volumetric operators located outside the radial would serve this area despite longer delivery distances, consistent with longer distances travelled by all suppliers in rural areas.

67. We considered the main parties' view. We did not have evidence of volumetric trucks competing in this area. The radial we used takes into account that this is a non-urban area. We decided that the JV share of production at [50–60] per cent would raise competition concerns and we therefore found this to be a problem area.

Area centred on JV Tarmac/Carter Great Yarmouth plant (East Anglia)

68. The Great Yarmouth plant is owned by C&H Quickmix (C&H), a 50:50 JV between Tarmac and RG Carter Construction (see Appendix C). Tables 25 summarizes catchment area information and Table 26 shows the main parties' number of RMX plants and shares of RMX production in that local area. Volumetric operators are not present in the local area. Annex 2, Figure 9, shows a map of the area.

TABLE 25 **Summary information for area centred on JV Tarmac/Carter Great Yarmouth**

Filter	*Centre of radial*	*Radial miles*	*Market size '000 m^3*	*Volumetrics no of operators/trucks*
Fascia reduction 3 to 2	Urban	[✂]	[✂]	None

Source: CC estimates based on main parties' and third parties' data.

TABLE 26 **Lafarge and Tarmac number of plants and shares of production in JV Tarmac/Carter Great Yarmouth**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

69. The main parties said that the fascia reduction in a 10-mile radial would be four to three. In addition, they argued that C&H [✂] is managed separately and independently from its parents, [✂], and operates as a strong regional player. They noted that their fascia reduction numbers had effectively treated C&H plants as Tarmac. However, in reality this is not the case, given the independent nature of C&H.

70. We decided that, [✂], we could not expect this company to behave independently from Tarmac in this local market. We also decided that the JV share of production at [60–70] per cent would raise competition concerns and we therefore found this to be a problem area.

71. We therefore identified seven problem areas for RMX:

(a) the area centred on Tarmac Greenock Concrete plant;

(b) the area centred on Lafarge Greenock plant;

(c) the area centred on Tarmac Selby Concrete plant;

(d) the area centred on Tarmac Lincoln Concrete plant;

(e) the area centred on Tarmac Scunthorpe plant;

(f) the area centred on Lafarge Northallerton plant; and

(g) the area centred on JV TarmacCarter Great Yarmouth plant.

Primary aggregates

72. In this section we look at the possible problem areas for aggregates identified by the filters and we identify the areas we find to be problems and give our reasons for our decision.

Area centred on Tarmac Swansea Wharf site (sand and gravel; Wales)[28]

73. Table 27 summarizes catchment area information; Tables 28 to 30 show the main parties' number of sites and shares of production in that local area for primary aggregates, sand and gravel aggregates, and all aggregates respectively. Annex 2, Figure 10, shows a map of the area.

TABLE 27 **Summary information for area centred on Tarmac Swansea Wharf**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Fascia reduction in sand & gravel 3 to 2	Sand & gravel; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 28 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Swansea Wharf—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 29 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Swansea Wharf—sand and gravel**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

[28] The catchment area centred in Lafarge Briton Ferry largely overlaps with the catchment area centred in Tarmac Swansea Wharf. However, the set of competitors and the main parties' sites in the two areas are (partly) different.

TABLE 30 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Swansea Wharf—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	6	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

74. The main parties said that Lafarge's presence in this local area was [✂] with [✂] per cent of Briton Ferry's volume being supplied to [✂]; hence there was limited impact on competition for supply to third parties as a result of the JV.

75. We considered the main parties' views. We do not agree that we should ignore internal volumes as the parties have the ability to switch between internal and external volumes (see paragraph 36*(a)*). Based on sand and gravel aggregates alone, the JV share of production is [50–60] per cent. However, the main parties' sand and gravel operations will face competition from other primary aggregates. Taking account of primary aggregates, the JV share of production is [30–40] per cent and [40–50] per cent when we include competition from recycled and secondary aggregates. On balance, we found that this was a problem area.

Area centred on Tarmac Scorton Quarry (sand and gravel; Yorkshire & Humberside)

76. Table 31 summarizes catchment area information; Tables 32 to 34 show the main parties' number of sites and shares of production in that local area for primary aggregates, sand and gravel aggregates, and all aggregates respectively. Annex 2, Figure 11, shows a map of the area.

TABLE 31 **Summary information for area centred on Tarmac Scorton Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Fascia reduction in sand & gravel 4 to 3	Sand & gravel; non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 32 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Scorton Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	6	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 33 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Scorton Quarry—sand and gravel**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	4	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 34 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Scorton Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	10	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

77. The main parties argued that the true economic radial was wider to the north-east coast and took account of the major demand centre of Teesside located away from centre of the radial. They said that significant competitors were located closer to that demand centre and there were significant competitive constraints from Cemex, recycled/secondary producers and also additional strong competitors just outside the radial, which would continue to constrain the parties post-JV.

78. We considered the views of the main parties. We agree that much of the demand is to the north-east of Scorton Quarry. However, there are still many customer sites within the catchment area which, in our view, could experience a reduction in competition if the JV went ahead. In support of this, the JV would have a [70–80] per cent share of production of sand and gravel aggregates, it would have a [30–40] per cent share of the production of primary aggregates and a [40–50] per cent share of production of all aggregates. Taking all the factors into account—the locations of the

quarries, the customer sites and the shares of all parties—we find this to be a problem area.

Area centred on Tarmac Ballidon Quarry (crushed rock; East Midlands)

79. Table 35 summarizes catchment area information; Tables 36 to 38 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 12, shows a map of the area.

TABLE 35 **Summary information for area centred on Tarmac Ballidon Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 36 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Ballidon Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	8	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 37 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Ballidon Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	5	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 38 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Ballidon Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
8	9	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

80. The main parties argued that the radials from Ballidon, as well as from Dene and Caldon Low, catch the presence of the Dowlow and Tunstead quarries in the North but these sites supply different conurbation areas: Ballidon, Dene and Caldon Low sell predominantly into [✂] and [✂] to the [✂], whereas Dowlow and Tunstead sell predominantly into [✂]. The main parties submitted that, as a consequence, there was a limited overlap in the main parties' sales from these sites and the shares of both parties (and particularly Lafarge's) were significantly overstated by an assessment of production share in the local radial.

81. We considered the views of the main parties. We agree with the main parties that the locations of Dowlow and Tunstead are better placed to serve the Manchester area than they are to serve the Stoke area; and that the reverse is true for quarries at Ballidon, Caldon Low and Dene. However, there are many customer sites in the catchment area around Ballidon Quarry, which all the above quarries can compete for. This being the case, we feel that the formation of the JV could lead to a reduction in competition. In support of this, the JV share of the production of primary aggregates is [30–40] per cent. Whilst some of this (about [0–10] percentage points) is currently transported to depots outside the area, the main parties have to ability to alter this balance. Taking all these factors into account, we did find this to be a problem area.

Area centred on Lafarge Cadeby site (crushed rock; Yorkshire & Humberside)

82. Table 39 summarizes catchment area information; Tables 40 to 42 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 13, shows a map of the area.

TABLE 39 **Summary information for area centred on Lafarge Cadeby**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 40 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Cadeby—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 41 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Cadeby—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 42 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Cadeby—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
10	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

83. The main parties argued that the proposed JV would continue to be constrained by extensive competition from recycled and secondary aggregates as well as from Cemex, Holcim and independent producers. In particular, the main parties submitted that this area was significantly affected by recycling and secondary aggregates as a result of significant demolition and regeneration from old factories, slag banks and mine spoils (especially in the Doncaster area). The main parties also noted that Lafarge Cadeby was currently mothballed due to [✂].

84. We considered the views of the main parties. We do not believe we should exclude from our analysis mothballed quarries that were recently producing as these can be reopened in the short term (see paragraph 36*(e)*). We looked at the JV shares of

production in primary aggregates, crushed rock aggregates and all aggregates. The JV will have a [50–60] per cent share of the production of primary aggregates. Its share of the production of all aggregates will be [30–40] per cent. Taking all these factors into account, we found this to be a problem area.

Area centred on Tarmac Caldon Low Quarry (crushed rock; West Midlands)

85. Table 43 summarizes catchment area information; Tables 44 to 46 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 14, shows a map of the area.

TABLE 43 **Summary information for area centred on Tarmac Caldon Low Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 44 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Caldon Low Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	6	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 45 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Caldon Low Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 46 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Caldon Low Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
7	7	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

86. The main parties argued that the radials from Caldon Low, as well as from Ballidon and Dene, caught the presence of the Dowlow and Tunstead quarries in the North but these sites supplied different conurbation areas: Ballidon, Dene and Caldon Low sold predominantly into [✄] and [✄] to the [✄], whereas Dowlow and Tunstead sold predominantly [✄]. The parties submitted that, as a consequence, there was a limited overlap in the main parties' sales from these sites and the shares of both parties (and particularly Lafarge's) were significantly overstated by an assessment of production share in the local radial.

87. We considered the main parties' views. Our view on the demand areas served by Caldon Low Quarry and its implication for our competition assessment is the same as that for Ballidon Quarry (see paragraph 80). As with Ballidon Quarry, there are many customer sites in the catchment area around Caldon Low Quarry, for which all the above quarries can compete. This being the case, we decided that the formation of the JV could lead to a reduction in competition. In support of this, the JV share of the production of primary aggregates is [30–40] per cent. Whilst some of this (about [0–10] percentage points) is currently transported to depots outside the area, the main parties have the ability to alter this balance. This share of production of primary aggregates held by the JV together with the number of customer sites in the catchment area leads us to find that, on balance, this is a problem area.

Area centred on Tarmac/Hanson MQP JV Cliffe Hill site (crushed rock; East Midlands)[29]

88. The Cliffe Hill quarry is owned by Midland Quarry Products (MQP), a 50:50 JV between Tarmac and Hanson (see Appendix C). Table 47 summarizes catchment area information; Tables 48 to 50 show the main parties' number of sites and shares

[29] Almost all of Tarmac's activity in rail ballast relates to Cliffe Hill (see Appendix J).

of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 15, shows a map of the area.

TABLE 47 **Summary information for area centred on Tarmac/Hanson MQP JV Cliffe Hill**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban rail-link	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 48 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac/Hanson MQP JV Cliffe Hill—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
8	6	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 49 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac/Hanson MQP JV Cliffe Hill—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 50 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac/Hanson MQP JV Cliffe Hill—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
15	7	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

89. The main parties argued that a large volume of aggregates produced in this radial were sold in the South-East ([✂]).

90. We considered the views of the main parties. Including the production of aggregates sent to depots, the JV's shares of production are high—[50–60] per cent for crushed rock aggregates, [50–60] per cent for primary aggregates and [40–50] per cent for all aggregates. Excluding the production sent to depots, the JV's shares are still high—[40–50] per cent for crushed rock aggregates, [40–50] per cent for primary aggre-

gates and [40–50] per cent for all aggregates. We therefore found this to be a problem area.

Area centred on Tarmac Clitheroe Bankfield Quarry (crushed rock; North West)

91. Table 51 summarizes catchment area information; Tables 52 to 54 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 16, shows a map of the area.

TABLE 51 **Summary information for area centred on Tarmac Clitheroe Bankfield Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 52 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Clitheroe Bankfield Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 53 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Clitheroe Bankfield Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 54 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Clitheroe Bankfield Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

92. The main parties argued that there was no material overlap between the main parties in this radial. They submitted that the only Lafarge crushed-rock-producing quarry in

the radial was Dry Rigg, which was a high PSV quarry which produced no sub-base and only very limited quantities of graded materials sold as non-PSV.

93. We considered the main parties' views. We have taken account of the main parties' point on PSV by excluding the production of this product from our calculations of shares. The increment to the JV's share of production accounted for by Lafarge is less than [0–10] percentage points for primary and all aggregates. The shares of production accounted for by the JV are high—[40–50] per cent for primary aggregates and [30–40] per cent for all aggregates. Excluding production sent to depots, the shares are [30–40] per cent for primary aggregate and [30–40] per cent for all aggregates. Given the ability of the JV to switch sales from outside the area to inside the area, we believe the higher shares are indicative of the shares the JV could hold within the area. This being the case, we find this to be a problem area.

Area centred on Tarmac Coxhoe Quarry (crushed rock; North)

94. Table 55 summarizes catchment area information; Tables 56 to 58 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure17, shows a map of the area.

TABLE 55 **Summary information for area centred on Tarmac Coxhoe Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 56 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Coxhoe Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	7	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 57 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Coxhoe Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 58 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Coxhoe Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
5	13	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

95. The main parties argued that there was strong competition from recycled and secondary producers as well as from imports, Cemex and several significant non-major suppliers. They submitted that this would continue to constrain the proposed JV.

96. We considered the views of the main parties. Recycled and secondary aggregates are included in our calculation of shares for all aggregates. The JV's share of production of primary aggregates is [40–50] per cent and [40–50] per cent for all aggregates. We find this to be a problem area.

Area centred on Tarmac Dene Quarry (crushed rock; East Midlands)

97. Table 59 summarizes catchment area information; Tables 60 to 62 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 18, shows a map of the area.

TABLE 59 **Summary information for area centred on Tarmac Dene Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 60 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Dene Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
5	7	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 61 **Lafarge and Tarmac number of sites and shares of production in Area centred on Tarmac Dene Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 62 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Dene Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
11	8	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

98. The main parties argued that the radials from Tarmac Dene Quarry, as well as from Ballidon and Caldon Low, catch the presence of the Dowlow and Tunstead quarries in the North but these supply different conurbation areas: Ballidon, Dene and Caldon Low sell predominantly [✂] to the [✂], whereas Dowlow and Tunstead sell predominantly [✂] (see the map entitled Caldon). The main parties submitted that, as a consequence, there was a limited overlap in the parties' sales from these sites and the shares of both parties (and particularly Lafarge's) were significantly overstated by an assessment of production share in the local radial.

99. We considered the main parties' views. Our view on the demand areas served by Dene Quarry and its implication for our competition assessment is the same as that for Ballidon Quarry and Caldon Low Quarry (see paragraphs 80 and 86). As with these two quarries, there are many customer sites in the catchment area around

Dene Quarry, which all of the above quarries can compete for. This being the case, we decided that the formation of the JV could lead to a reduction in competition. In support of this, the JV share of the production of primary aggregates is [30–40] per cent. Whilst some of this (about [0–10] percentage points) is currently transported to depots outside the area, the main parties have the ability to alter this balance. This share of production of primary aggregates held by the JV together with the number of customer sites in the catchment area leads us to find that, on balance, this is a problem area.

Area centred on Lafarge Dowlow site (crushed rock; East Midlands)[30]

100. Table 63 summarizes catchment area information; Tables 64 to 66 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 19, shows a map of the area.

TABLE 63 **Summary information for area centred on Lafarge Dowlow**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban; rail-link	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 64 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Dowlow—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
7	13	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 65 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Dowlow—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	7	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

[30] Lafarge Dowlow site supplies all of Lafarge HPL sold for FGD (see Appendix J).

TABLE 66 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Dowlow—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
16	14	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

101. The main parties argued that Lafarge Dowlow, as well as Tarmac Tunstead (see paragraph 122), supplied aggregates to [✂] area in which there were a significant number of competitors both in terms of primary aggregates and, most significantly, recycled aggregates production sites. They submitted that the proposed JV would continue to be constrained by these competitors in making sales [✂] from these sites.

102. We considered the main parties' views. We agree with the main parties that there are many customer sites located to the north-west of Dowlow. However, there are many customer sites in the catchment area around Dowlow other than those located to the north-west. This being the case, we decided that the formation of the JV could lead to a reduction in competition in this area. Including the production of aggregates sent to depots, the JV share of the production of primary aggregates is [40–50] per cent and some of this (about [0–10] percentage points) is currently transported to depots out-side the area. Its share of all aggregates production is [30–40] per cent, of which about [0–10] percentage points are sent to depots. This share of production of primary aggregates held by the JV together with the number of customer sites in the catchment area leads us to find that, on balance, this is a problem area.

Area centred on Tarmac Hendre site (crushed rock; Wales)

103. Table 67 summarizes catchment area information; Tables 68 to 70 show the main parties' number of sites and shares of production in that local area for primary aggre-

gates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 20, shows a map of the area.

TABLE 67 **Summary information for area centred on Tarmac Hendre**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 68 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Hendre—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 69 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Hendre—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 70 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Hendre—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

104. The main parties argued that aggregates produced in North Wales were generally focused on supply to Cheshire and Merseyside. They told us that there were significant other producers in North Wales (Hanson, Cemex, DP Williams) along with recycled aggregates producers and Holcim 'import' of aggregates from Scotland into Liverpool, which would continue to constrain the parties post-JV. They also submitted that Lafarge was a [✂], such that the extent of the overlap between the parties was limited.

105. We considered the views of the main parties. We agree with the main parties that there are many customer sites to the north-west of Hendre Quarry. However, there are many customer sites in the catchment area around Hendre. This being the case, we decided that the formation of the JV could lead to a reduction in competition in this area. Lafarge accounts for less than [0–10] percentage points of the JV's increment in the share of production in this area. The JV share of the production of primary aggregates is [40–50] per cent. Its share of all aggregates production is [30–40] per cent. This share of production of primary aggregates held by the JV together with the number of customer sites in the catchment area leads us, on balance, to find this to be a problem area.

Area centred on Tarmac Holme Hall quarry (crushed rock; Yorkshire & Humberside)

106. Table 71 summarizes catchment area information; Tables 72 to 74 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 21, shows a map of the area.

TABLE 71 **Summary information for area centred on Tarmac Holme Hall**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 72 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Holme Hall—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 73 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Holme Hall—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 74 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Holme Hall—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
10	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

107. The main parties submitted that the proposed JV would continue to be constrained by extensive competition from recycled and secondary aggregates as well as from Cemex, Holcim and independent producers.

108. We considered the main parties' arguments. We looked at the JV shares of production in primary aggregates, crushed rock aggregates and all aggregates. In this local area, the JV's share of production for primary aggregates is [50–60] per cent, which is high. Its share of production of all aggregates is much lower at [30–40] per cent. Taking all of these factors into account, we find this to be a problem area.

Area centred on Tarmac Mancetter quarry (crushed rock; West Midlands)

109. Table 75 summarizes catchment area information; Tables 76 to 78 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 22, shows a map of the area.

TABLE 75 **Summary information for area centred on Tarmac Mancetter**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 76 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Mancetter—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
6	6	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 77 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Mancetter—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 78 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Mancetter—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
11	7	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

110. The main parties submitted that a large volume of aggregates produced in this radial were sold in the South-East ([✂]). They also told us that Mancetter quarry was focused on internal supply to asphalt and, therefore, there was a limited overlap between the parties in relation to external sales.

111. We considered the views of the main parties. Including the production of aggregates sent to depots, the JV's shares of production are high—[50–60] per cent for crushed rock aggregates, [50–60] per cent for primary aggregates and [40–50] per cent for all aggregates. Excluding the production sent to depots, the JV's shares are still high—

[40–50] per cent for crushed rock aggregates, [40–50] per cent for primary aggregates and [40–50] per cent for all aggregates. We find this to be a problem area.

Area centred on Lafarge Mountsorrel (crushed rock; East Midlands)[31]

112. Table 79 summarizes catchment area information; Tables 80 to 82 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 23, shows a map of the area.

TABLE 79 **Summary information for area centred on Lafarge Mountsorrel**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban; rail-link	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 80 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Mountsorrel—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
5	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 81 **Lafarge and Tarmac number of sites and shares of production in Area centred on Lafarge Mountsorrel—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 82 **Lafarge and Tarmac number of sites and shares of production in Area centred on Lafarge Mountsorrel—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
9	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

[31] All of Lafarge's rail ballast supply comes from Mountsorrel (see Appendix J).

113. The main parties submitted that a large volume of aggregates produced in this radial was sold in the South-East ([✂]).

114. We considered the views of the main parties. Including the production of aggregates sent to depots, the JV’s shares of production are high—[50–60] per cent for crushed rock aggregates and for primary aggregates and [40–50] per cent for all aggregates. Excluding the production sent to depots, the JV’s shares are still high—[40–50] per cent for crushed rock aggregates and for primary aggregates and [40–50] per cent for all aggregates. We find this to be a problem area.

Area centred on Tarmac Swinden Quarry (crushed rock; Yorkshire & Humberside)

115. Table 83 summarizes catchment area information; Tables 84 to 86 show the main parties’ number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 24, shows a map of the area.

TABLE 83 **Summary information for area centred on Tarmac Swinden Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✂]	[✂]

Source: CC estimates based on main parties’ and third parties’ data.

TABLE 84 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Swinden Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties’ and third parties’ data.

Note: Totals may not sum due to rounding.

TABLE 85 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Swinden Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	4	[✂]	[✂]	[✂]

Source: CC estimates based on main parties’ and third parties’ data.

TABLE 86 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Swinden Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	5	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

116. The main parties submitted that there was no material overlap between the parties in this radial. They argued that the only Lafarge crushed-rock-producing quarry in the radial was Dry Rigg, which was a high PSV quarry which produced no sub-base and only very limited quantities of graded materials sold as non-PSV.

117. We considered the main parties' views. We have taken account of the main parties' point on PSV by excluding the production of this product from our calculations of shares. The increment to the JV's share of production accounted for by Lafarge is [0–10] percentage points or less for primary and all aggregates. The shares of production accounted for by the JV are [40–50] per cent for primary aggregates and [30–40] per cent for all aggregates. Excluding production sent to depots, the shares are [30–40] per cent for primary aggregates and [30–40] per cent for all aggregates. Given the ability of the JV to switch sales from outside the area to inside the area, we believe the higher shares are indicative of the shares the JV could hold within the area. This being the case, we find this to be a problem area.

Area centred on Lafarge Thrislington (crushed rock; Yorkshire & Humberside)

118. Table 87 summarizes catchment area information; Tables 88 to 90 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 25, shows a map of the area.

TABLE 87 **Summary information for Area centred on Lafarge Thrislington**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban; rail-link	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 88 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Thrislington—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 89 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Thrislington—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 90 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Thrislington—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
5	8	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

119. The main parties submitted that there was strong competition from recycled and secondary producers as well as from imports, Cemex and several significant non-major suppliers. This would continue to constrain the proposed JV.

120. We considered the views of the main parties. Recycled and secondary aggregates are included in our calculation of shares for all aggregates. The JV's share of production of primary aggregates will be [30–40] per cent. Its share of all aggregates will be [40–50] per cent. We find this to be a problem area.

Area centred on Tarmac Tunstead Quarry (crushed rock; East Midlands)[32]

121. Table 91 summarizes catchment area information; Tables 92 to 94 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 26, shows a map of the area.

TABLE 91 **Summary information for area centred on Tarmac Tunstead**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non- urban; rail-link	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 92 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Tunstead—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	6	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 93 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Tunstead—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	5	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 94 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Tunstead—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
3	7	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

122. The main parties argued that Tarmac Tunstead, as well as Lafarge Dowlow (see paragraph 101), supplied aggregates to [✄] in which there were a significant number of competitors both in terms of primary aggregates and, most significantly, recycled

[32] All of Tarmac's HPL supplies for FGD comes from Tunstead (see Appendix J).

aggregates production sites. They submitted that the proposed JV would continue to be constrained by these competitors in making sales [✂] from these sites.

123. We considered the main parties' views. We agree with the main parties that there are many customer sites located to the north-west of Tunstead. However, there are many customer sites in the catchment area around Tunstead other than those located to the north-west. This being the case, we decided that the formation of the JV could lead to a reduction in competition in this area. Including the production of aggregates sent to depots, the JV share of the production of primary aggregates is [40–50] per cent but some of this (about [0–10] percentage points) is currently transported to depots outside the area. Its share of all aggregates production is [30–40] per cent, of which about [0–10] percentage points are sent to depots. Given the ability of the JV to switch sales from outside the area to inside the area, we believe the higher shares are indicative of the shares the JV could hold within the area. This being the case, we find this to be a problem area.

Area centred on Tarmac Wensley Quarry (crushed rock; Yorkshire & Humberside)

124. Table 95 summarizes catchment area information; Tables 96 to 98 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 27, shows a map of the area.

TABLE 95 **Summary information for area centred on Tarmac Wensley Quarry**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 96 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Wensley Quarry—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	6	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 97 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Wensley Quarry—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	3	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 98 **Lafarge and Tarmac number of sites and shares of production in Area centred on Tarmac Wensley Quarry—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	6	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

125. The main parties submitted that there was no material overlap between the parties in this radial. They argued that the only Lafarge crushed-rock-producing quarry in the radial was Dry Rigg, which was a high PSV quarry which produced no sub-base and only very limited quantities of graded materials sold as non-PSV.

126. We considered the main parties' views. We have taken account of the main parties' point on PSV by excluding the production of this product from our calculations of shares. The increment to the JV's share of production accounted for by Lafarge is [0–10] percentage points or less for primary and all aggregates. The shares of production accounted for by the JV are [30–40] per cent for primary aggregates and [30–40] per cent for all aggregates. Excluding production sent to depots, the shares are [30–40] per cent for primary aggregate and [30–40] per cent for all aggregates. Given the ability of the JV to switch sales from outside the area to inside the area, we believe the higher shares are indicative of the shares the JV could hold within the area. This being the case, we find this to be a problem area.

Area centred on Lafarge Whitwell (crushed rock; East Midlands)

127. Table 99 summarizes catchment area information; Tables 100 to 102 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 28, shows a map of the area.

TABLE 99 **Summary information for area centred on Lafarge Whitwell**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; non-urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 100 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Whitwell—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
10	9	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 101 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Whitwell—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	7	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 102 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Whitwell—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
19	13	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

128. The main parties submitted that the proposed JV would continue to be constrained by extensive competition from recycled and secondary aggregates as well as from Cemex, Holcim and independent producers (see also paragraph 83 for Lafarge Cadeby and paragraph 107 for Tarmac Holme Hall).

129. We considered the main parties' arguments. We looked at the JV shares of production in primary aggregates, crushed rock aggregates and all aggregates. In this local area, the JV's share of production for primary aggregates is [40–50] per cent. Its share for production of all aggregates is lower at [30–40] per cent. As we consider both of these shares to be high, we find this to be a problem area.

Area centred on Tarmac Agecroft depot (crushed rock; North-West)

130. Table 103 summarizes catchment area information; Tables 104 to 106 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 29, shows a map of the area.

TABLE 103 **Summary information for area centred on Tarmac Age croft**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 104 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Agecroft—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

Note: Totals may not sum due to rounding.

TABLE 105 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Agecroft—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 106 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Agecroft—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	4	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

131. The main parties submitted that these sites supplied aggregates to [✄] in which there were a significant number of competitors both in terms of primary aggregates and, most significantly, recycled aggregates production sites. The proposed JV will continue to be constrained by these competitors in making sales [✄] from these sites.

132. We considered the main parties' arguments. Whilst it may be the case that the plants and depots in this catchment area supply aggregates to Greater Manchester, there are many customer sites in the catchment area around Agecroft, which, in our view, could experience a reduction in competition if the JV went ahead. In this local area, the JV's share of production for primary aggregates would be high—[50–60] per cent. Its share for production of all aggregates would be much lower—[20–30] per cent. Taking all the factors into account—the locations of the quarries, the customer sites and the shares of all parties—we find this to be a problem area.

Area centred on Lafarge Ashbury depot (crushed rock; North-West)

133. Table 107 summarizes catchment area information; Tables 108 to 110 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 30, shows a map of the area.

TABLE 107 **Summary information for area centred on Lafarge Ashbury**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 108 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Ashbury—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✄]	[✄]	[✄]

Source: CC estimates based on main parties' and third parties' data.

TABLE 109 **Lafarge and Tarmac number of sites and shares of production in area centred on Lafarge Ashbury—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 110 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Agecroft—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

134. The main parties' views on this site were the same as those for Agecroft: that these sites supplied aggregates to the [✂] in which there were a significant number of competitors both in terms of primary aggregates and, most significantly, recycled aggregates production sites. The proposed JV would continue to be constrained by these competitors in making sales to [✂] from these sites.

135. We considered the main parties' arguments and our views are the same as those for Agecroft. Whilst it may be the case that the plants and depots in this catchment area supply aggregates to Greater Manchester, there are many customer sites in the catchment area around Ashbury, which, in our view, could experience a reduction in competition if the JV went ahead. In this local area, the JV's share of production for primary aggregates would be high—[50–60] per cent. Its share for production of all aggregates would be much lower—[30–40] per cent. Taking all the factors into account—the locations of the quarries, the customer sites and the shares of all parties—we find this to be a problem area.

Area centred on Tarmac Bredbury depot (crushed rock; North-West)

136. Table 111 summarizes catchment area information; Tables 112 to 114 show the main parties' number of sites and shares of production in that local area for primary

aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 31, shows a map of the area.

TABLE 111 **Summary information for area centred on Tarmac Bredbury**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 112 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Bredbury—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 113 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Bredbury—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
1	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 114 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Bredbury—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

137. The main parties' views on Bredbury were the same as those for Agecroft and Ashbury. They submitted that these sites supplied aggregates to the [✂] in which there were a significant number of competitors both in terms of primary aggregates and, most significantly, recycled aggregates production sites. The proposed JV would continue to be constrained by these competitors in making sales to [✂] from these sites.

138. We considered the main parties' arguments and our views are the same as those for Agecroft and Ashbury. Whilst it may be the case that the plants and depots in this

catchment area supply aggregates to Greater Manchester, there are many customer sites in the catchment area around Bredbury, which, in our view, could experience a reduction in competition if the JV went ahead. In this local area, the JV's share of production for primary aggregates would be high—[40–50] per cent. Its share for production of all aggregates would be much lower—[20–30] per cent. Taking all the factors into account—the locations of the quarries, the customer sites and the shares of all parties—we find this to be a problem area.

Area centred on Tarmac Bury St Edmunds depot (crushed rock; East Anglia)

139. Table 115 summarizes catchment area information; Tables 116 to 118 show the main parties' number of sites and shares of production in that local area for primary aggregates, crushed rock aggregates, and all aggregates respectively. Annex 2, Figure 32, shows a map of the area.

TABLE 115 **Summary information for area centred on Tarmac Bury St Edmunds**

Filter	*Centre of radial*	*Radial miles*	*Market size, primary aggregates '000 tonnes*
Roadstone/Graded 40	Crushed rock; urban	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 116 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Bury St Edmunds—primary aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
4	2	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 117 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Bury St Edmunds—crushed rock**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
2	1	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

TABLE 118 **Lafarge and Tarmac number of sites and shares of production in area centred on Tarmac Bury St Edmunds—all aggregates**

Number of plants		*Shares of production (%)*		
Lafarge	*Tarmac*	*Lafarge*	*Tarmac*	*JV*
6	3	[✂]	[✂]	[✂]

Source: CC estimates based on main parties' and third parties' data.

140. The main parties submitted that there was a significant constraint on sub-base and graded sales from recycled aggregates which would continue to constrain the parties' activities within this radial post-JV.

141. We considered the main parties' arguments. We looked at the JV shares of production in primary aggregates, crushed rock aggregates and all aggregates. In this local area, the JVs share of production for primary aggregates is [30–40] per cent. Its share of production of all aggregates is lower at [20–30] per cent. Taking all the factors into account, we find this to be a problem area.

142. We therefore identified 23 problem areas for primary aggregates, 19 around plants and 4 around depots:

(a) the area centred on Tarmac Swansea Wharf site;

(b) the area centred on Tarmac Scorton Quarry;

(c) the area centred on Tarmac Ballidon Quarry;

(d) the area centred on Lafarge Cadeby site;

(e) the area centred on Tarmac Caldon Low;

(f) the area centred on Tarmac/Hanson MQP JV Cliffe Hill site;

(g) the area centred on Tarmac Clitheroe Bankfield Quarry;

(h) the area centred on Tarmac Coxhoe Quarry;

(i) the area centred on Tarmac Dene Quarry;

(j) the area centred on Lafarge Dowlow site;

(k) the area centred on Tarmac Hendre site;

(l) the area centred on Tarmac Holme Hall quarry;

(m) the area centred on Tarmac Mancetter quarry;

(n) the area centred on Lafarge Mountsorrel;

(o) the area centred on Tarmac Swinden Quarry;

(p) the area centred on Lafarge Thrislington;

(q) the area centred on Tarmac Tunstead Quarry;

(r) the area centred on Tarmac Wensley Quarry;

(s) the area centred on Lafarge Whitwell;

(t) the area centred on Tarmac Agecroft depot;

(u) the area centred on Lafarge Ashbury depot;

(v) the area centred on Tarmac Bredbury depot; and

(w) the area centred on Tarmac Bury St Edmunds depot.

Possible problem areas

Asphalt

TABLE 1 **Asphalt possible problem areas and filter which captured the area**

Possible problem area centred on	*Filter*
Higham	3 to 2
Wivenhoe	3 to 2

RMX

TABLE 2 **RMX possible problem areas and filter which captured the area**

Possible problem area centred on	*Filter*
Selby Concrete	2 to 1
Greenock Concrete	2 to 1
Scunthorpe	3 to 2
Greenock	3 to 2
Northallerton	3 to 2
Great Yarmouth	3 to 2
Dumbarton Concrete	3 to 2
Lincoln Concrete	3 to 2

Aggregates

TABLE 3 **Aggregates possible problem areas and filter which captured the area**

Problem area centered on	*Filter*
Briton Ferry	2 to 1
Swansea Wharf	3 to 2
Scorton Quarry	4 to 3
Ballidon Quarry	PCA: roadstone sub-base and graded (40mm max)
Cadeby	PCA: roadstone sub-base and graded (40mm max)
Caldon Low Quarry	PCA: roadstone sub-base and graded (40mm max)
Cardiff Wharf	PCA: roadstone sub-base and graded (40mm max)
Cliffe Hill	PCA: roadstone sub-base and graded (40mm max)
Clitheroe Bankfield Quarry	PCA: roadstone sub-base and graded (40mm max)
Cornelly Quarry	PCA: roadstone sub-base and graded (40mm max)
Coxhoe Quarry	PCA: roadstone sub-base and graded (40mm max)
Croxden Quarry	PCA: roadstone sub-base and graded (40mm max)
Dene Quarry	PCA: roadstone sub-base and graded (40mm max)
Dowlow	PCA: roadstone sub-base and graded (40mm max)
Dry Rigg	PCA: roadstone sub-base and graded (40mm max)
Ebchester Quarry	PCA: roadstone sub-base and graded (40mm max)
Ewenny	PCA: roadstone sub-base and graded (40mm max)
Graig	PCA: roadstone sub-base and graded (40mm max)
Hafod	PCA: roadstone sub-base and graded (40mm max)
Hendre Quarry	PCA: roadstone sub-base and graded (40mm max)
Hendy Quarry	PCA: roadstone sub-base and graded (40mm max)
Holme Hall Quarry	PCA: roadstone sub-base and graded (40mm max)
Leapers Wood Quarry	PCA: roadstone sub-base and graded (40mm max)
Llynclys Quarry	PCA: roadstone sub-base and graded (40mm max)
Mancetter Quarry	PCA: roadstone sub-base and graded (40mm max)
Mountsorrel	PCA: roadstone sub-base and graded (40mm max)
Newport Wharf	PCA: roadstone sub-base and graded (40mm max)
Pant Quarry	PCA: roadstone sub-base and graded (40mm max)
Sandside Quarry	PCA: roadstone sub-base and graded (40mm max)
Swansea Wharf	PCA: roadstone sub-base and graded (40mm max)
Swinden Quarry	PCA: roadstone sub-base and graded (40mm max)
Thrislington	PCA: roadstone sub-base and graded (40mm max)
Tunstead Quarry	PCA: roadstone sub-base and graded (40mm max)
Wensley Quarry	PCA: roadstone sub-base and graded (40mm max)
Whitwell	PCA: roadstone sub-base and graded (40mm max)
Agecroft depot	PCA: roadstone sub-base and graded (40mm max)
Ashbury	PCA: roadstone sub-base and graded (40mm max)
Bredbury depot	PCA: roadstone sub-base and graded (40mm max)
Bury St Edmunds depot	PCA: roadstone sub-base and graded (40mm max)
Higham depot	PCA: roadstone sub-base and graded (40mm max)

Note: Croxden Quarry, Ebchester Quarry, Cardiff Wharf, Newport Wharf do not produce either roadstone sub-base or graded (40 mm max) and were therefore not considered as problem areas. Swansea Wharf does not produce the two products either but is also captured by the '2 to 1' filter.

Problem areas and JV sites

Asphalt

TABLE 4 **Asphalt problem areas and Tarmac/Lafarge plants in these problem areas**

Problem area centred on	*Lafarge plants*	*Tarmac plants*
Higham	Higham Cambridge	Cavenham Asphalt
Wivenhoe	Wivenhoe	Bellhouse Asphalt Ipswich Asphalt 2

RMX

TABLE 5 **RMX problem areas and Tarmac/Lafarge plants in these problem areas**

Problem area centred on	*Lafarge plants*	*Tarmac plants*
Selby Concrete	Selby	Selby Concrete
Greenock Concrete	Greenock	Greenock Concrete
Scunthorpe	Scunthorpe	Scunthorpe Concrete
Greenock	Greenock	Greenock Concrete Dumbarton Concrete
Northallerton	Northallerton	Thirsk Concrete
Great Yarmouth	Great Yarmouth	Great Yarmouth
Lincoln Concrete	Whisby	Lincoln Concrete

Aggregates

TABLE 6 **Aggregates problem areas and Tarmac/Lafarge plants in these problem areas**

Problem areas centred on	*Lafarge plants*	*Tarmac plants*
Swansea Wharf	Briton Ferry Ewenny	Cornelly Quarry Hendy Quarry Pant Quarry Swansea Wharf Torcoed Quarry
Scorton Quarry	Marfield Thrislington	Cochranes Wharf Coxhoe Quarry Ellerton Quarry Nosterfield Quarry Scorton Quarry Wensley Quarry
Ballidon Quarry	Chaddesden Dowlow Lockington Swarkestone	Ballidon Quarry Bestwood Quarry Caldon Low Quarry Calverton Quarry Croxden Quarry Dene Quarry Eaton Hall Quarry Tunstead Quarry
Cadeby	Cadeby Finningley Methley Whitwell	Carlton Forest Quarry Holme Hall Quarry
Caldon Low Quarry	Alrewas Chaddesden Dowlow Swarkestone	Ballidon Quarry Caldon Low Quarry Croxden Quarry Dene Quarry Eaton Hall Quarry Tunstead Quarry
Cliffe Hill	Alrewas Brooksby Chaddesden Husbands Bosworth Lockington Mountsorrel Shawell Swarkestone	Cadeby Quarry Cliffe Hill Griff Hints Quarry Mancetter Quarry Meriden Quarry
Clitheroe Bankfield Quarry	Dry Rigg	Arcow Quarry Clitheroe Bankfield Quarry Leapers Wood Quarry Pilsworth Quarry Swinden Quarry
Coxhoe Quarry	Quarrington Merchanting Thrislington	Quarrington Merchanting Cochranes Wharf Coxhoe Quarry Ebchester Quarry Ellerton Quarry Howdon Quarry Scorton Quarry

Problem areas centred on	*Lafarge plants*	*Tarmac plants*
Dene Quarry	Chaddesden Dowlow Lockington Swarkestone Whitwell	Ballidon Quarry Bestwood Quarry Caldon Low Quarry Calverton Quarry Croxden Quarry Dene Quarry Tunstead Quarry
Dowlow	Alrewas Cadeby Chaddesden Dowlow Lockington Swarkestone Whitwell	Ballidon Quarry Bestwood Quarry Caldon Low Quarry Calverton Quarry Carlton Forest Quarry Crown Farm Quarry Croxden Quarry Dene Quarry Eaton Hall Quarry Fourways Quarry Holme Hall Quarry Pilsworth Quarry Tunstead Quarry
Hendre Quarry	Graig	Borras Quarry Bramley Moore Crown Farm Quarry Fourways Quarry Hendre Quarry
Holme Hall Quarry	Cadeby Finningley Methley Whitwell	Carlton Forest Quarry Holme Hall Quarry
Mancetter Quarry	Alrewas Husbands Bosworth Lockington Mountsorrel Shawell Swarkestone	Cadeby Quarry Cliffe Hill Griff Hints Quarry Mancetter Quarry Meriden Quarry
Mountsorrel	Brooksby Chaddesden Lockington Mountsorrel Swarkestone	Cadeby Quarry Cliffe Hill
Swinden Quarry	Dry Rigg Marfield	Arcow Quarry Clitheroe Bankfield Quarry Nosterfield Quarry Swinden Quarry Wensley Quarry
Thrislington	Quarrington Merchanting Thrislington	Quarrington Merchanting Cochranes Wharf Coxhoe Quarry
Tunstead Quarry	Dowlow	Ballidon Quarry Caldon Low Quarry Croxden Quarry Dene Quarry Eaton Hall Quarry Tunstead Quarry
Wensley Quarry	Dry Rigg Marfield	Arcow Quarry Ellerton Quarry Nosterfield Quarry Scorton Quarry Swinden Quarry Wensley Quarry
Whitwell	Besthorpe Cadeby Chaddesden Dowlow Finningley Lockington Methley Swarkestone Whisby Whitwell	Ballidon Quarry Bestwood Quarry Caldon Low Quarry Calverton Quarry Carlton Forest Quarry Dene Quarry Holme Hall Quarry Langford Quarry Tunstead Quarry
Agecroft depot	Ashbury depot	Agecroft depot Bredbury depot Pilsworth Quarry
Ashbury depot	Ashbury depot	Agecroft depot Bredbury depot

Problem areas centred on	*Lafarge plants*	*Tarmac plants*
Bredbury depot	Ashbury depot	Agecroft depot Bredbury depot
Bury St Edmunds depot	Barham Barham depot Cambridge (Chesterton) Higham (Kennett)	Bury St Edmunds depot Ingham Quarry

Maps of possible problem areas

FIGURE 1

Area centred on Lafarge Higham plant (East Anglia)

[✂]

Source: CC analysis.

FIGURE 2

Area centred on Lafarge Wivenhoe plant (South-East)

[✂]

Source: CC analysis.

FIGURE 3

Area centred on Tarmac Greenock Concrete plant (Scotland)

[✂]

Source: CC analysis.

FIGURE 4

Area centred on Lafarge Greenock plant (Scotland)

[✂]

Source: CC analysis.

FIGURE 5

Area centred on Tarmac Selby Concrete plant (Yorkshire & Humberside)

[✂]

Source: CC analysis.

FIGURE 6

Area centred on Tarmac Lincoln Concrete plant (East Midlands)

[✂]

Source: CC analysis.

FIGURE 7

Area centred on Lafarge Scunthorpe plant (Yorkshire & Humberside)

[✄]

Source: CC analysis.

FIGURE 8

Area centred on Lafarge Northallerton plant (Yorkshire & Humberside)

[✄]

Source: CC analysis.

FIGURE 9

Area centred on JV Tarmac/Carter Great Yarmouth plant (East Anglia)

[✄]

Source: CC analysis.

FIGURE 10

Area centred on Tarmac Swansea Wharf site (sand and gravel; Wales)

[✄]

Source: CC analysis.

FIGURE 11

Area centred on Tarmac Scorton Quarry (sand and gravel; Yorkshire & Humberside)

[✄]

Source: CC analysis.

FIGURE 12

Area centred on Tarmac Ballidon Quarry (crushed rock; East Midlands)

[✄]

Source: CC analysis.

FIGURE 13

Area centred on Lafarge Cadeby site (crushed rock; Yorkshire & Humberside)

[✄]

Source: CC analysis.

FIGURE 14

Area centred on Tarmac Caldon Low Quarry (crushed rock; West Midlands)

[✄]

Source: CC analysis.

FIGURE 15

Area centred on Tarmac/Hanson MQP JV Cliffe Hill site (crushed rock; East Midlands)

[✄]

Source: CC analysis.

FIGURE 16

Area centred on Tarmac Clitheroe Bankfield Quarry (crushed rock; North-West)

[✄]

Source: CC analysis.

FIGURE 17

Area centred on Tarmac Coxhoe Quarry (crushed rock; North)

[✄]

Source: CC analysis.

FIGURE 18

Area centred on Tarmac Dene Quarry (crushed rock; East Midlands)

[✄]

Source: CC analysis.

FIGURE 19

Area centred on Lafarge Dowlow site (crushed rock; East Midlands)

[✄]

Source: CC analysis.

FIGURE 20

Area centred on Tarmac Hendre site (crushed rock; Wales)

[✄]

Source: CC analysis.

FIGURE 21

Area centred on Tarmac Holme Hall quarry (crushed rock; Yorkshire & Humberside)

[✂]

Source: CC analysis.

FIGURE 22

Area centred on Tarmac Mancetter quarry (crushed rock; West Midlands)

[✂]

Source: CC analysis.

FIGURE 23

Area centred on Lafarge Mountsorrel (crushed rock; East Midlands)

[✂]

Source: CC analysis.

FIGURE 24

Area centred on Tarmac Swinden Quarry (crushed rock; Yorkshire & Humberside)

[✂]

Source: CC analysis.

FIGURE 25

Area centred on Lafarge Thrislington (crushed rock; Yorkshire & Humberside)

[✂]

Source: CC analysis.

FIGURE 26

Area centred on Tarmac Tunstead Quarry (crushed rock; East Midlands)

[✂]

Source: CC analysis.

FIGURE 27

Area centred on Tarmac Wensley Quarry (crushed rock; Yorkshire & Humberside)

[✂]

Source: CC analysis.

FIGURE 28

Area centred on Lafarge Whitwell (crushed rock; East Midlands)

[✂]

Source: CC analysis.

FIGURE 29

Area centred on Tarmac Agecroft depot (crushed rock; North West)

[✂]

Source: CC analysis.

FIGURE 30

Area centred on Lafarge Ashbury depot (crushed rock; North West)

[✂]

Source: CC analysis.

FIGURE 31

Area centred on Tarmac Bredbury depot (crushed rock; North West)

[✂]

Source: CC analysis.

FIGURE 32

Area centred on Tarmac Bury St Edmunds depot (crushed rock; East Anglia)

[✂]

Source: CC analysis.

FIGURE 33

Legend for maps centred on asphalt plants

[✂]

Source: CC analysis.

FIGURE 34

Legend for maps centred on RMX plants

[✂]

Source: CC analysis.

FIGURE 35

Legend for maps centred on aggregates plants

[✂]

Source: CC analysis.

APPENDIX J

Supporting material for unilateral effects assessment in bagged cement, rail ballast and high purity limestone

Introduction

1. In this appendix we present evidence to support our unilateral effects assessment in relation to:

   (a) bagged cement;

   (b) rail ballast, in particular:

      (i) Network Rail's views on the proposed JV; and

      (ii) location of production sites and depots for rail ballast; and

   (c) high purity limestone:

      (i) market conditions;

      (ii) competitive effects for FGD applications;

      (iii) competitive effects for non-FGD applications; and

      (iv) location of production sites for HPL.

Bagged cement

2. Table 1 shows the total sales of bagged cement of each of the UK cement producers for the years 2008 to 2010.

TABLE 1 **Total Great Britain sales of bagged cement by the majors**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Transaction data from Lafarge, Anglo American, Cemex and Hanson.

3. Table 2 shows the relative shares of supply of UK-produced bagged cement.

TABLE 2 **Relative shares for the supply of UK-produced bagged cement**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*
2008	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]

Source: Transaction data from Lafarge, Anglo American, Cemex and Hanson.

Rail ballast

Network Rail's view

Loss of existing competition

4. Network Rail has just concluded a competitive tender process for the next five-year period and provided us with details of the tender. There were seven pre-qualified bids. The assessment criteria were based 90 per cent on delivered price; 10 per cent on environmental and sustainability requirements; and a number of pass/fail criteria. Overall, the most important considerations to Network Rail were the following:

(a) specification of the product; and

(b) the ex-works price and costs of delivery.[1]

5. Network Rail indicated that, in terms of ex-works price, the cheapest bid was around £[✂] a tonne excluding the aggregate levy [✂], and the most expensive [✂]. Based on tender analysis, the average delivery cost for delivery by rail was around £[✂] a tonne and for delivery by road it was around £[✂] a tonne. Differences in delivered prices are due to the different transport modes used (rail versus road) as well as the location of the quarry compared with the area where the product has to be used.[2]

[1] Network Rail told us that it used rail-connected quarries and road-connected quarries and that the use of quarries was determined by reference to the product specification required and the value for money offered in terms of the ex-works price and costs of delivery to site. Transportation costs to point of use were an important consideration: where large volumes were required, generally it will be cheaper to use rail-connected facilities, but this was not always possible so road transportation was also used.

[2] By way of example, Network Rail told us that the price quoted by [✂] for a supply via [✂] into the South of England was [✂] than the price quoted for a supply from its quarry at [✂], although the two quarries were likely to be equally efficient.

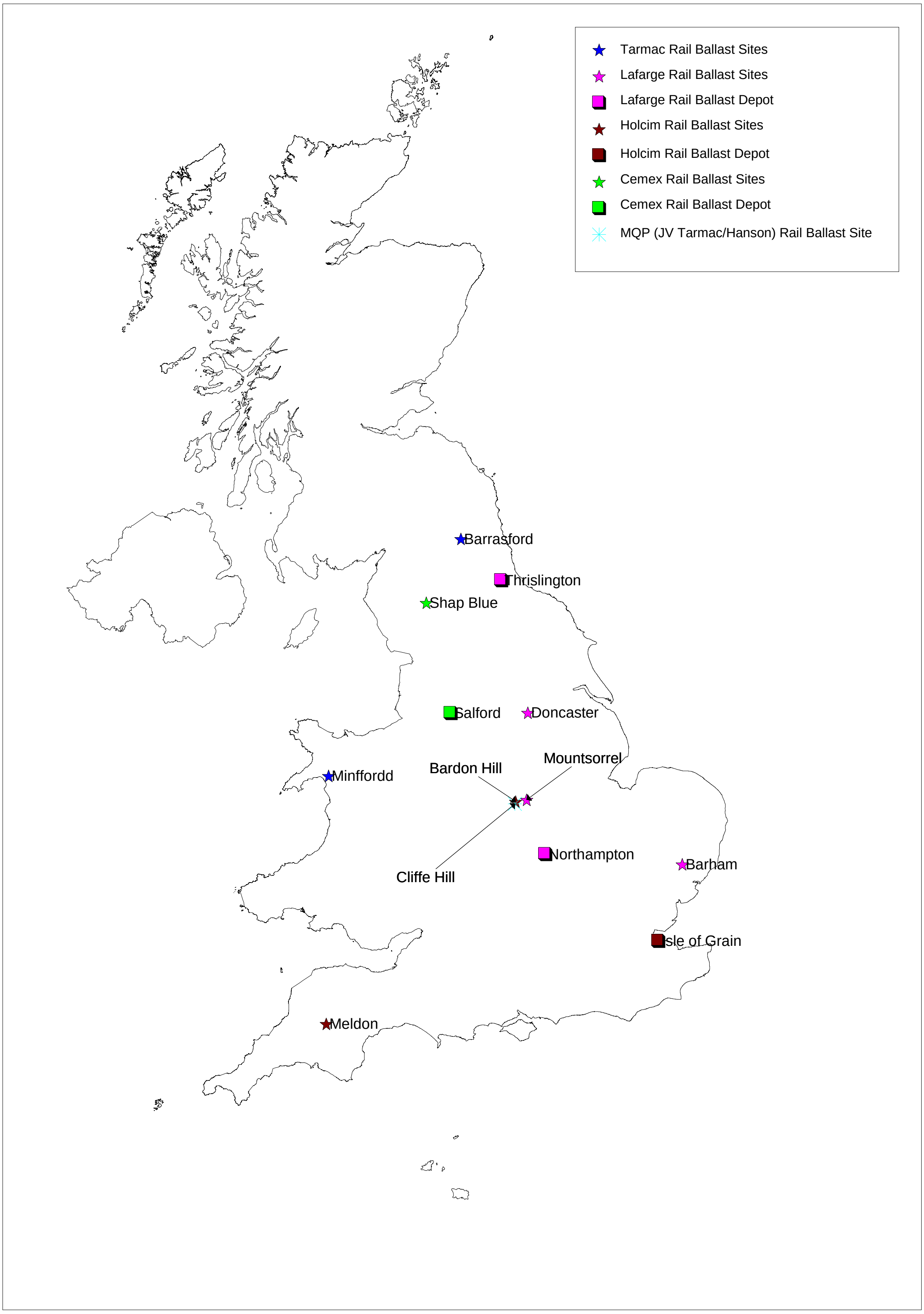
6. Network Rail explained that its recent tender process concluded in the award of '5-year framework contracts', with zero volume commitment and prices indexed to the RPI, between Network Rail and a number of suppliers. This means that the volumes agreed upon were forecasts but Network Rail had the ability to replan over the terms of the contracts as its demand varied.

Locations of production sites and depots for Rail Ballast

7. Figure 1 shows the rail ballast production sites of Lafarge, MQP, Tarmac, Holcim/ Aggregate Industries and Cemex.

FIGURE 1

Locations of production sites and depots for rail ballast



Source: CC based on main and third parties.
Note: Due to small volumes, Tarmac's Park Quarry is not included on the map.

High purity limestone

Market conditions

8. Table 3 shows the market shares estimated by the main parties for HPL in Great Britain in 2009 whilst Table 4 shows Anglo's estimates for 2010. In relation to these estimates, we note that some of the suppliers listed in the table are suppliers of limestone powders rather than HPL.

TABLE 3 **Main parties' estimates of market shares for HPL in Great Britain in 2009**

Company	*Volume '000 tonnes*	*Share of supply %*
Tarmac ([✂])	[✂]	[✂]
Singleton Birch (sinter)	[✂]	[✂]
Hanson (sinter & powders)	[✂]	[✂]
Tata (sinter)	[✂]	[✂]
Omya (powders)	[✂]	[✂]
Longcliffe (powders)	[✂]	[✂]
Lafarge	[✂]	[✂]
Cemex (sugar)	[✂]	[✂]
Ben Bennett (powders)	[✂]	[✂]
Other limestone powder producers (powders)	[✂]	[✂]
Total	[✂]	[✂]

Source: Main parties.

*Volume of limestone powder produced by Omya from the semi-processed limestone supplied by Lafarge and others.

TABLE 4 **Anglo American's estimates of market shares for HPL in Great Britain in 2010**

Company	*Volume '000 tonnes*	*Share of supply %*
Tarmac ([✂])	[✂]	[✂]
Singleton Birch (sinter)	[✂]	[✂]
Hanson (sinter & powders)	[✂]	[✂]
Tata (sinter)	[✂]	[✂]
Omya (powders)	[✂]	[✂]
Longcliffe (powders)	[✂]	[✂]
Lafarge	[✂]	[✂]
Cemex (sugar)	[✂]	[✂]
Ben Bennett (powders)	[✂]	[✂]
Other limestone powder producers (powders)	[✂]	[✂]
Total	[✂]	[✂]

Source: Anglo American.

9. Table 5 shows the volumes and value of sales of HPL for flue gas desulphurization (FGD), for Tarmac and Lafarge, by customer in 2010.

TABLE 5 **Main parties' customers for HPL for FGD, 2010**

Supplier	*Customer*	*Sales to customer 2010 Volume (tonnes)*	*Sales to customer 2010 Value (£)*
Tarmac	RugeleyPower Ltd	[✂]	[✂]
	E.ON	[✂]	[✂]
	Drax Power	[✂]	[✂]
	Keadby Generation Ltd	[✂]	[✂]
	Eggborough Power Ltd	[✂]	[✂]
	EDF Energy	[✂]	[✂]
Lafarge	EDF Energy	[✂]	[✂]
	Eggborough Power Ltd	[✂]	[✂]
	Lafarge Plasterboard Ltd (SSE Ferrybridge)	[✂]	[✂]

Source: Main parties.

Note: Lafarge has not supplied Eggborough Power Station since March 2010.

Competitive effects for FGD application

Third party views

Loss of existing competition

10. Table 6 presents information on customers' latest tenders.

TABLE 6 **Summary of contract information**

	Length of contract	*Whether contract has a renewal option and, if so, for how long*	*Identity of bidders*	*Winning bid*	*Closeness of bids*
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: [✂].

11. Eggborough Power told us that, in the last tender it issued in 2009, the [✂] and that these were the only suppliers it was aware of that could supply HPL to the required specification by rail. [✂] told us that its agreement with [✂] was the result of a single tender action direct to Tarmac as no other quarry had rail links at that time. [✂] also indicated that benchmarking of costs and rail availability had recently been done in 2011, again with the same outcome of restricted rail transportation, but there was a potential for this to change after 2013 providing other supplier investment plans were

realized. SSE told us that Lafarge and Tarmac were the major UK producers and that contracts were set up at the time of the FGD installation with both Lafarge and Tarmac to guarantee security of supply. E.ON told us that it asked for quotes from Tarmac, Lafarge and Hanson. However, it also noted that it needed to source HPL for the plant at Ratcliffe from a supplier within a reasonable distance of the plant and that only Tarmac and Lafarge could currently offer acceptable prices.

12. Eggborough Power provided detailed information about the last tender it issued in 2009. In that tender [✂]. Technical specification and the ability to deliver by rail were considered on a pass/fail basis, so subject to this, the contract was awarded 100 per cent based on price. [✂]

13. As regards the technical specification, SSE told us that FGD systems were set up and designed around the limestone specification and that any change in this specification would require substantial pre-sampling and testing before any change could possibly be implemented. Eggborough Power told us that early in 2003, when this process was introduced, there was some consideration given to using limestone powder from Singleton-Birch, but that was dismissed for a number of reasons, not the least of which was the ability to transport it to site, and that the consequent plant investment was done specifically for the use of HPL. E.ON told us that the design of the plant and its technical specification did not allow for the use of different grades or types of HPL, and a similar view was expressed by [✂].

14. Table 7 illustrates customers' views as to who potential suppliers are.

TABLE 7 **Customers' views on who potential suppliers are**

	Which are the suppliers of HPL you would consider now if you had to renegotiate your contract?
[✂]	[✂]
E.ON	[✂]
Rugeley Power	[✂]
Eggborough Power	[✂]
SSE	[✂]

Source: Third parties.

15. Hanson told us that it did not supply HPL for FGD uses and had not done so for many years. Cemex told us that it did not currently supply HPL for FDG but had tendered to supply HPL for FGD in [✂] instances: [✂].

16. Eggborough Power expressed a serious concern that the number of potential suppliers will fall from three to two following the JV, with the consequence that it will be easier for each competitor to second-guess the actions of the other competitor in a tender process. E.ON told us that the only suppliers that could offer it a competitive price (due to distance from the power station) were Tarmac and Lafarge and that, therefore, the proposed JV would have a significant detrimental effect on competition. SSE considered that there were a very limited number of UK suppliers, Lafarge and Tarmac being the major ones, and that the proposed JV would leave the main source of competition to imports, which were more expensive due to transport costs.

Demand of HPL for FGD and negotiating power

17. Demand of HPL for FGD uses depends on power generation and the sulphur content of the different coals used and is therefore largely unpredictable. Contracts may or may not have a minimum volume requirement: for example, [✂] contract with [✂] does not have any minimum volume requirement and the supplier has to supply the volume required, while [✂] contract includes a 'minimum take' clause. [✂] told us that the 'minimum take' clause made its residual demand above the minimum take unpredictable and less attractive for alternative suppliers.

18. [✂]

19. [✂] told us that when it was asked for a price increase it tried to find a different supplier for benchmarking purposes. [✂] said that other suppliers, although competitive in price, were unable to deliver the large quantities required by rail, and that it had attempted to negotiate on price to defeat the price increase, but with no success.

20. Potential competition might come from limestone powder producers (such as Longcliffe, Singleton Birch and Ben Bennett) and imports. Eggborough Power told us that it would consider Singleton Birch if it built a rail connection.

21. When asked whether limestone powders could be used as a substitute for HPL in the FGD process, respondents told us that this substitution was not possible/would entail substantial costs. E.ON considered that this substitution was not possible as the FGD plant had been designed to use limestone slurry as an input. SSE told us that limestone powders were used during commissioning of the FGD plant, but this was a very temporary set-up and any more permanent use would require substantial capital investment. Eggborough Power, while considering that limestone powders could be used, told us that this would require some materials handling changes.

22. In relation to imports, E.ON and SSE noted that HPL imports, due to higher transport costs, were more expensive and non-economic.

Competitive effects for non-FGD applications

23. Tata Steel buys chemical stone as an input to steel and iron manufacture. [✂] Tata Steel did not have any concerns regarding the effect of the JV on its supply of chemical stone.

24. Customers who buy chemical stone as an input to animal feed production told us that the competitive environment would not be damaged by the JV. The reasons given were that there were several suppliers available to them and that previous price negotiations had been successful. None had purchased the product from Lafarge.[3]

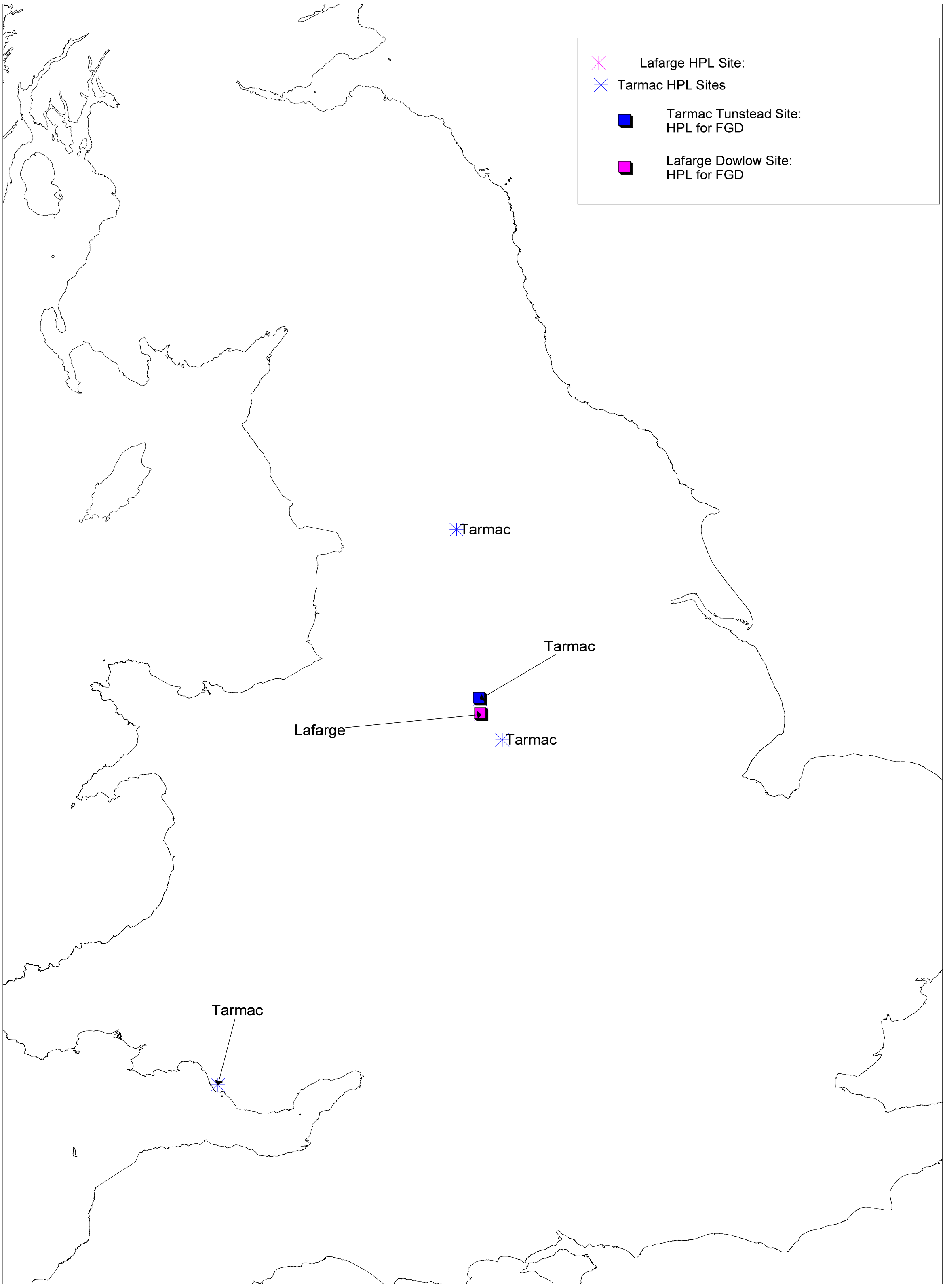
Location of production sites for HPL

25. Figure 2 shows the location of Lafarge and Tarmac production sites of HPL; and Figure 3 shows the location of Lafarge, Tarmac and Cemex production sites of HPL for FGD as well as the location of the main parties' FGD customers.

[3] [✂] According to evidence from Tarmac and Lafarge, it appears that (although certain types of limestone make particularly desirable agricultural lime for certain applications), there are many alternative suppliers of agricultural lime. Some agricultural lime comes from HPL quarries and some from limestone (or chalk) quarries producing limestone of a lesser calcium carbonate content. There is no formal chemical specification for agricultural lime. Lafarge and Tarmac each have only of the order of 10 per cent share of supply of agricultural lime in the UK. Overall, we did not consider that there were likely to be competition concerns in relation to agricultural lime specifically.

FIGURE 2

Location of Lafarge and Tarmac HPL production sites (including those for FGD)



Source: Main parties.

FIGURE 3

Location of production sites of HPL for FGD and of Lafarge's and Tarmac's FGD customers

[✂]

Source: Main parties.
Note: [✂].

Cement market shares and capacity over time

Introduction

1. In this appendix, we present data on the relative shares of sales and production of cement, and production capacity of the UK major cement producers over time. We also present, in Annex 2, a timeline showing the ownership structure in the UK cement industry over the last 20 years.

Market shares over time

2. In this section we provide evidence on the relative shares of the major UK cement producers for cement production and sales. The shares presented in this appendix do not take into account sales of cement by independent importers and therefore these are not proper market shares. Our analysis of the constraint from importers, and the market shares taking into account imports by independent importers, are presented in Appendix Q.

3. The reason for presenting data excluding imports here is that we are interested in the shares of production and sales of the majors relative to each-other, to find out whether the majors have managed to maintain stable shares relative to each-other (which could be indicative of some market sharing arrangements), or, if not, to find out which cement producers have been successful at increasing volumes relative to the others.

4. We have two sources of data on production and sales of cement:

   (a) total Great Britain cement production by each major, 2001 to 2010; and

   (b) transaction data on cement sales by each major. We have data for the years 2007 to 2010 for Lafarge and Tarmac, and for 2008 to 2010 for Cemex, Hanson and Aggregate Industries. Therefore we can calculate relative shares of cement

sales (not including independent importers) of the majors for the years 2008 to 2010.

Total production shares

5. Table 1 below presents the total volumes of cement produced by Lafarge, Tarmac, Hanson and Cemex in Great Britain, 2001 to 2010. Table 2 presents the shares of each of these companies relative to each other based on total Great Britain production. Aggregate Industries is not included in this table as it does not produce cement in the UK.

6. These are shares of production and therefore they include production for each major's own use (internal sales). We see that Lafarge's and Hanson's shares of production have reduced over the period, with Lafarge losing [✂] percentage points of share in ten years, and Hanson losing [✂] percentage points in ten years. The share of Great Britain production of Tarmac and Cemex has increased.

TABLE 1 **Total Great Britain production of cement, 2001 to 2010**

tonnes

	Hanson	*Cemex*	*Tarmac*	*Lafarge**	*Total production*
2001	[✂]	[✂]	[✂]	[✂]	[✂]
2002	[✂]	[✂]	[✂]	[✂]	[✂]
2003	[✂]	[✂]	[✂]	[✂]	[✂]
2004	[✂]	[✂]	[✂]	[✂]	[✂]
2005	[✂]	[✂]	[✂]	[✂]	[✂]
2006	[✂]	[✂]	[✂]	[✂]	[✂]
2007	[✂]	[✂]	[✂]	[✂]	[✂]
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Hanson, Cemex, Tarmac and Lafarge.

*Lafarge Great Britain production was calculated as total UK production but excluding production of cement at Cookstown (Northern Ireland).

TABLE 2 **Shares of Great Britain production of cement, 2001 to 2010**

per cent

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

Source: CC, based on data on cement production provided by the main parties and other majors.

7. The main parties and Cemex told us that there was substantial asymmetry in market shares and in production capacity, which were likely to give rise to differences in the incentives of the Great Britain cement producers in relation to coordination. We agree that asymmetry in market shares, in itself, would make coordination less likely, though we note that much of the difference in market shares is likely to be explained by the fact that the different producers do not have the same number of cement plants and therefore different total capacity, rather than large imbalances in amounts of spare capacity or costs differences which are more relevant factors to assess likelihood of coordination.[1]

Total sales

8. In Table 3 we present the sales of cement of the majors based on their total sales of cement for 2008, 2009 and 2010.[2,3] In Table 4 we present the relative shares of sales of cement of the majors based on total sales of cement for 2008, 2009 and 2010.

[1] See final report by Ivaldi, Jullien, Rey, Seabright and Tirole for the DG Competition on The Economics of Tacit Collusion (March 2003).

[2] All market shares in the following are calculated by volume (tonnes sold). Market shares by value may be misleading because of the existence of internal sales (where the price may reflect internal transfer policies rather than real transaction value). Moreover, sales values include transport costs which may also bias results.

[3] All the sales and market shares below are based on total UK sales, rather than Great Britain. This is unlikely to make a large difference to results given that Northern Ireland represents about 10 per cent of total UK production. However, because Lafarge is the only Northern Ireland producer, the UK shares will tend to overestimate Lafarge's Great Britain sales (and underestimate the share of the other majors).

TABLE 3 **Total sales of cement**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*	*Total*
2008	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]
2009	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]
2010	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]

Source: Parties' transactions data.

TABLE 4 **Relative shares of the majors—total sales of cement**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*
2008	[✄]	[✄]	[✄]	[✄]	[✄]
2009	[✄]	[✄]	[✄]	[✄]	[✄]
2010	[✄]	[✄]	[✄]	[✄]	[✄]

Source: Parties' transactions data.

Note: Aggregate Industries' sales are only for CEM I.

9. We see that in terms of total sales, the majors' relative market shares exhibit some small variations from year to year, with a reduction of Lafarge's share by [✄] in 2009, and an increase in both Tarmac and Cemex shares in that year. Lafarge's total share varies from [✄] to [✄] per cent, Tarmac's from [✄] to [✄] per cent, Cemex's from [✄] to [✄] per cent and Hanson's from [✄] to [✄] per cent. Aggregate Industries' share is between [✄] and [✄] per cent.

10. Lafarge and Tarmac told us that calculating market shares on the basis of total sales, ie including both internal and external sales and including both bulk and bagged sales, was inappropriate in the context of a coordinated effects analysis for the following reasons. First, the theory of harm related to the supply of cement to customers that were not part of the alleged coordination group—it follows that the CC should consider the shares of supply of external bulk cement to non-majors. We do not agree with this interpretation, and as set out in paragraph 6.2 of the provisional findings, our theory of harm was not limited to the supply of cement to particular types of customer. Rather, as set out in paragraph 6.120 of the provisional findings, it seemed likely that any pre-existing coordination would affect all cement customers—

whether these were independent or part of one of the majors. Second, Lafarge and Tarmac told us that it was critical also to include importers in the calculation of market shares relevant to the CC's coordinated effects theory of harm—indeed, importers were strong in this channel and certainly far more important than Tarmac. We analyse the constraint on the UK cement producers from importers in Appendix Q; in this appendix our focus is on the share of the major UK cement suppliers relative to each other, as set out above.

11. Lafarge and Tarmac also told us that the CC had incorrectly examined the combined sales of two products, bulk and bagged cement, in its shares of supply analysis because the CC had elsewhere considered that they belonged to different markets. As a result, they told us that bulk and bagged cement shares should be calculated separately. We note in this regard that we also calculate bagged and bulk cement shares separately in Tables 8 to 13 below. However, even if bagged and bulk cement are in separate product markets because of lack of demand-side substitution, we note that bulk cement is an input to bagged cement and therefore that from the point of view of UK bulk cement producers, it may be relevant to look at combined market shares for bulk and bagged cement.

Total external sales

12. We also calculated the shares of the UK producers for external sales from 2008 to 2010; these are reproduced in Table 6, as well as shares of the UK producers of external sales to independent customers (Table 7). These show that Lafarge has maintained a stable share of external sales and external sales to independent customers in 2008 to 2010. Cemex's share of external sales increased by [✄] percentage points in 2009 (and its share of external sales to independent customers increased by [✄] percentage points in 2009). Hanson's share of external sales dropped by [✄] percentage points in 2009, and its share of sales to independent

customers dropped less. Between 2009 and 2010 external sales shares, and external shares to independent customers, were stable. We think that the changes in 2009 were a consequence of large repatriation by Hanson.

TABLE 5 **External total sales of cement**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

Note: Aggregate Industries sales are only for CEM I.

TABLE 6 **Relative shares—external sales only**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

Note: Aggregate Industries' sales are only for CEM I.

TABLE 7 **Relative shares—external sales to independent customers only**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CC analysis of sales data from main parties and other majors.

Note: Totals differ from 100 per cent due to rounding.

13. In what follows we break the shares down by product category. To make the data comparable across majors we put in the category 'Other than CEM I' all kinds of bulk cement other than CEM I.

14. We therefore report market shares for bulk CEM I sales, for sales of bulk cement other than CEM I, and for packed cement. Overall about half of sales by volume are

CEM I, 25 to 30 per cent are CEM II and III, and 20 to 25 per cent are packed cement sales.

Total sales by product—including internal sales

15. We first look at total sales by product. Table 8 shows total sales for bulk CEM I for each of the majors and Table 9 shows their relative market shares.

TABLE 8 **Total sales for bulk CEM I**

tonnes

CEM I	*Lafarge*	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

TABLE 9 **Relative market shares of total sales—bulk CEM I**

per cent

CEM I	*Lafarge*	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

16. Regarding total CEM I sales there are variations over time, with Lafarge's share falling from [✂] per cent in 2008 to [✂] per cent in 2010, and Tarmac's share increasing from [✂] to [✂] per cent in the same time. Cemex's share varies between [✂] and [✂] per cent while Hanson's share increased from [✂] per cent in 2008 to [✂] per cent in 2010. Aggregate Industries' share of UK sales of CEM I is [✂].

TABLE 10 **Total sales—bulk cement other than CEM I**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

TABLE 11 **Relative market shares of total sales—bulk cement other than CEM I**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*
2008	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

17. Regarding bulk cement products other than CEM I (Tables 10 and 11), we see that Lafarge here has the highest share compared to the rest of the majors and this has reduced from [✂] per cent in 2008 to [✂] per cent in 2010. Cemex [✂] its share of CEM II/ III types in the same period while Hanson's share fluctuated between [✂] and [✂] per cent over these three years. Tarmac's sales of CEM II/III were [✂].

18. Looking at packed cement[4] in Tables 12 and 13, Lafarge has the largest share varying between [✂] and [✂] per cent. Tarmac's share is only between [✂] and [✂] per cent. Cemex's share of packed cement sales is [✂] per cent in 2008 and [✂] per cent for 2009 to 2010 while Hanson's share varies between [✂] and [✂] per cent.

TABLE 12 **Total sales—packed cement**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

[4] Tarmac's transactions data reported packed cement transactions in bags as opposed to tonnes like other majors did. In order to make the data comparable we converted these numbers into tonnes. The table reports the results using tonnes as the unit of measure.

TABLE 13 **Relative shares of total sales—packed cement**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*
2008	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

Total external sales by product

19. As before, we exclude internal sales and look at the shares of sales for each product separately.

TABLE 14 **Total external sales for bulk CEM I**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

TABLE 15 **Relative shares of external sales—bulk CEM I**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Aggregate Industries*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

20. Regarding CEM I transactions Lafarge has the largest share of external sales, varying between [✂] and [✂] per cent over time. Hanson is the second largest with a relative market share between [✂] and [✂] per cent over the three years. Tarmac's share is [✂] between [✂] and [✂] per cent while Cemex's share is between [✂] and [✂] per cent. Aggregate Industries' share of external sales of CEM I is [✂].

TABLE 16 **Total external sales—bulk cement other than CEM I**

tonnes

	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

TABLE 17 **Relative shares of external sales—bulk cement other than CEM I**

per cent

	Lafarge	*Tarmac*	*Cemex*	*Hanson*
2008	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

21. As with the total sales (including internal transactions), Lafarge has the largest relative share which lies between [✂] and [✂] per cent over time for 'other than CEM I' sales. Hanson's share fluctuates between [✂] and [✂] per cent. Cemex's share of external sales [✂] from [✂] per cent in 2008 to [✂] per cent in 2010 while Tarmac's share is [✂] per cent for all three years.

22. The main parties told us that the tables on external bulk sales split by CEM I and other than CEM I show a clear asymmetry in portfolios among the majors, which is a factor that makes coordination harder. We do not agree that the asymmetry in portfolio necessarily makes coordination harder. We thought that it could go the other way, and facilitate coordination by enabling majors to engage in some sort of customer allocations based on the types of products (CEM I/CEM II/CEM III) which are needed by the different customers.

TABLE 18 **Total external sales—packed cement**

					tonnes
	Lafarge	*Tarmac*	*Cemex*	*Hanson*	*Total*
2008	[✂]	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

TABLE 19 **Relative shares of external sales—packed cement**

				per cent
	Lafarge	*Tarmac*	*Cemex*	*Hanson*
2008	[✂]	[✂]	[✂]	[✂]
2009	[✂]	[✂]	[✂]	[✂]
2010	[✂]	[✂]	[✂]	[✂]

Source: Parties' transactions data.

23. Finally, regarding packed cement (Table 19), Lafarge's share is relatively constant over time, increasing from [✂] per cent in 2008 to [✂] per cent in 2010. Cemex's and Hanson's shares vary around [✂] (an [✂] from [✂] to [✂] per cent for Cemex and a decrease from [✂] to [✂] per cent for Hanson). Tarmac's share is [✂] and relatively constant [✂] to [✂] per cent.

24. Overall we observe that there has been some variation in the majors' relative shares of cement sales and production over time. Between 2001 and 2010, Lafarge and Hanson have been losing share of total production, and Tarmac and Cemex have increased their share over time.

25. In terms of shares by product, Lafarge is the largest seller of CEM I, followed by Hanson and Cemex. When we exclude internal sales, the relative shares of [✂] and [✂] increase while those of [✂] and [✂] drop.

26. Looking at external sales only, Lafarge accounts for almost [✂] of all CEM I external sales, followed then by Hanson and Cemex. When looking at cement other than

CEM I, then Lafarge has an even larger relative market share between [✂] and [✂] per cent.

27. For packed cement, Lafarge is by far the market leader, with a share of around [✂] per cent.

Capacity and capacity utilization

Data

28. We asked the majors for data on their total capacity for cement production over time, and capacity utilization. Here we report the data on capacity and utilization for each major.

29. Note that there is no unique measure of capacity for cement, and that the factors limiting production may differ by plant and/or producer. For these reasons, it is not always possible to directly compare levels of capacity and amounts of spare capacity across different plants and suppliers, and any comparisons in this paper between producers on capacity utilization ratios and overall capacity should therefore be interpreted with caution and as indicators of magnitudes of the differences or similarities rather than precise estimates.

Cemex

30. Over the period 2001 to 2011, Cemex has had a total of five cement plants, though two of them are currently inactive:

(a) Rugby (kiln and grinding station);

(b) South Ferriby (kilns, [✂], and grinding capability);

(c) Barrington: This plant was decommissioned in [✂];

(d) Rochester: the plant was closed and decommissioned, and part of the site was sold in 2010; and

(e) Tilbury: it was only used as a terminal prior to 2009. In May 2009 a new cement mill started operating at Tilbury (grinding capability).

31. Table 20 shows the total cement capacity of each of Cemex's plants in 2010. Rugby is by far Cemex's largest plant in terms of capacity, followed by South Ferriby. Cemex's total cement capacity in 2010 was [✄]Mt of cement a year.

TABLE 20 **Cemex cement plants—total cement capacity in 2010**

	Total cement capacity tonnes
Rugby	[✄]
South Ferriby	[✄]
Barrington	[✄]
Rochester	[✄]
Tilbury	[✄]
Total	[✄]

Source: Cemex.

32. Regarding the measurement of capacity, Cemex told us that, until recently, capacity for a CEM I plant depended on the amount of clinker that could be produced in the kilns. However, dependent on the ratio of external inputs, such as PFA and GGBS, the maximum theoretical output of a plant can now be increased, even if no physical changes are made to it and clinker volumes remain the same.[5] For the Rugby and South Ferriby plants (producing mainly CEM I), total capacity was driven for the most part by the amount of clinker that could be produced in the kilns (ie kiln capacity). For Tilbury, which was a grinding station and did not have a kiln, total capacity was driven by milling capacity.

33. Figure 1 shows Cemex's total production of cement, and total spare capacity, in each year from 2001 to 2010 (total capacity being equal to the sum of production and spare capacity). Overall cement capacity [✄].

[5] Cemex told us that this was not strictly correct: hoppers and storage equipment must be installed for PFA or GGBS as required.

34. In every year shown, Cemex had spare cement capacity, [✄]. Figure 2 shows the average capacity utilization for all sites. 2007 was the year with [✄]; since 2008, and in particular in 2009, utilization has been [✄].

FIGURE 1

Cemex cement production and spare capacity, 2001 to 2010

[✄]

Source: Cemex.

FIGURE 2

Cemex capacity utilization, 2001 to 2011

[✄]

Source: Cemex.

Tarmac

35. Tarmac has a single cement plant in Buxton, with total production capacity of [✄] tonnes of cement a year. Figure 3 shows Tarmac's total bulk cement production, and spare capacity, in every year between 2001 and 2010 (with the sum of the two being equal to total cement capacity).

36. As Figure 3 shows Tarmac increased cement capacity twice during the period:

(a) In March 2004, a new cement plant was built, replacing the old wet system plant which was closed.

(b) In April 2008, Tarmac told us that it invested £[✄] million to increase capacity from [✄] tonnes a year to [✄] a year.

FIGURE 3

Tarmac cement production and spare capacity, 2001 to 2010

[✄]

Source: Anglo American.

37. Figure 4 shows Tarmac average capacity utilisation between 2001 and 2011 (year to date). It can be seen that Tarmac has generally been operating at high levels of capacity utilisation up until the capacity was increased in 2008 [✂]. Since then, utilization has reduced though it remains high compared to the utilization of the other majors.

38. [✂] Therefore, we note that Figure 4 underestimates Tarmac capacity utilization over the period 2008 to 2011.

FIGURE 4

Tarmac cement capacity utilization, 2001 to 2011

[✂]

Source: Anglo American.

Hanson

39. Hanson produces cement at three different plants:

(a) Ketton;

(b) Padeswood; and

(c) Clitheroe.

40. Hanson has mothballed one of its two kilns at Ketton in 2010; it also mothballed capacity at Padeswood. Hanson told us that, to reinstate mothballed mills, Hanson would not require any permissions, but that it would need to inform the Environment Agency. Hanson told us that, to restart the mills in their current condition would cost approximately £400,000 to £500,000 for Ketton, and it would take approximately three to four months. To restart mothballed capacity at Padeswood would cost £250,000 to £350,000 and would take approximately three to six months.

41. In the following estimates of total capacity and spare capacity (and capacity utilization estimates), the mothballed capacity is not included. However, we note that Hanson would be able, if needed, to reuse the mothballed capacity[6] within six months or less though at significant cost.

42. Table 21 shows total clinker and cement capacity at each of Hanson's plants in 2010. Ketton is Hanson's largest plant, followed by Clitheroe.

TABLE 21 **Hanson cement plants, clinker and cement capacity in 2010**

tonnes

	Total clinker capacity	*Total cement capacity*
Ketton	[✂]	[✂]
Padeswood	[✂]	[✂]
Clitheroe	[✂]	[✂]
Total	[✂]	[✂]

Source: Hanson.

43. According to these data, Hanson currently has capacity to produce about [✂]Mt of cement a year. But we think this is likely to be an overestimate of Hanson's total capacity. Indeed, the data provided by Hanson shows that some capacity was mothballed at each of the sites, but the total cement capacity figures provided by Hanson do not reduce as a consequence. Therefore, our understanding is that these total capacity figures include some capacity which has been mothballed and is therefore not likely to be useable within a year.

44. In terms of the measurement of capacity, Hanson told us that cement capacity could be affected by both the clinker available and the capacity of the grinding stations. It told us that clinker could be and was purchased externally, although it had not purchased any clinker since 2007. Hanson told us that, for its plants, it was more

[6] This refers to grinding capacity.

appropriate to consider clinker capacity (and associated cement capacity) to actually represent the capacity that Hanson had to produce cement.

45. Figure 5 shows Hanson's production and spare capacity in each year between 2001 and 2010 (with total cement capacity being the sum of both). It can be seen that Hanson's total cement capacity has reduced over the period, from around [✂]Mt in 2001 to around [✂]Mt in 2010.[7] Figure 5 shows that Hanson was operating at full capacity in 2006 and 2007. Since 2008, it has been operating with substantial amounts of spare capacity.

FIGURE 5

Hanson cement production and spare capacity, 2001 to 2010

[✂]

Source: Hanson.

46. Figure 6 shows total capacity utilization over time. Hanson was operating at high levels of capacity utilization in the years 2004 to 2007 ([✂] per cent or over). In 2008, capacity utilization dropped, and has remained relatively low between 2008 and 2010, reaching its lowest level in 2009 ([✂] per cent).

FIGURE 6

Hanson average capacity utilization, 2001 to 2011

[✂]

Source: Hanson.

Lafarge

47. Lafarge currently has five plants which are producing clinker for cement, namely:

(a) Aberthaw;

(b) Cauldon;

[7] Though we note that this was through mothballing of plants, and that this capacity could be reused with six months though at substantial cost, as set out above.

(c) Cookstown;[8]

(d) Dunbar; and

(e) Hope.

48. In addition, four other plants were active in the earlier years covered but have been decommissioned:

(a) Barnstone (ceased production in 2007);

(b) Northfleet (ceased production in 2009);

(c) Weardale (ceased production in 2003); and

(d) Westbury cement works (closed in 2009).

49. Lafarge told us that, in relation to the Westbury cement works which were closed in 2009, although plant production facilities remained, there was no possible circumstance in which Lafarge would recommence production from these cement works. Lafarge told us that the plant was an old, wet process plant which was not compliant with current and emerging environmental regulations. Furthermore, a commitment has been made to the local authorities in Wiltshire to decommission these kilns. Similarly, although four cement grinding mills remain at Westbury, Lafarge told us that significant amounts of time and money, in addition to secure local planning permission, would be required to bring these mills back in operation.

50. Table 22 shows the ‘expected grey cement capacity’ by plant. Lafarge told us that it preferred to use ‘expected cement’ capacity as a measure of capacity, which was a synthetic view of what cement was capable of being produced in the context of the constraints for that year (seasonality, weather conditions, availability of additives etc). Hope is the largest plant, followed by Cauldon and Dunbar. Total capacity in 2010 was just under [✄]Mt of cement a year.

[8] Cookstown is located in Northern Ireland. In the following we produce capacity estimates for Great Britain so excluding capacity at Cookstown.

TABLE 22 **Lafarge Great Britain cement plants—capacity in 2010**

	Expected cement capacity tonnes
Aberthaw	[✂]
Cauldon	[✂]
Dunbar	[✂]
Hope	[✂]
Total	[✂]

Source: Lafarge

51. Figure 7 shows Lafarge cement production and spare capacity in the years 2001 to 2010. Total capacity reduced substantially in 2008, and again in 2009, largely because of Northfleet capacity being reduced in 2008 and then decommissioned in 2009.

FIGURE 7

Lafarge Great Britain cement production and spare capacity, 2001 to 2010

[✂]

Source: Lafarge.

52. Figure 8 shows Lafarge capacity utilization from 2001 to 2011 for its Great Britain plants. Capacity utilization has remained relatively high throughout the period, though Lafarge always maintained at least [✂] per cent spare capacity since 2002. Capacity utilization reduced in 2009 to reach its lowest level for the 2001 to 2011 period, and since then it has increased and is around [✂] per cent at present.

53. Lafarge told us that it was potentially misleading for the CC to conclude that LCUK had been running with 'substantial excess capacity' over the 2001 to 2010 period since the maximum capacity used was a theoretical figure, based on the plant effectively running at maximum reliability and performance with zero unplanned outages. In reality such perfect operational statistics are rarely, if ever, achieved, because of issues such as unplanned breakdowns and outages significantly reducing the effective capacity. For instance in 2007, [✂]. As such, the maximum output that can in

reality be achieved at a plant is inevitably considerably less than the theoretical maximum. [✄] While Lafarge accepted that it currently had excess capacity (a result of the downturn), over the 2001 to 2010 period as a whole it was in effect close to full capacity in practical terms for much of this period.

54. We accept that theoretical capacity may overestimate the actual capacity in a year, and therefore that Figure 9 underestimates the ratio of capacity utilization. We therefore can conclude that Lafarge has been running close to full capacity between 2001 and 2008, but that since 2009, it has excess capacity.

FIGURE 8

Lafarge Great Britain cement capacity utilization, 2001 to 2011

[✄]

Source: Lafarge.

Overall capacity and production

55. Table 23 summarizes the information on total cement capacity, total production, excess capacity and utilization for each major in 2010. We can see that all majors have spare capacity in 2010, with the exception of Tarmac whose spare capacity was low [✄]. Lafarge has the largest total capacity in the UK (and largest production), but Cemex appears to have more excess capacity than Lafarge at present. Cemex was operating at low levels of utilization in 2010 [✄].

56. After the JV, Lafarge will increase its capacity and therefore remain the producer with largest capacity in the UK, and total spare capacity will be more balanced, though Cemex will retain more excess capacity than the merged Lafarge/Tarmac.

TABLE 23 **Cement capacity, production and utilization in 2010**

				tonnes
	Capacity	*Production*	*Utilization %*	*Excess capacity*
Hanson	[✂]	[✂]	[✂]	[✂]*
Cemex	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]†	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Tarmac-Lafarge JV	[✂]	[✂]	[✂]	[✂]

Source: Hanson, Cemex, Anglo American and Lafarge.

*[✂].
†[✂]

57. Summary of findings on capacity and capacity utilization for cement:

(a) Lafarge, Tarmac and Hanson were operating at high levels of capacity utilization for most of the period between 2001 and 2008. Cemex has been operating with excess capacity throughout the period.

(b) Since 2009, capacity utilization has generally reduced. Lafarge, Hanson and Cemex are currently operating with substantial excess capacity.[9] Tarmac is still operating close to full capacity at present.

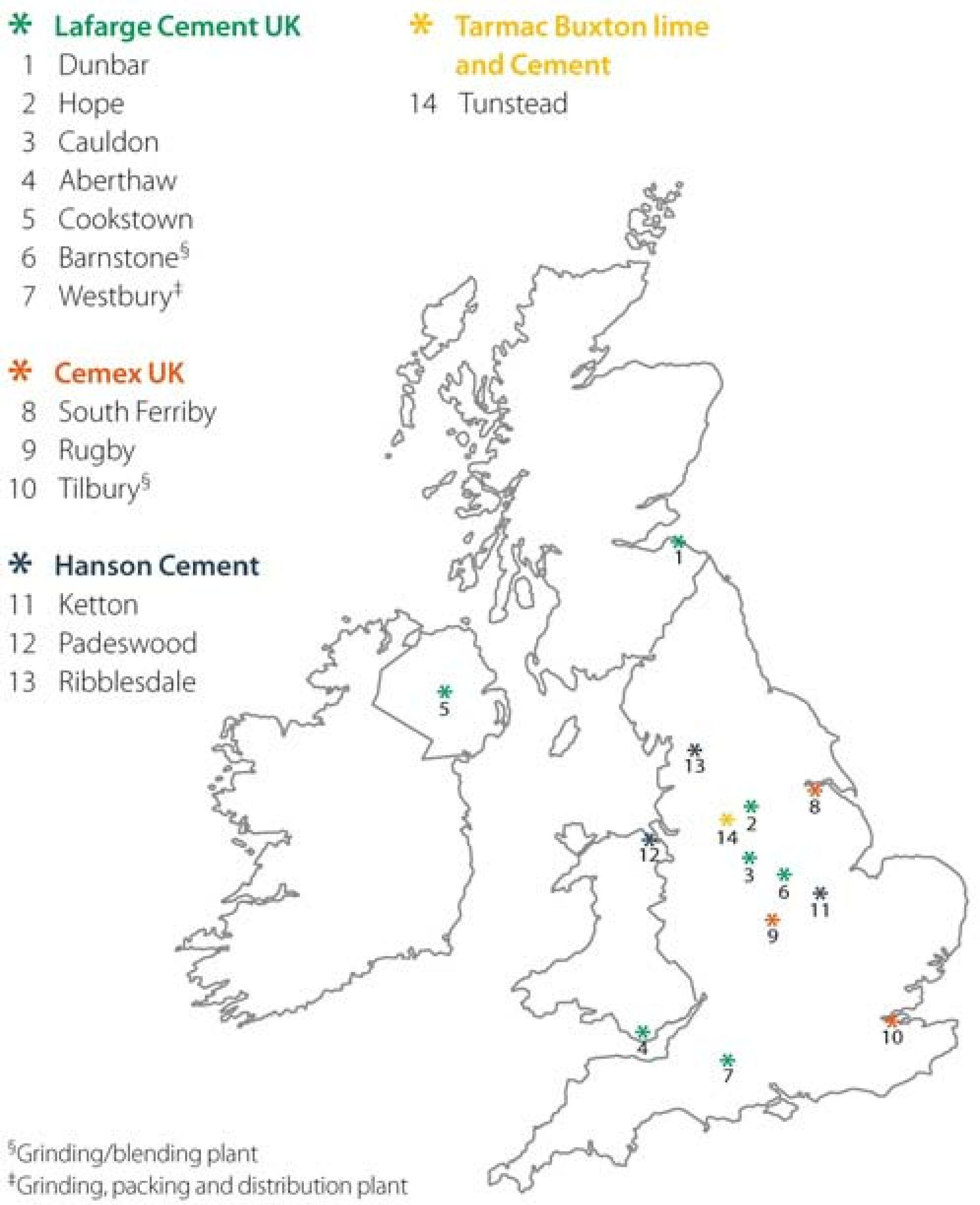
(c) There have been some reductions in capacity by majors (Hanson mothballed capacity; Cemex closed two plants (but opened a new one as well), Lafarge closed Northfleet[10] and Westbury in 2009) following the reduction in demand in 2009. Tarmac increased capacity in the period (though the increase was not large compared to the capacity of the other majors).

(d) Lafarge and Tarmac told us that evolution in changes in nameplate capacity had not been aligned, with Lafarge reducing capacity, Cemex increasing its capacity (though we note that the increase was small), and Hanson not changing capacity. The main parties suggested that this revealed lack of alignment of incentives between the UK cement producers. We noted that we are not suggesting that

[9] Cemex told us that the increase in spare capacity was due to the contraction of demand combined with the opening of a new grinding plant (where the decision to invest in this new plant was in fact taken years earlier). Cemex did not agree that spare capacity in 2010 was substantial and told us that spare capacity was sufficient to meet its needs. We thought that Cemex excess capacity in 2010, effectively representing the amount of a large cement plant, could be qualified as substantial.
[10] Lafarge told us that the Northfleet plant closure was in fact due to the expiry of planning permission, rather than the fall in demand.

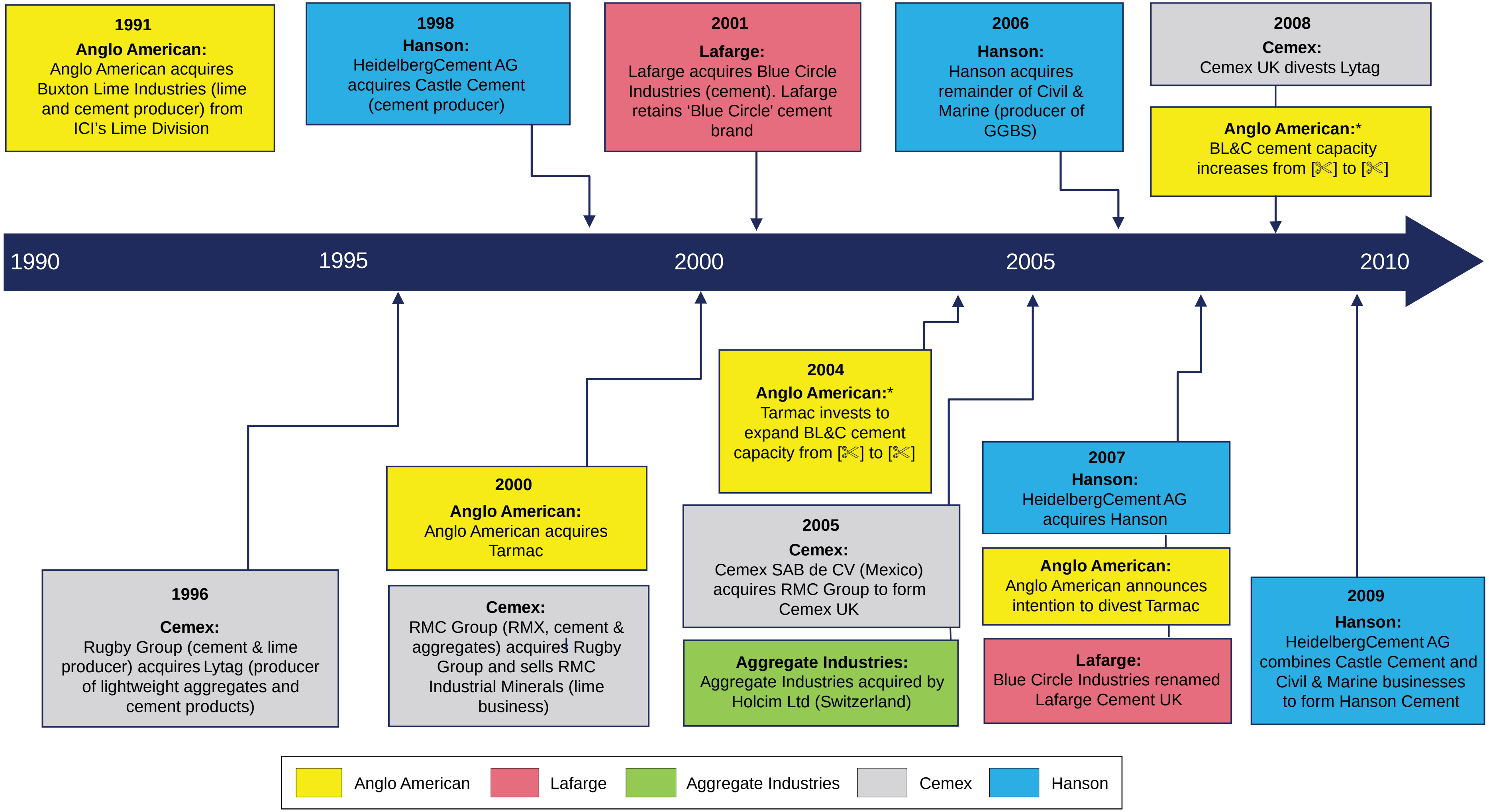
cement producers have, or will, coordinate on capacity levels. The evidence suggested that the least efficient plants had been closed down following the downturn (which were Lafarge's plants). This was consistent with a competitive outcome (least efficient plant exit) or with a coordinated outcome (in which the coordinating group closes capacity where it is less costly).

Distribution of cement plants by company across the UK



Source: Mineral Products Association (MPA) Cement website.
Note: Lafarge's Westbury plant is a grinding, packing and distribution plant, and was closed in 2009.

Timeline of the UK majors in cement (1990 to present)



Source: Information provided by the parties to the CC.
*Increases in cement capacity have only been shown on the timeline for BL&C (Tarmac's cement division), given the significance of these changes, and Tarmac's ownership of BL&C.

Cement margins

1. This appendix sets out our calculation of variable profit margins[1] for the four UK cement producers, namely Tarmac, Lafarge, Cemex and Hanson.[2]

2. There are two main reasons for looking at variable profit margins when assessing the evidence in relation to possible coordinated behaviour:

   (a) the ability of one or more firms to maintain their price and variable profit margins despite falling demand and excess production capacity, may be an indicator of coordinated behaviour; and

   (b) similarities and transparency in the firms' cost structures can increase the likelihood of coordination between firms in the market.

3. 'High' variable profit margins are not in themselves definitive indicators of market power (eg a firm's competitive price may exceed variable costs in an industry with substantial fixed costs), or 'excess' profitability. In relation to the latter, an appropriate comparator or benchmark return is required to determine whether profits or returns are deemed 'excessive', and return on capital employed (ROCE) or internal rate of return calculations are better suited as indicators of excess profitability when benchmarked against an appropriate cost of capital.

4. The main parties told us that variable profit margins in isolation could not be considered as the 'relevant metric for understanding the performance of a cement plant', without also taking into account fixed and support costs, their trends over time, and ROCE. The main parties added that ROCE would be a 'better way to capture profitability', in particular given the 'substantial assets required to operate a cement

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[1] Variable profit margin can be broadly defined as sales revenue less direct cost of sales.
[2] Aggregate Industries does not have its own cement production facility in the UK and therefore has not been included in our analysis.

plant and the investments required to build new capacity'. Anglo American also told us that it was misleading to focus on a measure which excluded semi-variable and fixed costs as these were 'critical costs that a cement plant must cover'. However, our aim was not to carry out a profitability assessment to determine whether profits were excessive. Rather, for the purposes of our analysis, we focused on the stability and sustainability of variable profit margin performance on cement sales and how these margins in a market characterized by excess capacity have reacted to changes in market demand. Given that fixed costs by definition are largely unaffected by changes in production volumes, we considered that an assessment of margins over variable costs would show a clearer link between changes in revenues and costs during sharp falls in market demand with excess capacity in the market.

5. Some useful inferences can, however, be made from comparing variable profit margins between different firms in the same market or between different national markets. [✄]

Methodology for calculating variable profit margins

Definitions

6. Whilst we have aimed to be as consistent as possible in our calculation of variable profit margins for the UK cement producers, we recognize that there may be differences in how each measures and accounts for each revenue and cost item, which may reduce the precise like-for-like comparability of their figures. Our definitions of net revenues, variable costs and variable profit margins are set out below.

Variable profit margin

7. We defined variable profit margin as variable profit as a percentage of net revenues, where:

(a) net revenues equal gross revenues less distribution costs; and

(b) variable profit equals net revenues less cash variable costs.

8. The main parties told us that variable profit margins should be calculated as a percentage of gross revenues and not net revenues given that cement producers competed on a delivered price basis; the customer paid a delivered price and not an ex-works price; and transport costs were a key variable cost which, with all things being equal, would increase if cement sales increased. Cemex and Hanson did not make a similar argument.

9. We acknowledge that distribution costs are an important part of a cement producer's costs, and note that our assessment in this appendix of variable profit per tonne would take distribution costs into account (ie variable profit equals gross revenues less distribution and variable costs).

10. However, we considered that to assess trends in variable profit margins, our focus should be on net revenues and those costs which are closely linked and variable to production volumes, namely materials and variable production costs. Distribution costs do not move in line with changes in production volumes, and furthermore, do not necessarily move in line with changes in sales volumes since distribution costs are largely determined by factors unrelated to changes in output levels, eg the mix of delivered/collect customers; the locations of customers from the cement plant or depot; and the total annual distance travelled to customers. Based on data from the main parties, between FY07 and FY10 the percentage of net revenues accounted for by delivered cement sales (as opposed to collected orders where distribution costs are not incurred) ranged from [✂] to [✂] per cent for Tarmac, and from [✂] to [✂] per cent for Lafarge.

11. Therefore by focusing on variable profit as a percentage of net revenues, this enables us to assess changes in variable profit margins as a result of changes in net revenues and the variable costs associated with production, without the impact from changes in the delivery arrangements for the customer.[3]

12. We would also note that focusing on the ex-works price and calculating margins based on net revenues appears common practice in Tarmac's internal documentation and financial reporting.[4]

Gross and net revenues

13. We defined net revenues as gross revenues less distribution costs, where gross revenues equal the revenues based on delivered prices paid by customers (ie the ex-works price plus the delivery charge), ie delivered price per tonne multiplied by sales volumes, where sales volumes equal production volumes plus or minus changes in stock and purchases from third parties.

14. Distribution costs are defined as the total variable cash costs associated with transporting cement, either between plants or to the customer. We note that for some of the UK cement producers, a single figure for distribution costs was given which did not distinguish between its variable and fixed cost elements, and between the costs of transporting cement between plants and to the customer. Where possible, we have aimed to include in our margin calculation only the variable cost element of distribution costs, and the distribution costs relating to external cement sales.

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[3] Based on the main parties' transactions data for cement sales, the percentage of net revenues accounted for by delivered sales.
[4] Examples include: [✄].

Variable costs (excluding distribution costs)

15. As mentioned above, distribution costs are deducted from gross revenues to calculate net revenues.

16. In order to determine which cost items should be included within our definition of variable costs, we first assumed that variable costs will not include step changes in fixed costs associated with changes in production capacity. Variable costs have been defined as those short-run variable cash costs which vary directly in line with sales volumes based on existing production capacity. Lafarge told us that production decisions at a cement plant were 'long term decisions' and that the 'relevant period for measuring 'variable' costs should be considered to be at least a year'. We did not consider that our definition of the time horizon over which costs are variable contradicted Lafarge's statement, since our time horizon was determined as a period of time within which no changes can be made to existing production capacity, ie production capacity is held fixed. It follows that our time horizon for determining variable costs would be just less than the lead time taken for increases in production capacity to be implemented. As Lafarge pointed out, 'cement plants cannot easily flex production in the short term', which supports our assumption that production capacity can be assumed to be constant in the short run for the purpose of our definition of variable costs. Furthermore, we did not consider it necessary for our analysis to define the short run as a specified time period.

17. We considered that variable costs mainly comprise the following cost categories:

   (a) *Materials costs:* defined as the cash cost of the raw material inputs (eg clinker) used in the production of the finished good, including the cost of both externally and internally sourced inputs (where applicable).

   (b) *Variable production costs:* defined as the variable cash costs of the production process, which for cement production predominantly relate to power and fuel

costs which are incurred at the plant. Our reasons for considering only cash costs are stated below.

Methodology for calculating variable profit margin

18. When calculating variable profit margins for the UK cement producers, we focused on their external cement sales only, and made various adjustments to their annual net revenue and variable cost figures. We set out further detail of our methodology below.

Calculating variable profit margins on external cement sales only

19. The vertical integration of the UK cement producers' upstream cement operations with their various downstream operations (eg the production of RMX, precast concrete, concrete blocks and mortar, where applicable) gives rise to both external cement sales to customers and internal cement sales to their downstream operations.

20. To ensure that our variable profit calculations were not affected by internal prices, we calculated annual variable profit margins for the period from FY07 to FY10 for Tarmac and Lafarge, and from FY08 to FY10 for Cemex and Hanson, based on their external cement sales to third party customers, and excluded the revenues associated with all internal cement sales made to their downstream operations. All the UK cement producers were able to provide a split of their revenues between their internal and external sales.

21. Whilst the financial data from the UK cement producers provided a split between external and internal cement sales for their sales volumes data and gross revenue data (net revenue in some cases), we did not have this split for their cost data. In order to calculate the proportion of variable costs which related to their external

sales, we assumed that this would equal the proportion of sales volumes which relate to external sales. We note that whilst we would have preferred using the proportion of production volumes which relate to external sales, since these match more closely with current year costs (with the exception of costs associated with stock changes), we did not have the detailed production volume data to do so.

22. We noted that some UK cement producers treated cement sales to their JVs as part of their external sales. We considered that these generally formed a small proportion of total sales and where these were included within external sales, we did not attempt to exclude sales to JVs from their total external sales data.[5]

23. All references in this appendix to revenues, costs, profit and volumes relate to external cement sales, unless stated otherwise.

Adjustments to net revenues

Customer rebates and discounts

24. We considered that all rebates or discounts given to customers for the period considered should be included within net revenues unless already accounted for.

Adjustments to variable costs

Focus on cash costs

25. In assessing which costs to include within variable costs, we focused on cash costs to eliminate the effect on variable profit margins of any historic capitalized costs.[6] We note that, based on the UK cement producers' financial data, the vast majority of their costs which they reported as 'variable' were cash costs.

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[5] Tarmac has only [✂] JVs in RMX (JV's total FY10 revenues were £[✂]) and [✂] JVs in respect of cement. Lafarge has no JVs in RMX and sells cement internally to two JVs (Island Cement Ltd, which imports cement into the Isle of Man and generated FY10 revenues of £[✂], and ScotAsh Ltd, which produces PFA and generated FY10 revenues of £[✂]).

[6] Based on our definition, mineral depletion costs, a non-cash item, were also excluded from our calculation of variable costs.

Supplier rebates and discounts

26. We also included the rebates paid by suppliers to each of the UK cement producers to the extent that they have not already been accounted for within their variable cost figures.

Costs associated with changes in stock

27. For a given financial year, materials and variable production costs relate to the volumes produced in the year. However, where sales volumes are greater or less than production volumes, then the costs associated with the volume difference are accounted for by a 'change in stock' line. This enables a matching of current year revenues and costs based on total sales volumes. For the purpose of our variable cost calculation, we included, where data was available, the variable cost element of this 'change in stock' item. However, where we did not have sufficiently detailed data splitting out the variable and fixed elements of this item, we included the entire figure within our variable cost calculation.

Revenues from the sale of excess CO_2 emissions allowances

28. Between FY08 and FY10, all of the UK cement producers generated revenues from the sale of their excess CO_2 emissions allowances under Phase II of the ETS (carbon trading). These represent financial transactions, and the proceeds can vary from year to year depending on production decisions and the decision of the UK cement producer to either retain or sell any excess allowances.

29. Based on the evidence received, we note that there are potentially significant costs involved for all of the UK cement producers in administering and complying with the ETS.[7] Cemex told us that the ETS imposed a 'considerable net cost burden' on the

[7] Anglo American told us that it had made an investment of around £[✂] million into equipment and systems to burn alternative fuels, and that whilst the cost of this investment would not be reflected in any analysis of variable profit margins, it affects profits after total costs and ROCE.

company and that these costs were not taken into account in any calculation of variable profit margins.[8]

30. In the absence of the costs of administering and complying with the ETS for all of the UK cement producers, and given that these gross proceeds can involve significant amounts, we have illustrated the impact of the gross proceeds of carbon trading on variable profit margins by presenting both variable profit margins before and after their inclusion.

Costs excluded from variable costs

31. The costs we excluded from variable costs were:

(a) non-cash variable costs (with the exception of costs associated with stock movements); and

(b) semi-variable and fixed costs.

32. We note that for the period considered, the UK cement producers did not report in their Profit and Loss statements a separate 'semi-variable' cost category with costs broadly categorized into variable and fixed costs. However, the UK cement producers told us that certain fixed costs were semi-variable in nature, eg the cost of plant staff payroll,[9] plant hire, and repairs and maintenance[10] may have both variable and fixed elements. Cemex told us that whilst it attributed certain variable and semi-variable costs to fixed costs for accounting purposes, many aspects of these costs were 'at the very least partially variable', eg 'increased overtime and maintenance', and that variable profit margins would be inflated should these items not be included in our calculation of variable costs. Cemex added that for this reason, our variable profit

[8] Cemex told us that it incurred around £[✄] million each year in monitoring compliance with the ETS. [✄]
[9] [✄]
[10] [✄]

margin calculations could not be used to 'reach conclusions as to whether variable margin is at a level which the CC considers appropriate in a competitive market'.

33. In relation to these semi-variable cost items, we did not have a sufficiently detailed breakdown of the UK cement producers' cost data to separate the variable and fixed cost elements of these costs. To ensure we calculated variable profit margins consistently for each of the UK cement producers, we considered it appropriate to exclude plant payroll, plant hire, and repairs and maintenance costs from our definition of variable costs.

Summary results of variable profit margins for the UK cement producers

34. Table 1 below sets out a summary of the UK cement producers' annual variable profit margins (both including and excluding the effect of carbon trading) on external cement sales for FY08 to FY10 (FY07 variable profit margins were calculated for Tarmac and Lafarge only). Note that all of the UK cement producers have 31 December as their financial year ends. In Annexes 1 to 4, we set out detailed calculations of the variable profit margin for each of Tarmac, Lafarge, Cemex and Hanson respectively.

TABLE 1 **Summary of the UK cement producers' variable profit margins on external cement sales (FY08–FY10)**

	FYE 31 December			
	2007	*2008*	*2009*	*2010*
*Tarmac**				
External sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Internal sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
On external sales:				
Net revenues (£m)	[✂]	[✂]	[✂]	[✂]
Net revenue/t (£/t)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Lafarge†				
External sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Internal sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
On external sales:				
Net revenues (£m)	[✂]	[✂]	[✂]	[✂]
Net revenue/t (£/t)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (before carbon and hedging)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (before carbon and hedging)	[✂]	[✂]	[✂]	[✂]
Cemex‡				
External sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Internal sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
On external sales:				
Net revenues (£m)	[✂]	[✂]	[✂]	[✂]
Net revenue/t (£/t)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Hanson§				
External sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Internal, purchased cement sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% change	[✂]	[✂]	[✂]	[✂]
On external sales:				
Net revenues (£m)	[✂]	[✂]	[✂]	[✂]
Net revenue/t (£/t)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit/t (£/t) (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (%) (after carbon trading)	[✂]	[✂]	[✂]	[✂]

Source: UK cement producers (see Annexes 1 to 4 for further details of the sources used).

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*[✂]
†Lafarge's FY09 and FY10 variable profit margins have been [✂]. The analysis of the impact on variable profit margins [✂] is set out in Annex 2.

‡Cemex's variable profit margins include a small element of non-grey cement sales. In the time available, Cemex has not been able to provide us with the appropriate figures to enable us to exclude them from its figures. See Annex 3 for further details.
§Hanson's variable profit margins are on its external cement sales, excluding resales of externally purchased cement. This was due to purchased cement sales being aggregated with non-grey cement sales in Hanson's financial data. See Annex 4 for further details.

Commentary on historic trends in variable profit margins

35. Based on Table 1 above, in FY08, whilst Tarmac and Lafarge both saw their external sales volumes fall by [✂] and [✂] per cent respectively on prior year, external net revenues increased by [✂] and [✂] per cent driven by increases in net revenue per tonne of [✂] and [✂] per cent respectively. Variable profit per tonne (before carbon trading) in FY08 also increased from £[✂] to £[✂] for Tarmac and from £[✂] to £[✂] for Lafarge. FY08 variable profit margin remained at prior year levels for Tarmac at [✂] per cent, but increased for Lafarge from [✂] to [✂] per cent.

36. In FY09, [✂]. Whilst Tarmac's and Cemex's external net revenues [✂] by [✂] and [✂] per cent respectively in FY09, Lafarge and Hanson saw a [✂] in their external net revenues, [✂] by [✂] and [✂] per cent respectively.

37. However, the net revenue per tonne (a proxy for the average ex-works price per tonne of cement sold externally) increased for all the UK cement producers in FY09, with Tarmac and Cemex seeing [✂] of [✂] and [✂] per cent respectively. Lafarge and Hanson, which had [✂] in their external net revenues [✂], saw [✂] of [✂] and [✂] per cent respectively. After these [✂], the net revenue per tonne was £[✂] for Tarmac, £[✂] for Lafarge, £[✂] for Cemex and £[✂] for Hanson. Note that these are proxies for the average external ex-works selling price.

38. Variable profit margins in FY09 [✂] on prior year levels [✂] by between [✂] and [✂] percentage points, [✂] Lafarge, whose variable profit margin [✂] at around [✂] per cent over the entire period from FY08 to FY10. However, in FY09 and FY10, Lafarge had [✂] on its FY09 and FY10 variable profit margins. If Lafarge had [✂] in FY08

and FY09, then Lafarge's variable profit margins in FY09 would [✂] from [✂] per cent to [✂] per cent (see Annex 2 for further details).

39. In FY10, all the UK cement producers [✂] on FY09 levels, by between [✂] and [✂] per cent for Lafarge, Cemex and Hanson and by [✂] per cent for Tarmac. However, the net revenue per tonne in FY10 [✂], with a [✂] of between [✂] and [✂] per cent. After these [✂], the net revenue per tonne was £[✂] for Tarmac, £[✂] for Lafarge, £[✂] for Cemex and £[✂] for Hanson.

Response to economic submissions on variable profit margins

40. We found that, over the period FY08 to FY10, the variable margins of the UK cement producers [✂]. We extended our analysis to cover FY07 for Tarmac and Lafarge for which we had the relevant data. This showed that variable profit margin, expressed in £ per tonne, [✂] between FY07 and FY08.

41. In light of the reduction in the demand for cement starting in FY08, we interpreted this as being inconsistent with UK cement producers strongly competing for customers in a homogenous product market with excess capacity.

42. The main parties and Cemex challenged our inference, and sent us papers from their respective economic advisers, RBB and Compass Lexecon, in support of their position.

43. RBB stated that our view that, absent coordination, variable profit margins should have fallen when volumes fell in FY09 had no empirical or theoretical support. This was for a number of reasons:

(a) First, RBB told us that Lafarge's prices of bulk CEM I[11] [✂] by £[✂] per tonne from January 2009 to December 2010, and by £[✂] per tonne from February 2009 to December 2010, and that Tarmac's CEM I[12] price [✂] by £[✂] per tonne in nominal terms. According to our data for Tarmac and Lafarge, we agreed that cement prices declined in FY10, but there was a more than compensating increase in prices in FY08 and FY09, so overall prices had actually increased between FY08 and FY10. We set out the average delivered price for bulk cement (split into CEM I, II and III, as applicable) over the period from FY07 to FY10 for Tarmac and Lafarge in Annex 5.

(b) Second, RBB argued that our variable profit margin calculation should have focused only on sales of bulk CEM I to non-Majors, which it stated, [✂] for Lafarge. According to its calculations (calculated by excluding bagged cement sales and removing Lafarge's cement plants (Westbury and Northfleet) which were closed in FY08 and FY09), Lafarge's price of bulk CEM I sold to all external customers (including the Majors) also [✂] between FY08 and FY10. However, it is unclear why bulk CEM II and CEM III sales to independent customers should be excluded. We would also highlight that calculating margins on bulk CEM I sales to non-Majors would require a large number of assumptions in relation to the appropriate cost allocation methodology for the variable costs associated only with CEM I production, which is arguably far more capital-intensive than the blending activities involved in the production of CEM II and CEM III.

(c) Third, RBB argued that economic theory showed that a reduction in demand could lead to higher variable profit margins where firms behaved unilaterally. However, its graph illustrating its point was based on very specific assumptions.

[11] CEM I (Portland PCRM CEM I 52.5N).
[12] CEM I (Portland PC to EN197-1 CEM I 52.5N).

We considered that the assumptions under which this result arose were unlikely to apply to the cement industry.[13]

44. In relation to the stability of margins, Compass Lexecon (on behalf of Cemex) put forward three sets of arguments that UK cement producers with falling demand and large excess capacity would have a weaker incentive to compete on price:

(a) First, Compass Lexecon argued that Cemex and other UK cement producers would be expected to respond to a fall in prices and margins by reducing output in order to stabilize prices and margins. If this reaction occurred with some time lag, then it would explain why we observed an increase in variable profit margins in FY09 on prior year levels. However, it was not clear to us what Compass Lexecon meant by referring to UK cement producers reducing their output.[14] We interpreted this as the UK cement producers' unilateral reaction to an exogenous fall in demand for cement. We believed that a reduction in the industry demand (rather than output) would not necessarily lead to an increase in margins other than when marginal or variable costs increase with output. As discussed above, we did not consider that this is likely in the production of cement.

(b) Second, Compass Lexecon understood that Cemex had made substantial efforts to cut costs with a positive impact on margins in FY09. We observed that this needed to be assessed in the light of the main parties' claim that they faced substantial input cost hikes over the period which justified their mid-year price announcements to customers. However, taking these claims at face value, the overall impact on costs over the period considered is unclear.

(c) Third, Compass Lexecon, by reference to the theoretical and empirical corporate finance literature, argued that there was no compelling case that absent

[13] The result shown by RBB is based on two assumptions: first, RBB assumes that marginal costs are increasing with output. We did not consider that this reflects the reality of cement production in relation to variable costs, especially when production is at levels significantly below maximum capacity. Second, RBB assumes that the reduction in demand is not a parallel shift to the left of the demand curve. Instead, RBB assumes that demand would reduce increasingly less at higher levels of prices. We did not consider that there is any basis for this assumption.

[14] A reduction in output without a change in demand is expected to lead to an increase in prices and margins, but this is not the case here.

coordination, margins and prices would decrease as demand fell. Specifically, Compass Lexecon argued that the observed margin increases could be explained by the theory that firms, at times of financial distress, tended to compete less aggressively. It put forward the following reasons for this:

(i) Firms with higher leverage require larger debt repayments and are, therefore, more likely to become financially distressed.

(ii) With high fixed costs, lower output needs to be spread over smaller volumes.

(iii) Concerns over long-term viability reduce a firm's incentives to attract new customers.

(iv) Financial distress means that current revenues are more important than future and uncertain revenues.

45. In relation to Compass Lexecon's argument in paragraph 44*(c)* above, we made two general observations. First, a key aspect of evaluating these claims is whether the downturn substantially changed matters for the UK cement producers, ie whether the degree of indebtedness increased over the period considered. Only similar changes in the level of indebtedness for all producers could explain whether UK cement producers may have competed less aggressively on prices. Second, we noted that there can be many possible factors that may affect whether or not firms compete strongly on price. For example, an alternative explanation is that as demand shifts downwards with constant marginal costs, both industry prices and margins are expected to decrease under most cases and, in particular, in an industry which has the characteristics of the cement industry. This latter effect would run in the opposite direction to the effect mentioned by Compass Lexecon, and is also likely to dominate under most circumstances.

46. Furthermore, we did not accept its argument in paragraph 44*(c)*(ii) that in times of low demand, profits needed to be spread over lower sales volumes and therefore higher

margins were required. We considered that in a competitive market, any price increases would be determined by what the market could bear. We further considered that much of these fixed costs are likely to be sunk and therefore should not affect short-term pricing decisions.

47. In relation to its points in paragraphs 44*(c)*(iii) and 44*(c)*(iv) above, it seems likely that the overall outcome on the basis of the explanation put forward by Compass Lexecon will depend on the incentives of all the firms in the market; their situation (eg whether or not they are indebted); and their reaction and implications for their rivals. For example, if some producers were not indebted and continued to compete aggressively, absent coordination the indebted firm would have to behave in the same way. Therefore, the argument put forward seems intuitive only when the demand shock:

(a) has the effect of increasing indebtedness for all firms in a similar way; and

(b) this effect outweighs the main effect on prices and margins of an exogenous reduction in demand.

48. Overall, we remained of the view that in an industry like cement, and following a significant decline in demand such as that experienced after FY08, one would expect the margins of the UK cement producers to decline. In setting out this expectation, we did not consider that margins should reduce to the level of marginal or variable costs nor that margins at that level should be expected in a market that did not exhibit coordination. However, the observation that variable profit margin stayed broadly constant, if not increasing, when the UK demand for cement declined by around 40 per cent in two years was consistent with the presence of coordination which was not significantly disrupted by this exogenous event.

Cost structure similarities

49. We mentioned above that similarities and transparency in the firms' cost structures can increase the likelihood of coordination between firms in the market. Below, we compare the variable cost structures of the UK cement producers to assess their similarities. We first set out the variable cost per tonne for the UK cement producers in Table 2, and then their variable costs as a percentage of net revenues in Table 3.

TABLE 2 **Summary of the variable cost per tonne for the UK cement producers (FY08–FY10) (excluding carbon trading)**

			£/tonne
		FYE 31 December	
	2008	*2009*	*2010*
Tarmac			
Materials	[✂]	[✂]	[✂]
Variable production	[✂]	[✂]	[✂]
Total variable	[✂]	[✂]	[✂]
Variable profit margin (before carbon trading) (%)	[✂]	[✂]	[✂]
Lafarge			
Materials	[✂]	[✂]	[✂]
Variable production	[✂]	[✂]	[✂]
Total variable	[✂]	[✂]	[✂]
Variable profit margin (before carbon trading) (%)	[✂]	[✂]	[✂]
Cemex			
Materials	[✂]	[✂]	[✂]
Variable production	[✂]	[✂]	[✂]
Total variable	[✂]	[✂]	[✂]
Variable profit margin (before carbon trading) (%)	[✂]	[✂]	[✂]
Hanson			
Materials	[✂]	[✂]	[✂]
Variable production	[✂]	[✂]	[✂]
Total variable	[✂]	[✂]	[✂]
Variable profit margin (before carbon trading) (%)	[✂]	[✂]	[✂]

Source: UK cement producers (see Annexes 1 to 4 for further details of the sources used).

TABLE 3 **Summary of cost ratios for the UK cement producers (FY08–FY10) (excluding carbon trading)**

			per cent
		FYE 31 December	
	2008	*2009*	*2010*
Tarmac			
Materials costs as % of net revenues	[✂]	[✂]	[✂]
Production costs as % of net revenues	[✂]	[✂]	[✂]
Variable costs as % of net revenues	[✂]	[✂]	[✂]
Lafarge			
Materials costs as % of net revenues	[✂]	[✂]	[✂]
Production costs as % of net revenues	[✂]	[✂]	[✂]
Variable costs as % of net revenues	[✂]	[✂]	[✂]
Cemex			
Materials costs as % of net revenues	[✂]	[✂]	[✂]
Production costs as % of net revenues	[✂]	[✂]	[✂]
Variable costs as % of net revenues	[✂]	[✂]	[✂]
Hanson			
Materials costs as % of net revenues	[✂]	[✂]	[✂]
Production costs as % of net revenues	[✂]	[✂]	[✂]
Variable costs as % of net revenues	[✂]	[✂]	[✂]

Source: UK cement producers (see Annexes 1 to 4 for further details of the sources used).

50. Table 2 shows that between FY08 and FY10, the range of variable cost per tonne for the UK cement producers was as follows:

(a) FY08: from £[✂] to £[✂];

(b) FY09: from £[✂] to £[✂]; and

(c) FY10: from £[✂] to £[✂].

51. Based on total variable cost per tonne, Tarmac was the [✂]-cost producer in FY09 and FY10, whilst Lafarge was the [✂]-cost producer for these two years. We also note that in FY09 and FY10, Tarmac generated the [✂] variable profit margins ([✂] and [✂] per cent respectively) relative to the other UK cement producers. Lafarge, however, generated variable profit margins which were [✂], in that Lafarge, Cemex and Hanson [✂] variable profit margins ranging from [✂] to [✂] per cent in FY09 and FY10.

52. In Table 3, we noticed a similar trend for these cost ratios as for the cost per tonne analysis above, in that, based on variable costs as a percentage of net revenues,

Tarmac was the [✂]-cost producer in FY09 and FY10 ([✂] and [✂] per cent respectively). We also noted that in FY09 and FY10, the ranges for the percentage of variable costs to net revenues appeared [✂] for Lafarge, Cemex and Hanson, than when comparing variable cost per tonne figures, with percentages ranging from [✂] to [✂] per cent in FY09, and from [✂] to [✂] per cent in FY10.

53. The main parties told us that excluding transport costs results in a ‘greater similarity in cost levels ... which is not reflective of the true cost position’. We would expect distribution costs to be more closely aligned with the following major factors: whether the product is collected or delivered;[15] the distance travelled to the customer; and the mode of transport used (eg road or rail), none of which are linked to changes in production or sales volumes. We therefore considered that a more appropriate methodology for comparing distribution costs between the UK cement producers would be based on comparing the distribution cost per delivered mile, for which limited data was available from the UK cement producers for us to calculate.[16] For these reasons, increases or decreases in distribution costs do not necessarily correspond to similar movements in sales volumes, and we considered that for comparing variable cost structures, it was more informative to exclude distribution costs.

[15] We note that based on four years of Tarmac’s and Lafarge’s transactions data for cement from FY07 to FY10, collected orders account for [✂] per cent and [✂] per cent of total transactions respectively, where no distribution costs would be incurred.

[16] Based on the main parties’ transactions data, we calculated the annual haulage cost per delivered mile for Tarmac’s and Lafarge’s cement operations for FY07 to FY10. Whilst we noted significant differences between Tarmac’s and Lafarge’s figures (eg in FY10, the haulage cost per mile was £[✂] per mile for Tarmac and £[✂] per mile for Lafarge), we noted that Tarmac provided us with the radial delivery distance (based on a straight line between two points), whilst Lafarge provided us with the actual delivery distance. We also noted that the haulage costs in Tarmac’s and Lafarge’s transactions data were significantly less than the distribution costs shown in their financial data, for which we have not, in the time available, been able to reconcile. For this reason and given radial distances are less than the actual distance, we considered that Tarmac’s and Lafarge’s figures were not comparable.

Tarmac: calculation of variable profit margins

1. This annex provides details of the relevant adjustments made to Tarmac's figures for our calculation of its variable profit margins. A detailed calculation of Tarmac's variable profit margins for FY07 to FY10 is set out in the table below.

Tarmac's net revenues

Focus on external cement sales

2. Tarmac's cement activities are carried out by its BL&C division which, in addition to cement, also produces lime, chemical stone, powders, and crushed rock. We calculated variable profit margins for FY07 to FY10 only on BL&C's external cement sales, ie excluding all of its other products.

Customer rebates

3. Anglo American told us that during FY10, it paid a total rebate of £[✄] (all off-invoice) to eight cement customers. In FY09 and FY08, the total rebates paid by BL&C to external cement customers were £[✄] and £[✄] respectively. Anglo American told us that rebates paid by BL&C to customers were already taken into account in net revenues.

Tarmac's variable costs

Variable costs on external sales

4. The split of variable costs between those related to external and internal sales was based on the proportion of total sales volumes accounted for by external sales.

Supplier rebates

5. [✄]

Stock movement

6. [✂]

Hedging policies

7. [✂]

Carbon trading

8. The current Phase II of the ETS applies to BL&C's cement and lime operations. We calculated variable profit margins for Tarmac both including and excluding the carbon trading attributable to the cement operations only, ie excluding those attributable to the lime operations.

Tarmac's variable profit margins

9. The table below sets out our calculation of Tarmac's variable profit margins from FY07 to FY10.

Tarmac: variable profit margins on external cement sales (FY07–FY10)

				£'000
		FYE 31 December		
Tarmac (BL&C, cement only)	*2007*	*2008*	*2009*	*2010*
Sales volumes (Kt)				
Total production volumes (Kt)	[✂]	[✂]	[✂]	[✂]
Total stock movement, including purchases (Kt)	[✂]	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal volumes (Kt)	[✂]	[✂]	[✂]	[✂]
External sales volumes (Kt)*	[✂]	[✂]	[✂]	[✂]
% of sales volumes which is external†	[✂]	[✂]	[✂]	[✂]
Net revenues				
Total net revenues	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal net revenues	[✂]	[✂]	[✂]	[✂]
Adjust: reduce by customer rebates	[✂]	[✂]	[✂]	[✂]
External net revenues*	[✂]	[✂]	[✂]	[✂]
% of net revenues which is external	[✂]	[✂]	[✂]	[✂]
Materials costs				
Total aggregates costs	[✂]	[✂]	[✂]	[✂]
Total cement products costs	[✂]	[✂]	[✂]	[✂]
Total lime costs	[✂]	[✂]	[✂]	[✂]
Total pigment & additives costs	[✂]	[✂]	[✂]	[✂]
Total packaging costs	[✂]	[✂]	[✂]	[✂]
Total cost of resale products	[✂]	[✂]	[✂]	[✂]
Total cost of other materials	[✂]	[✂]	[✂]	[✂]
Total materials costs	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Adjust: include supplier rebates	[✂]	[✂]	[✂]	[✂]
Materials costs for external sales	[✂]	[✂]	[✂]	[✂]

Tarmac (BL&C, cement only)		FYE 31 December		£'000
	2007	*2008*	*2009*	*2010*
Variable production costs				
Total fuel oil costs	[✂]	[✂]	[✂]	[✂]
Total electricity costs	[✂]	[✂]	[✂]	[✂]
Total gas costs	[✂]	[✂]	[✂]	[✂]
Total other power costs	[✂]	[✂]	[✂]	[✂]
Total 'quality complaints' costs	[✂]	[✂]	[✂]	[✂]
Total subcontractor costs	[✂]	[✂]	[✂]	[✂]
Total other variable costs	[✂]	[✂]	[✂]	[✂]
Adjust: include change in stock§	[✂]	[✂]	[✂]	[✂]
Total variable production costs	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Variable production costs for external sales	[✂]	[✂]	[✂]	[✂]
Carbon trading				
Total proceeds from sale of carbon allowances	[✂]	[✂]	[✂]	[✂]
Adjust: exclude lime element of carbon trading‡	[✂]	[✂]	[✂]	[✂]
Cement element of sale of carbon allowances	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Sale of carbon allowances for external sales	[✂]	[✂]	[✂]	[✂]
Variable margins				
External net revenues	[✂]	[✂]	[✂]	[✂]
Variable costs (external)	[✂]	[✂]	[✂]	[✂]
Carbon trading (external)	[✂]	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]	[✂]
				per cent
Variable profit margin (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (after carbon trading)	[✂]	[✂]	[✂]	[✂]
				£/tonne
£ per sales volume				
External net revenues	[✂]	[✂]	[✂]	[✂]
Materials cost	[✂]	[✂]	[✂]	[✂]
Variable production cost	[✂]	[✂]	[✂]	[✂]
Variable costs (external)—excluding carbon trading	[✂]	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]	[✂]

Source: CC calculations based on Anglo American data.

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*[✂] We note that Tarmac did not make any sales of cement to its JVs in RMX during FY10.
†[✂]
‡[✂] can be [✂]. Only the carbon trading attributable to cement production have been taken into account for the purpose of our calculation of variable profit margins including carbon trading.
§[✂]
Note: N/A = not applicable..

Lafarge: calculation of variable profit margins

1. This annex provides details of the relevant adjustments made to Lafarge's figures for our calculation of its variable profit margins. A detailed calculation of Lafarge's variable profit margins for FY07 to FY10 is set out in the table below.

Lafarge's net revenues

Customer rebates

2. Lafarge told us that it negotiated rebates or discounts with individual customers and did not offer customers a standardized rebate scheme. Lafarge added that 'discounts or rebates are not shown on physical invoices'.

3. Lafarge provided us with its top [✂] rebate and discount payments in FY10, which included one rebate payment of £[✂] to [✂]. The remaining [✂] rebates and discounts totalled around £[✂]. Lafarge told us that all rebates and discounts were accounted for within its net revenue figures.

Lafarge's variable costs

4. The allocation of variable costs to those items which related to external sales was based on the proportion of total sales volumes accounted for by external sales.

Impact of Lafarge's hedging arrangements on margins

5. For its cement activities, Lafarge has in place hedging arrangements for its power costs (ie in relation to its purchases of electricity), but not for its gas, oil and diesel costs and [✂]. Lafarge [✂]. We do not have details of Lafarge's hedging activities before FY08.

6. Lafarge told us that these forward contracts [✂].

7. The impact of Lafarge's [✂].

8. We illustrate the impact of Lafarge's [✂].

Lafarge's variable profit margins

9. The table below sets out our calculation of Lafarge's variable profit margins from FY07 to FY10.

Lafarge: variable profit margins on external cement sales (FY07–FY10)

				£'000
		FYE 31 December		
Lafarge Cement	*2007*	*2008*	*2009*	*2010*
Sales volumes (Kt)				
Total production volumes (Kt)	[✂]	[✂]	[✂]	[✂]
Total stock movement (Kt)	[✂]	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal volumes (Kt)	[✂]	[✂]	[✂]	[✂]
External sales volumes (Kt)	[✂]	[✂]	[✂]	[✂]
% of sales volumes which is external†	[✂]	[✂]	[✂]	[✂]
Gross revenues				
Total gross revenues	[✂]	[✂]	[✂]	[✂]
Adjust: third party customer rebates	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal gross revenues	[✂]	[✂]	[✂]	[✂]
External gross revenues	[✂]	[✂]	[✂]	[✂]
Distribution costs				
Total cost of freight to terminal	[✂]	[✂]	[✂]	[✂]
Total cost of inter-plant cement/clinker freight	[✂]	[✂]	[✂]	[✂]
Terminal and inter-plant freight costs	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Total cost of freight to customer (all external)	[✂]	[✂]	[✂]	[✂]
Adjust: exclude fixed element (30%) of customer freight§	[✂]	[✂]	[✂]	[✂]
External distribution costs	[✂]	[✂]	[✂]	[✂]
External net revenues	[✂]	[✂]	[✂]	[✂]
% of net revenues which is external	[✂]	[✂]	[✂]	[✂]
Materials costs				
Total raw materials and consumables	[✂]	[✂]	[✂]	[✂]
Total clinker purchased	[✂]	[✂]	[✂]	[✂]
Total cement materials purchases*	[✂]	[✂]	[✂]	[✂]
Total materials costs	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Adjust: include supplier discounts	[✂]	[✂]	[✂]	[✂]
Materials costs for external sales	[✂]	[✂]	[✂]	[✂]
Variable production costs				
Total process fuel costs	[✂]	[✂]	[✂]	[✂]
Total power costs	[✂]	[✂]	[✂]	[✂]
Adjust: include change in stock	[✂]	[✂]	[✂]	[✂]
Total variable production costs	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Variable production costs for external sales	[✂]	[✂]	[✂]	[✂]
Carbon trading				
Total proceeds from sale of carbon allowances	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Sale of carbon allowances for external sales	[✂]	[✂]	[✂]	[✂]
Variable margins				
External net revenues	[✂]	[✂]	[✂]	[✂]
Variable costs (external)	[✂]	[✂]	[✂]	[✂]
Carbon trading (external)	[✂]	[✂]	[✂]	[✂]

				£'000
		FYE 31 December		
Lafarge Cement	*2007*	*2008*	*2009*	*2010*
Variable profit (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (before carbon trading) (%)	[✂]	[✂]	[✂]	[✂]
Variable profit margin (after carbon trading) (%)	[✂]	[✂]	[✂]	[✂]
Impact on profit if Lafarge had not hedged power costs‡	[✂]	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]	[✂]
Impact on external profit without hedging‡	[✂]	[✂]	[✂]	[✂]
Variable profit (before carbon trading and hedging impact)‡	[✂]	[✂]	[✂]	[✂]
Variable profit margin (before carbon trading and hedging)‡ (%)	[✂]	[✂]	[✂]	[✂]
£ per sales volume				*£/tonne*
External net revenues	[✂]	[✂]	[✂]	[✂]
Materials cost	[✂]	[✂]	[✂]	[✂]
Variable production cost	[✂]	[✂]	[✂]	[✂]
Variable costs (external)—excluding carbon trading	[✂]	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]	[✂]
Variable profit (before carbon trading and hedging)‡	[✂]	[✂]	[✂]	[✂]

Source: CC calculations based on Lafarge data.

*Lafarge told us that in FY08, despite a fall in demand, it had a [✂].
†The percentage of external sales volumes to total sales volumes was used to determine the costs (and carbon trading and hedging impact) relating to external cement sales.
‡The impact on profits of Lafarge [✂], we have assumed that the impact remains unchanged at the variable profit level. We have only included the proportion attributable to external sales.
§We included the cost of freight to terminals, customers, and inter-plant cement and clinker transfers within Lafarge's distribution costs. Lafarge told us that the freight costs to terminals comprised mainly variable costs, although some fixed costs were included, eg lease costs on rail wagons at its Hope cement works. Lafarge also told us that freight costs in relation to inter-plant cement and clinker transfers were purely [✂]. In relation to freight costs to customers, Lafarge told us that around 70 per cent were variable in nature (ie determined by volumes delivered) and the remaining were fixed in nature (eg salary costs of Lafarge's own drivers and lorry leasing costs). Based on this assumption, we included only [✂] per cent of freight costs to customers, and [✂] per cent of the other freight costs within our calculation of variable distribution costs.

Cemex: calculation of variable profit margins

1. This annex provides details of the relevant adjustments made to Cemex's figures for our calculation of its variable profit margins. A detailed calculation of Cemex's variable profit margins for FY08 to FY10 is set out in the table below.

Cemex's net revenues

Non-grey cement sales

2. Based on the financial data for its cement operations, Cemex told us that its revenue, cost and sales volumes data included its sales of non-grey cement,[1] which between FY08 and FY10 generated annual gross revenues of between £[✄] and £[✄] and accounted for between [✄] and [✄] per cent of Cemex's gross revenues for its cement operations. Cemex told us that much of these sales did not have any associated sales volumes, eg in relation to packing services, but where sales volumes were measured, these non-grey cement products accounted for [✄] to [✄] per cent of sales volumes. Cemex was not able, in the time available, to provide us with the relevant variable costs attributable to its non-grey cement sales. In the absence of the relevant data, we were not able to exclude revenues and costs relating to non-grey cement sales in Cemex's financial data. However, given the small proportion of gross revenues and sales volumes accounted for by non-grey cement sales, Cemex told us that the inclusion of non-grey cement sales would not have a material impact on our results.

Customer rebates and discounts

3. Cemex told us that its customers preferred to have their rebates or discounts [✄]. Whilst Cemex also told us that it offered some discounts for [✄].

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[1] [✄]

Cemex's variable costs

4. The split of variable costs between those related to external and internal sales was based on the proportion of total sales volumes accounted for by external sales.

Hedging policies

5. Cemex told us that it hedged around [✂] per cent of its power requirements and [✂] per cent of its gas requirements for all of its businesses. We did not have any details of these hedging arrangements and therefore cannot determine the impact these hedging arrangements had on Cemex's variable profit margins, eg whether power and gas costs had been adversely impacted as a result of its hedging arrangements.

Cemex's variable profit margins

6. The table below sets out our calculation of Cemex's variable profit margins from FY08 to FY10.

Cemex: variable profit margins on external cement sales (FY08–FY10)

			£'000
		FYE 31 December	
Cemex (cement)	*2008*	*2009*	*2010*
Sales volumes (Kt)—based on transaction data			
External sales volumes (Kt)	[✂]	[✂]	[✂]
Internal sales volumes (Kt)	[✂]	[✂]	[✂]
Total sales volumes (Kt)*	[✂]	[✂]	[✂]
% of sales volumes which is external†	[✂]	[✂]	[✂]
Sales volumes (Kt)—based on financial data			
Total production volumes (Kt)	[✂]	[✂]	[✂]
Total stock movement (Kt)	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]
Adjust: exclude internal transaction volumes (Kt)‡	[✂]	[✂]	[✂]
External sales volumes (Kt)	[✂]	[✂]	[✂]
% of sales volumes which is external†	[✂]	[✂]	[✂]
Gross revenues—based on transaction data§			
External gross revenues	[✂]	[✂]	[✂]
Internal gross revenues	[✂]	[✂]	[✂]
Total gross revenues*	[✂]	[✂]	[✂]
% of gross revenues which is external	[✂]	[✂]	[✂]
Gross revenues—based on financial data			
Total gross revenues	[✂]	[✂]	[✂]
Adjust: reduce by customer rebates	[✂]	[✂]	[✂]
Adjust: exclude internal gross revenues	[✂]	[✂]	[✂]
External gross revenues	[✂]	[✂]	[✂]
Distribution costs	[✂]	[✂]	[✂]
Total cost of domestic freight	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
External distribution costs	[✂]	[✂]	[✂]

		FYE 31 December	*£'000*
Cemex (cement)	*2008*	*2009*	*2010*
External net revenues	[✂]	[✂]	[✂]
% of net revenues which is external	[✂]	[✂]	[✂]
Materials costs			
Total raw materials	[✂]	[✂]	[✂]
Total castables	[✂]	[✂]	[✂]
Total admixtures	[✂]	[✂]	[✂]
Total cost of purchased cement	[✂]	[✂]	[✂]
Total cost of packaging	[✂]	[✂]	[✂]
Total cost of bags	[✂]	[✂]	[✂]
Total materials costs	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
Adjust: include supplier rebates	[✂]	[✂]	[✂]
Materials costs for external sales	[✂]	[✂]	[✂]
Variable production costs			
Total fuel oil	[✂]	[✂]	[✂]
Total coke	[✂]	[✂]	[✂]
Total gas	[✂]	[✂]	[✂]
Total coal	[✂]	[✂]	[✂]
Total diesel	[✂]	[✂]	[✂]
Total alternate fuels	[✂]	[✂]	[✂]
Total other fuels	[✂]	[✂]	[✂]
Total electric power	[✂]	[✂]	[✂]
Total explosives	[✂]	[✂]	[✂]
Total grinding and crushing media	[✂]	[✂]	[✂]
Total cost of internal freight	[✂]	[✂]	[✂]
Total other variable costs	[✂]	[✂]	[✂]
Adjust: include change in stock	[✂]	[✂]	[✂]
Total variable production costs	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
Variable production costs for external sales	[✂]	[✂]	[✂]
Carbon trading			
Total proceeds from sale of carbon allowances	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
Sale of carbon allowances for external cement sales	[✂]	[✂]	[✂]
Variable margins			
External net revenues	[✂]	[✂]	[✂]
Variable costs (external)	[✂]	[✂]	[✂]
Carbon trading (external)	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]
			per cent
Variable profit margin (before carbon trading)	[✂]	[✂]	[✂]
Variable profit margin (after carbon trading)	[✂]	[✂]	[✂]
£ per sales volume			*£/tonne*
External net revenues	[✂]	[✂]	[✂]
Materials cost	[✂]	[✂]	[✂]
Variable production cost	[✂]	[✂]	[✂]
Variable costs (external)—excluding carbon trading	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]

Source: CC calculations based on Cemex data.

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*There were minor differences between the financial data and the transaction data, which were due to the financial data including non-grey cement sales. Cemex was not able, in the time available, to provide us with sufficient detail to enable us to exclude non-grey cement sales from its revenue and cost data. However, we did not consider the inclusion of non-grey cement sales to have a material impact on our results.
†The percentage of external sales volumes to total sales volumes was used to allocate total costs between costs related to external cement sales and costs related to internal cement sales. The split between external and internal sales was calculated from Cemex's transactions data, which was then applied to Cemex's financial data to determine the proportion attributable to external sales.
‡Internal transactions relate to sales volumes to internal RMX and building products activities.
§The split between internal and external sales was available in Cemex's transactions data but not in its financial data. Since Cemex's transactions data showed the split between internal and external sales for volumes and gross revenues, we applied this split to Cemex's financial data. See footnote † above.

Hanson: calculation of variable profit margins

1. This annex provides details of the relevant adjustments made to Hanson's figures for our calculation of its variable profit margins. A detailed calculation of Hanson's variable profit margins for FY08 to FY10 is set out in the table below.

Hanson's net revenues

Exclusion of cement resales

2. Hanson's external sales exclude sales of purchased cement, since these were aggregated together with its sale of non-grey cement, which are not relevant for our assessment. The table below shows that the proportion of gross revenues accounted for by cement resales and non-grey cement was relatively small, accounting for between 7 and 12 per cent of gross revenues over the period from FY08 to FY10. Since we exclude sales from cement resale from Hanson's net revenues, we have also excluded the cost of resale products from Hanson's variable costs.

Customer discounts and rebates

3. Based on Hanson's transactions data, its invoiced net value for its transactions data includes all discounts and rebates and therefore Hanson's net revenues fully account for all customer discounts and rebates.

Hanson's variable costs

Hedging policy

4. Hanson told us that it regularly looked to ensure that it managed its costs in the most effective way, including considering hedging options. For cement, Hanson told us that it hedged its electricity and natural gas costs. We do not have any details of these hedging arrangements and therefore cannot determine the impact these hedging arrangements had on Hanson's variable profit margins.

Stock movements

5. Hanson told us that the 'value of stock change' was split roughly 80 per cent variable and 20 per cent fixed costs based on Hanson's internal view of the appropriate allocation between its variable and fixed components. In the table below, we adopted this assumption and adjusted Hanson's 'change in stock' figure by excluding the 20 per cent which broadly relates to its fixed cost element.

Hanson's variable profit margins

6. The table below sets out our calculation of Hanson's variable profit margins from FY08 to FY10.

Hanson: variable profit margins on external cement sales (FY08–FY10)

			£'000
		FYE 31 December	
Hanson Cement	*2008*	*2009*	*2010*
Sales volumes (Kt)			
Total production volumes (Kt)	[✂]	[✂]	[✂]
Total stock movement and purchases (Kt)	[✂]	[✂]	[✂]
Total sales volumes (Kt)	[✂]	[✂]	[✂]
Adjust: exclude non-grey sales and cement resales (Kt)*	[✂]	[✂]	[✂]
Adjusted sales volumes (excluding non-grey and resales) (Kt)	[✂]	[✂]	[✂]
Adjust: exclude internal volumes (Kt)	[✂]	[✂]	[✂]
External sales volumes (Kt)	[✂]	[✂]	[✂]
% of adjusted sales volumes which is external†	[✂]	[✂]	[✂]
Gross revenues			
Total gross revenues	[✂]	[✂]	[✂]
Adjust: exclude non-grey sales and cement resales*	[✂]	[✂]	[✂]
Adjust: exclude internal gross revenues	[✂]	[✂]	[✂]
External gross revenues	[✂]	[✂]	[✂]
Distribution costs			
External distribution costs	[✂]	[✂]	[✂]
External net revenues	[✂]	[✂]	[✂]
Materials costs			
Total raw materials	[✂]	[✂]	[✂]
Total consumables	[✂]	[✂]	[✂]
Total packaging	[✂]	[✂]	[✂]
Total cost of resale products	[✂]	[✂]	[✂]
Adjust: exclude cost of resale products*	[✂]	[✂]	[✂]
Adjust: exclude non–grey sales and cement resales*	[✂]	[✂]	[✂]
Total materials costs	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
Materials costs for external sales	[✂]	[✂]	[✂]
Variable production costs			
Total electricity	[✂]	[✂]	[✂]
Total kiln fuels	[✂]	[✂]	[✂]
Total other variable	[✂]	[✂]	[✂]
Adjust: include change in stock	[✂]	[✂]	[✂]
Adjust: exclude 20% of fixed element	[✂]	[✂]	[✂]
Adjust: exclude non-grey sales and cement resales*	[✂]	[✂]	[✂]
Total relevant variable production costs	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
Variable production costs for external sales	[✂]	[✂]	[✂]
Total proceeds from sale of carbon allowances			
Total profits on sale of carbon allowances	[✂]	[✂]	[✂]
Adjust: exclude internal sale element†	[✂]	[✂]	[✂]
Sale of carbon allowances for external cement sales	[✂]	[✂]	[✂]
Variable margins			
External net revenues	[✂]	[✂]	[✂]
Variable costs (external)	[✂]	[✂]	[✂]
Carbon trading (external)	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]
			per cent
Variable profit margin (before carbon trading)	[✂]	[✂]	[✂]
Variable profit margin (after carbon trading)	[✂]	[✂]	[✂]
£ per sales volume			*£/t*
External net revenues	[✂]	[✂]	[✂]
Materials cost	[✂]	[✂]	[✂]
Variable production cost	[✂]	[✂]	[✂]
Variable costs (external)—excluding carbon trading	[✂]	[✂]	[✂]
Variable profit (before carbon trading)	[✂]	[✂]	[✂]
Variable profit (after carbon trading)	[✂]	[✂]	[✂]

S*ource:* CC calculations based on Hanson data.

*We excluded the resale of purchased cement since these figures were combined in Hanson's financial data with sales of non-

grey cement (which are not relevant for our analysis).
†The percentage of external sales volumes to total sales volumes was used to allocate total costs between costs related to external cement sales and costs related to internal cement sales.
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Main parties' FY07 to FY10 bulk cement prices

1. This annex sets out the main parties' average delivered price of bulk cement by cement type, namely CEM I and CEM II for Tarmac, and CEM I, CEM II and CEM II for Lafarge, for their independent customers and the other Majors over the period from FY07 to FY10.

2. The relevant figures (based on taking average Gross revenue per tonne as a proxy for the average delivered price) for Tarmac and Lafarge are set out in Tables 1 and 2 below respectively.

3. The tables below show that there was a small reduction in average delivered prices of CEM I to independents in FY10 (a [✂] per cent fall for Lafarge and a [✂] per cent fall for Tarmac on prior year), but note that in the preceding two years, average delivered prices of CEM I to independents had increased sharply (by at least [✂] per cent each year).

TABLE 1 **Tarmac's average gross revenue per tonne for external sales of bulk cement**

Year	*Product*	*Gross revenues £'000*	*Volumes Kt*	*Average gross revenue per tonne £/tonne*	*Year-on-year change in average gross revenue per tonne %*
Tarmac's sales of bulk cement to independents					
2007	CEM I	[✂]	[✂]	[✂]	[✂]
2008	CEM I	[✂]	[✂]	[✂]	[✂]
2009	CEM I	[✂]	[✂]	[✂]	[✂]
2010	CEM I	[✂]	[✂]	[✂]	[✂]
2007	CEM II	[✂]	[✂]	[✂]	[✂]
2008	CEM II	[✂]	[✂]	[✂]	[✂]
2009	CEM II	[✂]	[✂]	[✂]	[✂]
2010	CEM II	[✂]	[✂]	[✂]	[✂]
Tarmac's sales of bulk cement to other majors					
2007	CEM I	[✂]	[✂]	[✂]	[✂]
2008	CEM I	[✂]	[✂]	[✂]	[✂]
2009	CEM I	[✂]	[✂]	[✂]	[✂]
2010	CEM I	[✂]	[✂]	[✂]	[✂]

Source: Anglo American.

*Based on Tarmac's gross revenues and volumes figures for its CEM II sales to independents in FY08, we could not reconcile its stated gross revenue per tonne figure of £[✂] with our own calculation of £[✂] per tonne.
Note: N/A = not applicable.

TABLE 2 **Lafarge's average gross revenue per tonne for external sales of bulk cement**

Year	*Product*	*Gross revenues £'000*	*Volumes Kt*	*Average gross revenue per tonne £/tonne*	*Year-on-year change in average gross revenue per tonne %*
Lafarge's sales of bulk cement to independents					
2007	CEM I	[✂]	[✂]	[✂]	[✂]
2008	CEM I	[✂]	[✂]	[✂]	[✂]
2009	CEM I	[✂]	[✂]	[✂]	[✂]
2010	CEM I	[✂]	[✂]	[✂]	[✂]
2007	CEM II	[✂]	[✂]	[✂]	[✂]
2008	CEM II	[✂]	[✂]	[✂]	[✂]
2009	CEM II	[✂]	[✂]	[✂]	[✂]
2010	CEM II	[✂]	[✂]	[✂]	[✂]
2007	CEM III	[✂]	[✂]	[✂]	[✂]
2008	CEM III	[✂]	[✂]	[✂]	[✂]
2009	CEM III	[✂]	[✂]	[✂]	[✂]
2010	CEM III	[✂]	[✂]	[✂]	[✂]
Lafarge's sales of bulk cement to other majors					
2007	CEM I	[✂]	[✂]	[✂]	[✂]
2008	CEM I	[✂]	[✂]	[✂]	[✂]
2009	CEM I	[✂]	[✂]	[✂]	[✂]
2010	CEM I	[✂]	[✂]	[✂]	[✂]
2007	CEM II	[✂]	[✂]	[✂]	[✂]
2008	CEM II	[✂]	[✂]	[✂]	[✂]
2009	CEM II	[✂]	[✂]	[✂]	[✂]
2010	CEM II	[✂]	[✂]	[✂]	[✂]
2007	CEM III	[✂]	[✂]	[✂]	[✂]
2008	CEM III	[✂]	[✂]	[✂]	[✂]
2009	CEM III	[✂]	[✂]	[✂]	[✂]
2010	CEM III	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

Note: N/A = not applicable.

Analysis of price announcements for cement

Background

1. Cement suppliers regularly send out letters to their customers to notify them that the supplier in question plans to increase the prices for cement. These letters are usually sent out at least once a year, sometimes several times in the year, and usually at least one month before the date of the planned increase. In this appendix, we assess the available information on the announcement letters sent by the majors to their customers, and set out our analysis on the extent to which these announcements are translated into increases in realized prices.

2. We first present the analysis of the timing and content of price announcement letters. We then report our findings on whether prices paid by customers increase following a price increase announcement, and on the extent to which announced price increases are realized in terms of increases in actual prices paid by customers.

Analysis of the price announcement letters: dates and levels of increases announced

Data

3. We received the following data on price announcements letters for grey cement from the main parties and the other majors:

Company	*Data*	*Dates covered*	*Product coverage*
Lafarge	Date of letter, date of increase and magnitude of increase	From Mar 2002	Bagged and bulk cement
Tarmac	Date of letter, date of increase and magnitude of increase	From Jan 2006	Bagged and bulk cement
Hanson	Date of letter, date of increase and magnitude of increase	From Oct 2006	Bagged and bulk cement
Cemex	Date of letter, date of increase and magnitude of increase	From Jan 2006	Bagged and bulk cement
Aggregate industries	No information provided, because Aggregate Industries does not produce cement in the UK and sales to external customers are marginal		

Dates of letters and dates of increase

4. In Table 1 below, we summarize the information we received from all the suppliers for announced price increases of bulk grey cement.[1] There is a clear parallelism in the dates for the price increases and the amounts of the increases. Although to an extent this can be expected (1 January increases are a standard in many industries),[2] there are also occasionally mid-year announcements which are particularly notable in the parallelism in dates of announcement, date of increase and amount of increase.

5. In particular, the increase for 1 August 2008 was announced in late June by all the cement manufacturers within days of each other: both Hanson and Cemex sent the letters out to announce the price increase on 25 June, and Lafarge sent a letter out on 29 June. Tarmac sent a letter out on 30 June. Therefore, all four major UK cement producers announced the increase within less than one week of one another. The amounts of the price increases announced were also similar: £3.40 per tonne for

[1] We note that, as shown in our analysis of cement cross-sales between the majors, most majors are all customers of each other and would therefore receive these price announcement letters directly, in their capacity as cement customers.
[2] Cemex told us that this was particularly the case in the construction industry where customers often required a price adjustment to take effect in January to allow for planning downstream adjustments to their own prices. Furthermore, [✂].

Hanson; £3.75 for CEM I and £3.15 for CEM II per tonne for Cemex, £3.53 for Lafarge and £3.70 for Tarmac.

6. Anglo American told us that it made an independent assessment of its proposed price increase based upon the need to cover increases in its input costs (including costs which had not been recouped from a previous price increase) and a small amount of headroom to reflect the fact that almost always the proposed price increase was not obtained. It told us that any announced price increase then acted as a starting point for customer-by-customer negotiations. In particular, with reference to the announced 1 August 2008 announced price increase, both Anglo American[3] and Lafarge told us that this reflected an unusual spike in energy prices, including oil prices (Lafarge also argued that prices for coal, haulage and sea freight had also increased at the same time).

7. In most cases, once a supplier has announced price increases for a certain date, the other cement suppliers also announced similar increases within one or two months.[4] The other partial 'pattern' that emerges is that, in five out of the ten price announcements, Lafarge is the first mover (five out of seven if we exclude the occasions on which only one firm announced a price increase). Hanson often acts second and either Tarmac or Cemex come next. This is not a general rule and there are some exceptions, notably in 2010, when Tarmac and Hanson announced a price increase for January 2010, Cemex and Lafarge only announced the increase for March 2010 (although shortly after Hanson and Tarmac).

[3] [✂]
[4] Cemex argued that a delay of one to two months had no evidential value as to coordination. It was consistent with rival suppliers reacting to similar changes in input costs, for example. For the 1 January price increases, we considered that the fact that few months might have elapsed between cement producers' announcements did not matter much because all the letters were sent well in advance of 1 January. However, we noted that the 1 August 2008 price increase announcements all came out in a very short space of time.

8. Finally, there appears to be trend for announcing larger price increases by the different suppliers. In many, but not all, instances, Lafarge was the first to announce a price increase, and was then followed by the others which announced slightly larger increases than Lafarge.[5] While this piece of analysis is only part of our assessment of coordinated effects, this observation (that Lafarge was often first, followed by the other suppliers announcing slightly larger increases) seems more consistent with cement suppliers accommodating Lafarge's first move rather than trying to compete strongly on prices to increase volumes to take advantage of Lafarge's price increases. At least in relation to intent, the cement suppliers appear to be signalling that they will try to accommodate the other majors' price increases in many cases.[6]

[5] Anglo American argued that this did not apply to the price increases of January 2009 (when it announced a lower price increase than Lafarge) and January 2010 (when it announced a lower price increase than Hanson). It also noted for bulk cement and all instances in which Lafarge was the first to announce not all cement producers followed with a larger price announcement increase. Similarly Lafarge argued that in January 2009 Tarmac announced a lower price increase than Lafarge. Lafarge also pointed out that it announced a lower price increase in August 2008 and substantially lower in March 2010 than Cemex.

[6] Anglo American and Cemex disagreed with this interpretation, arguing that only a few customers accepted the announced price increase and that prices sometimes fell despite an announced increase, and that even where prices did not fall, the dispersion of prices was wide and irregular. Lafarge also argued that it did not interpret rival price announcements as a signal and did not monitor them. It further argued that they were sent to Lafarge's RMX business which was a separate business from Lafarge's cement business. We considered that the price increases announced in the price announcement letters must have some information value for customers as for the direction of future prices. In this context we have noted that there are often similarities across cement producers as to the level of the announced increases and the dates of the letters (especially for price increases that are not sent out at the start of the year).

TABLE 1 **Bulk cement price increase announcements**

Date of price increase	*Date of announcement*	*Supplier*	*Price increase*
1 Jan 06	23 Sep 05	Lafarge	£6.45
	18 Oct 05	Cemex	£6.45
	24 Oct 05	Tarmac	£6.50
	N/A	Hanson	N/A
1 Jan 07	25 Aug 06	Lafarge	£8.35, 8.75 or 9.50 depending on product
	21 Sep 06	Hanson	£8.50 for most products
	16 Oct 06	Tarmac	£8.50
	16 Oct 06	Cemex	£8.15 for most
1 Apr 07	29 Mar 07	Hanson	£8.50 (one product)
1 Jan 08	6 Sep 07	Lafarge	£7.20
	12 Sep 07	Hanson	£7.35 for most products
	24 Oct 07	Tarmac	£7.45
	26 Oct 07	Cemex	£8.85 for CEM 1, £8.45 CEM 2
1 Aug 08	25 Jun 08	Hanson	£3.40
	25 Jun 08	Cemex	£3.75 for CEM1, £3.15 for CEM 2
	26 Jun 08	Lafarge	£3.53 for most products
	30 Jun 08	Tarmac	£3.70
1 Oct 08	21 Aug 08	Cemex	£3.00 to £3.75
1 Jan 09	1 Oct 08	Lafarge	£16 for CEM 1; £13.60 for CEM 2
	23 Oct 08	Hanson	£17.20 for CEM 1, £12.30 for CEM 2
	31 Oct 08	Cemex	£16.40 for CEM 1, £13.40 for CEM 2
	13 Nov 08	Tarmac	£15.75
1 Jan 10	27 Oct 09	Tarmac	£5.20
	27 Oct 09	Hanson	£5.80 for most products
1 Mar 10	28 Oct 09	Cemex	£5.75 for CEM 1, £4.75 for CEM 2
	1 Dec 09	Lafarge	£4.75 for most products
1 Jan 11	23 Sep 10	Lafarge	£6.75 for most products
	7 Oct 10	Hanson	£7.10
	8 Oct 10	Cemex	£7.25 for CEM 1, £6.25 for CEM 2
	1 Nov 10	Tarmac	£7.00

Source: Lafarge, Hanson, Cemex and Anglo American.

9. We have found some internal documents that discuss price announcement letters and the strategy. [✂]

10. [✂]

11. We also found some references to price increase announcements for cement in a Lafarge internal document. In this correspondence, two members of Lafarge staff [✂].

12. In response to these extracts from internal documents, Lafarge told us the following. At the time of this correspondence, Lafarge (in common with other industry players) was experiencing an unprecedented large increase in its costs for a range of its key inputs including coal, energy, steel etc. There was also a simultaneous spike in costs

for oil and sea freight. These cost increases were common knowledge and were the subject of frequent press reports globally.[7] Lafarge's proposed response to these cost increases was discussed within meetings of its Executive Committee, with its CEO adopting the position that the company could not simply absorb cost increases of this scale. Lafarge's CEO received significant internal pushback from the UK sales team. This occurred at the time of the Cembureau meeting. [✂] At no point during the Cembureau meeting did Lafarge representatives discuss cement pricing with their competitors or otherwise attempt to persuade others to increase prices in response to cost increases.

13. Table 2 below shows the same information on price announcements, but for bagged cement this time. Most of the same characteristics are found again for bagged cement price increase announcements—with Lafarge often being the first to announce a price increase, followed in many instances by Hanson. The magnitude of the increases, and the dates, are once again very similar.[8]

14. Particularly notable is the fact that Hanson, Cemex and Lafarge almost always present the price increase for bagged cement as a percentage increase (though Tarmac almost always denotes the increase in £/bag), unlike for bulk where increases are presented in £/tonne. This may have to do with the nature of the contracts/type of customers (national merchants in many cases—with single delivered prices). Lafarge explained to us that any proposed price increase was expressed in £/tonne for bulk cement price increases. For packed cement though the

[7] See, for example, http://news.bbc.co.uk/1/hi/7486764.stm.

[8] Anglo American told us that, to the extent that a supplier did not issue separate price announcement letters for bulk and bagged cement, the timing and whether a competitor sought a price increase for bagged cement might simply be a function of one price announcement being sent to customers. Further, Anglo American told us that where a proposed price increase was announced on a percentage basis (as opposed to a pence per bag basis) the absolute magnitude of any price increase could not be readily identified.

historical practice was to convert it into a percentage increase as this was the norm for merchants.[9] Cemex and Hanson provided us with a similar explanation.

15. However, for the October 2008 increase, all of the suppliers used £/tonne rather than a percentage, breaking from their usual practice.[10] We are not aware of any fundamental reasons for this. It could be a consequence of cement suppliers following each other's actions (even in terms of formatting) when it comes to announced price increases. Lafarge and Hanson explained to us that this departure from the standard practice was due to the unprecedented and extraordinary nature of the 1 October 2008 price announcement and expressing it in £ per tonne would reflect the universal nature of this very unusual price increase and aligned it with the energy cost increases at the time.[11]

TABLE 2 **Bagged cement price increase announcements**

Date of price increase	*Date of announcement*	*Supplier*	*Magnitude*
1 Oct 06	26 Jun 06	Lafarge	10.50%
	25 Aug 06	Hanson	10%
	4 Sep 06	Tarmac	£0.18 per bag
	8 Sep 06	Cemex	9.50%
1 Jan 08	7 Sep 07	Lafarge	9.50%
	14 Sep 07	Hanson	10% on most products
	26 Oct 07	Cemex	12% CEM 1, 9 to 12% CEM 2
	6 Nov 07	Tarmac	£0.20 per bag
1 Aug 08	30 Jun 08	Tarmac*	£0.10 per bag
1 Oct 08	24 Jul 08	Hanson	£3.60–£3.96 per tonne
	1 Aug 08	Lafarge	£3.53 per tonne
	18 Aug 08	Cemex	£3.75 per tonne
	17 Sep 08	Tarmac	£0.10 per bag
1 Jan 09	1 Oct 08	Lafarge	19.80%
	23 Oct 08	Hanson	22% for most
	30 Oct 08	Cemex	19% CEM 1, 17 19% CEM 2
	13 Nov 08	Tarmac	£0.40 per bag for most products
1 Jan 10	27 Oct 09	Tarmac	£0.13 per bag for most products
	27 Oct 09	Hanson	7%
1 Mar 10	28 Oct 09	Cemex	6%
	1 Dec 09	Lafarge	6.50%
1 Jan 11	23 Sep 10	Lafarge	7.65%–11.75%
	7 Oct 10	Hanson	8%
	8 Oct 10	Cemex	9% CEM 1, 8% CEM 2
	1 Nov 10	Tarmac	8–9%

Source: Lafarge, Hanson, Cemex and Anglo American.

*Anglo American informed us that it did not seek two price increases effective 1 August 2008 and 1 October 2008. Tarmac announced a proposed price increase on 30 June 2008 with effect from 1 August 2008. Anglo American told us that it subsequently withdrew the proposed price increase announcement. However, customers indicated to Tarmac that they were not willing to accept any increase. Tarmac then sought to increase prices effective on 1 October 2008.

[9] Lafarge told us that this was in line with how these packed cement customers managed pricing across their own product ranges, and therefore reflected customer preferences.
[10] [✂]
[11] [✂]

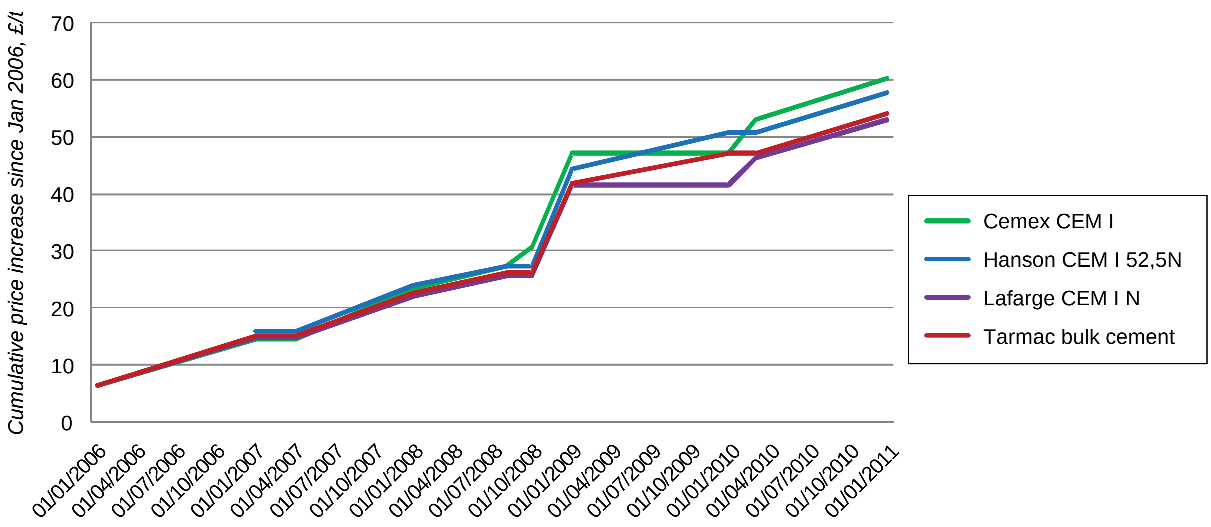
Announced price increases—levels

16. The series of charts below show the cumulative announced price increases over time for the different suppliers and for the different types of bulk cement. There are different types of cement which are sometimes subject to different price increases, and we do not have much information on which of these are for the same products, and which products are the 'best sellers'. These charts are based on our current estimates of comparable products across the majors.

17. In general, the charts show very similar announced price increases by the different suppliers (by product). Because these are cumulative increases, if the price increase were a little bit different on one particular date, the series would not be aligned at all following dates even if the increase was exactly the same thereafter. However, in that case, the series would be parallel to each other.[12]

FIGURE 1

Announced increases in price of bulk CEM I—category 52.5N

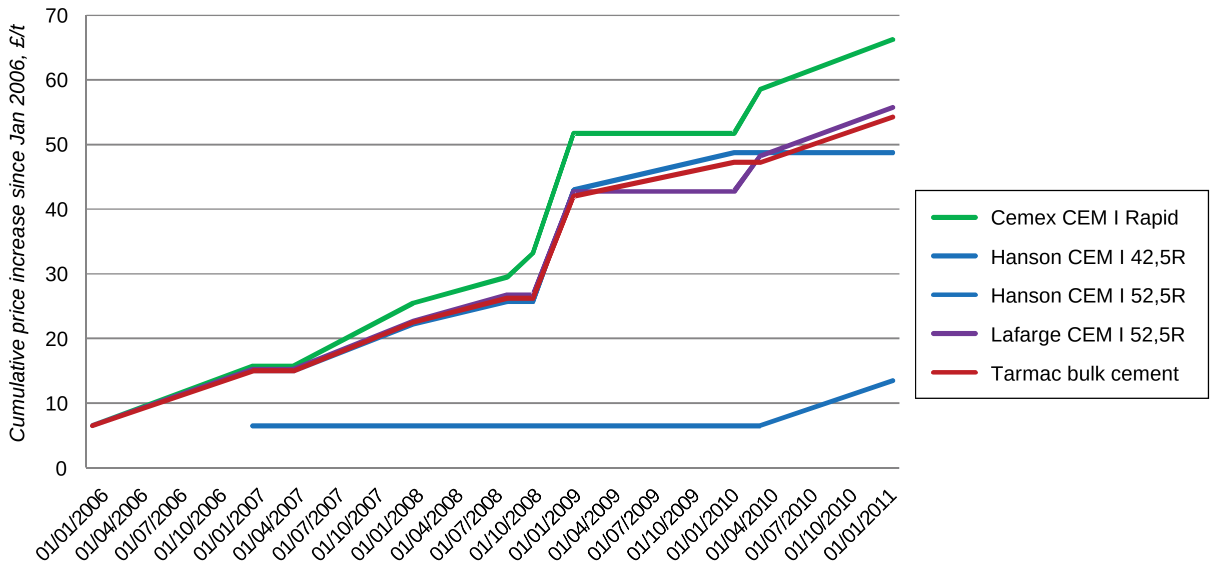


Source: CC's calculations using the parties' price increase announcement letters.

[12] Cemex (and its advisers Compass Lexecon) argued that there was no consistency in price increase announcements by cement majors and that each chart showed a clear divergence of cumulative announced price increases. It also argued that the design of the charts was wholly artificial because it rested on the assumption that each announced rise translated into an actual price increase, which was incorrect. Compass Lexecon also argued that the CC had to show parallelism in the level of realized prices (in addition to parallelism in the dates and size of announced prices). We consider that the timings and the level of price increases across cement producers are more important than whether price announcements are realized. This is because we consider that price announcement act as a signal for the future direction of prices and not as the focal point of coordination. Therefore, we consider that the charts correctly highlight when price increases by each major took place and at each time the level of the announced price increases.

FIGURE 2

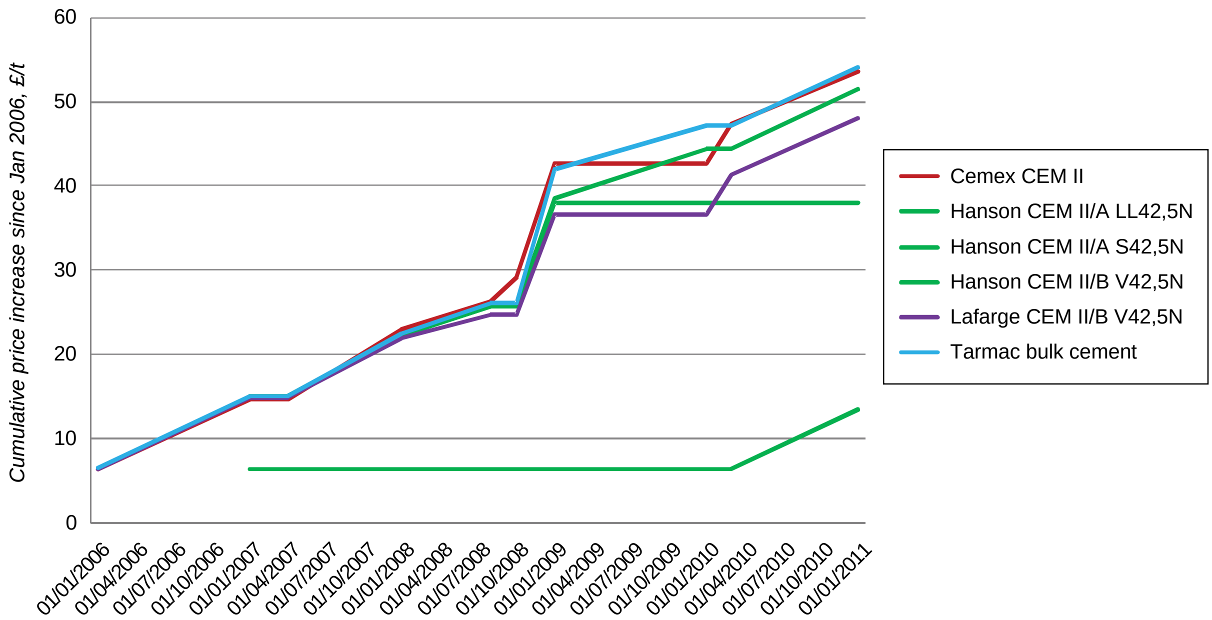
Announced increases in price of bulk CEM I—R types



Source: CC's calculations using the parties' price increase announcement letters.

FIGURE 3

Announced increases in price of bulk CEM II—N types



Source: CC's calculations using the parties' price increase announcement letters.

Announced vs realized prices

18. We have also conducted some analysis on the extent to which realized price increases follow price increase announcements.

19. [✄] Consequently, RBB concluded that price increase announcement letters could not facilitate transparency and coordination in the cement market.

20. We repeated RBB's original analysis and extended it to the other majors and the other periods for which we have price increase data.

21. We calculated the average realized change in customers' prices observed in the transactions data submitted by the main parties and compared this to the price increases that were announced by the majors. We aim in this way to understand:

(a) whether the majors are able to increase prices following a price increase announcement;

(b) if so, how the realized price increase compares with the announced increase; and

(c) whether there is an observed pattern in the actual price changes that is consistent across the majors.

22. In the context of our coordinated theory of harm these points are important in order to assess the probability of existing coordination and to better understand whether price increase announcements are a mechanism that could facilitate coordination or signalling of the direction of future price increases post the proposed JV.

23. All analysis is undertaken based on delivered prices only. We have looked at the announced price increase letters which are sent to customers for cement, and we understand that the increase in price in those letters applies to the delivered price to the customer. Also, we focus solely on external sales. Data is averaged across product, customer, location and period.

24. Both Anglo American and Lafarge argued that calculating the average realized price increases was only informative of the magnitude by which prices changed on

average. However, they did not provide information as to the degree of price dispersion across consumers. This was important information because if the level of price dispersion was substantial, price announcements could not act as focal points for coordination. They provided evidence in relation to several price announcements by Tarmac and Lafarge highlighting that the realized or actual prices following these announcements showed considerable variation across customers (as well as being below the level shown in the announcements). We acknowledge that there is significant price dispersion for cement and that prices for cement do not appear transparent.[13] We believe that, if the aim of price announcements was to monitor deviations from the coordinated outcome (ie they acted as the focal point for coordination), the extent of price dispersion would be a relevant factor to consider. However, we consider that price announcements act as a signal of the direction of future prices and are not the focal point of coordination. As cement buyers may differ in their bargaining power depending on the circumstances, it is to be expected that the prices they can negotiate vary.[14]

25. The results show that: [✄].

Lafarge

26. We analyse Lafarge's 1 January 2008 price increase announcement and focus on the top two selling product for that period. The announced price changes for these products were:

(a) Portland PCRM (bulk cement)—£7.20/tonne;

(b) Portland CP (bulk cement)—£7.20/tonne;

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[13] Lafarge also told us that there was 'tremendous dispersion in prices' and that cement prices were not transparent.
[14] Both Lafarge and Anglo American provided us with information on price dispersion across customers based on the realized prices following a number of announced price increases. As argued above, we do not consider that this information—ie how much prices vary across customers—is central to understanding whether the evidence we have is consistent with the presence of coordination prior to the proposed JV. The main parties also extended the analysis we performed on the difference between the announced and the realized prices to more price announcements than the ones considered in this appendix. We acknowledge this analysis, but we consider that it confirms the finding that overall the announced price increases are not fully realized in actual prices.

(c) Lafarge General Purpose Cement 25kg (packed cement)—9.5 per cent; and

(d) Mastercrete 25kg (Plastic) (packed cement)—10 per cent.

27. In order to calculate the realized average price change we take as a base period the transactions that took place during the period just before the increase was planned to become effective (Q4-2007 in our case) and compare this with the quarter that the announced price increase became effective (Q1-2008). Given that we expect that the price increases might not show immediately, we do the same analysis comparing the base quarter with each of the following quarters in turn (Q2-2008 in our case).[15] This allows us to see also how prices change over time.[16,17] The results are shown in the following table.[18]

TABLE 3 **Lafarge 01/01/2008 price increase announcement—Q4-2007 base quarter**

		Q1-2008		*Q2-2008*	
Product	*Announced price increase*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*
Portland PCRM	£7.20/tonne	[✂]	[✂]	[✂]	[✂]
Portland CP	£7.20/tonne	[✂]	[✂]	[✂]	[✂]
Lafarge General Purpose Cement 25kg	9.5%	[✂]	[✂]	[✂]	[✂]
Mastercrete 25kg (Plastic)	9.5%	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

28. [✂]

[15] Lafarge did not provide the same data on prices per customer and per product for Q3 of 2008, and therefore we were not able to calculate realized prices for Q3 as we did for the other majors.

[16] We conducted further sensitivity tests by excluding the majors and/or by weighting the results by volume. On average, price changes are higher when we exclude the cross-sales between the majors. However, since the results do not change substantially we do not report them here.

[17] In the case of packed cement, cross-sales between the majors are usually zero so in those cases we do not report separate results. This holds for the entire analysis that follows.

[18] Lafarge provided its own calculations for the average which differ slightly from the one presented in Table 3. We consider that the overall conclusions would remain the same.

Tarmac

29. We analysed two of Tarmac's price increase announcement letters for the product categories that are available in the datasets submitted by the parties. The announced price increases were the following in each case:

(a) 1 January 2009:

(i) bulk cement (increase per tonne)—£15.74;

(ii) Buxton Cement Packed 25kg bags (increase per bag)—£0.40;

(b) 1 January 2010:

(i) bulk cement (increase per tonne)—£5.50; and

(ii) Buxton Cement Packed 25kg bags (increase per bag)—£0.13.[]

30. We compare the prices realized in the quarter just before the increase was planned to become effective with the quarter following the date of the announcement. Given that we expect that the price increases might not show immediately or fully in Q1, we undertook the same comparison with the following quarters (Q2 and Q3).The results for each case are presented in Tables 4 and 5.[19]

TABLE 4 **Tarmac 1/1/2009 price increase announcement—Q4-2008 base quarter**

		Q1-2009		*Q2-2009*		*Q3-2009*	
Product	*Announced price increase*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*
Bulk cement	£15.74/tonne	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Packed cement	£0.40/bag	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Anglo American.

TABLE 5 **Tarmac 1/1/2010 price increase announcement—Q4-2009 base quarter**

		Q1-2010		*Q2-2010*		*Q3-2010*	
Product	*Announced price increase*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*
Bulk cement	£5.50/tonne	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Packed cement	£0.13/bag	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Anglo American.

[19] Anglo American provided its own calculations for the average which differ slightly from the one presented in Tables 4 and 5. We consider that the overall conclusions would remain the same.

31. [✂][20] We note in this respect that the 1 January 2010 announcement was unusual (see Table 1): whereas Tarmac and Hanson announced a price increase for January, Cemex and Lafarge only announced a price increase for March 2010. This could explain why Tarmac was not able to increase prices on average in Q1 2010.

32. [✂][21] Tarmac realized average prices are often decreasing in Q2 (and sometimes in Q3) compared to Q1.[22]

33. [✂]

Hanson

34. We analysed Hanson's 1 January 2009 and 1 January 2010 price increase announcements. The announced price increases by product were as follows:

    (a) 1 January 2009:[23]

    (i) bulk CEM II various sub-products—£15.35 (average);[24]

    (ii) bagged cement—23.5 per cent (average);

    (b) 1 January 2010:[25]

    (i) bulk CEM II various sub-products—£6.65 (average); and

    (ii) bagged cement—7 per cent.

[20] Anglo American argued that consistency required that we should look at price announcements of both Tarmac and Lafarge covering the same dates. As argued above, we do not consider that whether announced prices are realized by the same amount across customers and suppliers is necessarily an important feature for establishing whether there was evidence consistent with pre-existing coordination in this case.
[21] We consider it possible though that these results are driven by a volume effect: due to the fact that Tarmac's data is relatively aggregated (product categories are bulk and packed only), if within each category, customers purchase more of the cheaper cement and less of the more expensive cement in proportion, this would have the effect of reducing the average price paid even if the actual price of each product did not vary.
[22] Anglo American told us that [✂].
[23] In the data we analysed we did not have any observations regarding bulk CEM I transactions and this is why we do not report any results for this product.
[24] We obtained the announced price increases from the price increase letters. Given that the prices on these letters refer to more disaggregated products than the product categories we have in the transactions data, here we use as a point of reference, the average of the price increases announced in the letters within each product category.
[25] The same comments regarding bulk CEM I transactions and average prices as in the January 2009 announcement apply here as well.

35. We compare the prices realized in the quarter just before the increase was planned to become effective with the prices realized in the quarter following the effective date. Given that we expect that the actual price increases might not show immediately or fully in Q1, we undertook the same comparison with the following quarters (Q2 and Q3).The results for each case are presented in Tables 6 and 7.

TABLE 6 **Hanson 1/1/2009 price increase announcement—Q4-2008 base quarter**

		Q1-2009		*Q2-2009*		*Q3-2009*	
Product	*Announced price increase*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*
Bulk cement—other than CEM I	£15.35/tonne (average)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Packed cement	23.5% (average)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Hanson.

TABLE 7 **Hanson 1/1/2010 price increase announcement—Q4-2009 base quarter**

		Q1-2010		*Q2-2010*		*Q3-2010*	
Product	*Announced price increase*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*
Bulk cement—other than CEM I	£6.65/tonne (average)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Packed cement	7%	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Hanson.

36. [✂]

37. [✂]

Cemex

38. We analyse Cemex's price increase announcement of 1 January 2009.[26] The announced price increases and the relevant products were as follows:

(a) bulk, CEM I—£16.40;

[26] Cemex argued that the CC has not made its reasoning clear for choosing this particular price increase announcement. It argued that the CC should analyse all price increases, or if it did choose a single increase for a 'snapshot' assessment, it should provide a justifiable reason for doing so. We are not relying on this analysis to argue that price announcements are used to increase actual prices by similar amounts, therefore, the choice of date becomes irrelevant. We acknowledge that price increases are often not realized.

(b) bulk, other than CEM I—£13.40; and

(c) bagged cement—18 per cent (average).[27]

39. We calculated the realized average price change taking as a base period the quarter just before the increase was planned to become effective (Q4-2008) and compared this with the quarter that the announced price increase became effective (Q1-2009). Since we expect that the price increases might not show immediately or fully, we compared the base quarter transactions with each of the following quarters in turn (Q2 and Q3). The results for each product are shown in Table 8.

TABLE 8 **Cemex 1/1/2009 price increase announcement—Q4-2008 base quarter**

		Q1-2009		*Q2-2009*		*Q3-2009*	
Product	*Announced price increase*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*	*Average realized change*	*Deviation from announced price*
Bulk cement—CEM I	£16.40/tonne	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Bulk cement—other than CEM I	£13.40/tonne	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Packed cement	18% (average)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

40. [✂]

Preliminary conclusions

41. [✂]

42. [✂]

[27] We obtained the announced price increases from the price increase letters. Given that the prices on these letters refer to more disaggregated products than the product categories we have from the parties' transaction data, here we use as a point of reference, the average of the price increases announced in the letters within each product category.

Ability to monitor coordination—cement

Introduction

1. The first necessary condition for coordination is that firms must have the ability to reach and monitor the terms of coordination. In this appendix, we explore whether firms have the ability to monitor each other's behaviour sufficiently to ensure that deviation from the coordinated outcome can be detected.[1]

2. The ability to detect deviations from the coordinated outcome relies on a degree of transparency in the market. However, it is not necessary to observe rivals' actions directly to detect deviations. Even if firms are not able to observe the prices charged by competitors or the output sold by competitors, they may be able to infer their rivals' actions from market outcomes. For instance, in a market with very stable demand, a firm might be able to detect whether a deviation has occurred by observing whether its own sales are falling.

3. If detection is inferred from market outcomes, there will inevitably be less than complete transparency in relying on such observations. For instance, in the example above, in a market where demand is not very stable, an observed reduction in a firm's own sales may be due to changes in the industry demand for the product rather than deviation. Therefore, if firms rely on observed market outcomes (rather than directly observing competitor actions) to monitor coordination, they will need to be able to verify that the changes that they observe are due to deviations. This can be done by monitoring several variables at the same time. In the example above, a firm's ability to monitor its own market share as well as knowledge of its own sales volumes would give a very good indication of whether any observed fall in its own

[1] As set out in paragraph 5.5.12 of the Guidelines.

sales volumes is due to deviation (in which case its market share will reduce) rather than a general reduction in the industry demand (in which case its market share may remain stable).

4. More generally, if firms are not able to directly observe competitor's actions, they may be able to increase the probability of detection of deviations, and reduce the risk of punishing a deviation that has not occurred, by monitoring more than one variable.

5. Prices of cement are generally negotiated between the supplier and each customer, and as such actual prices paid by customers for cement are unlikely to be transparent to other cement suppliers. We therefore believe that coordination, if it is currently occurring, or if it were to occur after the proposed JV, would be more likely to be on the basis of the shares of UK producers relative to each other and volumes sold, and/or on the basis of customer allocations, rather than on actual prices paid by cement customers. Therefore, in the following we concentrate mainly on mechanisms by which cement suppliers may be able to monitor the behaviour of other suppliers and detect deviations, ie through monitoring of output, sales, capacity and/or their own market share, as well as through monitoring of whether their own customers are switching to other cement producers.

6. The remainder of this appendix is organized as follows. We first summarize the main parties' and other majors' responses to our questionnaire on the information which is available to them on their competitors. We find that, although actual prices may not be transparent (see Appendix M), there is a large amount of transparency for information related to capacity, production and own-shares of Great Britain production. As explained above, access to information on firms' own market shares may be sufficient to monitor deviations from coordination.

7. However, we also explore whether cement producers can complement the information on their own market share and production with monitoring of whether their customers are switching to competitors. This information could increase the probability of detection of a deviation, and also help identify the firm who has deviated. In the second part of this paper, we therefore analyse the characteristics of cement customers and their purchasing behaviour to find out whether cement producers will be able to monitor customer switching.

Information held on competing cement producers

8. In this section we summarize the main parties' and other majors' responses to our questionnaire on the information which is available to them on their cement competitors.

9. Lafarge told us that it collected market intelligence from a variety of sources, which was used to help it assess its position in the market and shape its strategy:

   (a) Competitor sales estimates: Lafarge told us that its external sales team was organized on a regional level for both packed and bulk cement sales. Each Lafarge sales representative was responsible for estimating all competitor sales (by both domestic producers and importers) of grey cement and cementitious products supplied to non-Lafarge customer sites in their area. Lafarge told us that this information was then entered into the Lafarge sales and marketing information database so that an overview of the Great Britain market could be constructed based on Lafarge's actual sales volumes and prices by product and estimates of competitors' sales volumes. Lafarge told us that this information could be used to estimate overall Great Britain grey cement and cementitious demand, market shares (on a regional and national level), split by bagged and bulk supply, as well as which customers Lafarge believed were buying from which suppliers. Lafarge told us that this information was formally updated

annually but might also be updated on an ad-hoc basis and that there was no incentive programme in place for sales staff in relation to intelligence gathering. Any performance bonus was linked to sales staff performance.

(b) Lafarge is a member of the MPA, which collects data on production and sales from returns sent by each member on a monthly basis. Lafarge therefore receives one month in arrears details of the whole market demand for cement and total Great Britain production of cement, from which it told us that it could calculate its share of sales relative to the other UK cement producers.[2] The MPA also published quarterly cementitious and cement sales data by channel and by region, three months in arrears.[3]

(c) Competitor production levels, capacities, use of inputs and costs: Lafarge told us that environmental permits, registers and planning applications for alternative fuels, press releases associated with upgraded or new installations, local stake-holder relations meetings as well as information and press releases by competi-tors themselves provided it with information on competitors' production levels and use of inputs. Lafarge told us that information on capacity was available from public documents as part of the EU Emissions Trading Scheme in the UK. With this data, Lafarge could ascertain the capacity of a competitor's cement kiln per day. Lafarge also told us that it could use these sources of information to esti-mate the variable cost of production of each competitor site, given that the major costs of inputs for cement were relatively similar across the industry. Information on fixed costs was not available, but Lafarge told us that a reasonable prediction of fixed costs could be made by reference to its own plants.

(d) Imports: Lafarge told us that it estimated Great Britain import volumes through the monitoring of any known importer vessels and tracking shipping movements

[2] Anglo American and Lafarge told us that monthly data were published by the MPA, not split by sales channel or Economic Planning Region (EPR). The MPA monthly data only shows Great Britain production and sales information of the MPA members. Information on cement imported by non-MPA members is not included as part of the MPA's monthly sales data publication.

[3] Annex 1 contains links to the various data published by the MPA on cement sales.

to known depot locations, and that such information was publicly available via shipping websites.

10. Anglo American told us that the MPA published sales statistics on a monthly basis which showed the volume and trend analysis for all domestic cement producers combined, based on a confidential survey of MPA members. (This is the same data that Lafarge told us about.) Anglo American mentioned to us that it was not possible to discern the sales made by any individual competitor from this data and that there was no site-specific information with this data set. Anglo American told us that it used the MPA figures to compare its sales performance against total MPA member figures. Anglo American told us that information regarding planning permissions was also publically available and that BDS produced a monthly report on planning applications activity within the industry. In addition, Tarmac traded with other suppliers of cement, and in its capacity as a customer, Anglo American told us that it received letters from these suppliers announcing their price increases.

11. Cemex told us that it gathered the following information on its competitors for cement: [✂].[4]

12. Cemex told us that it also gathered more general information on competitors (not just for cement) from various sources, including the published press, information obtained through customers regarding price increase letters, and competitor websites.

13. Hanson told us that it gathered the following information on its competitors:

(a) Competitor profile information: based on published results from competitors' annual reports, quarterly reports or analyst presentations. Occasionally historic

[4] Cemex told us that its market share estimates were based on 'general market assumptions' and that it did not possess any definitive evidence. It further stated that it was not in any way clear that such estimates were sufficiently accurate to serve as a tool for detecting deviations.

volume and high level pricing information was inferred from this. Competitors' projections were also sometimes inferred from these sources which could provide guidance on their view of the market's output for the next year.

(b) Market forecast reports from the MPA and construction products associations.

Summary on the information held by cement producers on their competitors

14. The main parties and the other majors hold many types of data on their competitors and generally there is a large amount of information available on production, capacity, costs and sales of cement. Some pricing information is also available (eg through feedback from customers and price announcement letters), though this is less transparent than production, sales and capacity.

15. In terms of ability to monitor the terms of coordination, the information on total Great Britain cement production and total sales of cement by MPA members, which is received monthly one month in arrears, would enable each domestic cement producer to monitor their share of sales of the UK-produced-cement market compared with the total share of the other majors for sales of UK-produced cement, and thereby provide information on whether a competitor may have deviated. Cemex told us that MPA data did not contain importers and, therefore, any inferences that could be drawn from the data might be distorted. We do not agree. In terms of monitoring, cement producers would be particularly interested in whether the other Great Britain producers have deviated, not whether importers have deviated. In most circumstances a gain by importers would not distort the shares of Great-Britain-produced cement sales provided by the MPA (as they are not included in the total). Anglo American, Lafarge[5] and Cemex[6] told us that this information alone would not allow

[5] Anglo American and Lafarge argued that the monthly MPA data would only allow a cement producer to determine its relative market share among MPA members, and would not allow a cement producer to calculate its market share of a wider cement market which included non-MPA imported cement sold in Great Britain. Consequently, an MPA cement producer would not be able to identify with certainty whether any change in share was a result of potential deviation or customer switching to a non-MPA cement importer.

cement producers to spot and distinguish deviation to importers. We acknowledged that such information alone would not be sufficient to detect who the deviator was, and because it is received one month in arrears, cement producers may be able to increase the probability of detection by monitoring customer/supplier relationships as well.

16. Cemex told us that there were practical problems in coordinating via market share. It told us that knowing that one's own sales increase could not provide information on whether this was due to an increase in its own or industry demand. However, we note that because cement producers receive own-market share data and total Great Britain cement production one month in arrears, they would be able to find out if any increase in their own sales was due to overall increase in market demand or to other factors. Cemex also told us that a relative concept such as market share would be more difficult to coordinate upon than an absolute concept such as, by way of hypothetical example, customer allocations. We consider that whether it will be more difficult depends on whether cement suppliers are able to monitor market shares and volumes, and we examine the available evidence in this appendix.

17. Lafarge and Anglo American also told us that a loss of market share might be caused by many factors other than deviation.[7] We understood that this may be the case and therefore examined whether cement producers are able to complement market share monitoring with other information. We noted that Lafarge's answer to our questionnaire (see paragraph 9) showed that it monitored closely cement buyers and from which suppliers they are purchasing cement. This strongly suggested that there is a

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[6] Cemex told us that it should not be overlooked that certain quantities of cement sold in Great Britain were produced by non-MPA members, such that the inference that a given cement producer drew from MPA data and its own sales figures might be distorted. Even if this problem did not arise, the value of the information obtained is limited, as due to the delay in receiving the aggregated data it is impossible for a firm to monitor its own market share in real time. Therefore, at any given point in time, the firm could not be sure that it is acting in line with a hypothetical tacit agreement.

[7] They mentioned: existence of major contract(s) with one player; certain customers hoarding/shedding stock; plant malfunction; lack of capacity; strikes; technological/marketing differences in the bagged sector (eg plastic packaging); special promotions; swings caused by a customer switching; and so on.

large amount of transparency in customer supplier relationships and that it would, therefore, be possible for cement producers to complement information on their own market share with information on whether customers were switching to competitors and, in particular, to which competitor.

18. In the following section, we therefore analysed whether monitoring of customer switching/customer allocations is feasible (in light of the degree of concentration in the customer base). We also analysed whether monitoring of customer allocations will enable deviations to be detected (in light of the evidence on types of customers, regularity of purchasing and amount of multi-sourcing). We start the section with a review of the evidence on whether such monitoring of customer/supplier relationships already takes place.

Ability to monitor customer allocations

19. The data provided by the majors on customers won and lost for cement showed that Lafarge, Cemex and Hanson often had knowledge of which customers were lost to which competitor (and which customers were won from which competitors).[8]

20. Anglo American told us that the win/loss data that it had provided showed that in the majority of cases, Tarmac had been unaware of the identity of the competitor to which it either won or lost a contract. Anglo American told us that this was illustrative of Tarmac's limited presence in the external segment of the cement market and was also indicative of Tarmac's inability to monitor alleged terms of any coordination. We agreed that this showed that Tarmac currently did not appear to always attempt to find out which suppliers customers were lost to or won from. However, we did not agree that this necessarily showed that it was unable to do so, but rather that prior to

[8] Cemex argued that the vast majority of such switches would not involve Cemex. Therefore such information could only provide visibility of a portion of the market.

the proposed JV Tarmac may have not had strong incentives to monitor wins and losses.

21. As set out above, Lafarge told us that its sales representatives closely monitored cement buyers to find out who they were purchasing cement from and in what volumes. Our review of internal documents, and particularly Lafarge's internal documents, also showed that Lafarge had good knowledge of customers who were lost to competing cement manufacturers and the reasons for these losses.

22. In the next section we reproduce the extracts from internal documents which suggest an ability to monitor and spot deviations.[9]

Internal document evidence on ability to monitor outcomes and spot deviations

23. The internal documents of Lafarge and other cement producers showed that they had high awareness of competitor's actions and were actively monitoring these actions. Here we reproduce the relevant extracts from these documents.

24. Lafarge noted that all the Lafarge materials were dated not later than 2008. Lafarge argued that the period covered by the documents (in particular, 2005 to 2008) was one of marked change in the industry, driven in particular by the acquisition by Cemex of RMC (including Rugby Cement) in 2004, and by Heidelberg of Hanson in 2007. The vertical integration strategies pursued by both these companies, Lafarge stated, led to significant reductions in demand by both groups for LCUK cement supply, forcing LCUK to compete aggressively to secure alternative supply volumes. Lafarge argued that these documents reflected the significant competitive pressures to which LCUK was subject at the time, and the strategic debate that continued within

[9] Some of these excerpts from internal documents may also provide evidence in relation to other aspects of the coordinated theory of harm in cement (eg the retaliation mechanism, coordination on the timing of price increases). We provide the full excerpt here simply in order to give the context for the statements that illustrate the extent of the transparency in the market.

Lafarge during this period as to whether it too should pursue downstream acquisitions.

25. We agreed that there have been changes in the industry (in particular, the fall in cement demand) since 2008. However, we thought that the documents were still informative of Lafarge's awareness of its competitors' action and ability to monitor its competitors' actions, factors which are unlikely to have changed. In addition, we consider that the documents provide strong evidence of how Lafarge was making commercial decisions at that time, and although market conditions have changed, this information is still relevant to understand the basis on which commercial decisions are made and the factors which are taken into account when taking commercial decisions.

26. In a Lafarge internal email on the subject of Cemex (2008) it was said: [✂].

27. [✂]

28. Internal Lafarge emails regarding Castle supply to Cemex (2008) include a spreadsheet of [✂] sites supplied by [✂] giving monthly volumes and product type.

29. [✂]

30. In an internal Lafarge email regarding sales of cement to Aggregate Industries/ Bardon RMX plants in 2008 it is stated: [✂].

31. Lafarge told us that in 2008, LCUK competed successfully to supply cement to five RMX plants operated by [✂]. Those plants were previously supplied by [✂]. Having secured [✂] of additional volume that was previously supplied by [✂], LCUK naturally recognized that [✂].

32. In an internal Lafarge email sent in 2008 it said: [✄].

33. [✄]

34. In internal Lafarge emails sent in 2006 regarding ‘Cemex update’ a request is made: [✄]. The response is as follows: [✄].

35. Lafarge explained to us that the trend [✄].

36. An internal 2006 Lafarge email on the subject of ‘Dudman’ discusses losses to Dudman Cement (which was getting cement from Teutonia, owned by Heidelberg, also owner of Castle Cement at that time). The email states: [✄].

37. Lafarge told us that, as it noted above, by 2006, LCUK was [✄]. Although Lafarge’s downstream RMX business was [✄], LCUK nonetheless sought to pursue [✄].

38. In an internal Lafarge email exchange in 2005 regarding Cemex losses, it was stated [✄].

39. Lafarge told us that in 2005, LCUK was approached by [✄]. As noted above, LCUK was competing aggressively for external sales volumes, [✄].

40. In a letter from Lafarge Cement Ireland to LCUK in 2008 we find the following quote: [✄]

41. Lafarge told us that in response to rising fuel and diesel prices, LCUK in 2008 announced [✄].

42. A set of Lafarge's internal documents from 2003 discuss a possible [✂]. The memo notes that a factor against the [✂] from Lafarge's point of view would be that [✂] and that it also [✂].

43. A Lafarge internal email on the same topic as above notes that [✂] and that [✂]. The same email continues: [✂].

44. [✂]

45. In an internal Lafarge email from 2008, a Lafarge employee raises the following points regarding the proposed 1 September price increase: [✂].

46. Lafarge told us that 2008 saw significant rises in energy costs that created costs pressure for a large number of industries. Within LCUK, there was significant discussion as to whether these cost shocks would need [✂].

47. An internal Lafarge email exchange in 2007, on the subject of 'Aberthaw Supplies-Update', comments on the fact that [✂].

48. [✂]

49. There are emails (in 2006) between Lafarge and Hanson regarding 'Supamix Nuneaton'.[10] Supamix was owned by Hanson in 2006 and Hanson was at that time not yet owned by Heidelberg. Supamix switched [✂]Kt cement annually from Lafarge to Castle (at that time already owned by Heidelberg). Lafarge identified [✂] Hanson RMX plants, supplied at that time by Castle which could [✂]. It is noted in the email that: [✂].

[10] Extra doc 8—BV/19.

50. [✄]

51. A series of Lafarge internal emails in 2005 discuss ‘Dudman—Milton Precast’. Dudman was threatening to approach the competition authorities regarding Lafarge’s winning of Milton Precast as a customer from Dudman (and from Cemex, who were also supplying Milton). In the emails it states: [✄].

52. [✄]

53. We considered Lafarge’s comments on the background to the document extracts reproduced above. As set out above, although these documents date back to 2008 and before, we think that they are still informative of Lafarge’s awareness of its competitors’ action and ability to monitor its competitors’ actions. In addition, as we set out above, we consider that the documents provide evidence on the basis on which commercial decisions are made.

54. Overall, we thought that the documents provided ample evidence of Lafarge’s ability to monitor to competitor’s actions:

(a) Lafarge was aware of who it was losing volumes/customers to, and who it was winning them from;

(b) competition to replace lost volumes can be targeted at the cement suppliers that won these volumes;

(c) Lafarge was aware of the details of approaches to its customers by the other suppliers;

(d) Lafarge was aware of the details of some of the other suppliers’ deals with those suppliers’ customers;

(e) Lafarge was aware of a link between the loss of its customers and previous wins it had made; and

(f) Lafarge selectively targeted volumes based on who was supplying them (even where a customer multi-sourced).

Characteristics of the cement customer base

55. Information on customer bases, and in particular information on whether a firm's own customers are switching to competitors for their cement purchases, can help in detecting whether a deviation has occurred, and, if the name of the new supplier is known, the identity of the deviator.

56. If the number of customers is limited, cement suppliers may be able to directly and more easily monitor their customers, who they are purchasing from and whether they are switching purchases, through sales force communication with these customers and observations of customer purchasing activity. Therefore, we looked at the number of cement customers of each major, as well as the degree of concentration in the customer base, to find out if it would be possible for cement producers to directly monitor most of their customers and find out, through communication between their sales force and customers, whether they are switching and why.

57. If direct monitoring of customers is not possible (for instance, because of a large and fragmented customer base), another way in which cement producers might discover whether customers are switching away because of a deviation is by keeping track of information on lapsed customers. If a critical number of customers cease purchasing in a given time period, this would indicate that a deviation has occurred. Information on lapsed customers will be a more reliable and useful indicator of switching if:

(a) Customers purchase cement on a regular basis: if purchases are regular, cement producers will be able to detect more rapidly whether a customer has stopped purchasing from them.

(b) Customers purchase cement for fixed delivery points, or to delivery points within a given region. If a customer switched its cement requirements to one of its projects in a very different locality which was not within a given plant's delivery zone, this customer may appear to have been lost as a result of deviation, even though the fact that it switched cement supplier was unrelated to any deviation. If many such customers exist, it would be difficult to use information on lapsed customers as an indicator of deviations.

(c) Single sourcing is prevalent at site level.[11] If customers tend to multi-source for cement at individual sites, switching following a deviation may show up as partial switching rather than total switching, and therefore would not be detected through monitoring of lapsed customers. This could make it more difficult to detect deviations; however, it should be noted that, even if customers multi-source,[12] this does not mean that they would not switch away all volumes from one of the suppliers in which case a deviation would be observed.

58. We first presented results on the number of cement customers and concentration of the customer base. We find that, even though the total number of cement customers is large, the customer base is concentrated which means that it is likely that cement producers would be able to monitor most of their volumes by directly monitoring a relatively limited number of important customers (through communications from sales force representatives).

59. We then analysed whether the purchasing practices of customers (in terms of regularity of purchases, extent of single sourcing by site, and location of delivery points) would make it possible to monitor customer switching through information on lapsed customers. We find that the characteristics of the customer base are such that this

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[11] Cemex argued that we had not provided any systematic evidence to show that single sourcing was prevalent at site level.

[12] Lafarge told us that multi-sourcing at branch level often applied for bagged customers.

would probably be sufficient in order to monitor deviations, even if direct monitoring as described above were not possible.

Concentration in customer base

60. Monitoring of customer switching is easier if the number of customers that need to be monitored is not too large.

61. Table 1 shows the total number of external customers for bulk cement of each of the majors.

TABLE 1 **Total number of all external customers for bulk cement**

	2007	*2008*	*2009*	*2010*
Lafarge	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]
Hanson		[✂]	[✂]	[✂]
Cemex		[✂]	[✂]	[✂]

Source: CC based on UK cement producer data.

62. Numbers in Table 1 include some duplications, because certain customers may appear under different names even though they are part of the same group. The number of distinct external customers who purchase bulk CEM I in Great Britain is set out in Table 2 for Tarmac and Lafarge.

TABLE 2 **Number of distinct external customers of bulk CEM I**

	2007	*2008*	*2009*	*2010*
Lafarge	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]

Source: CC based on UK cement producer data.

63. As can be seen above, cement producers have many customers for bulk cement: Lafarge has around [✂] customers in any year for bulk cement. Tarmac has around [✂], Hanson over [✂] and Cemex around [✂]. Thus all majors have a relatively large number of customers.

64. It could be impractical and/or costly for cement producers to monitor purchasing by all of their cement customers. We therefore looked at indicators of the concentration of the customer base for bulk cement, in order to assess whether the majors would be able to monitor a large proportion of the output through a relatively small number of customers. Results are reported in Tables 3 to 6 below.[13]

TABLE 3 **Concentration in Lafarge Great Britain customer base for cement (per cent of total revenues accounted for by biggest external customers)**

	per cent of total revenue			
	2007	*2008*	*2009*	*2010*
Top 20 external customers	[✂]	[✂]	[✂]	[✂]
Top 30 external customers	[✂]	[✂]	[✂]	[✂]
Top 50 external customers	[✂]	[✂]	[✂]	[✂]
Top 100 external customers	[✂]	[✂]	[✂]	[✂]
Total number of external customers	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

65. We find that Lafarge's top 20 customers account for over [✂] per cent of all external sales revenues. Lafarge's top 50 customers account for at least [✂] per cent of all external sales revenues.

66. In relation to Tarmac, over the period 2007 to 2010, we find that the top 20 of its customers account for approximately [✂]. The top 30 customers account for [✂] while the top 50 represent more than the [✂] per cent (Table 4).

TABLE 4 **Concentration in Tarmac customer base for cement (per cent of total revenues accounted for by biggest external customers)**

	per cent of total revenue			
	2007	*2008*	*2009*	*2010*
Top 20 external customers	[✂]	[✂]	[✂]	[✂]
Top 30 external customers	[✂]	[✂]	[✂]	[✂]
Top 50 external customers	[✂]	[✂]	[✂]	[✂]
Top 100 external customer	[✂]	[✂]	[✂]	[✂]
Total number of external customers	[✂]	[✂]	[✂]	[✂]

Source: Anglo American.

[13] Results with total revenues for all majors are presented in Annex 2 (see Tables 37–40).

67. We observe a similar picture when looking at Hanson's transactions. The top 20 bulk cement customers account for considerably more than [✂] per cent of Hanson's total revenue from external customers and the top 50 customers for more than [✂] per cent (see Table 5 below).

TABLE 5 **Concentration in Hanson customer base for cement (per cent of total revenues accounted for by biggest external customers)**

	per cent of total revenue		
	2008	*2009*	*2010*
Top 20 external customers	[✂]	[✂]	[✂]
Top 30 external customers	[✂]	[✂]	[✂]
Top 50 external customers	[✂]	[✂]	[✂]
Top 100 external customers	[✂]	[✂]	[✂]
Total number of external customers	[✂]	[✂]	[✂]

Source: Hanson.

68. Cemex's total customer base appears more [✂].[14] The top 20 of Cemex's customers represent about [✂] per cent of Cemex's total revenues from external sales while the top 50 customers account for [✂] (see Table 6 below).

TABLE 6 **Concentration for Cemex customers—based on all external customer base for bulk and bagged cement (per cent of total revenues accounted for by biggest external customers)**

	per cent of total revenue		
	2008	*2009*	*2010*
Top 20 external customers	[✂]	[✂]	[✂]
Top 30 external customers	[✂]	[✂]	[✂]
Top 50 external customers	[✂]	[✂]	[✂]
Top 100 external customers	[✂]	[✂]	[✂]
Total number of external customers	[✂]	[✂]	[✂]

Source: Cemex.

69. Therefore, on the basis of 2010 data by monitoring switching by the 50 largest customers, Lafarge would cover [✂] per cent of external sales. Similarly, by monitoring the 50 largest customers Tarmac would monitor [✂] per cent of external sales; Hanson would cover over [✂] per cent of the total sales and Cemex [✂] per cent of total sales. Overall we see that if the majors each monitor their top 50 customers they

[14] However, Cemex provided data on concentration of customer base for both bagged and bulk customers, which may explain some of the difference.

would each be able to monitor substantially more than half of their external cement sales and in some cases much more.

70. Cemex told us that our acknowledgment that its customer base [✂] would suggest that monitoring of individual customers was impractical, [✂]. We do not agree with Cemex's interpretation. [✂], by monitoring the top 50 customers it would still be able to monitor the large majority of its sales ([✂] per cent).

Type of customers

71. We analysed the evidence on customers for cement to find out if they purchased cement from fixed delivery points (or, if not, whether they purchased within a given region). The existence of fixed delivery points will make it easier for cement producers to monitor whether lapsed customers have switched: otherwise, if deliveries to a specific site are discontinued, it may not be easy to find out whether this is because of the customer switching or because the customer is now operating on a new site which is not close to the former supplier's plant.

72. The difficulty should not be overestimated; however, in so far as the customer contact will remain the same, the fact that delivery points vary may not create problems in detecting switching as long as customers do not start operating in different regions (and therefore needing to purchase from different plants).

73. The data from the MPA (inclusive of both internal and external sales) shows sales of cement by channel. According to this data, in Q2 of 2011, 52 per cent of sales were to RMX producers, 21 per cent to merchants, 23 per cent to concrete producers and 4 per cent to others. A small proportion of sales of cement (in volume terms) are therefore to contractors and general construction companies, which would suggest that the large majority of sales of cement are to fixed delivery points. Lafarge and

Anglo American told us that this data could be misleading as it included both internal and external sales, so the split by type of customer could be different looking only at external sales. We addressed this by also looking at the split by type of customers for independent customers only, using the parties transaction data, as we set out in the following paragraph.

74. We also looked at the main parties' and the majors' data on their customers for cement. Detailed tables are presented in Annex 2. We found that, for bulk cement, the large majority of customers (both by number of customers and in terms of proportions of cement sold) are either concrete producers or RMX producers: about [✄] per cent of Lafarge customers are concrete or RMX producers, and sales to these customers represent over [✄] per cent of volumes of bulk cement sold in every year (see Annex 2, Tables 9 to 12). Similarly, RMX producers and concrete producers account for over [✄] per cent of Hanson's sales of bulk cement every year (see Annex 2, Tables 21 to 24). The vast majority of Cemex's bulk cement customers are also RMX and concrete producers with the two types representing over [✄] per cent of total sales (see Annex 2,Tables 29 to 32).[15] RMX and concrete producers are likely to be largely operating on fixed sites. Even in the case of volumetric trucks, it is likely that the point of delivery for the cement would be fixed (namely, the volumetric truck depot). The exception is mobile RMX sites where the point of delivery will vary and also soil stabilization sites. This suggests therefore that the large majority of bulk cement sales are to customers with fixed delivery points for cement.

75. We also had evidence from the GfK survey on the types of customers buying cement. We commissioned GfK to survey cement customers and RMX competitors on their purchases of cement. In effect this was designed as two separate surveys for cement purchasers:

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[15] We do not have enough customer type data for Tarmac to conduct a similar analysis.

1. One survey for RMX competitors (which also included RMX competitors who are customers of Anglo-Lafarge).
2. One survey for cement customers who are not competitors (RMX producers were excluded from this sample).[16]

76. From the MPA data, we know that the first category (RMX producers) account for about 50 per cent of customers.

77. For the bulk cement customers (not including RMX producers, so accounting for about 50 per cent of sales), the GfK survey found that 39 per cent of these are general construction/contractors, 27 per cent are distributors/builders merchants/DIY stores, and 33 per cent are concrete products producers. 53 per cent of these customers operate mainly fixed sites, and 43 per cent mainly projects.

78. For RMX competitors (who account for about 50 per cent of cement sales), the GfK survey found that 60 per cent operate fixed RMX plants, 38 per cent operate volumetric trucks, and 8 per cent operate mobile plants. Therefore, the RMX customers are likely to be mostly customers with a demand for cement at a fixed location or locations. For other customers, the survey suggests that about 53 per cent operate fixed sites, and 43 per cent mainly purchase cement for projects. Given that these customers account for about half of total cement purchases, this would suggest that about 20 per cent in total of customers purchase cement for projects, and 80 per cent purchase cement at fixed delivery points.

[16] Anglo American and Lafarge told us that [✂] per cent of 'cement customers' are concrete products producers and therefore would also in principle compete with Tarmac on account of Tarmac's activities in concrete product manufacture through Tarmac Building Products.

Evidence on multi-sourcing

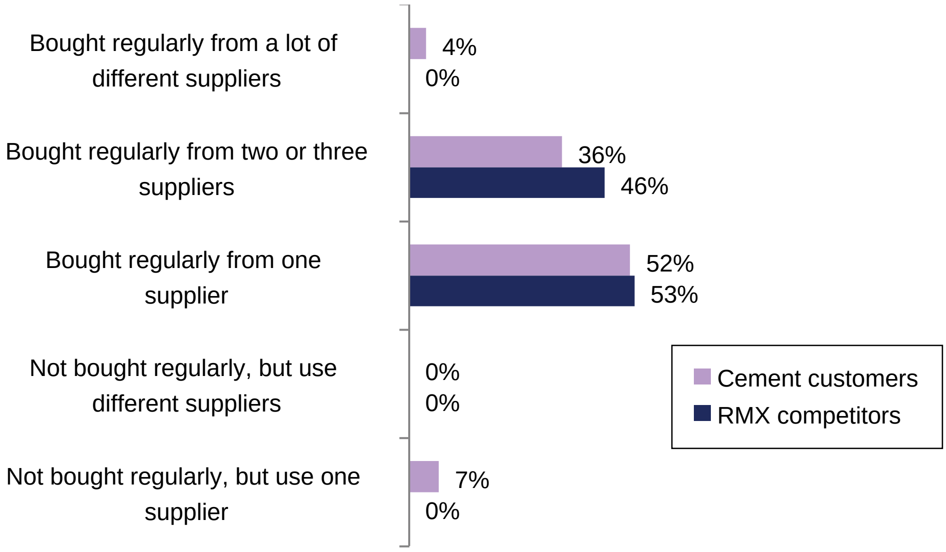
79. If customers source from different cement producers at the same time for the same site, and if they switch only part of their purchases in the event of a deviation by a competing cement producer, information on lapsed customers will not be sufficient to detect a deviation, and may need to be completed with analysis of sales volumes reductions by customers. Therefore if many customers multi-source at given sites and tend to switch by rebalancing purchases for a given site, it could make monitoring of deviations more difficult.

80. If customers are purchasing from different suppliers for different sites, but source mainly from a single cement producer for any specific site, although this would count as multi-sourcing, this would not reduce ability to monitor customer switching, because cement producers will know whether they are supplying to any specific site or not.

81. We had evidence from the GfK survey on the incidence of multi-sourcing. Respondents were asked about their purchasing behavior in the last three years. Results are reported in Figure 1 below: about 52 per cent of cement customers, and 53 per cent of RMX competitors, said that they purchased cement regularly from one supplier. 36 per cent of cement customers, and 46 per cent of RMX competitors, said that they purchased regularly from two to three cement suppliers.

FIGURE 1

Cement consumers' purchasing behaviour



Source: GFK Survey.

82. Within this, local businesses were more likely to source from a single supplier, and regional/multi-regional businesses were more likely to source from two to three suppliers. For RMX competitors: 61 per cent of local RMX businesses bought regularly from one supplier, but 73 per cent of regional RMX businesses bought from two to three suppliers. Similarly for cement customers: 64 per cent of local businesses bought from one supplier; this reduced to 46 per cent for regional businesses and 29 per cent for multi-regional businesses.

83. The data from GfK therefore gives some indications on the extent of single-sourcing and multi-sourcing. However, it is likely that, within those who said that they sourced from two to three suppliers, some will be customers with several sites who purchase from different cement suppliers for different sites (but from a unique supplier for any given site). Moreover, it is possible that some of the purchases from other suppliers are small (eg for specific specialist types of cement). For these reasons we think it is likely that the proportion that single source at site level is likely to be more than 50 per cent.

84. We also reviewed direct evidence given to us by cement customers (RMX and concrete products companies with whom we held hearings or who answered our questionnaire to intermediate-sized RMX producers) on how they purchased cement. We found that all of these were sourcing from a unique producer for a given site (though two of them sourced from different producers for sites in different regions).

85. Breedon Aggregates (which operates 40 RMX plants) told us that it purchased cement from both Lafarge and Cemex, but that it single-sourced on a regional basis: all its purchases of cement in Scotland were from Lafarge, and its purchases of cement in England were from Cemex and Hanson.

86. Brett (which operates 20 RMX plants) told us that it self-supplied approximately 30 per cent of its cementitious requirements using GGBS, with the remainder of CEMI coming only from Lafarge. The Concrete Company (another RMX producer with 11 plants in the UK) told us that 70 per cent of its total cement purchase value came from Southern Cement (an independent importer) and 27 per cent from Titan (another independent importer). Southern Cement (based in Ipswich) supplied its southern plants, while Titan (based in Hull) supplied its northern plants.[17] The Concrete Company more recently informed us that now all its cement was purchased from Southern Cement, with none being purchased from either Titan or Cemex. A Tarmac customer (a manufacturer of concrete blocks) told us that it used to purchase cement from several suppliers, but that now it purchased almost all of its requirements (99 per cent) from Lafarge. It told us that it switched to a single supplier because: 'In 2000, the price went up dramatically and we decided that, to get the best price, we'd give it all to one supplier and that was Lafarge or Blue Circle at the time.' This Tarmac customer told us that the remaining 1 per cent was white cement which was not produced in the UK.

[17] The Concrete Company also purchases very small amounts of cement from Cemex (3 per cent).

87. Hillhouse Quarry (a producer of RMX (and other construction materials) based in Scotland) told us that it single-sourced from Lafarge for its cement requirements).

88. Newark Concrete, a RMX producer based in the East Midlands, told us that it purchased all its cement from Tarmac.

89. Allen Newport Ltd (RMX producer from East Anglia) told us that it bought all of its cement from Lafarge.

90. Cemex commented that all this information was anecdotal and hence of limited value. We do not agree: our assessment of the extent of multi-sourcing is based on several sources, of which the GfK survey results and direct evidence from customers. While the direct evidence from customers is necessarily incomplete, the fact that all the customers we had direct evidence from had similar extent of single sourcing appears to be indicative. We therefore thought that, considering the GfK evidence and direct evidence from customers, that the majority of cement customers were likely to single source their cement requirements (at least, at an individual site level).

Regularity of purchasing

91. Regularity of purchasing is also a factor that will facilitate identifying whether lapsed customers have switched away to competitors. If purchasing is irregular, it may be difficult to know whether a customer is not purchasing because the customer does not need cement in a particular time period or because the customer has switched. If purchasing is regular, it will be easy to infer, when a customer has not purchased in a given period, that this customer has switched (or gone out of business, but this would be straightforward to check and discount such cases).

92. Moreover, regularity of purchasing means that deviations will be detected faster. For example, if a customer only buys cement once a year (and irregularly in the year), it could take up to one year for a cement producer to realize that this customer has switched. If a customer purchases cement monthly, it should take only one month for a cement producer to detect that this customer has switched.

93. The survey evidence showed that cement purchasing was regular: only 7 per cent of cement customers, and no RMX competitors, said that they did not purchase cement regularly.

94. We also analysed the main parties' transaction data to find out if customers tended to purchase cement regularly. Table 7 sets out the average number of transactions per customer per year for Lafarge external customers. Average number of transactions per customer and per site is large.

TABLE 7 **Lafarge customers: average number of transactions per customer per year**

	2007	*2008*	*2009*	*2010*
Average number of transactions per customer	[✂]	[✂]	[✂]	[✂]
Average number of transactions per site	[✂]	[✂]	[✂]	[✂]

Source: CC based on UK cement producer data.

95. We also looked at the number of customers having purchased at least four times from Lafarge during any one year (ie in most cases, at least once per quarter). We found that the large majority of customers ([✂] per cent or more) in any one year would have had at least four transactions recorded in the data in the year.

TABLE 8 **Number of customers with at least four transactions***

	2007	*2008*	*2009*	*2010*
Number of customers with at least four transactions	[✂]	[✂]	[✂]	[✂]
Total number of customers in the year	[✂]	[✂]	[✂]	[✂]
Proportion with at least four transactions (%)	[✂]	[✂]	[✂]	[✂]

Source: CC based on UK cement producer data.

*Total number of customers reported in this table are higher than those in Table 1. Table 1 was submitted by Lafarge whereas the figures here were extracted from the transaction data, which may explain the difference.

96. In conclusion, from the Lafarge data, most customers of bulk cement purchase cement on a regular basis (at least four transactions a year). Such frequent transactions will facilitate the identification of customers that have switched. If a customer does not purchase in a quarter, there is a high probability that this customer has switched or gone out of business (rather than the customer not needing cement for that quarter).

Summary of evidence on monitoring of customer allocations

97. We find that, although realized prices for cement are not very transparent, there is considerable transparency of total production of cement, capacity, and each firm's own market share. We find that cement producers have many sources of information available to them on industry outcomes, and Lafarge's answer to our questionnaire shows that they are able to gather a lot of market intelligence on cement users and where they purchase their cement from, as well as the volumes purchased from competitors, through their sales force. In addition, our review of internal documents shows that the UK cement producers have a high awareness of each other's actions.

98. We find that a firm can monitor its own market share with a one month lag using publicly available information from the MPA. This would in many cases be sufficient to detect whether a deviation is likely to have occurred.

99. We also reviewed the evidence on whether cement producers could complement market share monitoring with monitoring of whether their own customers are switching to other UK cement producers (given the evidence that Lafarge is already doing this through its sales force). We find that, although there is a relatively large number of cement purchasers, the customer base is concentrated. This means that, by actively monitoring a relatively limited number of customers (around 50 customers in total), cement manufacturers would cover most of their cement volumes. This could

be done (as already appears to be the case for Lafarge) by contacts between sales representatives and these customers to find out from where and in what quantities they are purchasing, in the event that one of these customer's volumes reduce.

100. Absent direct monitoring of large customers, cement producers could also complement information on market production and market share with information on lapsed customers. We find that, because customers tend to be regular purchasers, buying cement from fixed delivery points, and because they single source (for particular sites) in the majority of cases, monitoring of lapsed customers would also enable cement producers to help identify whether a deviation has occurred.

101. Therefore, we think that it is highly likely that cement producers would be able to monitor the terms of coordination, by monitoring their own market shares, as well as by monitoring switching by their large customers and (if necessary) by keeping track of lapsed customers.

Links to the Mineral Products Association data on cement sales and production

Monthly data received from the MPA on total production of cement by MPA members, total clinker production and total sales (as well as imports and exports by MPA members). This is received one month in arrears according to Lafarge:

http://cement.mineralproducts.org/documents/Table1_Monthly_Cement_30Sep11.pdf

Quarterly data on sales by channel:

http://cement.mineralproducts.org/documents/Table3_Quarterly_Cement_Channel_of_Sale_30Sep11a.pdf

Quaterly data on sales by type of cement:

http://cement.mineralproducts.org/documents/Table2_Quarterly_Cementitious_30Sep11.pdf

Quarterly data on sales of cement by region and by sales channel:

http://cement.mineralproducts.org/documents/Table4_Quarterly_Cement_Regional_Sales_30Sep11a.pdf

Analysis of cement producers' data on customers

1. We looked at the main parties' transaction data for cement and what this told us about customers for cement in terms of type of customers. We focus here on independent customers; that is, we do not take into account in this analysis internal sales, and sales to other majors.

[✂]

Analysis of cement switching data

Rationale for and use of this analysis

1. We analysed the data on cement customers won and lost provided by the UK cement producers. Switching data can provide indications on:

   (a) the closeness of competition between the different UK cement producers (are certain producers particularly close competitors?) and indications of the strength or weakness of the 'competitive fringe';

   (b) the possible existence of a firm which has substantially different behaviour from the other players;

   (c) the analysis of win/loss data may also indicate if there have been changes in the nature or intensity of competition over time. For instance, periods with relatively high or low levels of switching. Periods with high switching could indicate periods with more intense competition between firms, but could also be consistent with periods of breakdown of a possible coordinated outcome; and

   (d) the analysis of win/loss data may also provide some evidence on the existence of retaliatory behaviour. Such evidence is relevant to our analysis of coordinated theories of harm, in so far as it can provide indications on whether cement producers are able to spot when customers have switched and which producer they have switched to.

2. An analysis of switching data can provide some indications of the dynamism of the market and extent of competition for cement customers. However, analysis of switching data on its own is not sufficient evidence to conclude on the amount of existing competition, and should therefore be considered along the other evidence on the existing competition. For instance, a finding of low levels of switching between the majors would be consistent with (but not on its own conclusive evidence of) cement suppliers not actively competing to gain each other's customers (and therefore could

be interpreted as an indicator of the existence of some degree of coordination pre-merger). Competition for customers could still be intense but switching limited if customers are able to obtain competitive prices from their existing supplier through the threat of switching (given the lack of barriers to switching between cement suppliers).

3. This appendix is organized as follows. We first describe the data which was used for this analysis. We then present the results of the analysis of the cement win/loss data for Lafarge, Cemex and Hanson in turn.[1] For each of these companies, we present various summary tables on:

(a) the amount of switching that has been taking place in each year overall and distinguishing between independent customers, major customers and internal sales; and

(b) the competitors from whom customers were gained and the competitors to whom customers were lost, again distinguishing between major customers and independent customers.

Data

4. We received the following data on customers won and lost for cement:

	Win/loss data
Lafarge	January 2007 to July 2011.
[✄]	[✄]
Hanson	Data on wins/losses for bulk cement since 2009 for bulk cement and from 2011 for packed cement.
Cemex	Data on wins/losses from 2006 to 2010. Data represents about 70 per cent of switching for 2006 and 2007, and 90 to 95 per cent of switching for 2008 to 2010.
[✄]	[✄][2]

[1] Aggregate Industries and [✄] are not included in the analysis: [✄]; and [✄].
[2] [✄] by way of comparison this represents less than [✄] per cent of Lafarge's external sales.

Lafarge switching data

5. Lafarge provided data on customers won and lost for cement from January 2007 to July 2011. It told us that this data was a nearly complete dataset, and that any missing wins or losses would relate to smaller jobs and the total volumes associated with such missing data would likely represent an insignificant amount.

6. Table 1 shows the volumes won and lost by Lafarge in each year for all of its cement business. 2009, and to a lesser extent 2008, were the years with the largest volumes of business both lost and won. 2010 and 2011, in contrast, were characterized by much lower levels of wins and losses.

TABLE 1 **Lafarge volumes won and lost**

tonnes

	2007	*2008*	*2009*	*2010*	*2011**
Customers lost	[✂]	[✂]	[✂]	[✂]	[✂]
Customers won	[✂]	[✂]	[✂]	[✂]	[✂]
Net gains	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

*2011 volumes of customers won and lost have been annualized to make them comparable to other years (multiplied volumes by 12/7 to take into account that the data only covered wins and losses to the end of July 2011).

7. Table 2 shows volumes won and lost by Lafarge in each year, as a proportion of Lafarge's total sales of cement. Volumes won from competitors and lost to competitors are low as a proportion of total cement sales (less than [✂] per cent of sales in most years). In 2009, Lafarge won many more volumes, and also lost many more volumes, than in the other years. As we set out below, most of this switching activity was due to major cement suppliers switching away from Lafarge in 2009: two-thirds of the volumes lost by Lafarge in 2009 were in fact lost from other cement majors (and in particular Hanson) switching to self-supply. Similarly, over half of the volumes won in that year were due to Lafarge repatriating volumes in-house, as well as Aggregate Industries switching large volumes to Lafarge for its in-house downstream cement purchases.

TABLE 2 **Lafarge volumes won and lost, as a proportion of total Great Britain cement sales**

	Volumes lost and won as a percentage of total sales of cement				
	2007	*2008*	*2009*	*2010*	*2011*
Customers lost	[✂]	[✂]	[✂]	[✂]	[✂]
Customers won	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

8. Tables 1 and 2 include switching by Lafarge businesses to and from Lafarge cement (and relate this to total sales by Lafarge). Therefore, this does not give an accurate representation of switching by external customers. In Table 2*(a)*, we stripped out from the data any switching by Lafarge internal businesses, in order to show the amount of switching by external customers. We show these amounts as a proportion of total external sales by Lafarge in Table 2*(a)*. Lafarge internal sales are relatively low; therefore stripping out Lafarge internal sales from the data does not make a large difference to the results, though we can see that some of the gains over the years are due to Lafarge switching its internal businesses to Lafarge cement (gains of external customers are lower than overall gains).

TABLE 2*(a)* **Lafarge external volumes won and lost**

					tonnes
	2007	*2008*	*2009*	*2010*	*2011*
Losses	[✂]	[✂]	[✂]	[✂]	[✂]
Wins	[✂]	[✂]	[✂]	[✂]	[✂]
Net gains	[✂]	[✂]	[✂]	[✂]	[✂]
					per cent of external sales
Loss	[✂]	[✂]	[✂]	[✂]	[✂]
Win	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

9. Lafarge told us that data on actual switching underestimated the amount of competitive activity and provided data on failed approaches and retentions of bulk non-major customers following competitive threat for 2010 and 2011. For 2010 and 2011, Lafarge provided data on [✂] of ‘failed approaches’ to bulk non-major customers, ie instances in which Lafarge had approached a customer of a competitor to attempt to

gain the business (so comparable, but below, the total amount of volumes gained in 2010 and 2011). Hanson and Cemex accounted for around [✄] per cent of Lafarge's failed approaches (in volumes), whereas importers accounted for around [✄] per cent of Lafarge's failed approaches. Tarmac represented less than [✄] per cent of failed approaches. In comparison, for actual wins of non-major bulk customers in 2010 and 2011, [✄] per cent of volumes were from Hanson, [✄] per cent were won from Cemex and [✄] per cent were won from importers. Less than [✄] per cent of wins in 2010 and 2011 were gained from Tarmac.

10. Lafarge also provided data on losses and retained business where customers secured lower prices after threatening to switch. For actual losses of independent customers over 2010 and 2011, [✄] per cent of volumes were lost to Hanson and [✄] per cent to Cemex, and [✄] per cent were lost to importers. Less than [✄] per cent of losses were to Tarmac. For retentions leading to lower prices following a threat to switch over 2010/11, Hanson and Cemex accounted for around [✄] per cent of the failed approaches to Lafarge's customers, while importers accounted for [✄] per cent of failed approaches. Failed approaches from Tarmac were very small. Lafarge also told us that the average price reduction for retained customers was £[✄] for that period.

11. We agreed that actual switching data might underestimate the amount of competitive activity, and that the threat of switching might be sufficient in markets where there were no barriers to switching (as we set out above). Therefore we accepted that relatively low levels of switching in proportion to total sales was not necessarily an indicator of lack of competition between the UK cement producers. As a result, we assessed the evidence on switching alongside the other evidence on the extent of competition for cement customers, such as the evidence on margins, prices, and price announcement letters.

12. However, we continued to consider that data on actual switching was more reliable than data on failed approaches and retentions, because in the case of actual switching we could assume that the customer found it worthwhile to switch (so would have obtained a better deal). In the case of failed approaches, these may fail because Lafarge quotes a price that is in excess of the price charged by the current provider. Similarly, customers may be retained because alternative providers actually quote high prices (in excess of Lafarge's current prices). In this respect, we noted that the data provided by Lafarge showed that Lafarge approaches to customers of importers were much more successful than Lafarge approaches to customers of Hanson or Cemex. This suggested that Lafarge might be quoting lower prices when approaching customers of importers than customers of Hanson and Cemex. Similarly, Lafarge was more successful in retaining customers when these said that they were approached by Cemex or Hanson than by importers, which again could suggest that Cemex and Hanson may be approaching these customers with relatively high prices.

13. For each year, Table 3 shows the split of wins and losses between the downstream business of the UK cement producers and independent customers.[3] Table 4 shows the same data but in percentage terms. In every year except 2011, the majority of volumes of cement lost by Lafarge were volumes sold to customers who are part of one of the major cement producers (presumably, downstream RMX and/or concrete businesses of the majors). This is particularly pronounced in 2007 and in 2009. There is no pattern for business won, with the proportions between independents/majors varying widely from year to year.

[3] By 'independent customers', here and throughout the note, we refer to customers which are not a downstream RMX or concrete business of one of the majors. Some of these may not be independent in the usual meaning of the word (eg a national DIY chain would be classified as independent here).

TABLE 3 **Lafarge volumes won and lost, split between majors and independent customers**

					tonnes
	2007	*2008*	*2009*	*2010*	*2011*
Losses, of which:	[✄]	[✄]	[✄]	[✄]	[✄]
Independents	[✄]	[✄]	[✄]	[✄]	[✄]
Majors	[✄]	[✄]	[✄]	[✄]	[✄]
Wins, of which:	[✄]	[✄]	[✄]	[✄]	[✄]
Independents	[✄]	[✄]	[✄]	[✄]	[✄]
Majors	[✄]	[✄]	[✄]	[✄]	[✄]

Source: Lafarge.

TABLE 4 **Lafarge volumes won and lost, split between majors and independent customers, as a proportion of total wins/losses**

					per cent
	2007	*2008*	*2009*	*2010*	*2011*
Losses, of which:					
Independents	[✄]	[✄]	[✄]	[✄]	[✄]
Majors	[✄]	[✄]	[✄]	[✄]	[✄]
Wins, of which:					
Independents	[✄]	[✄]	[✄]	[✄]	[✄]
Majors	[✄]	[✄]	[✄]	[✄]	[✄]

Source: Lafarge.

14. Turning to the analysis of which competitors customers were gained from and lost to, Figures 1 and 2 show, in each year, the volumes which were won and lost from different competitors. In 2007 and 2009, the competitor from which the largest volumes were won and lost was Hanson. However, in 2008, Cemex was the competitor from which the largest volumes were won, and the largest losses were to Tarmac. In 2010 and 2011, the largest wins were from importers.[4] Lafarge told us that any substantial volume losses to Tarmac were a special case of Tarmac repatriation as a result of the recession, and Tarmac's more general policy of producing for self-supply. We analyse the amount of switching by independent customers between Tarmac and Lafarge below.

15. Lafarge told us that because Figures 1 and 2 included repatriated volumes, important competitive dynamics were hidden as regards supply to independent bulk customers.

[4] By importers, we mean importers that are independent from the majors. Therefore, Aggregate Industries, even though it imports a large amount of cement, is not classified as an importer.

For this reason, we also produced figures that analyse switching by independent customers only (Figures 4 and 5). However, we think that switching of volumes by the majors (through repatriation, or if a major switches external cement purchases from one major to another) are also important aspects of the competitive dynamics.

16. Lafarge told us it considered that the repatriation of volumes over 2007 to 2009 was caused primarily by the substantial drop in Great Britain demand for cement. The large drop in industry demand resulted in Cemex, Tarmac and Hanson repatriating substantial volumes in order to achieve greater certainty over their firm-level down-stream demand. Lafarge told us that the consequence of these asymmetric repatri-ation decisions was that Lafarge lost [✂] to Cemex in 2007, [✂] to Tarmac in 2008 and lost [✂] of volumes to Hanson in 2009 purely as a result of repatriation, totalling over [✂] over three years. Consequently, Lafarge told us that its rational response was to seek to regain an efficient level of production so as to avoid the need to close additional cement operations in Great Britain. Lafarge further noted that despite its considerable efforts to win additional business over this period its share of Great Britain bulk external supply dropped markedly from [✂] per cent to [✂] per cent from 2007 to 2009.

FIGURE 1

Lafarge volumes won, by competitor won from

[✂]

Source: Lafarge.

FIGURE 2

Lafarge volumes lost, by competitor lost to

[✂]

Source: Lafarge.

17. There is therefore no clear pattern for Lafarge's 'closest competitor' in terms of gains and losses. However, Figure 3, which shows in each year the gains and losses of

volumes by major, highlights that there is some similarity in wins and losses in any given year. In years where losses to Hanson were large (2007 and 2009), gains were also very large and of a similar magnitude. In years where these losses were low (2008 and 2010), gains were also low. The same is true for gains and losses to Cemex, which are generally similar in a given year, though not for Tarmac (with a large loss in 2008 which was not balanced by a gain). Lafarge told us that it did not agree that there was any meaningful symmetry in wins and losses, and that it considered that the repatriation of volumes over 2007 to 2009 might distort substantially the competitive dynamics between cement suppliers as regards supply to independents. We note that we also produced charts looking only at switching by independents. However, we think that repatriation (and more generally, switching by downstream operations of the majors) are part of the competitive dynamics of the market. In terms of overall profitability, what matters to cement producers are their total sales, whether these are internal, to majors, or to independent customers.

18. We noted this symmetry in wins and losses in a given year. One could expect some symmetry in gains and losses to a given competitor: this could reflect the closeness of a particular competitor. However, in a competitive market, one might not expect wins and losses to balance out in each year (but rather some fluctuation depending on performance of each competitor in each year). The high degree of symmetry in any given year, coupled with the large fluctuations in levels of wins and losses from year to year, could suggest that Lafarge targets competitors from whom it loses customers (and conversely): for instance, if Hanson gains customers from Lafarge, or repatriates volumes away from Lafarge, Lafarge will try to gain customers from Hanson, and vice versa. Lafarge did not agree that there was any symmetry, and told us that this was due to the fact that the charts included both independent and major customers. It told us (and we agree) that there was less symmetry when looking only at switching by independent customers. However, we thought that it was interesting

to note that, when Hanson repatriated very large volumes in 2009, Lafarge not only repatriated (to a smaller extent given its smaller purchases), but also gained a substantial amount of independent business from Hanson that year (200kt). This suggested to us that competitive dynamics of the market include both sales to other majors and to independents and that we should not necessarily look at each type of customer in isolation.

FIGURE 3

Lafarge gains and losses of volumes from each major competitor

[✂]

Source: Lafarge.

19. The data presented above includes all volumes won and lost and therefore include data on the majors switching to and from Lafarge.

20. Figures 4 and 5 show wins and losses of volumes from independent customers only. There is variation, in each year, on the identity of the 'closest competitor' in terms of wins and losses of independent customers. There is also less symmetry (than in the case of major customers) in the patterns of wins and losses of independent customers by competitor. As one would expect, importers appear to be more of a threat for independent customers than when the majors are included in the analysis. There were steady gains of volumes from importers over the period. Losses of customers by Lafarge to importers were particularly high in 2008 and in 2009; in 2010 they were low.[5] Except in 2008 where there were relatively large losses of volumes to Tarmac, Tarmac does not appear as a particularly close competitor to Lafarge (in terms of the supply of cement) from this data.

[5] 2011 is part year data (to end of July)—if we annualize losses to importers for 2011 they are larger than in 2010, but below the levels observed in 2008 and 2009.

FIGURE 4

Lafarge independent customers lost, by competitors lost to

[✂]

Source: Lafarge.

FIGURE 5

Lafarge independent customers won, by competitor won from

[✂]

Source: Lafarge.

21. Table 6 summarizes the total independent customer volumes won and lost to each competitor for the period 2007 to 2011. On average, Hanson accounts for the largest proportion of independent volumes won over the period ([✂]per cent of wins), closely followed by importers and other suppliers ([✂] per cent of wins). Importers account for the largest proportion of volumes lost by Lafarge ([✂] per cent of volumes lost), followed equally by Hanson and Cemex. Tarmac and Aggregate Industries account for small proportions of both volumes won and lost.

22. Table 6 also reports the 'expected' diversion ratios computed from market share data in 2010: if market shares were an accurate reflection of closeness of each competitor, what percentage of volumes would we expect to be diverted to each competitor?[6] Observed diversions above the expected diversion ratios can suggest either that a competitor is particularly close (in terms of product offering or geographic footprint, for instance) or that a competitor is particularly active in trying to gain customers.[7] The data shows that diversion to importers is higher than one would expect from market shares—suggesting that these are either particularly close competitors or that their behaviour is different from the behaviour of the majors. Diversion to Tarmac is

[6] To calculate expected diversion, we used national cement market shares based on volumes in 2010 from total UK production and total imports in the UK. The formula for expected diversion to competitor X is the following:

DR = (Market share of competitor X)/ (1 – market share of Lafarge).

[7] We compare diversion ratios to expected diversion for independent customers only. This is because the large volumes switched by the majors between each other would distort any analysis.

below what we would expect from market shares, suggesting that Tarmac is not a close competitor to Lafarge in cement (or that it is not active in gaining external customers).

TABLE 6 **Total wins and losses of independent customers, 2007 to 2011**

	Cumulative wins tonnes	*Cumulative losses tonnes*	*Wins % of all volumes won*	*Losses % of all volumes lost*	*Expected diversion %*
Aggregate Industries	[✂]		[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]	[✂]
Importers and others	[✂]	[✂]	[✂]	[✂]	[✂]
Total	[✂]	[✂]	[✂]	[✂]	

Source: The parties.

23. Turning now to the analysis of volumes won and lost from the majors, Figure 6 shows net gains of volumes from each of the majors in each year. As set out above, Hanson switched large volumes away from Lafarge in 2009 (all of these volumes were switched to self-supply). Lafarge told us that Hanson's repatriation (as well as that of other UK producers) was most likely a consequence of the substantial drop in industry demand, in order to achieve greater certainty over firm-level demand. In the same year, Lafarge also repatriated large volumes (though less than Hanson repatriated), and although it is not shown on this chart, the data shows that almost all of these volumes were in fact switched away from Hanson. [✂][8] Lafarge also gained large volumes of sales to Aggregate Industries (as a customer) in that same year, and again these were almost all won from Hanson. The other notable move was a large switch by Tarmac in 2008—this was also repatriation to self-supply.

24. Overall, Lafarge told us that it had lost a large amount of business from the other majors between 2007 and 2011, and that even though it repatriated volumes and gained business from Aggregate Industries' downstream operations, on a net basis

[8] [✂]

Lafarge lost large amounts of cross-sales to/from majors. Lafarge told us that it had effectively no ability to repatriate volumes any further, because it only purchased around 10kt of volumes externally in Great Britain in 2010.

FIGURE 6

Lafarge major customers: net gains in each year

[✂]

Source: Lafarge.
Note: This figure does not exclude Lafarge-Marcon and Tarmac-Caledonian even though these are integrated with a major. However, the volumes associated with these customers are small and consequently would not change Figure 6 significantly.

Cemex switching data

25. Cemex provided data on cement customers won and lost between 2006 and 2010. Cemex told us that, during 2006 and 2007, win/loss data was not systematically recorded and consequently Cemex estimated that the data provided to us represents around 70 per cent of Cemex's wins and losses of customers during that period. It told us that it had developed a more comprehensive system to monitor wins and losses for the years 2008 to 2010, and that it believed that the data provided to us included around 90 to 95 per cent of relevant customer switching activity for 2008 to 2010.

26. For the years 2006 and 2007, the data provided by Cemex specifies the volumes gained or lost, the type of product (bulk or bagged, and at a more detailed level, the product specification), the location of the customer and the competitor to or from whom the customer was lost/won. The value of the contract is also specified in some instances. For the years 2008 to 2010, although the data is more complete according to Cemex (detailing around 90 to 95 per cent of customer switching activity), the data does not specify the location of the customer, the value of the contract, or the product type. All in all, there are 12 instances of switching (out of over [✂]) over the whole period where the volume of the switch is not known in the data. We used volumes

switched as the relevant measure throughout the analysis, even though there were a few missing observations, because there were many more missing values for values switched. Also, the data included some customers which were won because they were new entrants (eg new RMX plant) and some customers which were lost because they went out of business. We excluded these from our analysis and concentrated on customers that were won/lost from/to other competitors.

27. Table 7 shows the total volumes won and lost by Cemex in each year because of customers switching to or from other suppliers. Note that 2006 and 2007 are not directly comparable to the other years because the data in those years only represents about 70 per cent of all switching according to Cemex. 2006 and 2008 appear to be years with large levels of switching (both wins and losses), whereas switching activity was very low in 2010. There is a large degree of symmetry in volumes won and lost in any given year: years in which large total volumes were lost also correspond to years with large total volumes gained, and the reverse (where low total volumes were lost, low total volumes were also gained). Periods with large losses of volumes and wins would be consistent with periods of deviation and retaliation. Although there may also be other explanations, we are not currently aware of what these might be.

TABLE 7 **Cemex total volumes won and lost**

tonnes

	2006	*2007*	*2008*	*2009*	*2010*
Loss	[✂]	[✂]	[✂]	[✂]	[✂]
Win	[✂]	[✂]	[✂]	[✂]	[✂]
Net gains	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

TABLE 8 **Cemex total volumes won and lost, as a proportion of total sales of cement**

per cent

	2006	*2007*	*2008*	*2009*	*2010*
Loss	[✂]	[✂]	[✂]	[✂]	[✂]
Win	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

Note: N/A = not available.

28. Table 8 relates the total volumes won and lost to Cemex's total sales of cement (for 2008 to 2010—data on total sales not available for previous years). As a proportion of total sales, the total volumes won and lost in every year appear relatively [✂] ([✂] per cent in all cases). Cemex told us that the relationship between volumes won and lost in a year and the volumes of sales made in a given year was not entirely straightforward because each win or loss recorded took the form of an anticipated annual purchase volume. Cemex told us that this could artificially inflate a customer's switched volume for a given year if the customer switched late in the year, but it could also deflate the switched volume if the customer mostly purchased the switched volumes in the next year with no further record. In addition, Cemex told us that customers would not always purchase the volumes that they indicated they would and might switch away before they had purchased agreed volumes. We accept that there was some imprecision in these estimates, and therefore do not place much weight in the analysis on actual percentages but rather on magnitude of the numbers and changes in these magnitudes.

29. However, Cemex sells a large proportion of its production internally, so it may be more relevant to compare total wins and losses to external sales. In order to do so, we have stripped out all of Cemex internal volume switching from the data in Table 9, and related these volumes to total external sales in Table 10.

30. It can be seen that:

(a) Cemex internal switching accounts [✂] of the volumes won in 2006 and 2007: total wins are [✂] in those years when we strip out Cemex switching to self-supply. In all years, on a net basis, Cemex has [✂] when we strip out the impact of Cemex internal volumes.

(b) External volumes switched as a proportion of total external volumes are [✂]—though total switching activity remains [✂] in 2009 and [✂] in 2010. Cemex told us that in 2010 competitive conditions were very difficult, and that as a result, Cemex [✂]. In 2008, there were [✂] won and lost (representing [✂] of external sales)—in particular business won in 2008 was [✂].

TABLE 9 **Cemex total external volumes won and lost**

tonnes

	2006	*2007*	*2008*	*2009*	*2010*
Loss	[✂]	[✂]	[✂]	[✂]	[✂]
Win	[✂]	[✂]	[✂]	[✂]	[✂]
Net gains of external volumes	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

TABLE 10 **Cemex total external volumes won and lost, as a proportion of external sales**

per cent

	2006	*2007*	*2008*	*2009*	*2010*
Loss	[✂]	[✂]	[✂]	[✂]	[✂]
Win	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

Note: N/A = not available.

31. Table 11 shows the split of Cemex wins and losses between major customers and independents, and Table 12 shows this split in percentage terms.[9] In 2006 and 2007, the majority of customers won and lost were [✂] (particularly marked in 2006). In 2009, [✂]. In 2010, [✂].

[9] Independents are defined here as customers who are not a major; however, these include customers which may have a national presence such as, for example, large DIY chains.

TABLE 11 **Cemex wins and losses, split between independents and majors**

tonnes

	2006	2007	2008	2009	2010
Independent customers lost	[✂]	[✂]	[✂]	[✂]	[✂]
Major customers lost	[✂]	[✂]	[✂]	[✂]	
All volumes lost	[✂]	[✂]	[✂]	[✂]	[✂]
Independent customers won	[✂]	[✂]	[✂]	[✂]	[✂]
Major customers won	[✂]	[✂]	[✂]	[✂]	
All volumes won	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

TABLE 12 **Cemex wins and losses, split between major customers and independents, by proportion of all wins/losses**

per cent

	2006	*2007*	*2008*	*2009*	*2010*
Independent customers lost	[✂]	[✂]	[✂]	[✂]	[✂]
Major customers lost	[✂]	[✂]	[✂]	[✂]	[✂]
All volumes lost	[✂]	[✂]	[✂]	[✂]	[✂]
Independent customers won	[✂]	[✂]	[✂]	[✂]	[✂]
Major customers won	[✂]	[✂]	[✂]	[✂]	[✂]
All volumes won	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

32. Turning now to the analysis of which competitors customers were gained from and lost to, Figure 7 shows, in each year, the volumes which were won from the various different competitors (where known). In 2006, 2007 and 2008, [✂] appear to be the closest competitors to Cemex in terms of volumes won, while gains from [✂]. In 2009, [✂]. 2010 is characterized [✂].

FIGURE 7

Cemex volumes won, by competitor won from

[✂]

Source: Cemex.

33. [✂] when looking at the competitors to whom volumes were lost. [✂] In 2009, the largest losses of volumes by Cemex were to [✂], with losses of volumes by Cemex to [✂]. Losses of volumes by Cemex to [✂]. As for losses of volumes by Cemex to importers, [✂].

FIGURE 8

Cemex volumes lost, by competitor lost to

[✄]

Source: Cemex.

34. A different way of looking at the same data is to compute the gains and losses by Cemex from/to each major in each year, as presented in Figure 9. This highlights [✄]. This could be indicative of some retaliatory strategies. There is not such a relationship between Cemex gains and losses to/from Hanson. Cemex disputed that there was any symmetry, saying that there were significant differences in total volumes won and lost to each major over the period. We agreed that gains and losses did not balance out overall.

FIGURE 9

Cemex gains and losses of customers from each major, 2006 to 2010

[✄]

Source: Cemex.

35. The charts above were computed for all volumes lost. Figures 10 and 11 look specifically at independent customers won and lost. [✄]

FIGURE 10

Cemex independent customers lost, by competitors lost to

[✄]

Source: Cemex.

FIGURE 11

Cemex independent customers gained, by competitor won from

[✄]

Source: Cemex.

36. Table 13 shows the percentage of losses and wins over the period to the different competitors, as well as the 'expected diversion ratios' calculated on the basis of national market shares (see paragraph 22 above). If the observed percentage of switching to a particular competitor were larger than the expected diversion, this could indicate that this is a particularly close competitor (eg in terms of geographic footprint or range of products offered). [✂]

TABLE 13 **Total losses and wins of independent customers, 2006 to 2010**

	Cumulative losses tonnes	*Cumulative wins tonnes*	*Percentage of wins %*	*Percentage of losses %*	*Expected diversion %*
Aggregate Industries	[✂]	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]	[✂]
Importer/other suppliers	[✂]	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]	[✂]
Not known	[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]	[✂]
Total	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Cemex.

37. Finally, Figure 12 shows wins and losses of major customers. For each major customer, we show the net gains to Cemex in every year. [✂] Although this is not in the figure, closer inspection of the data shows that [✂]. There has therefore been a clear movement by the majors towards self-supply for cement (repatriation)—and the data also shows that Cemex repatriated volumes over the period, particularly in 2006. Most of these volumes were switched away from [✂].

38. Cemex told us that switching data alone did not provide a complete picture of customer arbitrage between cement manufacturers. Threats of switching were also important. Cemex told us that [✂]. The data showed that volumes of cement which Cemex defended in 2009 were [✂] of Cemex's net volumes for that year. For 2010, defended volumes were [✂] per cent of total volumes. Cemex told us that this data indicated strongly that customers considered it worthwhile to switch or threaten to switch and that Cemex was obliged to defend a large part of its volumes in any given year. [✂] We accepted that data on actual switching was not necessarily indicative

of the extent of competition in the market and that threats to switch could be as effective as actual switching in markets with no barriers to switching. We would expect that, after sending out price increase announcement letters, Cemex would be contacted by customers threatening to switch. [✄]

FIGURE 12

Cemex major customers: net gains in each year

[✄]

Source: Cemex.

Hanson switching data

39. Hanson provided data on wins and losses for bulk cement from 2009 onwards, and for packed cement from 2011 onwards. Hanson told us that these were the dates from which such data had been collected by the business as a matter of course.

40. The source of this information is sales personnel knowledge which is collated monthly. Hanson told us that all volume and competitor information was estimated and should not be taken as evidence of actual volumes switched (and the records should not be assumed to be comprehensive). In the following we only analyse the data on switching for bulk cement, as the data for bagged cement covers only one year so we cannot make any comparisons. The bulk cement data contains wins and losses of volumes due to customers going out of business or new businesses—these have been excluded from the analysis to concentrate on customer switching activity.

41. Table 14 shows the total volumes won and lost by Hanson in each year, and Table 15 shows the proportion of total sales these account for. There was a very large volume won and lost in 2009 in relation to total sales: gains represented ([✄] per cent) of total sales in 2009, and losses represented—([✄] per cent) of total sales.

TABLE 14 **Hanson total volumes won and lost**

			tonnes
	2009	*2010*	*2011*
Gain	[✂]	[✂]	[✂]
Loss	[✂]	[✂]	[✂]

Source: Data provided by Hanson.

TABLE 15 **Hanson total volumes won and lost, as a proportion of total sales of bulk cement***

			per cent
	2009	*2010*	*2011*
Gain	[✂]	[✂]	[✂]
Loss	[✂]	[✂]	[✂]

Source: Hanson.

*For the denominator, we used total sales of bulk cement minus sales to new businesses.
Note: N/A = not available.

42. Confirming what we found in the Lafarge data, almost all of the volumes won in 2009 were in fact due to Hanson repatriating cement volumes in-house (these represent [✂] per cent of the 2009 gains). Similarly, the large majority of lost volumes in 2009 ([✂] per cent) were also because of majors switching their own cement purchases away from Hanson (again confirming the Lafarge data: Lafarge repatriated from Hanson in 2009).

43. Table 16 shows the total external volumes won and lost by Hanson over the period—ie stripping out the effect from Hanson switching its in-house volumes. Apart from the large loss in 2009 (because of majors switching away from Hanson), the volumes won and lost are relatively low as a proportion of external sales. In 2010, there were relatively high gains, but these are again mainly due to majors switching back to Hanson (see below).

TABLE 16 **Hanson external volumes won and lost**

			tonnes
	2009	*2010*	*2011*
Gain	[✂]	[✂]	[✂]
Loss	[✂]	[✂]	[✂]

Source: Hanson.

TABLE 17 **Hanson external volumes won and lost, as a proportion of external sales of bulk cement**

per cent of external sales

	2009	*2010*	*2011*
Gain	[✂]	[✂]	[✂]
Loss	[✂]	[✂]	[✂]

Source: Hanson.

44. Table 18 shows the split of wins and losses between major customers and independent customers in each year, and Table 19 shows the split between majors and independents as a proportion of wins and losses. Overall, switching by independent customers was low during the period. There was considerable switching by the majors in 2009, and some in 2010. In 2011, there was little switching either from the major customers or independent customers.

TABLE 18 **Hanson wins and losses, split between majors and independent customers***

	2009	*2010*	*2011*
Gains, of which:	[✂]	[✂]	[✂]
Independents	[✂]	[✂]	[✂]
Majors	[✂]	[✂]	[✂]
Losses, of which:	[✂]	[✂]	[✂]
Independents	[✂]	[✂]	[✂]
Majors	[✂]	[✂]	[✂]

Source: Hanson.

*Identifying major customers is not always straightforward as they trade under many different names. Hanson told us that its own calculations produced different results and that this was probably due to different customers are being flagged as independent and majors in comparison to the CC's approach.

TABLE 19 **Hanson wins and losses, split between majors and independents, as a proportion of all wins/losses**

% of wins/losses

	2009	*2010*	*2011*
Gains, of which:			
Independents	[✂]	[✂]	[✂]
Majors	[✂]	[✂]	[✂]
Losses, of which:			
Independents	[✂]	[✂]	[✂]
Majors	[✂]	[✂]	[✂]

Source: Hanson.

45. Figure 13 shows which competitors volumes were won from in each year, and the figure also shows the competitors to which volumes were lost in each year. [✂]

FIGURE 13

Hanson volumes won, by competitor won from

[✂]

Source: Hanson.

FIGURE 14

Hanson volumes lost, by competitor lost to

[✂]

Source: Hanson.

46. Figure 15 presents the data differently: it shows gains and losses by competitor in each year. [✂]

FIGURE 15

Hanson gains and losses from the majors, 2009 to 2011

[✂]

Source: Hanson.

47. Figures 16 and 17 show losses and gains of independent customers, by competitor. [✂]

FIGURE 16

Hanson independent customers won, by competitors won from

[✂]

Source: Hanson.

FIGURE 17

Hanson independent customers lost, by competitor lost to

[✂]

Source: Hanson.

48. Table 20 shows total gains and losses to each competitor. [✂] If we compare the realized diversion to the expected diversion from market shares (see paragraph 22),

diversion to importers is higher than what we would expect from market shares. Diversion to Tarmac and Lafarge is in line with market shares, and diversion to Cemex is lower than expected from market shares.

TABLE 20 **Hanson total gains and losses of independent customers, 2009 to 2011**

	Gains	*Losses*	*% of gains*	*% of losses*	*Expected diversion*
Aggregate Industries	[✄]	[✄]	[✄]	[✄]	[✄]
Cemex	[✄]	[✄]	[✄]	[✄]	[✄]
Importer	[✄]	[✄]	[✄]	[✄]	[✄]
Lafarge	[✄]	[✄]	[✄]	[✄]	[✄]
Other suppliers	[✄]	[✄]	[✄]	[✄]	
Tarmac	[✄]	[✄]	[✄]	[✄]	[✄]
Total	[✄]	[✄]	[✄]	[✄]	

Source: Hanson.

49. Looking at majors' switching to and from Hanson, we find once again that there has been a substantial amount of repatriation in 2009 (Figure 18). [✄]

50. Confirming the findings in the Lafarge win/loss data, we find that Hanson repatriated large volumes (particularly in 2009), and that Lafarge did the same, [✄].

FIGURE 18

Hanson major customers: net gains in each year

[✄]

Source: Hanson.

Summary

51. In summary, we find that:

(a) Most of the majors repatriated volumes in-house in 2008 and 2009. [✄]

(b) Switching activity by independent customers (ie customers who are not a down-stream business of one of the majors) is generally relatively low as a proportion of total sales. There was substantially more switching activity in 2008 and 2009 than in 2010 and 2011.

(c) The relatively high amounts of switching activity in 2008 and 2009, compared with 2010 and 2011, could indicate that the reduction in demand for cement resulted in more competition between UK cement producers and/or otherwise destabilized the market. It could suggest that, if UK cement producers had been tacitly coordinated, the reduction in demand resulted in some deviations and/or retaliation.

(d) In 2010 and 2011, the market appeared stable, with few independent volumes being switched and little switching by customers that were downstream businesses of one of the majors.

(e) There is some evidence of symmetry in gains and losses (years with high losses to a particular major correspond to years of large gains from that major as well)—which is consistent with retaliatory behaviour in the market. This is particularly the case when looking at the majors switching volumes between themselves (symmetry in repatriation patterns).

(f) Tarmac does not appear to be a close competitor to Lafarge and Cemex from this data, in the sense that wins and losses of cement volumes to/from Tarmac are small.

(g) Switching to/from importers is higher than we would expect from diversion ratios. Importers appear proportionally to be more active in gaining customers from the majors than other majors.

(h) Data on failed approaches and retentions suggest that customers may be able to play cement providers against each other without having to switch, though we have some reservations on the reliability of data on failed approaches and retentions as set out above.

Analysis of cross-sales of cement between the majors

1. We analysed the extent to which the five major vertically-integrated producers of construction materials in the UK (Lafarge, Tarmac, Cemex, Hanson and Aggregate Industries[1]) buy and sell cement to each other (so called 'cross-sales').

2. In this appendix, we review the evidence on cross-sales of cement,[2] and in particular:
   (a) for each of the majors, which cement suppliers it purchases from and sells to;
   (b) how cross-sales balance out between the majors, and which majors are net purchasers/net sellers of cement;
   (c) whether there have been any trends in cross-sales; and
   (d) the possible impact of the merger on the amount and symmetry of cross-selling patterns.

3. This appendix does not deal with existing joint ventures between the five major producers of construction materials in the UK and cross-sales arising from these joint ventures.

Rationale for cross-sales

4. The main parties (and other cement producers) told us of three main reasons why the majors purchase cement from each other:
   (a) For logistical reasons, if a producer of cement has a shortfall of inputs in a particular location. Lafarge told us that these types of cross-sales were usually supplied as a matter of short-term expediency during product shortages in periods of high demand. Lafarge told us that in these circumstances, the competitors sought to purchase domestically rather than importing cement.

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[1] Aggregate Industries does not produce cement.
[2] The majors also sell aggregates, RMX and asphalt to each other, although these cross-sales are beyond the scope of this appendix.

(b) Where there are transport cost savings, ie when a major's RMX or other 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 (see paragraphs 6 to 8).

(c) When a producer of cement does not have the capacity to self-supply its RMX operations. Anglo American told us that for this reason it purchases cement from competitors (including domestic producers and cement importers).

5. From data provided by Lafarge, the type of sales under paragraph 4*(b)* (where a downstream RMX or concrete operation purchases cement from a competing major) are much more prevalent and account for some 90 per cent of Lafarge's cement sales to competing majors.

6. Hanson and Cemex also told us that cross-sales were mainly motivated by transport cost savings. In respect of its relationship with Lafarge, Hanson stated that:

> Hanson purchases cement from Lafarge predominantly to supply [Hanson's] RMX plants in the South and South West. ... This supply arrangement results from the optimal location of Lafarge's cement plants (and its rail link into the South West) for supplies into the South West, compared to Hanson's cement plants which are not rail linked into the South West.

In respect of its relationship with Tarmac, Hanson stated that:

> Hanson currently sells cement to Tarmac predominantly for use in [Tarmac's] RMX plants in Scotland and the North West .... Again, such a supply arrangement arises largely due to logistic considerations. In particular, Hanson operates a rail depot in Scotland while Tarmac does not.

7. While some of the above cross-sales arrangements are informal, there are also some more formal arrangements or agreements in place between some of the majors for supplying cement to each other. [✄]

8. [✄][3]

Data on cross-sales

9. Data from various sources can be analysed to provide estimates of the amounts of cross-sales of cement:

   (a) Cement transaction data of both main parties and the majors includes sales of cement to other majors and can therefore be used to deduce, for each major:

      (i) their sales to other majors; and

      (ii) their purchases from each major.

   (b) Our market questionnaire also included a question on the amount of cross-sales. This was answered by most majors, but the initial quality of the responses varied.

   (c) When we infer the majors' purchases of cement from another party's sales data, there is inevitably some scope for inconsistencies with the data provided by the purchaser[4] because we have to identify manually which of the customers in the transaction data are in fact part of a major, and some majors (in particular Aggregate Industries) trade under a large number of different names.

10. The data we received originally was subsequently amended by all the cement majors. Therefore, the figures shown here are those subsequently provided by the majors.

[3] [✄]
[4] We found particularly large (ie larger than 30,000 tonnes a year) inconsistencies, between the volume data provided by the seller and the purchaser, arise in the following cases: *(a)* in 2007, 2008, 2009 between Aggregate Industries and Hanson, Aggregate Industries and Lafarge; *(b)* in 2008 between Hanson and Lafarge; and *(c)* in 2010 between Cemex and Tarmac.

Sales and purchases of cement from other major cement producers

Tarmac

11. Table 1 below shows Tarmac sales to and purchases from other major cement producers, in tonnes, from 2007 to 2010. Tarmac relies mainly on internal supplies for its cement requirements, but it is also a net purchaser of cement.

TABLE 1 **Tarmac sales and purchases of (bulk) cement to/ from the other majors**

tonnes

	2007	*2008*	*2009*	*2010*
Sales to majors				
Aggregate Industries	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]		[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]
Total sales to majors (incl internal sales)	[✂]	[✂]	[✂]	[✂]
Purchases from majors				
Aggregate Industries	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]
Total purchases of cement	[✂]	[✂]	[✂]	[✂]
Net sales				
Aggregate Industries	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]

Source: Anglo American.

12. Tarmac sells very small quantities of cement to other majors, and it is generally a net buyer of cement from the majors (with the exception of Aggregate Industries in 2007 and 2008). Anglo American told us that in 2007 it implemented a strategy of being more self-sufficient in the supply of cement increasing its internal sales as the output of its Tunstead plant increased. Tarmac has been reducing its purchases of cement from the other majors over time, and [✂]. The proportion of cement purchases which was self-supplied has increased over the period, from [✂] per cent of purchases (by volume) in 2007 to [✂] per cent in 2010. It appears from the data that Tarmac has been able to increase its reliance on internal sales because of the large decline in its requirements for cement (presumably linked to the reduction in demand for

construction over the period) and also because of the new capacity it installed in 2008.

Lafarge

13. Table 2 below shows Lafarge sales to and purchases from other major cement producers, in tonnes, from 2007 to 2011.

14. Lafarge currently purchases very small quantities of cement from other majors: in 2011, it bought only marginal amounts from [✂]. Lafarge is a net seller of cement [✂].

15. Purchases from other cement producers (in particular from Hanson) have been reduced and no longer take place. The proportion of cement purchased which was self-supplied increased from 68 per cent (by volume) in 2007 to 98 per cent in 2010. As for Tarmac, it appears from the data that Lafarge has increased reliance (in percentage terms) on self-supply due to the contraction in Lafarge's demand for cement: while internal supplies remained broadly stable, the fall in Lafarge's demand for cement has apparently been translated into a very large reduction in purchases from other majors.

TABLE 2 **Lafarge sales and purchases of cement from other majors**

					tonnes
	2007	*2008*	*2009*	*2010*	*2011*
Sales to majors					
Aggregate Industries	[✂]	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]	[✂]
Total sales to majors (incl internal sales)	[✂]	[✂]	[✂]	[✂]	[✂]
Purchases from majors					
Aggregate Industries					
Cemex	[✂]	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]	[✂]
Total purchases of cement	[✂]	[✂]	[✂]	[✂]	
Net sales to majors					
Aggregate Industries	[✂]	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

Cemex

16. Table 3 shows Cemex's sales to and purchases from other major cement producers, in tonnes, from 2008 to 2010.

TABLE 3 **Cemex purchases and sales of cement to/from other majors**

			tonnes
	2008	*2009*	*2010*
Sales to majors			
Aggregate Industries	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]
Total sales to majors (incl internal sales)	[✂]	[✂]	[✂]
Purchases from majors			
Aggregate Industries	0		0
Internal	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]
Total purchases	[✂]	[✂]	[✂]
Net sales			
Aggregate Industries	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]

Source: Cemex.

17. Cemex is a [✂] of cement [✂] Tarmac and Aggregate Industries, [✂] Lafarge [✂] Hanson (except in [✂] when it was a [✂] by a small margin). [✂], Cemex has [✂] purchases from Lafarge and Tarmac between 2008 and 2010, [✂] purchases from Hanson. Overall, it appears to have reduced its reliance on self-supply of cement between 2008 and 2010, from [✂] per cent (by volume) of its cement use to [✂] per cent.

Hanson

18. Table 4 shows Hanson’s sales to and purchases from other major cement producers, in tonnes, from 2008 to 2010*.*

TABLE 4 **Hanson sales and purchases of cement to/from the majors**

			tonnes
	2008	*2009*	*2010*
Sales to majors			
Aggregate Industries	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]
Total sales to majors (incl internal sales)	[✂]	[✂]	[✂]
Purchases from majors			
Aggregate Industries	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]
Total purchases of cement	[✂]	[✂]	[✂]
Net sales			
Aggregate Industries	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]

Source: Hanson.

19. Hanson was a [✂]. It is a net purchaser from Lafarge who is Hanson’s main external cement supplier. Like Lafarge [✂], Hanson has increased its reliance on self-supply of cement over the period, from [✂] per cent of volumes of cement purchased being sourced in-house in 2008 to [✂] per cent in 2010. This has been done by increasing

the amounts purchased in-house; and a large reduction in volumes purchased from Lafarge and Cemex.

20. Hanson was acquired by Heidelberg in September 2007 (prior to which it did not have in-house UK cement production). To some extent this may be an explanation for the increase in cement supplied in house between 2008 and 2009.

Aggregate Industries

21. [✂]

22. [✂][5]

23. [✂]

TABLE 5 **[✂]**

	2007	*2008*	*2009*	*2010*
Sales to majors				
Internal	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]
Total sales to majors (incl internal sales)	[✂]	[✂]	[✂]	[✂]
Purchases from majors				
Internal	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]
Total purchases of cement	[✂]	[✂]	[✂]	[✂]
Net sales				
Internal	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]

Source: Aggregate Industries.

[5] [✂]

Cross-sales before and after the joint venture

24. Currently Lafarge is a net seller of cement, and Tarmac is a net purchaser of cement. Hanson and Cemex are currently both net sellers of cement overall (ie in total they produce more than they need for their in-house businesses), but their position varies depending on the major to which they are selling: [✂].

25. After the proposed JV, assuming that the JV entity maintains the existing sales patterns,[6] the cross-sales will be much more balanced [✂].

TABLE 6 **JV sales and purchases to majors**

	2007	*2008*	*2009*	*2010*
Sales to majors				
Aggregate Industries	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]
Total sales to majors (incl internal sales)	[✂]	[✂]	[✂]	[✂]
Purchases from majors				
Aggregate Industries	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]
Total purchases of cement	[✂]	[✂]	[✂]	[✂]
Net sales				
Aggregate Industries	[✂]	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]	[✂]
Internal	[✂]	[✂]	[✂]	[✂]

Source: CC calculations based on aggregating Tarmac and Lafarge sales and purchases in Table 1. [✂]

26. Table 7 shows the position of each of the majors in terms of total purchases and total sales of cement, and the ratios of purchasing to production before and after the JV. Currently, Tarmac needs more cement than it purchases (its ratio of use to production over 100 per cent) although this has reduced substantially in more recent years, whereas Lafarge currently produces much more cement than it needs internally (its ratio of use to production is around [✂] per cent). Cemex and Hanson both produce more cement than they use, and in similar proportions [✂].

[6] A number of parties ([✂]) commented that the proposed JV was likely to internalize most (if not all) of Tarmac's existing external purchases of cement, given Lafarge's existing excess cement capacity.

27. The proposed JV has a large impact on these ratios: after the proposed JV, the position of Cemex, Hanson and the JV entity will be more similar in terms of their ratios of use to production—all of which will be around [✄] to [✄] per cent after the proposed JV.

TABLE 7 **Balance of purchases and sales, and ratios of use/production, before and after the JV, all majors**

			tonnes
	2008	*2009*	*2010*
Volumes produced			
Lafarge	[✄]	[✄]	[✄]
Hanson	[✄]	[✄]	[✄]
Tarmac (bulk only)*	[✄]	[✄]	[✄]
Cemex	[✄]	[✄]	[✄]
Aggregate Industries†	[✄]	[✄]	[✄]
Volumes used			
Lafarge	[✄]	[✄]	[✄]
Hanson	[✄]	[✄]	[✄]
Tarmac	[✄]	[✄]	[✄]
Cemex	[✄]	[✄]	[✄]
Aggregate Industries	[✄]	[✄]	[✄]
			per cent
Ratio of use/sales			
Lafarge	[✄]	[✄]	[✄]
Hanson	[✄]	[✄]	[✄]
Tarmac	[✄]	[✄]	[✄]
Cemex	[✄]	[✄]	[✄]
Aggregate Industries	[✄]	[✄]	[✄]
JV entity	[✄]	[✄]	[✄]

Source: Transaction data for each major.

*[✄]
†For Aggregate Industries only we used sales data.

28. An implication of this symmetry is that, following the proposed JV and assuming that the JV entity maintains, at least in part, the existing cross-sales patterns, Cemex, Hanson and the JV entity will have a similar ability to repatriate volumes. This ability is much less before the proposed JV, where Lafarge uses very little cement in-house and therefore has little scope for repatriating.

Cement imports

Introduction

1. In this appendix, we review the evidence on imported cement and the strength of the constraint from imports on Great-Britain-produced cement.

2. This analysis forms part of our wider analysis of possible coordination in cement. Our guidelines set out that coordination will be sustainable only if the outside constraints on the firms involved in coordination are relatively limited. It is not necessary for all firms in the market to be involved in coordination, but those firms which coordinate need to be able collectively to exercise a degree of market power.[1]

3. The appendix is set out as follows. First, we provide details of the ownership, capacity and market shares of importers. Next we consider evidence on the costs of importing cement into Great Britain and how these compare with the costs of producing cement in Great Britain and to Great Britain cement prices. This section also includes an assessment of the evidence on the geographic scope of imports. We then present evidence on the general competitiveness of cement imports, including evidence on the amount of switching by customers between the majors and importers of cement, the views of importers, evidence gathered from internal documents from the majors, and the views of cement customers on imported cement respectively.

[1] The Guidelines, paragraph 5.5.17.

Import capacity and market share of imports

4. Bulk cement is imported to Great Britain through import terminals. There are 29 import terminals in Great Britain, of which 16 are operated by the majors, and the remaining 13 by independent importers.[2]

5. We are interested in the extent to which imported cement is a constraint on the price of cement produced/supplied by the UK majors. We therefore focus on independent importers in this appendix.

6. Lafarge and Tarmac told us that, in so far as Aggregate Industries is not part of the alleged group of coordinating firms, the constraint from imports from Aggregate Industries should be considered together with the constraint from independent importers. We review the constraint from Aggregate Industries on UK cement producers separately in the provisional findings (see paragraph 6.177 of the provisional findings), and [✂].[3] Therefore in the remainder of this appendix we consider imports by importers other than Aggregate industries separately.

Importers and location of terminals

7. Table 1 lists the 11 independents importing cement into Great Britain, and their terminal locations. We note that Dragon Alfa Cement and Southern Cement are both owned by the largest player in the Spanish market, Cementos Portland Valderrivas (CPV). There are 13 import terminals operated by independents around the Great Britain coastline, and one in Northern Ireland. In addition, one importer (Quinn) imports by ferry from the Republic of Ireland without using an import terminal.

[2] By independent importers, here and in the rest of this report, we mean importers which are not a subsidiary of one of the major UK construction product manufacturers. Therefore we do not include imports by Aggregate Industries and affiliated companies as independent importers, though we discuss more specifically imports by Aggregate Industries in this appendix.
[3] [✂]

8. We understand that all the cement which is currently imported into Great Britain is CEM I. We were told that there were no imports of CEM II/III into Great Britain, but that it would be possible for importers to blend CEM I with cementitious products to produce CEM II and CEM III.

TABLE 1 **Independent cement importers**

Importer	*Location*	*Notes*
Brett Concrete	Ridham Dock, Kent	All Brett imports are for own-use only; only GGBS is imported
Channel Cement	Truro, Cornwall	
PCL (formerly Dan Morrissey Concrete (UK) Ltd)	Swansea, Wales	
Dragon Alfa Cement	Sharpness, Gloucestershire	Owned by CPV
Dudman	Shoreham, Kent Howden Lowestoft, Suffolk Garston, Liverpool; Dibbles Wharf, Southampton*	[✂]
Lagan	Belfast, N Ireland	Imports to Great Britain by ferry or by Dudman
Thomas Armstrong	Workington, Cumbria	Imports to Great Britain from Lagan for own use only
Titan Cement	Hull	Titan Cement is owned by Titan Cement Company SA, a Greek cement and building materials producer and imports cement from Titan's Kamari plant Greece
Sherburn Stone	Blyth	
Southern Cement	Ipswich, Suffolk	Owned by CPV
Quinn	Republic of Ireland	Imports to Great Britain by ferry

Source: Main parties and third parties.

*[✂].

Market share and capacity

9. Import capacity depends both on the amount of spare production capacity in the countries of origin and on the availability of capacity to store cement at import terminals.

10. Since 2008, demand for cement has fallen dramatically in many countries, in response to adverse macroeconomic conditions, and several countries have significant excess capacity at a national level. In particular, we were told that there was excess capacity in Spain, Greece and the Republic of Ireland. Tarmac also told us that Portugal and Italy had particularly high levels of excess capacity.

11. We were told that the number of importers and the capacity at import terminals in Great Britain rose in response to a shortage of capacity relative to high levels of domestic demand and high prices in the period 2002 to 2006. Tarmac told us that it did not consider that cement prices were high in 2002 to 2006, and that the higher prices during this period were largely attributable to increasing energy costs. Tarmac told us that there had been successful expansion by cement importers in the past three years, despite current market conditions, which demonstrated importers' ability to compete with domestic Great Britain producers.

12. Tarmac told us that the forthcoming implementation of EU ETS Phase III[4] was likely to increase incentives for importers to sell cement in Great Britain. More specifically, under EU ETS Phase III, cement producers which failed to produce sufficient cement to reach 50 per cent of their historical allocation level will receive a lower CO_2 allocation the following year (losing at least 50 per cent of their allocation). Tarmac told us that this would increase the incentive for a non-UK European cement producer to import cement into the Great Britain market. We do not agree with Tarmac that this will necessarily be the case: instead, non-UK cement producers which are producing below the 50 per cent threshold may instead decide to decommission plants, as has been done by several of the UK cement producers in the past few years.

13. Lafarge estimates that the capacity of independent cement importers (including Aggregate Industries) is approximately [✄]Mt per year, of which [✄] per cent ([✄]Mt) was used in 2010.[5] Tarmac estimated that the collective import capacity of these companies was [✄]Mt of grey cement a year as at 2009, with reported 2009 sales of 1.086Mt a year (per MPA statistical data).

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[4] The ETS was introduced by the EU to help meet its greenhouse gas emissions targets under the Kyoto Protocol. See the glossary for a definition.
[5] Lafarge told us that this estimate included import capacity from Aggregate Industries, which it estimated at 800Kt of cement.

14. The evidence we received from importers which answered our questionnaire confirmed that they had spare capacity for importing cement at their terminals. Brett and Thomas Armstrong told us that they were operating at around 50 per cent capacity at their terminals, while Sherburn told us that its capacity utilization was around 15 per cent at present. PCL is operating at around [✂] per cent of capacity, and Lagan at around 40 per cent of capacity in 2010. Dudman has recently opened its terminal at Liverpool, [✂].

15. We received evidence on the share of imported cement in Great Britain. Data from the MPA, which was also submitted to us by the main parties, suggests that the total share of sales of imports in Great Britain has increased continuously since 2005, from about 8 per cent in 2005 to about 13 per cent in 2010. The data from the MPA is set out in Table 2.

TABLE 2 **Share of imports in Great Britain from MPA estimates**

'000 tonnes

	2005	*2006*	*2007*	*2008*	*2009*	*2010*
Cement sales from Great Britain production	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cement imports to Great Britain (by domestic cement producers)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Estimated cement imports to Great Britain (by importers other than the domestic cement producers)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total Great Britain cement sales (including imports)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Share of imports by non-Great Britain producers (%)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Main parties, from MPA estimates.

16. Cemex told us that the share of imports increased in spite of the fact that the trade value of sterling had decreased by 20 per cent over the same period. Cemex told us that in a more stable exchange rate environment, the increase in imported volumes might have been more pronounced. We noted that imported volumes had not increased much during the period in which the sterling exchange rate fell (the import share increased mainly because the total Great Britain sales reduced).

17. We note that the estimates from the MPA include imports by Aggregate Industries, which is not a Great Britain producer of cement but is one of the major UK construction and building materials companies (and which is owned by Holcim, a large producer of cement in mainland Europe) (see paragraph 6).

18. Aggregate Industries imports cement into the UK through four import facilities (Chatham, Plymouth, Glasgow and Ellesmere Port). We used sales data from Aggregate Industries to calculate the market share of independent importers excluding Aggregate Industries (see Table 3).The share of independent importers increased from about 6 per cent in 2006 to 9 per cent in 2010, with a small decline in share between 2009 and 2010.

TABLE 3 **Share of imports excluding Aggregate Industries (by volume)**

'000 tonnes

	2006	*2007*	*2008*	*2009*	*2010*
MPA estimated cement imports to Great Britain by non-Great Britain producers	1,089	1,121	1,084	1,086	1,153
Aggregate Industries imports*	[✂]	[✂]	[✂]	[✂]	[✂]
Imports by independents	[✂]	[✂]	[✂]	[✂]	[✂]
MPA total Great Britain cement sales	12,434	13,025	11,228	8,660	8,981
Share of independent importers (%)	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Main parties, from MPA estimates, except * Aggregate Industries.

19. We also obtained direct evidence from some importers on their total sales of cement in Great Britain for 2010. Using this direct evidence (supplemented by Lafarge estimates where direct evidence was not available), we found total cement sales by independent importers that were very similar to the estimates from the MPA, giving us confidence in the reliability of the data from the MPA. We used the MPA estimates throughout, because they cover several years whereas sales data obtained from individual importers was only for 2010.

20. We also calculated the market shares of the UK producers and importers for sales of bulk cement in Great Britain, which we defined as the relevant market. Table 4 shows total sales of bulk cement by the majors and importers in Great Britain, and Table 5

shows the market shares for 2008 to 2010 (years for which we had data from all the UK producers).

TABLE 4 **Total Great Britain sales of bulk cement**

tonnes

	2008	*2009*	*2010*
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]
Aggregate Industries	[✂]	[✂]	[✂]
Importers (non-domestic)	[✂]	[✂]	[✂]
Total	[✂]	[✂]	[✂]

Source: Data for the majors is from the majors' transactions data. Data for non-domestic importers is from MPA estimates, assuming all imports of cement are bulk cement.

TABLE 5 **Great Britain market shares for bulk cement**

per cent

	2008	*2009*	*2010*
Lafarge	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]
Cemex	[✂]	[✂]	[✂]
Hanson	[✂]	[✂]	[✂]
Aggregate Industries	[✂]	[✂]	[✂]
Importers (non-domestic)	[✂]	[✂]	[✂]

Source: Data for the majors is from the majors' transactions data. Data for non-domestic importers is from MPA estimates, assuming all imports of cement are bulk cement.

21. We see that the market share of importers for Great Britain bulk cement sales has increased from [✂] to [✂] per cent between 2008 and 2010. Lafarge’s relative market share has fallen from [✂] to [✂] per cent for the same period, while Tarmac’s and Aggregate Industries’ shares have increased. Cemex’s and Hanson’s shares remained almost unchanged.

22. Overall, we find that independent importers currently account for about [✂] per cent of all cement sales and [✂] per cent of total bulk cement sales in Great Britain. We find that the share of importers has been increasing between 2005 and 2009 for all cement sales and between 2008 and 2009 for bulk cement (see paragraphs 18 and 20). In 2010, the market share of independent importers remained stable compared with its level of 2009.

23. Despite the increase in market share by importers from 2008 to 2009, we did not find that this increase in market share had any noticeable impact on UK producers' margins for cement or on their average prices. The evidence on margins and prices is presented in Appendix L. We found that variable cement margins increased in 2009 compared with 2008 and 2007, and that average cement prices charged by Lafarge and Tarmac also increased compared with 2007 and 2008. This suggested to us that, despite importers gaining market share, this did not result in a pressure on Great Britain cement prices charged by Lafarge and Tarmac.

Evidence on the price and competitiveness of imports of cement in Great Britain

24. The ability of imports to compete successfully with Great-Britain-produced cement depends mainly on the price at which imports of cement can be sold profitably in Great Britain. This in turn depends primarily on the costs of producing cement at the country of origin, the £/€ exchange rate, the cost of transporting and storing the cement to Great Britain import terminals, any other import costs (such as import levies) and the additional costs of transporting the cement to customers within Great Britain.

25. In this section, we first review evidence on various elements of cost that are expected to affect the final price of cement. We then review evidence on the catchment area for imports (ie the distance from import terminals over which imports are likely to be price competitive against Great-Britain-produced cement). We then present evidence on the competitiveness of imports more generally, including customer views on the attractiveness of imports and evidence of customers switching to imports, and views from importers on their ability to compete with Great-Britain-produced cement.

Cost of imported cement

26. There are various cost elements that we might expect to influence the final price of both domestic and imported cement. We summarize the evidence we have obtained regarding the various elements of costs and assess how the costs of importing cement to Great Britain and delivering it to Great Britain customers compares with the cost of producing cement in Great Britain and delivering it to Great Britain customers.

27. We first review the evidence we received on the costs of shipment of imports to Great Britain. We next review the evidence on the costs of producing cement in provenance countries. We then review evidence on the total costs of producing and shipping imports to an import terminal, and compare this with evidence on the ex-works costs of producing cement in Great Britain.

Shipping costs

28. Shipping is a significant additional cost for importers compared with Great Britain producers of cement. Table 6 provides estimates by the main parties of the cost of shipping cement to Great Britain terminals from several locations, as well as an estimate from one independent importer (Premium Cement) of the cost of importing cement from the Republic of Ireland.

TABLE 6 **Estimated cost per tonne of shipping cement, provided by the main parties and one independent importer**

Source	*Destination*	*Year*	*Cost**
[✂]	Thames/South Coast	2007	£9.50
[✂]	Bristol	2007	£13.40
[✂]	Not given	2007	£15.00
[✂]	Not given	2007	£11.00
[✂]	Not given	2007	£21.00
[✂]	Swansea	2007	[€11–€14 (£9.16–£11.66)]
[✂]	Scotland	2010	€10–15 (ie £8.60–£12.90)
[✂]	Greater London	2010	£9.7
Average estimate			£12.6

Source: The main parties and one independent importer.

*Where costs are in euros, we converted to pounds using average exchange rate for the year in question.

29. The estimates above suggest that, on a simple average, importers incur a freight cost of £12.60 per tonne overall, though this varies by country of origin. Based on the above data, this average was £13.40 per tonne for 2007, and £10.10 per tonne for 2010. We use the more recent estimate of £10.10 per tonne for 2010 in the following estimates.

30. We note that £10.10 per tonne compares with average variable costs of producing cement in Great Britain of the order of £25 per tonne according to our estimates of variable margins (see Appendix L). This means that production of cement in other countries would need to be substantially more efficient than production in Great Britain to compensate for the freight cost disadvantage.

Cost of production of imported cement

31. Lafarge said that importers of cement to the UK are able to compete successfully with domestically-produced cement for reasons including lower production costs in other European countries. Lafarge estimated that the UK had higher power costs (representing [✂] per cent of Lafarge's variable manufacturing costs in 2010) than other European countries: Spain's power costs were estimated by Lafarge to be less than two-thirds (around [✂] per cent) of the UK's costs; and Germany's power costs were estimated to be [✂] per cent of costs in the UK.

32. Cemex told us that imported cement would often be cheaper at source: for example, Turkish cement was not subject to EU carbon levies.

33. We obtained data from independent importers on the average costs to them of sourcing cement in the provenance countries (before shipment, ie FOB costs). We also obtained estimates from the UK cement producers on the FOB costs of cement produced in other countries. These various estimates are presented in Table 7.

TABLE 7 **Estimated FOB cost**

Source of estimate	*Provenance country*	*Destination*	*Year*	*FOB cost (per tonne)*
[✂]	[✂]	[✂]	2010	€51–€54
[✂]	[✂]	[✂]	2010	£42.30
[✂]	[✂]	[✂]	2011	£54
[✂]	[✂]	[✂]	2011	£58
[✂]	[✂]	[✂]	2011	€65
[✂]	[✂]	[✂]	2011	€52
[✂]	[✂]	[✂]	2011	€48
[✂]	[✂]	[✂]		[£40–£50]
Average of the direct evidence from independent importers on their costs (£)				£49.60
Average of the estimates from Great Britain cement producers on costs to independent importers (£)				£44.20

Source: [✂].

34. We therefore found that the costs of imported cement are of the order of £44 to £50 per tonne on average before shipping,[6] or £54 to £60 per tonne (including shipping costs; see paragraph 28) for imported cement to Great Britain import terminals, before delivery to Great Britain customers.

Overall costs of imported cement

35. As set out above, we found the overall costs of importing cement to be of the order of £55 to £60 per tonne to Great Britain terminals.[7] This compares with average variable ex-works costs for Great-Britain-produced cement of the order of £25 per tonne. Therefore, this suggests to us that Great Britain producers have a substantial cost advantage over importers, in that, at the margins, they can serve customers at much lower prices than importers would be able to.

36. Table 8 summarizes the various estimates of the costs of importing cement that we received, and compares the overall cost of importing cement (using these estimates) with our estimates of the marginal costs to Great Britain producers of selling cement.

[6] In general, we put more weight on estimates obtained directly from importers than estimates provided by the Great Britain cement producers, so the £50 per tonne average is used in the remainder of this appendix (£60 per tonne including shipment).
[7] We also obtained an estimate from an independent importer of total costs of importing to Great Britain terminals including shipping (see paragraph 28), and this was of the same magnitude as the average we found above.

TABLE 8 **Cost comparison between Great Britain and imported cement**

	Cost element (per tonne)	
	Great Britain cement	*Imported cement*
FOB cement cost (average)	-	£49.6
Freight shipping cost (average)	-	£10.10
Cost of production ex works	£25*	-
Transport cost by road	£6.34-£12.37	£6.34–£12.37
Depot cost	£2.4	N/A
Port dues	-	€1–€2
Estimated total (average variable costs to Great Britain customers)		
By road	£34	£70

Source: The main parties, third parties and CC calculations.

*CC analysis of margin data.

37. We found that imports are substantially more costly than locally-produced UK cement, even taking into account the possible lower cost of production outside the UK. Table 8 estimates that, on average, it would cost about £70 per tonne to deliver imported cement to Great Britain customers (based on variable costs, not including overheads). This contrasts with average variable costs to Great Britain producers of delivering cement to Great Britain customers of the order of £34 per tonne. We therefore find that, on a marginal basis, Great Britain producers have a substantial cost advantage over importers. Given the lack of transparency in prices of cement, this means that they would be able to undercut importers profitably. This will limit the extent to which importers can constrain Great Britain cement prices, as importers can anticipate that Great Britain producers are able to undercut them and therefore may find it in their interest to behave as price followers.

38. In terms of the comparison between the average costs of importing and current import prices, the average costs of importing of £70 per tonne compared with average delivered prices of cement are about £74 to £82 per tonne.[8] This implies that the profitability of importing cement and delivering it to customers is likely to be low.

[8] See Appendix L.

39. Lafarge and Tarmac told us that, even if the profitability of importing was low, importing cement could still be incrementally profitable. We agree that importing cement is likely to be profitable incrementally at current Great Britain prices given that imports exist. However, given the low profitability of imports at current prices, we find it unlikely that importers would have an incentive to increase imports substantially to such an extent that this would have a significant downwards impact on cement prices and prompt a reaction from Great Britain producers. In other words, we think that it is likely that some imports can be profitable at current prices, but that any substantial increase in volumes imported, if it created incentive for Great Britain producers to undercut importers (which they have the ability to do given their lower variable costs), would make these imports unprofitable.

40. Lafarge provided some estimates which it said demonstrated that the overall costs of a domestic producer and a cement importer to serve Great Britain customers were similar. [✂]

41. However, in these estimates, Lafarge's estimates of its own ex-works costs were much higher than our estimates of their costs based on our analysis of their margins. Lafarge included, in its costs calculation, both variable and fixed costs, so that ex-works average costs (including both average and fixed costs) were estimated at £[✂] per tonne (about double the amount of variable costs). We did not think that this was the appropriate comparison. This is because, given the lack of transparency in cement prices and the variation in prices paid by customers, we think that Lafarge would be able to serve additional customers profitably at any price which exceeds average variable costs. Therefore, we think that Lafarge (and the other UK cement producers) would be able to undercut importers given the substantial cost advantage they have over importers. We think that this will limit the competitive constraint by

importers on prices, as importers will anticipate that Great Britain cement producers could undercut them.

Geographic scope of imported cement

42. We also considered evidence on the geographic scope of imported cement. In the following paragraphs we summarize the evidence we received from importers, the main parties and the results from the PCA on the geographic scope of imported cement.

43. The evidence from independent importers on catchment areas is reviewed first. We find that catchment areas vary depending on the importer: two importers told us that most of their customers were located within 25 to 40 miles, whereas two importers told us that they served customers up to 100 miles away, and one importer told us that, although its customers tended to be local, it had a few small customers over 100 miles from its import terminal.

44. [✂], a [✂] importer, told us that importing from its [✂] cement works to [✂] cost about £50 per tonne including shipping and material, but that this did not include further costs such as landing costs, storage costs and road haulage to get the cement to customers. It told us that, as a result, it had a much higher cost than UK-produced cement, and it was not in a position to reduce prices greatly to secure work. [✂] told us that its customers tended to be fairly local to the [✂] terminal, though it had a few small customers in [✂] and [✂].[9] It also told us that its customers were small cement users, from which it could get the better price, but for which there was more instability in terms of longer-term deals because this type of customer tended to buy ad hoc.

[9] [✂] is about 140 miles from [✂]; [✂] is about 90 miles from [✂].

45. [✂] told us that its catchment area was [✂] with over [✂] per cent of its customer base being within 25 miles of the [✂] terminal and that the maximum effective competition distance was 25 miles because there was a [✂] terminal at [✂] approximately 45 miles away. It also told us that its terminal facility was limited to about [✂] tonnes a year and currently almost all of its capacity was being utilized for the requirements of existing customers.

46. [✂] said that its catchment area was [✂] with [✂] per cent of its customers being located within 25 miles of the import terminal. The maximum distance over which it could compete with UK producers was 40 miles.

47. [✂] told us that [✂] per cent of its sales were at or below 110 miles away and that it would be very difficult to compete over 175 miles from the terminal since transport of powders such as cement was extremely expensive.

48. Dragon Alfa said that [✂] per cent of its business was within 100 miles of its terminals in Ipswich and Sharpness and that it found it hard to compete outside the 100-mile radius as haulage charges made it uncompetitive. It also told us that it was restricted in selling to certain customers due to the limitation of supply. These limitations were controlled by factors such as available production capacity in Spain; available shipping to transport product to the UK; tidal conditions in port of import; silo capacity in port of import; distance to customer depots from port of import (particularly when deliveries were time sensitive due to traffic congestion); the type of cement it supplied; technical requirements of customers in relation to other products cement was to be used alongside; and/or products to be manufactured.

49. Lafarge said that it was not the case that importers could only compete in a small geographic area, restricted to the immediate vicinity of import terminals. Lafarge

estimated that around 80 per cent of bulk cement volumes supplied by importers were distributed within 80 miles of import terminals.

50. The results from the PCA, which are described in Appendix H, suggested that imports were not a strong constraint on the prices paid by Lafarge and Tarmac cement customers. In our base specification, we did not find any statistically significant effect on the prices of Lafarge or Tarmac of the presence of an import terminal within 50 miles, 100 miles or 150 miles. The exception was an effect of weak significance and small magnitude on Lafarge prices from terminals in the range 50–100 miles. This effect becomes somewhat larger and statistically more significant when Lafarge's largest customers are excluded from the regression sample, representing a decline of 86p per tonne in Lafarge's price for each additional terminal in the given distance range.

51. Prompted by comments from main parties' advisers, we also investigated alternative specifications in which the 'import terminals' category is restricted to include only 'pure' importers, ie operators with no cement works in the UK. We studied two variations on this alternative specification, depending on whether or not Aggregate Industries (Holcim) is counted as a pure importer.

52. Counting Aggregate Industries (Holcim) as a pure importer yields the largest estimated price effects from import competition. Then the reduction in Lafarge's price due to an extra import terminal ranges from [✂]p, to [✂]p, to [✂]p per tonne depending on whether the terminal is within 150, 100 or 50 miles.

53. Although these effects are the most significant that we identified, their statistical significances are mixed (and they become less significant when Aggregate Industries is not counted as an importer). For example, the [✂]p effect figure from terminals

within 50 miles is only of marginal statistical significance. The confidence intervals around this [✄]p estimate suggest that the effect of an extra 'pure' import terminal within 50 miles is at most a reduction of £[✄] per tonne.

54. Unlike in our base specification, excluding Lafarge's largest customers from the sample does not improve the significance of the import-competition effects in these alternative specifications.

55. Therefore, on the basis of the evidence above, we find that the catchment area of importers varies depending on the importer and can be between 40 and 100 miles. Lafarge and Tarmac told us that the large majority of their customers were located within [✄] miles of an import terminal: Tarmac told us that all of its external bulk delivered volumes supplied to non-major customers were sold within [✄] miles of an import terminal, and around two-thirds of volumes were sold within [✄] miles of an import terminal. Lafarge told us that nearly 90 per cent of Lafarge's external bulk volumes supplied to non-major customers were sold within [✄] miles of an import terminal which was not operated by Hanson, Cemex, Lafarge, Tarmac or Aggregate Industries, and around two-thirds of such volumes were sold within [✄] miles of an import terminal which was not operated by Hanson, Cemex, Lafarge, Tarmac or Aggregate Industries.

56. On the basis of the evidence provided by Lafarge and Tarmac, we therefore find that availability of imports is unlikely to be a major constraint for the majority of bulk cement customers.

Other evidence on the competitiveness of imports

57. In this section, we review the non-cost evidence on the competitiveness of imports. We first review the results from our win/loss data analysis and evidence from the

main parties on the amount of switching to importers. The amount of switching by customers to importers can provide some indications on the competitiveness of imports. We then set out the views of importers, evidence from the majors' internal documents and the views of customers on the competitiveness of imports.

Evidence on switching to imports

58. We received evidence on customer switching to imported cement.

59. In relation to customer switching, Lafarge told us that it competed actively with imported grey cement as evidenced by substantial losses to these rivals each year. Lafarge said that it lost nearly [✂] per cent of non-repatriated lost volumes over 2007 to 2011 and over [✂] per cent of lost volumes in the year to July 2011 to importers other than Aggregate Industries.[10]

60. Tarmac also provided a list of the customers it lost ([✂]) since the beginning of 2010, representing [✂] per cent of Tarmac's external bulk customers for the year 2010. Tarmac said that this showed that it was competing with several importers.

61. In the following paragraphs, we summarize the main results on the amount of switching from majors to importers (and vice versa) by independent customers for cement, which is in Appendix O. If the competitive constraint imports exert on the majors is large, then we might expect to observe significant switching of customers between the two categories, although Lafarge noted that this was not necessarily the case and that low levels of switching did not imply an absence of competition.

[10] Here, repatriated volumes refer to instances where an integrated cement producer had a downstream operation that switched from sourcing cement from Lafarge to in-house supply, or where Lafarge's downstream units were sourcing cement from a competitor and switched to sourcing cement in-house.

62. Both Hanson and Lafarge data showed that proportions of gains and losses to importers (compared with proportions of customers won and lost to other majors) tended to be larger than one would expect if calculating diversion ratios on the basis of market shares.

63. In our view, the fact that the proportion of switching by independent customers to importers tended to be larger than would be expected based on market shares was consistent with the finding that importers have increased their market share in recent years. However, we also noted that the amount of switching to/from importers was relatively low in any given year, as we set out in more detail below.

64. Lafarge disputed that switching to importers was low, and told us that the amount of actual switching underestimated the degree of competitive interaction. In this respect, Lafarge provided further data on failed approaches and retentions following a competitive threat for 2010 and 2011. This data is presented in Appendix O on switching. This data showed that [✂]. We agreed that this data showed that actual switching to importers may underestimate the amount of competitive threats from importers. However, we also noted that Lafarge's data showed that in general importers accounted for small proportions of failed attempts to gain Lafarge's customers, and low proportions of Lafarge's failed approaches to potential customers, compared with the other majors. This suggested to us that, when it came to imports, the threat of switching to importers may not be sufficient and customers needed to actually switch to importers rather than threaten to switch.

65. Our analysis of Lafarge's win/loss data showed that losses of independent customers to importers were larger in 2008 and 2009 than in 2010 and in 2011 (in terms of volumes lost). Gains by Lafarge from importers were steady during 2007 to 2011.

66. The data from Cemex showed that gains and losses of independent customers to/ from importers were generally [✂]. Cemex told us that actual switching did not take into account threats to switch from customers. Cemex provided additional data on defended volumes, which is set out in Appendix O. With regard to importers, the additional data provided by Cemex showed that threats to switch to importers accounted for [✂] per cent of the volumes that Cemex had to defend in 2009 (the other [✂] per cent of volumes being accounted for by threats to switch to other majors), and [✂] per cent in 2010 (the other [✂] per cent being accounted for by threats to switch to other majors).

67. The data from Hanson showed that there were relatively large losses and gains of independent customers to/from importers in 2009, but that these were low in 2010 and 2011.

68. We therefore found, based on the switching data, that importers won most customers from the majors in 2009 compared with 2010 and 2011, during which gains of volumes by importers from the majors were lower. This could in part be due to the lower average €/£ exchange rate in 2009 compared with 2010 and 2011 (so that imports were relatively cheaper).

69. Overall the total volumes lost and won to/from importers are low in proportion to total volumes sold to independent customers. Table 9 sets out the volumes won and lost by Lafarge to importers as a proportion of total sales of cement to independent customers: these are [✂] per cent or less in 2007, 2008 and 2010, with higher losses and gains in 2009 ([✂] per cent for losses, and [✂] per cent for gains). Table 10 sets out the volumes won and lost by Cemex to importers as a proportion of total sales of cement to independent customers: these are less than 6 per cent in all years, though we note that they only include actual switches to importers rather than also including

customers which Cemex retained after a threat to switch to importers. Table 11 sets out the volumes won and lost by Hanson to importers in 2009 to 2011.

TABLE 9 **Lafarge Great Britain losses and gains of non-major bulk customers to independent importers, as a proportion of Lafarge's Great Britain volumes sold to independents**

per cent

	2007	*2008*	*2009*	*2010*
Losses	[✂]	[✂]	[✂]	[✂]
Gains	[✂]	[✂]	[✂]	[✂]

Source: Lafarge.

TABLE 10 **Cemex losses and gains to importers as a proportion of total volumes sold to independent customers**

per cent

	2008	*2009*	*2010*
Losses	[✂]	[✂]	[✂]
Gains	[✂]	[✂]	[✂]

Source: Cemex.

TABLE 11 **Hanson losses and gains to importers as a proportion of total volumes sold to independent customers**

	2009	*2010*	*2011**
Independent customer volumes lost to importers	[✂]	[✂]	N/A
Independent volumes gained from importers	[✂]	[✂]	N/A

Source: Hanson .

*We could not calculate ratios for 2011 because we did not have data on total sales to independents for 2011.

Views of importers

70. [✂] also told us that imported cement might have some effect on the pricing of UK-produced cement but that it doubted whether it had enough of an effect to counter a significant concentration of UK production facilities, particularly during times of high demand when there was less cement available for importation. In relation to the prices of imports, [✂] has imported cement [✂], for more than six years, [✂]. It told us that, in its experience, cement which was imported to the coastal areas of the UK was more competitively priced than that produced in the central areas of the UK.

71. Sherburn (an independent importer) also commented that cement imports probably constrained the pricing behaviour of UK producers, since 'we operate in exactly the same market'. Sherburn also told us that its overall capacity utilization in 2009 and

2010 was only about 15 per cent, and that it could supply a lot more into the UK, but that the market prices were too low for it to be able to compete at current exchange rates.

72. Independent cement importers told us that shipping costs meant that importers could achieve only low margins so had limited scope to reduce prices which left them vulnerable to undercutting from the majors. [✂] described losing the business of [✂] (a concrete block maker—[✂]) to Lafarge because Lafarge approached [✂] directly, and offered to undercut the existing price from [✂] (which it said was already very competitive) by £2 per tonne. [✂] could not meet that price and lost the business, which accounted for a third of its sales at that time.

73. [✂] said that it would be able to supply increased volume into the UK, but commented that Lafarge and Tarmac would attempt to keep it out by negotiating directly with its customers.

74. [✂] told us that the majors were targeting the customers of independent importers by undercutting prices to ensure that they secured these businesses. It said that its sales had been falling since 2008 and continued to do so because of the pricing of its competitors.

75. Thomas Armstrong, an importer based in Cumbria which imports cement solely for its own use (for the manufacture of concrete blocks), told us that it began importing cement four years ago in response to rising prices in the UK, both for cement produced in the UK and the imported cement it was using at the time. It told us that the price of imported cement was increasing in line with the increase in the price of domestically-produced cement.

Evidence from internal documents by the majors on imports

76. We reviewed the internal documents provided by the main parties and the major competitors for evidence related to the competitive position of imported cement. The main extracts are reproduced below. We find that the UK major cement producers perceive imports as a significant threat, though this threat varies by region.

77. In a presentation by Cemex in 2010, 'Business Plan: Country Strategy—UK', it is said: [✄].

78. [✄]

79. [✄]

80. Lafarge in its 'Cement—Strategic Review 2009' for the Midlands notes: '[✄]'. In the same document, but for the South, Lafarge notes: '[✄]'.

81. In Lafarge's 'Cement Strategic Base file Strategic review 2010', it is stated: [✄].

82. In Lafarge's 'Cement Strategic base file: Strategic review 2011', it is stated: [✄].

83. In an internal Lafarge email from 2008 to Lafarge Central and Lafarge Spain titled 'Spanish Import Threat' it is said: [✄].

84. In an email from 2005 between [✄] and [✄] regarding an agreement with Brett, the following two points are noted: [✄].

85. In a Lafarge email exchange to [✄] in 2008, [✄].

Evidence from cement customers on imported cement

86. We now review evidence from cement customers on imported cement. We were told that additional costs arose from imports due to foreign exchange risks and the transportation time and planning. Costain, a construction and civil engineering company, told us that in the past it had used imported cement from the Republic of Ireland for a particular job, but that imports created foreign exchange risks and issues in terms of transportation time and logistics, as well as delivery uncertainty.

87. Hillhouse Quarry (an RMX and concrete producer from Scotland) told us that it could get more sources of supply of cement through imports. However, it told us that the problem with imports was that 'CEMEX, Lafarge, Heidelberg and so on are large multi-national organisations with huge cement capacity throughout the world and most of the cement that will come to the UK will come from these sources'. Lafarge told us that this was not correct, and that, of the Great Britain cement importers, Dudman was the only importer which sourced from suppliers other than Lafarge, while other importers sourced from Spain, Greece and the Republic of Ireland. Lafarge also said that for bulk cement supplied externally to non-major customers, such as Hillhouse Quarry, the number of suppliers of imported cement was larger than the source of imports suggested. Imported cement was supplied by players such as Thomas Armstrong, Channel, Dragon, Dudman, CRH/Morrissey, Sherburn Stone, Southern and Titan with cement from Spain, Greece and the Republic of Ireland.

88. Newark told us that it once purchased imported cement through Dragon Alfa Cement for a short period of time when it had differences with its then supplier, Hanson. Imported cement was competitive at that time and although importers were dependent on regular ship deliveries to maintain continuity of supply (imported cement

came in large shiploads and was stored in holding silos, located at the docks), Newark had not experienced any supply problems.

89. [✄], a manufacturer of concrete blocks in [✄], told us that imports of cement were too expensive because it was not located near a coast. It told us: 'I'm too much in the middle of the country for imports to be effective for me, because the amount of road haulage involved means it's too expensive.'

90. Allen Newport Ltd (an RMX producer located in Cambridgeshire) told us that it was approached and was offered a fairly attractive price from an importer (Southern Cement). However, Lafarge undercut the importer's price when this happened. Lafarge told us that this was consistent with competition in Great Britain and demonstrated the competitive constraint posed by importers. Allen Newport Ltd also told us that Southern Cement only offered CEM I, and it needed both CEM I and CEM II. It said that it did not want to multi-source from Lafarge and Southern Cement as it was concerned about Lafarge increasing its prices for smaller volumes.

91. Breedon Aggregates (an aggregate and RMX producer) told us that imports were an alternative to UK-produced cement, but that it would buy imports only if these were at least 5 to 10 per cent cheaper than local cement because of concerns over consistency of quality and security of supply. It told us that even if the cement produced was perfectly adequate, there was quite a lot of additional testing that it would need to make for imported cement. It told us that imported cement was not price competitive but kept a lid on domestic price. Lafarge told us that it was unclear why Breedon would need additional testing, and that assuming cement had EN certification, there was no need for additional testing of any cement. We agreed that this was likely to be the case for most customers.

92. We asked questions on imports of cement as part of the GfK survey of cement customers and of RMX competitors (which buy cement for use in their RMX production). Cement customers and RMX competitors were asked which suppliers they had purchased cement from in the past 12 months. We found that 16 per cent of cement customers, and 21 per cent of RMX competitors, said that they had purchased from a UK importer other than Aggregate Industries in the last 12 months (and 1 per cent of cement customers and 0 per cent of RMX competitors had bought from Aggregate Industries in the last 12 months). A large proportion of survey respondents (27 per cent of cement customers and 26 per cent of RMX competitors) said that they purchased cement from other UK-based producers. Lafarge told us that it would be reasonable to assume that a significant proportion of these respondents were buying from importers but not classifying those suppliers as importers because, for example, the customer purchased from a UK-based subsidiary of an importer and did not correctly identify the seller as an importer, and therefore that the survey evidence may underestimate the significance of importers as a source of supply. We agreed with Lafarge that this was a possibility, and that therefore proportions of customers and competitors having bought from importers were likely to be higher than the estimates above.

93. The 60 cement customers and 72 RMX competitors who had not purchased cement from an importer were asked if they had ever done so in the last five years, and 68 per cent of RMX competitors, and 78 per cent of cement customers, said that they had not done so. The main reasons for not purchasing from importers were better quality in the UK, better reliability of supply, and no importers in the area. However, the survey also shows that 32 per cent of competitors and 22 per cent of cement customers had purchased from an importer.

Vertical effects analysis—aggregate supply into asphalt and/or RMX

Introduction

1. This appendix considers whether vertical effects may arise in relation to the supply of primary aggregates to asphalt and/or RMX producers. In line with our work on market definition we focus on primary aggregates, including a breakdown of primary aggregates into crushed rock and sand and gravel. We consider only non-integrated customers, ie those which do not have their own aggregates sites, since we consider it more likely that any foreclosure strategy will be targeted here.

2. We explain what conditions must hold in order for there to be an SLC. The conditions can be classed as ability, incentive and effect. The appendix is based on the underlying assumption that primary aggregate suppliers compete unilaterally (ie do not coordinate in aggregate supply).[1]

3. We are considering the following theory of harm:

   The theory of harm ('vertical effects arising from unilateral market power') is that the joint venture may create or enhance vertical integration in certain local areas, such that the joint venture has the ability and incentive to engage in partial or full input foreclosure[2] in certain local areas in relation to:

   (a) aggregates sold to RMX-producing customers; and/or

   (b) aggregates sold to asphalt-producing customers.

[1] For the purposes of this appendix we have not tested this assumption.
[2] Full input foreclosure occurs when a supplier refuses to supply an input to customers which use that input to compete with it in downstream markets. Partial input foreclosure occurs when a supplier increases (to a greater extent than otherwise might be expected) the prices of an input to customers which use that input to compete with it in downstream markets. Input foreclosure would thus make it harder for rivals in downstream markets to compete.

CC guidelines

4. According to the Guidelines,[3] under certain conditions, vertical mergers can weaken rivalry. Where the merged firm harms the ability of its downstream rivals to compete post-merger, for example by raising effective input prices to its rivals, or by refusing to supply them completely, such actions may harm the ability of the merged firm's downstream rivals to provide a competitive constraint into the future.

5. Due to the vertical integration in the supply of aggregates and RMX, and aggregates and asphalt, foreclosing competing non-integrated asphalt and/or competing non-integrated RMX producers might be achieved by the main parties by either reducing the supply to those customers to achieve an increase in the market price for aggregates or by increasing prices charged to them for aggregates directly (partial foreclosure), or by stopping supplying them with aggregates altogether (total foreclosure).[4] If foreclosure is successful, the aggregates price paid by the main parties' external customers would be increased directly or the reduction in the supply would increase the (market) price for aggregates sold externally. This input price increase would put downstream rivals at a disadvantage. It might also increase the main parties' profits downstream (in asphalt or in RMX) if rivals downstream would have to increase prices to their customers, and some of these customers would therefore switch to the main parties to buy asphalt or RMX.

6. When assessing the likelihood of input foreclosure we therefore examine:

   (a) Ability. Would the merged firm have the ability to harm rivals, for example by reducing supplies of aggregates to them, increasing price or by refusing to supply them; thereby raising prices for aggregates sold externally (either generally or in certain local areas)?

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[3] The Guidelines, paragraphs 5.6.5 & 5.6.6.
[4] We noted that all non-integrated RMX and asphalt producers were external customers.

(b) *Incentive.* Would it find it profitable to do so?

(c) *Effect.* Would the effect of foreclosure (either full or partial) by the merged firm be sufficient to reduce competition downstream to the extent that, in the context of the market in question, it gives rise to an SLC?

7. Since (as set out below) we currently do not consider that the main parties unilaterally will have an ability to foreclose following the proposed JV, we do not discuss incentives and effect in this appendix.

Views of the main parties

8. The main parties argued that they had no ability to engage in input foreclosure (and thus there is no need to consider their incentive to do so). The reasons provided were:

(a) The main parties do not compete to any substantial degree to supply non-integrated asphalt[5] and RMX[6] producers:

(i) The size of aggregates purchases made by non-integrated asphalt and RMX producers from all aggregates suppliers is small (around 6,200kt compared to a total Great Britain market size of about [✂]kt for all supplies of aggregates used in the production of asphalt and RMX in 2010, ie internal and external).[7]

(ii) Since the main parties' presence in this segment is not substantial (estimated at [✂] per cent for Lafarge and around [✂] per cent for Tarmac of overall

[5] In 2010, the total volumes of asphalt produced by non-integrated asphalt players was around [✂], according to estimates based on BDS data (all asphalt producers that are not also aggregates producers are considered to be non-vertically integrated). Given the approximate one-for-one ratio between asphalt sold and aggregates used in the production of asphalt, this suggests that total aggregates purchases by non-integrated asphalt producers was around [✂] in 2010. Lafarge [✂] to non-integrated asphalt producers in 2010. Tarmac's share of supply to non-integrated asphalt producers is estimated to have been no greater than [✂].

[6] In relation to RMX, in 2010, the total volume of RMX produced by non-integrated players was [✂] (non-integrated producers of RMX have been identified from BDS 2009 reports and based on estimated volumes set out in those reports, excluding on-site batched volumes). Given the one-for-two ratio between the volume of RMX sold and the volume of aggregates used as an input in the production of RMX, this suggests that the total purchase of aggregates made by non-integrated RMX producers was around [✂] in 2010. Lafarge's share of supply to this segment is estimated to have been [✂] per cent at most (based on sales of [✂] to this segment of the market) and Tarmac's share is estimated to have been no greater than [✂] per cent (based on sales of [✂] to this segment of the market) in 2010.

[7] This is according to the main parties' estimates of the size of this market segment. The size of the aggregates market for use in asphalt and RMX production is estimated based on the total volume of asphalt and RMX supplied, and the corresponding aggregates required (1:1 for asphalt; 2:1 for RMX).

aggregates sales to non-integrated asphalt producers in 2010, and [✂] per cent for Lafarge and [✂] per cent for Tarmac of overall aggregates sales to non-integrated RMX producers) the proposed JV would not give rise to market power over non-integrated purchasers of aggregates for these uses.

(iii) Accordingly, it follows that the main parties have no ability to engage in input foreclosure in relation to purchasers that do not have their own source of aggregates supply for use in asphalt and RMX applications.

(b) The Proposed Transaction does not result in a material change in the ability of the JV entity to withdraw material volumes from integrated purchasers of aggregates for asphalt and RMX production, given the very small amounts supplied to such customers at present.[8]

(c) Since integrated firms can, and do, self-supply, the overcapacity within the market suggests that any attempted withdrawal of supplies by the JV entity would be easily replaced by rival suppliers switching to or increasing internal supply.

Ability to foreclose

9. The analysis developed in the following paragraphs focus on whether the merged entity would be able to foreclose competing non-integrated asphalt and/or RMX producers either by reducing supplies or increasing price to external producers of asphalt or RMX or by stopping supplying aggregates to them altogether, so that the price for aggregates sold externally increases.

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[8] While Lafarge supplies some aggregates to vertically integrated players, who may use aggregates purchased from Lafarge for their RMX and asphalt activities, the amounts involved are small. Specifically, Lafarge supplied [✂] per cent of its external construction related sales to such players in 2009 (based on sales of [✂] to this segment). Likewise, while Tarmac supplies some aggregates to vertically integrated players who may use aggregates purchased from Tarmac for their RMX and asphalt activities, the amounts involved are also small. Tarmac supplied around [✂] per cent of its external construction-related sales to such players (based on sales of around [✂] to this segment in 2009). It follows that between them the main parties supplied a total of just over [✂] of aggregates to integrated producers of asphalt and RMX. This compares to a total amount of aggregates consumed by the main parties' integrated rivals (in other words, all parties other than Tarmac and Lafarge that have their own source of aggregates supply) for the purpose of producing (respectively) asphalt and RMX of approximately 13,600Kt and approximately 22,000Kt. Based on BDS 2009 report, all RMX producers that are also aggregates producers are considered to be vertically integrated. The volume of aggregates required by vertically integrated RMX producers (other than the main parties) is estimated by using the BDS volumes for RMX and applying a ratio of 2 tonnes of aggregate required for every m^3 of RMX produced.

10. We organize the evidence as follows: *(a)* CC Guidelines and economic principles, *(b)* the importance of the input, *(c)* establishing market power, *(d)* review of main parties' internal documents and *(e)* third party concerns.

The Guidelines and economic principles

11. The Guidelines[9] and economic theory point to three conditions which are necessary for the JV entity to have the ability to foreclose its downstream competition, namely:

(a) the importance of the input. All else being equal, if the input accounts for only a small part of the total costs incurred, the merged firm will be less able to harm its downstream rival manufacturers' ability to compete than if the input accounts for a greater part of the total costs. This is true since an increase in the input price would then have a small effect on downstream rivals' costs.

(b) the existence of market power since in its absence, the main parties would not be able to drive up the input price; and

(c) the absence of timely and effective counter-strategies that allow rival downstream manufacturers to avoid a price increase by switching away from this input. If downstream rivals can turn to many good substitutes for the input, the merged company will be less able to impose an input price increase than if there were few alternative providers of the input.

12. We consider these conditions below.

The importance of the input, ie primary aggregates

13. Input foreclosure may raise competition problems only if it concerns an important input for the downstream product. Irrespective of its cost, an input may also be sufficiently important for other reasons, for instance it may be a critical component.

[9] The Guidelines, paragraphs 5.6.6 & 5.6.10.

14. The importance of aggregates as an input into asphalt and RMX is relatively undisputed, as illustrated by the percentage of aggregate type for each application in Tables 1 and 2. Crushed rock is the primary component of asphalt, and sand and gravel aggregates are the primary component of RMX.

TABLE 1 **Manufacture of asphalt: percentage by volume of aggregate type for application**

	Sand & gravel	*Crushed rock*	*Recycled*	*Secondary*
National–estimates for all suppliers	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]

Source: National, Lafarge and Anglo American.

Note: Anglo American data excludes non-aggregate components, eg bitumen etc.

TABLE 2 **Manufacture of RMX: percentage by volume of aggregate type for application**

	Sand & gravel	*Crushed rock*	*Recycled*	*Secondary*
National—estimates for all suppliers	[✂]	[✂]	[✂]	[✂]
Tarmac	[✂]	[✂]	[✂]	[✂]
Lafarge	[✂]	[✂]	[✂]	[✂]

Source: National, Lafarge and Anglo American.

Note: Anglo American data excludes non-aggregate components, eg bitumen etc.

15. In addition, our analysis of Lafarge's and Tarmac's profit and loss accounts indicates that aggregates account for approximately [✂] per cent of asphalt marginal cost[10] and [✂] per of RMX marginal cost.

Market power

16. The Guidelines indicate that input foreclosure can only be a concern if the JV entity will have market power in the upstream market. We consider whether the JV entity can reasonably be expected to influence the conditions of competition in the upstream market for primary aggregates. We base this analysis on the underlying

[10] Aggregates into Asphalt 2010 data. The definition of marginal cost is broadly raw material costs and production costs. Lafarge = [✂] per cent and Tarmac = [✂] per cent; Aggregates into RMX 2010 data. The definition of marginal cost is broadly raw material costs and production costs. Lafarge = [✂] per cent and Tarmac = [✂] per cent.

assumption that primary aggregate suppliers compete unilaterally (ie do not co-ordinate in aggregate supply).[11]

17. We note local variation in primary aggregate supply. Therefore we consider the potential to foreclose on a local level.[12]

18. The main parties argued that they had a small share in the supply of aggregates to external customers and especially to non-integrated external customers . As a first step, to test this assertion we derive the main parties' share of the supply of primary aggregates to non-integrated customers (asphalt and RMX), ie those which do not have their own aggregate sites.

19. If we observe that the main parties' share of external sales to non-integrated asphalt or RMX producers is low, this indicates that the latter have significant alternative sources of supply assuming that aggregate suppliers compete. In this case, not selling primary aggregates downstream is unlikely to result in an (input) price effect that would give rise to the foreclosure mechanism. The feasibility of a foreclosure strategy then becomes questionable.

20. We considered whether analysing external supply is the correct measure. Alternative measures include:

(a) total supply (internal and external aggregate supply)—since the majors[13] appear to have the ability to flex internal and external supply; and/or

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[11] For the purposes of this appendix we have not tested this assumption.
[12] With the exception of the assertions set out in paragraph 8, the main parties did not submit any quantitative analysis relating to vertical foreclosure of aggregates into asphalt and/or RMX. The main parties submitted a quantitative paper from RBB in relation to cement into RMX arguing that the JV had no ability to foreclose. The paper focuses on non-integrated RMX producers arguing that the JV is unlikely to be able to foreclose integrated rivals, ie those RMX producers with their own in-house source of supply, such as Cemex, Hanson and Aggregate Industries. The main parties use a ceiling of 50 per cent of cement capacity upstream in overlap areas as a safe harbour. Where the main parties have in excess of 50 per cent cement capacity. they argue that there is no ability to foreclosure for site-specific reasons.
[13] 'Majors' are Lafarge, Tarmac, Cemex, Hanson and Holcim (Aggregate Industries).

(b) total aggregate capacity. Capacity may be a true reflection of the alternative supply sources rather than current volumes, ie it may be the case that there is excess capacity in the market and alternative suppliers are available within local areas which together make foreclosure (partial or complete) unlikely.

21. We do not consider these alternative measures further since we believe that the primary aggregates volume sold to external (non-integrated) customers are relevant here since foreclosure implies raising rivals' costs by decreasing supply or increasing price of the input, primary aggregates to downstream customers. In our view, an analysis of sales to non-integrated customers captures the scope to influence the conditions of competition, especially the market price, in the upstream primary aggregate market. Choosing not to sell primary aggregate volumes currently used internally (or not currently sold at all—namely capacity) is not effective to this end since it does not decrease the supply to external customers.[14]

22. With respect to considering capacity, it might be argued that the main parties' share of the supply of primary aggregates to non-integrated producers of asphalt or RMX would be the relevant measure of market power upstream, namely if capacity rather than current volume is a better reflection of the alternative supply sources. We acknowledge, however, that there are measurement issues in relation to capacity. For example, there are different capacity proxies such as total reserves, consented reserves or a maximum output which all raise different issues. In addition, there are issues in relation to getting consistent measurements between parties. We therefore considered external supply to be a good starting point and took the view that if the results highlighted potential concerns we could explore capacity issues when reviewing individual radials rather than using this within the filter exercise.

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[14] This applies with the exception of times of significant demand increases, which are to our understanding not expected.

23. Below we set out how we derived the JV entity's external share of supply to non-integrated producers of asphalt and RMX. First, we outline the data we used and then set out the methodology used.

Our data sets

24. We focused on primary aggregates. We compiled the primary aggregate data set based on transaction data provided by Lafarge, Tarmac, Hanson, Aggregate Industries and Cemex (the 'majors'). For independents, we used a list of primary aggregates sites provided by RBB. The volumes for the independent sites are estimates of total site volume provided by BDS. Some caveats apply:

    (a) For Aggregate Industries, approximately half of the transactions did not include the volume sold. Where this was the case, we used the value of the aggregate levy the transaction incurred to estimate the tonnes sold. We used a levy value of £2.00 per tonne.

    (b) When the transaction data did not categorize the customer, ie did not indicate whether it was an asphalt or RMX producer, we used the name of the customer to classify it. This approach does lead to the possibility that some customers will be incorrectly classified as an asphalt or RMX producer and that some asphalt or RMX producers will not be classified as such.

    (c) We considered open sites as well as mothballed sites.

    (d) For the sites of non-major companies, we are unable to distinguish internal and external volumes as the majors' transaction data allows us to do. We are therefore also unable to distinguish internal and external volumes sold to asphalt or RMX producers for these sites.

    (e) JVs of Lafarge or Tarmac with other aggregates suppliers are included in our data as 'other competitors' (since their sales are available only in the BDS data).

Moreover, the underlying BDS data set does not allow us to distinguish internal and external sales and sales by end use for non-majors.[15]

Asphalt data set

25. We compiled the asphalt data set based on transaction data provided by Lafarge, Tarmac, Hanson, Aggregate Industries and Cemex. For independents, we use a list of asphalt sites based on BDS data provided by RBB. The volumes for the independent sites are estimates of total site volume provided by BDS.

RMX data set

26. We collated data from the main parties and the other majors on locations and volumes and then supplemented this with data purchased from BDS.[16] We considered static RMX sites only (excluded mobile sites). (Our present analysis relies on location data only.)

Methodology

27. In terms of the methodology to derive share of external aggregate supply, we apply the following approach:

    (a) Step 1: Identify vertical overlaps.

    (b) Step 2: Derive figures for volumes and shares externally supplied with a view to applying filters to identify problematic areas.

    We use this methodology for primary aggregates as well as for the analysis of crushed rock and sand and gravel separately.

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[15] The results presented below have been derived on the basis of that data. To assess the impact of this categorization of existing JVs on our analysis, we ran this analysis again on an amended data set. This assessment can only be imperfect since we cannot split the volumes sold by these JVs into internal and external sales or split them by end use (asphalt, RMX, general construction applications etc). Therefore, we used the following proxy for the external sales of the existing JV. First, we derived the share of external sales of primary aggregates in all sales of primary aggregates for the main party involved in the joint venture. Second, we attributed the total volume of primary aggregates sold by the JV to the main party involved and split this volume into external and internal sales using the share of external sales derived in the first step to using a proxy. For sand and gravel and crushed rock we used the same approach. The resulting alternative supply shares differ very little from those presented in Tables 4 to 6 below. (Since the main parties' share of external sales to non-integrated asphalt customers is negligible, we did not assess the impact of existing JVs for aggregates into asphalt.)

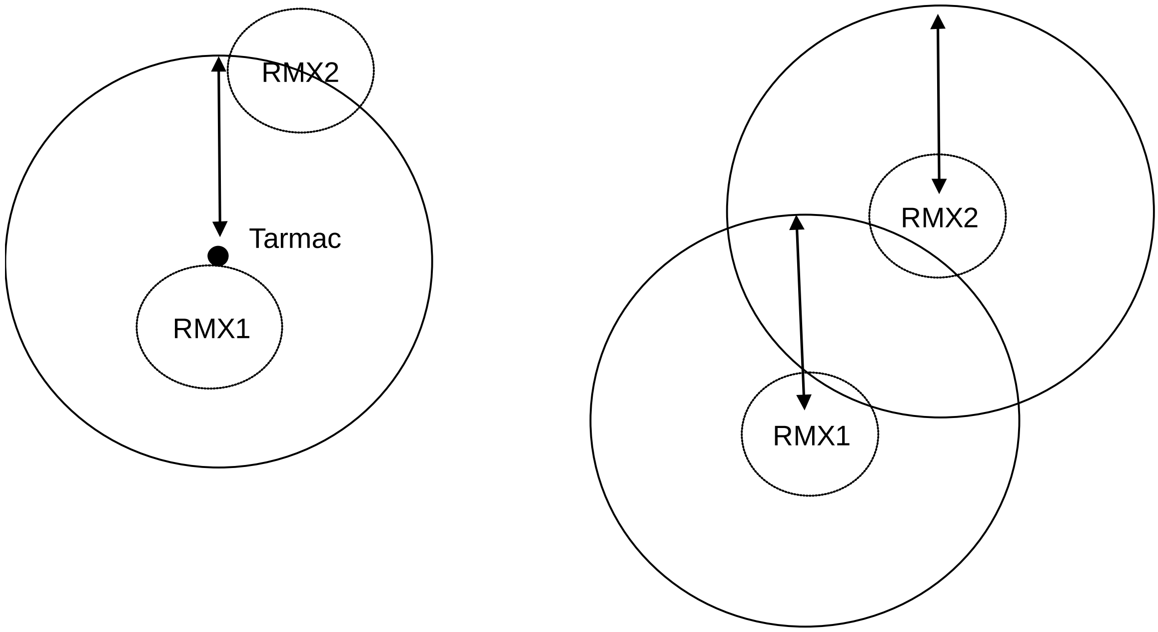
[16] RBB submitted RMX data for the 'cement into RMX' analysis based on MPA plus the main parties' RMX data to identify independent RMX producers. We used BDS data rather than that provided by the main parties as this provided estimates for RMX volumes. This information is particularly relevant as we wanted to keep the option open to consider incentives.

Methodology: step 1

28. First, we centre on all independent asphalt and RMX producers. Centring on the independent downstream producers captures the sources of supply for the individual asphalt and RMX producer in question. If we centre on Lafarge and Tarmac aggregate sites, the options available to RMX2 (shown below) will not be captured correctly.

FIGURE 1

Centring on non-integrated RMX sites rather than on the main parties' aggregate sites



Source: CC.

29. Second, to assess the effect of the merger regarding the ability to foreclose we considered 'additional' vertical overlaps (ie those created by the merger) only and dismissed local areas where Lafarge (or Tarmac) are currently vertically integrated—ie active upstream and downstream—but no additional vertical overlap is created by the merger. Figure 2 illustrates the different ways in which the merger could create an additional vertical overlap in a local area. ('R' stands for a competing integrated producer (which is active upstream and downstream), 'Ind' for a producer which is only active downstream).

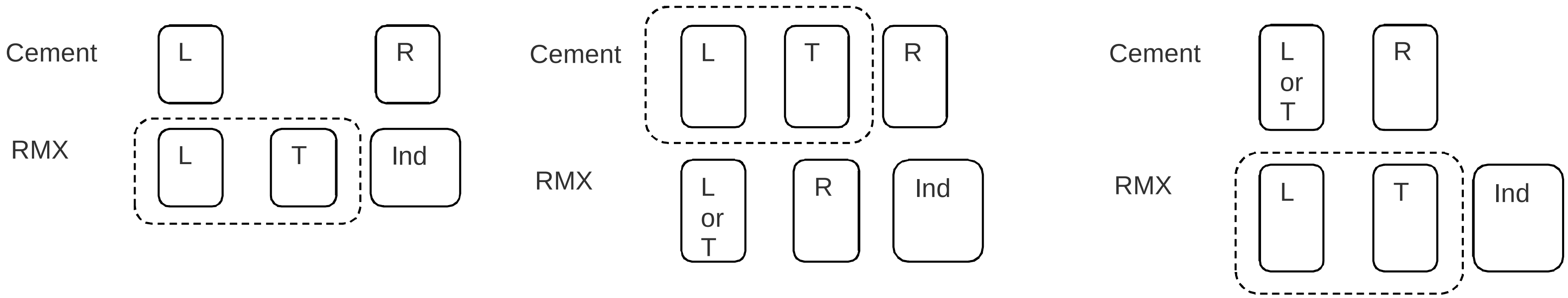
FIGURE 2

Additional vertical overlaps created by the JV

Scenario 1: Increment upstream; increment downstream

Scenario 2: Increment upstream; Lafarge and/or Tarmac active downstream

Scenario 3: No increment upstream but Lafarge and/or Tarmac active; increment downstream



Source: CC.

30. Third, we focus on non-integrated asphalt and RMX producers and do not consider integrated suppliers. Although there is a possibility within certain local areas that the JV entity may have the ability partially or completely to foreclose integrated suppliers, we consider that the most likely foreclosure strategy would be targeted at independents. Integrated suppliers potentially have the scope to retaliate in alternative areas (if they are active in them). Since we cannot distinguish integrated customers other than majors in our data set, we consider supply to non-majors only (that is, we use sales to non-majors as a proxy for sales to non-integrated customers).[17] We acknowledge that there may be other suppliers that are vertically integrated but took the view this was a cautious approach since *(a)* it would, if inaccurate, overstate the JV entity's share in the supply of aggregates to external non-integrated customers and *(b)* we could exclude additional vertically integrated players if any problematic radials emerged.

31. Fourth, to determine whether one of the main parties was active downstream we considered the geographic radial for asphalt and RMX supply based on the outcome of our unilateral effects analysis. For asphalt this equates to [✂] miles and for RMX this equates to [✂] miles.[18]

32. Fifth, centring on the non-integrated asphalt and RMX downstream sites we considered the sources of supply for primary aggregates. We considered the geographic radial for primary aggregate supply based on the outcome of our unilateral effects analysis: this is [✂] miles. To date, no distinction is made between urban and non-urban sites since the data does not indicate for all sites whether these are in urban or rural areas. We included depots which have a rail link to an aggregate site since we understand that they play a key role due to the relatively low transport costs between

[17] As explained above, non-majors are all companies but Lafarge, Tarmac, Cemex, Hanson and Aggregate Industries.
[18] The radials are derived based on the average distance within which 80 per cent of the external delivered volumes of the respective product are supplied from a plant.

the site and the depot. All other depots are excluded since these are not a primary source of aggregate supply.

Methodology: step 2

33. We see good reason to believe that, as a consequence of an initial price increase due to foreclosure, primary aggregates currently sold for other uses, such as general construction applications or railway ballast, and to internal customers would come on to the external 'market'. However, it might be argued that volumes currently supplied internally would not be (or would to a much lower degree be) sold externally in case of such a price increase, for example because avoidance of double-marginalization in the vertical structure makes that unattractive. Since we do not know which of the above cases is a better description of upstream competition in aggregates, we consider both cases.

34. Using the methodology outlined above, we calculated the JV entity's external share of supply in areas with 'additional' vertical overlaps. We derived the share of sales of primary aggregates by the JV entity to non-integrated asphalt customers and to non-integrated RMX customers in terms of *(a)* all sales of all primary aggregates (external and internal), and *(b)* in all external sales of primary aggregates—by all suppliers, the main parties and their rivals. The JV entity's share of supply in all primary aggregates is more relevant for the assessment of the ability to foreclose if some of the volumes which are currently internally supplied by rival aggregate producers would be made available on the market in case of an increase in the price of aggregates due to foreclosure. The JV entity's share of supply in primary aggregates sold to external customers only is more relevant if the volumes which are currently internally supplied would not be made available on the market in case of such an input price increase (see paragraph 33). Since the extreme case (that internally supplied aggregates volumes would not be sold externally at all) appears quite unlikely, the share of

supply in primary aggregates sold to external customers only can be thought of as an upper bound on the share of aggregates supply controlled by the main parties.

35. In terms of identifying potentially problematic areas, the Guidelines[19] only cite the OFT threshold which is 30 per cent based on EU guidelines. We note that the Guidelines say that 'a market share for the merged firm of less than 30 per cent will not often give the OFT cause for concern over input foreclosure'.[20] We use this threshold as our initial filter but apply it to the main parties' share in the supply of primary aggregates to non-integrated asphalt or RMX producers since we believe that the latter is more reflective of the main parties' ability to foreclose than their total share in the supply of primary aggregates.

Results

Primary aggregates

36. Tables 3 and 4 below show the ten radial areas where the main parties' shares of supply for primary aggregates are highest. Even if the more cautious measure is used (ie share of supply of external sales of primary aggregates only), the supply shares are lower than [✂] per cent (for RMX; negligible for asphalt). Since the data for non-majors does not allow us to distinguish external and internal sales, the JV entity's shares of supply in terms of all external sales understate the true share to some extent. Since the shares of supply are far below the threshold of 30 per cent, this appears unproblematic. In addition, the extreme case (that internally supplied volumes would not be sold externally at all in case of a price increase) appears quite unlikely.

[19] The Guidelines, paragraph 5.3.5.
[20] Past OFT decisions illustrate circumstances in which the OFT is less likely to identify competition concerns on the basis of these thresholds. In relation to market shares, previous OFT decisions in mergers in markets where products are undifferentiated suggest that combined market shares of less than 40 per cent will not often give the OFT cause for concern over unilateral effects. At the time of writing there have been too few OFT decisions in non-horizontal mergers to suggest a threshold in these cases. For such mergers, therefore, the OFT may have regard to the thresholds in the European Commission's guidelines on the assessment of non-horizontal mergers. In particular, a market share for the merged firm of less than 30 per cent will not often give the OFT cause for concern over input foreclosure (see discussion in paragraphs 5.6.9 to 5.6.12 of the Guidelines).

TABLE 3 **Share of sales of primary aggregates by the JV entity to non-integrated asphalt customers in the sales of primary aggregates (results for the all radials where these shares are highest)**

Asphalt producer	*Site*	*JV supply share (of all sales) %*	*JV supply share (of all external sales) %*
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

*The radials are derived based on the average distance within which 80 per cent of the deliveries of aggregates are made from a plant ([✂] miles).

TABLE 4 **Share of sales of primary aggregates by the JV entity to non-integrated RMX customers in the sales of primary aggregates (results for the ten radials where these shares are highest)**

[✂]	*Site*	*JV supply share (in all sales) %*	*JV supply share (in all external sales) %*
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

*The radials are derived based on the average distance within which 80 per cent of the deliveries of aggregates are made from a plant ([✂] miles).

'Crushed rock' and 'sand and gravel' (segments of primary aggregates)

37. Since the main parties' supply shares in all primary aggregates to non-integrated asphalt producers are negligible (in the context of our vertical effects analysis), we derived the share of supply figures for the segments 'crushed rock' and 'sand and gravel' separately only for aggregates into RMX.

38. Tables 5 and 6 below show the corresponding supply shares for 'crushed rock' and 'sand and gravel' for the ten radial where these shares are highest. These have been derived analogously to those for primary aggregates sold to non-integrated RMX customers (summarized in Table 4 above).

39. As Table 5 shows, the parties' shares in the supply of 'crushed rock' to non-integrated RMX suppliers do not exceed 20 per cent even if the more conservative measure of supply shares in all *external* sales of crushed rock is used. The analogous supply shares for sand and gravel remain below 24 per cent (see Table 6).

TABLE 5 **Share of sales of crushed rock by the JV entity to non-integrated RMX customers in the sales of crushed rock (results for the ten radials where these shares are highest)**

RMX supplier	*Site*	*JV supply share (in all sales) %*	*JV supply share (in all external sales) %*
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

*The radials are derived based on the average distance within which 80 per cent of the deliveries of aggregates are made from a plant ([✂] miles).

TABLE 6 **Share of sales of sand and gravel by the JV entity to non-integrated RMX customers in the sales of sand and gravel (results for the ten radials where these shares are highest)**

RMX supplier	*Site*	*JV supply share (in all sales) %*	*JV supply share (in all external sales) %*
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]
[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

*The radials are derived based on the average distance within which 80 per cent of the deliveries of aggregates are made from a plant ([✂] miles).

40. In addition to our analysis of the transaction data, we reviewed the main parties' internal documents and considered comments by third parties. The summary below shows that this evidence is consistent with the results of our analysis of the transaction data as set out above.

Review of the main parties' internal documents

41. To supplement the quantitative analysis we reviewed the internal documentation of the main parties for the following reasons:

(a) Lafarge and Tarmac are already vertically integrated and historically may have a strong aggregate position in some local areas. We looked for any examples of historic vertical foreclosure.

(b) Insight into pricing approaches, ie do Lafarge or Tarmac price their aggregates differently to majors and non-majors for strategic reasons?

(c) Insight into any strategic rationale or strategic behaviour towards independent non-integrated asphalt and RMX producers.

42. Overall we did not find any internal documentation that pointed towards historic evidence of vertical foreclosure of aggregates into asphalt and/or RMX. Although we observe that external sales of aggregates occur, we did not find any internal documents that point towards a strategic focus on non-integrated producers in terms of differential pricing. Some useful observations from the documents are as follows:

(a) Both main parties sell aggregates externally.

(b) Lafarge provided the following information on the degree of vertical integration. There is a high level of vertical integration between aggregates and RMX and aggregates and asphalt. Lafarge estimated that, nationally, more than 85 per cent of RMX production was vertically integrated with aggregates and in some local markets this was close to 100 per cent. Nationally, greater than 95 per cent of asphalt production is vertically integrated with aggregates. In most markets this is effectively 100 per cent. Most markets feature the same major players with many small (single-site) players but few medium-sized regional suppliers.[21] Supplies of hot mix asphalt (HMA) feed aggregates by companies which are not integrated

[21] Lafarge explained that 'in practice ... [there are] often long term supply deals (eg from past asset sale & purchase agreements) or co-located sites'. The quoted percentages appear to be shares of sales volumes, but this is not totally clear from the presentation. Moreover, we cannot exclude the possibility that Lafarge's definition of 'major players' differs from our definition of 'majors'.

with the customer are low (less than 7 per cent). This information is consistent with the low local shares of the JV entity in external sales of all primary aggregates to non-integrated RMX and asphalt producers we derived in our analysis.

(c) Lafarge stated that [✂].

(d) There is evidence of local variation in aggregate supply. One reason Lafarge cited for potential upward levers for price was [✂]. Further both main parties look at aggregates at a regional level.

43. To summarize, a review of the internal documentation does not point towards historic evidence of foreclosure of aggregates into RMX and asphalt to non-integrated producers and provides limited insight into the vertical theory of harm.

Third party concerns

44. No specific third party concerns were raised in relation to foreclosure of aggregate supply into asphalt and/or RMX.[22]

[22] A related concern not directly related to foreclosure in aggregates was raised by one of Tarmac's customers, [✂]. [✂] told us that it was concerned that Tarmac was the only local aggregates supplier able to provide the aggregates in the volume it required for its best-selling product, while other suppliers that could provide large quantities were located about 45 to 60 miles further away. [✂] thought that, while it could plausibly obtain supplies from four other aggregate suppliers if Tarmac increased prices by 5 to 10 per cent, the other suppliers would follow with similar price rises. We noted that [✂] was not concerned that such a price effect would arise from Tarmac's (or Lafarge's) vertical integration into cement.

Entry and expansion analysis

1. This appendix sets out our assessment of:

   (a) the barriers to entry and expansion in each of the markets for cement, aggregates, asphalt and RMX (see Part 1, paragraphs 2 to 105); and

   (b) the evidence on future entry plans (see Part 2, paragraphs 106 to 116).

Part 1: Barriers to entry and expansion

2. We set out below the evidence from main and third parties concerning the barriers to entry and expansion in each of the markets for:

   (a) cement (see paragraphs 4 to 28);

   (b) aggregates (see paragraphs 29 to 61);

   (c) asphalt (see paragraphs 62 to 84); and

   (d) RMX (see paragraphs 85 to 105).

3. We set out our conclusions on the relevant barriers to entry and expansion in each of the relevant product markets. Our views on whether they act as countervailing factors that would prevent or reduce an SLC that might otherwise arise as a result of the proposed JV are set out in Section 6 of the report.

Barriers to entry and exit in cement

4. We considered the evidence relating to the following possible barriers in the market for cement:

   (a) initial capital requirements and economies of scale;

   (b) regulatory barriers; and

   (c) barriers to expansion.

Cement: initial capital requirements and economies of scale

Setting up a cement plant

5. The main parties told us that the total capital expenditure involved in developing a new 1Mt capacity cement plant would typically be around £[✂] million on an 'existing cement plant operating site', but this could increase to over £[✂] million if the plant was to be built on a greenfield site. The largest component of these costs was the capital cost of purchasing and installing the cement production plant which ranged from £[✂] million to £[✂] million,[1] followed by the cost of building access roads and infrastructure (eg access to electricity and gas) which ranged from £[✂] million to £[✂] million. Included within the total capital expenditure range above was the cost of constructing a rail-connected depot network (similar to that owned by Tarmac) of between £[✂] million and £[✂] million.[2] In relation to the distribution network for a cement plant, Lafarge told us that its depots[3] were strategically located to serve its downstream customers in the most efficient way, with most of its depots having a rail connection to transfer cement by rail from the cement works. However, Lafarge added that a depot network was not required to enter into cement production.

6. Lafarge told us that new entry into cement production was unlikely given that the cost of building a greenfield cement plant was considerable and that overcapacity in the market meant that incumbents could increase production at relatively little cost, making entry unprofitable. Lafarge told us that ROCE remained low and therefore investment in greenfield cement works was currently unattractive.

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[1] Anglo American told us that for its Tunstead cement plant, the total cost of commissioning Tunstead's new dry process cement plant (over the period from 2004 to 2007), which replaced its original wet process cement plant, was around £[✂] million (representing the actual cost incurred by the manufacturer and construction contractor in supplying and constructing the new cement plant). The new cement plant enabled Tarmac to increase cement production from [✂]Mt to [✂]Mt.

[2] Other costs include the cost of: *(a)* addressing environmental, planning and public relations issues; and *(b)* building blending facilities.

[3] Lafarge told us that at a depot, there would usually be storage and dispatch facilities for onward transportation by road, as well as warehouses and office buildings for administrative functions.

7. Cemex told us that the cost of constructing its Rugby plant (which opened in 2000) was around £200 million and given that cement production was 'very capital intensive', highly regulated, and raw material reserves were required, the barriers to entry were high. In relation to Cemex's point about raw material reserves, we noted that in the UK, all the cement producers operate their own limestone and clay/shale quarries, which supply raw material inputs to their cement plants.

8. The views from independent third parties also suggested that these initial capital requirements were high (some of which we considered would be sunk costs which the entrant would not be able to recover), and that entry by small operators into cement production would be very difficult. Hillhouse Quarry Group told us that, mainly due to the costs of these plants and processes, it would be very difficult for small operators to enter into cement production, and Newark Concrete told us that many independents would not have the financial resources to set up a cement plant.

9. [✄], which supplies (but does not produce) cement in the UK, told us that for a new entrant, the cost of setting up a cement plant was very high, which it estimated at around £500 million. [✄] added that there were currently more barriers to entry than there were at the time when it had entered the UK market in 1990.

10. Allen Newport, an aggregates and RMX producer, told us that it would not consider self-supply of cement given the large capital costs required to set up a cement plant. Breedon Aggregates, whose activities include RMX and mortar production, told us that it would not consider building its own cement plant because of the capital costs involved, which it estimated at around £180 million, which would not be economical given its business's relatively small size and required cement volumes.

Setting up a grinding station or a cement import terminal

11. Whilst there was general consensus from main and third parties that the initial capital cost of setting up a cement plant was a barrier to entry, the UK cement producers told us that there were different models of entry which could take place at far lower cost, namely through the construction of a grinding station or an import terminal. We considered these below.

12. Cemex told us that a new entrant could build a grinding mill (without the kiln to manufacture clinker) and source its clinker, a highly available and globally traded commodity, from elsewhere. It said that this model of entry would not only reduce capital expenditure, but also reduce an entrant's raw material requirements and the external regulatory requirements for the manufacture of clinker. Cemex told us that it had opened one grinding mill at Tilbury for a capital cost of around £50 million, which primarily sourced its clinker from its Rugby plant. It added that given the grinding mill's location at a port, it would also have the ability to process imported clinker. Lafarge added that the establishment of a grinding station as a model for entry was widely adopted around the world, albeit this was currently not the case in the UK.

13. Anglo American estimated that the cost of setting up a cement import terminal could be as low as a 'few hundred thousand pounds' to up to around £50 million for a 'very sophisticated import terminal including a clinker grinding station'. It told us that the barriers to opening up a cement import terminal were reasonably low and that this was reflected in the successful expansion of cement importers, despite current market conditions, with five new import terminals opening in the UK over the past three years. Anglo American added that import terminals could be established within a short period of time such that entry could be achieved quickly. Lafarge told us that it was aware that Southern Cement established an import terminal in just over 40 days.

14. [✂] also shared the view that the capital cost of setting up a cement import terminal was low. [✂] estimated that the cost of constructing an ‘average’ import terminal could be no more than £0.2 million (excluding the cost of the annual lease to the relevant port authority) and told us that the barriers to opening up a cement import terminal were reasonably low. [✂] told us that the relative cost of setting up an import terminal was ‘quite low’ and given the large number of UK ports, the barriers to entry to set up as an importer were ‘low’.

Cement: regulatory barriers

15. Newark Concrete mentioned that getting planning permission to commence a new cement works could take a number of years and was therefore considered a barrier to entry.

16. Anglo American told us that the costs of environmental and regulatory compliance were operational costs which any entrant would face. The main parties provided details of the significant legislative (eg health and safety and product quality) and environmental obligations placed on UK cement producers, together with their associated costs of compliance. In particular, in relation to regulations concerning the UK cement producers’ ‘carbon footprint’ for cement, these included the ETS, the climate change levy, climate change agreements, carbon reduction commitments, renewable heat incentive, and carbon accounting 2012. Lafarge told us that the cost of complying with the ETS alone was between £[✂] and £[✂] a year.

17. We received limited evidence from third parties in relation to the regulatory barriers to entry into the cement market, and the costs these would create for a new entrant.

Cement: barriers to expansion

Expansion based on existing capacity

18. The main parties told us that the cement market was characterized by high levels of excess capacity in both domestic (even after plant closures) and international markets. Lafarge told us that production could therefore be increased at relatively little cost up to the limits of existing capacity.

Expansion based on increased capacity

19. The main parties told us that the cost of increasing capacity at an existing cement plant could vary substantially depending on the nature of the expansion, and illustrated this with several examples:

(a) Anglo American told us that the cost of increasing capacity at Tarmac's Tunstead cement plant in 2008 from [✂] to [✂] was around £[✂] million, but the cost of constructing a second kiln and plant at Tunstead would be much higher at around £[✂] million, and would also require planning permission and approval from the Environment Agency.

(b) Lafarge estimated that the cost of replacing an existing kiln and associated equipment could be similar to a new plant (up to £[✂] per tonne of cement capacity), but the cost of 'debottlenecking' could cost less than £[✂] per tonne depending on the investment required. Lafarge added that the lowest-cost expansion could be achieved through a number of methods, including: process improvements (adjusting raw materials); improving plant management; and reducing plant downtime through maintenance systems. Lafarge told us that such improvements could be made at very low cost, and sometimes involve no cost at all. In addition, cement production could be expanded at even lower cost levels by extending clinker with cementitious materials such as slag or ash or pozzolan, which would permit the production of good-quality cements with as little as 50 per cent clinker.

20. Hanson provided us with the cost of increasing capacity at its Padeswood cement plant in 2005, where the cost of building a new kiln was around £60 million.

21. [✂] told us that, in relation to cement import terminals, if the market opportunity arose, it would be able to expand capacity moderately within a 12-month time frame.[4]

Cement: conclusions on the relevant barriers to entry and expansion

22. Our conclusions on the relevant barriers to entry and expansion are set out below. Our views on whether they act as countervailing factors that would prevent or reduce an SLC that might otherwise arise as a result of the proposed JV are set out in Section 6 of the report.

23. Based on the evidence received, we considered that a minimum efficient-sized entry into cement production would be based on a 1Mt capacity plant for a minimum capital cost of around £250 million, some of which would be sunk and unrecoverable by the entrant. The resulting fixed costs would be high and therefore there are benefits from economies of scale, where a new plant would benefit from large-scale production to spread the high fixed costs over greater output volumes. We considered that the initial capital requirement would be prohibitive for small independent operators, which lack the financial resources to fund the upfront capital costs.

24. In relation to whether a larger entrant could profitably enter the market for cement production, if we assumed a new plant producing 1Mt of cement a year, this would account for a relatively significant proportion of total market volumes (just over 10 per cent[5]). Given weak market demand and excess capacity in the market, we considered it unlikely that such entry could be profitably accommodated. Further,

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[5] Based on MPA data, the total annual cement volumes supplied is around 8Mt. MPA website: www.mineralproducts.org/iss_fact01.htm.

incumbents face low barriers to expansion which enable them to respond to new entry by increasing volumes relatively quickly and at low cost. We therefore considered that excess capacity would undermine the profitability of the new entrant, in particular given the need for the new entrant to produce volumes on a large scale to benefit from economies of scale.

25. We also considered additional incumbency advantages. We considered that economic access to raw material inputs would be a relevant and important consideration for any new entrant, in particular in relation to reducing the availability of suitable sites for a new cement plant. We also considered that the incumbent UK cement producers' ownership of limestone and clay/shale quarries, which supply raw materials for their cement production, would provide incumbents with greater certainty of supply and provide certain incumbency advantages over a new entrant, unless the entrant's plant had economic access to its raw inputs on similar terms.

26. In relation to regulatory barriers to entry in cement production, any regulatory obligations would extend to all cement producers, and therefore we considered it possible that given the complexity of implementing, monitoring and complying with regulations, incumbents' experience and existing relationships with regulators may confer a strategic advantage[6] to incumbents over new entrants.

27. We also considered the feasibility of entry via setting up a grinding station or an import terminal. In our view, current market conditions would make entry unattractive and deter entry via either route. Further, in relation to setting up a grinding station, a significant capital outlay and an economic supply of clinker would still be required. Clinker would either have to be imported or come from a rival UK cement supplier,

[6] Strategic advantages can arise where incumbents have advantages over new entrants because of their established position (sometimes called 'first-mover advantages').

both of which would be likely to weaken the business case for the initial capital investment.

28. Entry via a single import terminal would only be likely to give access to part of the UK cement market, and would still require imported cement to be sourced on terms that provided a viable return on the investment. In particular, we considered that import terminals would need to be rail-linked to ensure economic onward transportation of cement.

Barriers to entry and exit in aggregates

29. We considered the evidence relating to the following possible barriers in the market for aggregates:

(a) initial capital requirements and economies of scale;

(b) difficulties in obtaining planning permission for greenfield sites;

(c) limited availability of greenfield sites; and

(d) barriers to expansion.

Aggregates: initial capital requirements and economies of scale

Primary aggregates

30. The main parties told us that entry into primary aggregates required a 'high level of fixed cost investment' and that most of the initial capital required for setting up a primary aggregates site was for acquiring land (for the extraction area and plant); mineral rights; planning permission; and plant and equipment:

(a) In relation to the costs of acquiring land and mineral rights, Lafarge told us that these could be acquired either on a freehold basis or on a leasehold basis, where under the latter, rental and royalty payments could apply. Anglo American also told us that these costs depended on geography (eg mineral rights were more

expensive in the South-East), geology (eg the depth of the overburden overlying the required mineral), and the volume of reserves required.

(b) In relation to the cost of obtaining planning permission,[7] building infrastructure (eg access to gas and electricity), and purchasing plant and equipment, the main parties estimated that capital expenditure ranged from £[✂] million to £[✂] million for a 'large' crushed rock site, and from £[✂] million to £[✂] million[8] for a sand and gravel site. The main parties added that these estimates would be lower if mobile plants were used, or if plant and equipment were leased or subcontracted.

(c) The main parties also told us that greenfield sites would require a further capital cost to prepare the site of between £[✂] million and £[✂] million, or a lower amount if mobile plants were used.

31. Cemex estimated that if a depot was required, this would cost between £[✂] million and £[✂] million.

32. The capital cost involved in setting up a primary aggregates site, some of which we considered would be sunk and unrecoverable by an entrant, was cited by a number of third parties to be a barrier to entry. Allen Newport, a producer of aggregates and RMX, told us that the high initial capital costs, mainly in relation to the costs of land and plant, together with the high ongoing costs of operating a quarry, formed a barrier to entry. Newark Concrete, an independent RMX producer, told us that a lot of independent RMX producers would not have the financial resources to move into aggregates production.

[7] Lafarge told us that obtaining planning permission alone could range from £50,000 to £500,000 depending on the site, its location, and whether or not it was an extension of an existing site or a new site.
[8] Lafarge provided additional details on the capital cost (including planning, infrastructure and plant costs) for a new sand and gravel site, where a site which could produce up to 0.3Mt of sand and gravel a year would cost between £2.2 million and £4.1 million, and a site which could produce between 0.3Mt and 0.6Mt a year would cost between £3.0 million and £5.9 million. Lafarge added that for a sand and gravel pit with annual production volumes of 0.3Mt, but where its operations were sub-contracted, it would cost between £1.8 million and £3.3 million.

33. The main parties told us that given the high initial capital requirements for a primary aggregates site, the ‘industry naturally favours production on a large scale, whereby fixed costs can be spread across a large number of units of production’, which enabled producers to exploit economies of scale.

Secondary and recycled aggregates

34. The main parties told us that for secondary and recycled aggregates, the barriers to entry were low. They added that unlike primary aggregates, producers of secondary and recycled aggregates did not need to have access to mineral reserves, but instead needed access to a supply of construction and industrial by-products or demolition waste.

35. The main parties also told us that no substantial investments were required for the production of secondary and recycled aggregates, eg mobile crushers could be hired on short-term contracts or leased, which allowed efficient entry to take place on a small scale. In relation to recycled aggregates, the main parties highlighted that more than 400 companies were operating over 580 static recycled aggregates sites in Great Britain. Hanson also agreed that barriers to entry into secondary and recycled aggregates were very low.

36. Costain, a construction and civil engineering company, told us that smaller local providers would find it easier to supply recycled aggregates than primary aggregates.

Aggregates: difficulties in obtaining planning permission for greenfield sites

37. The difficulties and long timescales involved in obtaining planning permission for primary aggregates sites were mentioned by both main and third parties, not only in relation to greenfield site developments, but also in relation to capacity expansion plans.

38. Lafarge told us that preparing and completing a planning application could take many months and obtaining planning permission on a new primary aggregates site could take up to eight years. Furthermore, it told us that the outcome of the planning process was uncertain, eg planning permission might be withheld if the scheme was opposed by the local authority or local community, or in the case of an extension, if the minerals were not in the planning authority's 'local mineral plan'.

39. Based on the evidence from independent third parties, there was a general consensus that obtaining planning permission was very difficult and that the process could take up to ten years. Both Asphalt Works (an independent asphalt surfacing contractor) and Breedon Aggregates told us that obtaining planning permission for a new aggregates quarry was very difficult. Besblock, a manufacturer of concrete blocks, told us that planning permission to open a new quarry was extremely difficult and cited one example where permission was granted after ten years. Allen Newport told us that the 'wider issue in terms of government policy' and 'planning system' were the two major barriers to entry, where the latter created a 'potential ten year barrier to entry'.

40. Hanson told us that getting planning consent for a new quarry could take ten years. Cemex explained that getting planning consent on a 'new Greenfield-type quarry' was very difficult because of current production overcapacity in aggregates; the planning authorities' view that enough planning consents had been given on quarries; and the availability of recycled and secondary aggregates. Aggregate Industries told us that planning consent for a new quarry, or an extension for a sand and gravel quarry, could take around five to six years, which increased the costs of entry. It added that a new entrant would need to have the expertise (either from external advisers or in-house) to manage the planning process.

41. In relation to secondary and recycled aggregates, however, the main parties told us that since producers did not require the extraction of mineral reserves, they did not require the same level of planning permission that was required by primary aggregates producers.

Aggregates: limited availability of greenfield sites

42. Limited availability of greenfield sites suitable for aggregates production was also cited as an important barrier to entry by a number of third parties. The following interrelated issues were highlighted:

(a) limited availability of suitable greenfield sites that are close to main conurbation areas; and

(b) the extensive ownership of suitable greenfield sites by incumbents, some of which have not been developed.

43. Hillhouse Quarry Group, a producer of aggregates, asphalt and RMX, told us that, whilst geology first dictates where these minerals are, these sites were not 'freely, abundantly available in the main conurbation areas where they probably need to be close to, to become economic sources of supply'. The importance of location was also mentioned by Aggregate Industries, which told us that an aggregates site needed a cost-effective route to its customers. The main parties stated that the 'economic geographic scope for aggregates is around 30 miles and therefore, the aggregates quarries themselves do not have to be (and are often not) located in the main conurbation areas in order to supply to these locations'.

44. Some third parties mentioned incumbency advantages in relation to ownership of quarries and greenfield sites. Asphalt Works told us that 'most of the quarries where the decent aggregates come from' were all owned by the 'bigger companies'. Breedon Aggregates told us that most of the rock quarries had been around for over

100 years, and that since the ‘last major completely Greenfield site for a rock quarry’ opened in Scotland over 30 years ago, it was not aware of any new planning consents being given on a new rock quarry.

45. In one external Lafarge marketing document, it stated that Lafarge had around 40 years of permitted reserves and controlled ‘significant additional aggregates deposits’, for which it had either not yet received, or requested, extraction permits. Lafarge told us that due to the ‘lengthy planning process involved (up to 10 years) before development can commence’, incumbents owned a ‘number of undeveloped sites’.

46. Besblock told us that Lafarge had acquired local reserves but not opened them up to the market, which Besblock stated ‘increases the price by restricting the supply’. Lafarge responded by stating that the site in question was Morville for which planning consent was only received in November 2011, and that Lafarge did not own any other sites within 30 miles of Morville. Lafarge argued that given the level of overcapacity in the market, no individual supplier could increase prices by restricting supply, since its competitors would be able to respond by readily expanding their output in response. Anglo American added that if a company were to propose a price increase, it would be unsuccessful as customers would switch to other suppliers which have substantial overcapacity with the ability to expand supply readily.

47. Anglo American told us that establishing a greenfield site was only one market entry option as potential producers could also acquire existing aggregates extraction facilities. However, whilst the availability of suitable greenfield sites for aggregates was limited, there also appeared to be limited opportunities for new entrants to acquire existing aggregates sites, with Asphalt Works telling us that very few aggregates quarries were available for sale, and Breedon Aggregates stating that

any plans to enter a new market based on an acquisition of an existing quarry would be 'highly speculative'. Breedon Aggregates added that it was sometimes possible to acquire aggregates through 'borrow pits' created as part of a construction project, but these were usually temporary and restricted to supplying the project in question.

48. The main parties told us that entry into the primary aggregates segment was 'most likely to take place through the acquisition by a new entrant of an existing production site, or of an existing producer'. Anglo American told us that opportunities existed for new entrants to acquire existing sites, eg Marwyn Materials, trading as Breedon Aggregates, entered the market by acquiring existing extraction facilities; and in relation to marine aggregates, Dudman purchased a marine dredging vessel and recently began this activity. Anglo American added that the reduced activity of acquisitions or disposals reflected the cyclical downturn in the construction sector as a whole, although acquisitions and divestments were still occurring, eg Breedon Aggregates' recent acquisition of C&G Concrete. However, we would note that an acquisition of itself does not increase supply, although new entrants might have different competitive strategies.

Aggregates: barriers to expansion

Expansion based on existing capacity

49. The main parties told us that given 'significant levels of overcapacity', the barriers to expansion from existing production sites were low since output could be readily scaled and the number of hours for which a plant was in operation could be easily increased without the need to incur additional fixed costs, thereby utilizing excess capacity. The main parties argued that this ease of expansion based on existing capacity provided a powerful competitive constraint in itself and therefore the importance of new entry was diminished.

50. The ability to increase production volumes based on existing capacity was also mentioned by some third parties. Breedon Aggregates told us that most of its plants were operating well below volumes achieved in 2008, and therefore had the capacity to increase volumes if market conditions improved. Brett Group, an independent aggregates and RMX producer, also told us that most of its quarries could increase their primary aggregates output immediately in response to market opportunities, unless further reserves needed to be secured, either because the quarry was close to exhausting its reserves, or had fully exhausted them.

Expansion based on increased capacity

51. The main parties told us that their ability to increase production capacity levels depended on the nature, size and circumstances of the expansion, which would in turn determine the amount of capital expenditure required.

52. Anglo American told us that the cost of expansion for a primary aggregates site could vary significantly depending on a number of factors, eg the current capacity utilization of screening and crushing equipment. Anglo American added that if the planned expansion fell outside the 'existing planning permission boundary and if the current permission did not allow for any additional volumes of sand and gravel to be extracted', then the costs of obtaining new planning permission would also be incurred.

53. Lafarge told us that the capacity of small to medium-sized rock quarries was scalable with the use of mobile crushing and screening equipment, but that this was less feasible at larger rock quarries and sand and gravel sites which had fixed equipment. Lafarge added that capacity expansions at existing primary aggregates sites would 'not normally entail significant planning costs or site infrastructure costs (unless the

site's capacity and overall scale was being expanded by an order of magnitude, in which case the planning and infrastructure costs would be similar to a new site)'.

54. In relation to a 'dormant' quarry where 'workable' and commercially viable mineral reserves exist with planning consent, but no plant has been built, Anglo American told us that the cost of commencing production could range from between £[✂] million and £[✂] million. Anglo American told us that the cost of reopening a mothballed quarry[9] would be much less than the costs of commencing production at a dormant quarry.

55. Breedon Aggregates told us that it had not expanded capacity at any of its plants in the last five years given the decline in market demand, and Brett Group told us that it would only increase capacity if it believed that any improvements in market conditions were sustainable. In relation to secondary and recycled aggregates, Brett Group told us that its ability to expand output would depend on the availability of the relevant 'feedstock'.

Aggregates: conclusions on the relevant barriers to entry and expansion

56. Our conclusions on the relevant barriers to entry and expansion are set out below. Our views on whether they act as countervailing factors that would prevent or reduce an SLC that might otherwise arise as a result of the proposed JV are set out in Section 6 of the report.

57. We concluded that in relation to primary aggregates, limited availability of suitable greenfield sites would make any new entry unlikely, unless existing sites were made available by incumbents for new entrants to acquire.

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[9] A mothballed quarry is one where the fixed plant is maintained in reasonable working order; the quarry face remains accessible; and in a relatively short period of time it could become operational (including those quarries which were previously operated by third party contractors which provided their own equipment and would readily be able to do so again).

58. Even if a new entrant could find a suitable greenfield site, we considered that the difficulties and the timescales involved in obtaining planning permission, which could take up to ten years, would make any such entry slow. Any entrant would also need access to sufficient financial resources to finance the initial capital requirements (up to £10 million to prepare the greenfield site and up to £25 million in planning, infra-structure, plant and equipment costs for a crushed rock site), but also to fund the operating costs of a quarry. However, we recognized that there were various possi-bilities in relation to the size of entry, and in relation to sand and gravel, entry could take place on a smaller scale than for entry into crushed rock. Given the relatively high fixed costs associated with entry and ongoing operations, there are economies of scale benefits from large-scale production. Therefore, we considered that only large-scale entry would be sustainable and sufficient to act as a competitive constraint.

59. Given weak market conditions, we considered that the incentives of new entrants to incur the initial capital costs of 'de novo' (or greenfield) entry would be significantly diminished since the entrant's ability to make large-scale entry profitable would be reduced under these conditions. In any case, as mentioned above, given the limited availability of greenfield sites and the timescales involved in obtaining planning per-mission, even if market conditions did improve significantly, we did not consider that new entry would be likely or timely.

60. Our survey suggested that the ability to expand output readily could be a counter-vailing factor to the proposed JV in some cases, where 24 per cent of aggregates producers told us that they would not be able to increase output competitively when compared with the majors, whilst 49 per cent told us that output could be increased competitively.

61. We found no evidence to suggest that barriers to entry into, or expansion in, the production of secondary and recycled aggregates were high, but there was evidence that supplies of raw materials (ie feedstock) for the production of secondary and recycled aggregates would be finite and would be specific to the geographic location in which they arose.

Barriers to entry and exit in asphalt

62. We considered the evidence relating to the following possible barriers in the market for asphalt:

(a) initial capital requirements;

(b) economic access to inputs; and

(c) barriers to expansion.

Asphalt: initial capital requirements

63. The key assets required to open a new asphalt plant comprise land (either freehold, leasehold or on a construction site), and plant and equipment (including aggregate feed hoppers, bitumen tanks, drier and heater, mixer and mixed product storage facilities).

64. The main parties told us that the barriers to entry into asphalt were low given that the initial capital requirements were not substantial. Hillhouse Quarry Group echoed this view and told us that whilst some ‘expertise’ was required, it was relatively easy to set up an asphalt plant.

65. The main parties told us that a new asphalt plant could typically cost between £[✄] million and £[✄] million. Anglo American added that this cost would depend on a number of factors, in particular the required capacity, and whether the new plant would be developed on an existing site or a greenfield site, where, for example, the

cost of building access roads and infrastructure would add a further £[✂] million to the initial capital costs.

66. Examples for the cost of a new asphalt plant from Cemex and Hanson were also broadly in line with the low end of Anglo American's cost estimate range, where Cemex provided us with a range of between £[✂] million and £[✂] million in 2008, and Hanson provided us with a figure of around £[✂] million for the replacement cost of an existing plant.

67. However, Cemex considered the initial capital requirement (of up to £[✂] million) for an asphalt plant to be 'high', but added that this would be the only barrier to entry into asphalt. Cemex also mentioned that a new entrant would need to consider whether entry would be economically feasible given the high costs of bitumen and fuel, and the low margins on asphalt.

68. Anglo American told us that whilst bitumen and crude oil prices fluctuated over time, they were not at a level that was considered prohibitive to new entrants. It added that entry was a real possibility despite current market conditions, eg GD Harries and FM Conway, two sizeable producers which entered the asphalt market in 2010.

69. Asphalt Works also told us that the initial capital requirement was 'considerable' for a new entrant, but this was based on a capital requirement of around £1 million.

70. The main parties told us that asphalt site plants 'provide an additional way for new asphalt competitors to enter the market ... particularly in relation to airfield work and major road building projects'. The main parties added that mobile asphalt plants could either be: *(a)* purchased and set up for around £[✂] million for a second-hand plant, or for around £[✂] million for a new plant; or *(b)* leased (where the total set-up

and hire costs for a typical contract period of 20 weeks was estimated to be around £[✂] million excluding site rental costs).

71. In relation to the presence of any regulatory barriers, Anglo American told us that environmental and regulatory costs in relation to opening a new asphalt plant were operational costs which any entrant would face once in production, and that new asphalt plants established by potential entrants were likely to be more energy efficient and cost effective than older plants. Anglo American added that fuel and energy costs accounted for around [✂] per cent of total asphalt production costs and Phase II of the ETS would not substantially increase the operating costs for asphalt producers in relative terms.

72. Unlike entry into primary aggregates, we did not receive any evidence from main and third parties to suggest that obtaining planning permission for an asphalt plant represented a significant barrier to entry. The main parties told us that a new asphalt plant would take around one year to set up, including the time taken to obtain planning permission and for commissioning. Anglo American added that the cost of obtaining planning permission for an asphalt plant would range from between £[✂] and £[✂], significantly less than the cost of obtaining planning permission for a primary aggregates site (which could range from £[✂] to £[✂]).

73. In relation to regulatory barriers, we noted that Phase III of the ETS, which is set to commence in 2013, may cover asphalt plants, albeit certain exemptions may apply. We noted that these could increase the cost of new entry in relation to monitoring and compliance with these regulations, albeit this would represent increases in costs for all asphalt plants covered by the ETS.

Asphalt: economic access to inputs

74. Only Asphalt Works mentioned that a ‘self-sufficient’ supply of aggregates was of ‘paramount’ importance when setting up an asphalt plant. It told us that it would only consider building its own asphalt plant if it could also own a quarry in which to build its asphalt plant, to ensure a ‘self-sufficient’ supply of aggregates. It told us that the alternative would be to source aggregates from the ‘likes of Tarmac, Aggregate Industries, [and] Cemex’, which Asphalt Works did not consider attractive.

75. Brett Group also alluded to the competitive advantages of vertically-integrated incumbents, when it mentioned that as a result of the combination of its competing against ‘majors with a vertically integrated supply chain’, the drop in demand, and cost increases outpacing market price increases, its ‘margins have suffered greatly’.

76. There was little evidence from third parties on why vertical integration of incumbents would form a barrier to entry. The main parties told us that entry in respect of asphalt was ‘most likely to arise through firms seeking to vertically integrate either “backwards” (from asphalt surfacing into asphalt production) or “forwards” (from aggregate production into asphalt surfacing)’. However, we noted that our survey showed that nearly 60 per cent of asphalt customers (not producers) surveyed did not view vertical integration of the supplier as being important.

77. There was very limited evidence from third parties which raised their ability to secure inputs on economic terms as a concern or a likely barrier to entry.

Asphalt: barriers to expansion

Expansion based on existing capacity

78. The main parties told us that barriers to expansion were low in asphalt production because output could be readily scaled without the need to incur additional fixed

costs, eg by increasing working hours. Lafarge added that asphalt plants were ‘rarely capacity constrained’.

79. We did not receive any evidence from third parties that there were barriers to expansion in asphalt production based on existing capacity levels.

Expansion based on increased capacity

80. Lafarge told us that any expansion of capacity at its asphalt plants would usually entail replacing the existing plant in its entirety, and therefore expansion costs would be similar to the costs of setting up a new plant, save for any planning and infrastructure costs which might not arise for an expansion.

81. Third parties did not make the same point on capacity increases. Brett Group told us that it was reluctant to increase asphalt capacity unless improvements in market conditions were sustainable, and Breedon Aggregates told us that its ability to expand capacity would depend mainly on haulage availability, which was a significant element of its delivered cost.

Asphalt: conclusions on the relevant barriers to entry and expansion

82. Our conclusions on the relevant barriers to entry and expansion are set out below. Our views on whether they act as countervailing factors that would prevent or reduce an SLC that might otherwise arise as a result of the proposed JV are set out in Section 6 of the report.

83. We concluded that the barriers to entry into, and expansion in, asphalt production, including planning risks and initial capital requirements, were generally perceived by main and third parties to be low. However, given the main and third parties’ lowest cost estimates for a new asphalt plant of around £2–£3 million, we considered the

initial capital requirement to be substantial in the context of likely revenue, in particular, given the perishability of asphalt, an asphalt plant can only serve its local customers within its limited catchment area, especially when compared with the wider regional or national 'reach' of a cement plant.

84. In light of current market conditions (ie excess capacity and falls in market demand) and the initial capital outlay required to serve a relatively limited 'local' market, we considered that entry would be unlikely unless market conditions significantly improved.

Barriers to entry and exit in RMX

85. We considered the evidence relating to the following possible barriers in the market for RMX:

(a) initial capital requirements;

(b) economic access to inputs; and

(c) barriers to expansion.

RMX: initial capital requirements

86. Cemex told us that the barriers to entry into RMX were very low, both in terms of new RMX plants or volumetric truck businesses, which were easy to set up.

87. Lafarge told us that the main assets required to open an RMX plant comprised land (either on a freehold or leasehold basis), and plant and equipment (including an RMX plant with cement silos and aggregates feed hoppers). Mixer trucks would also be required for delivery of the final product to customers, which Anglo American told us could be hired rather than purchased. Anglo American added that mixer trucks were generally not required at site plants. Lafarge told us that small suppliers tended to procure mixer trucks on hire-purchase agreements which therefore did not involve

any initial capital outlays, and that volumetric trucks required substantially lower capital costs. Lafarge estimated that the acquisition cost for an almost new volumetric truck would be around £160,000, and that this could be financed through a hire-purchase agreement. Anglo American added that entry costs by volumetric trucks would be much lower as no plants were required.

88. The main parties told us that the cost of the planning process for a new RMX site would be between £[✂] and £[✂], and that these plants were less likely to be subject to monitoring requirements with no provisions for permissions to be reviewed. Aggregate Industries told us that out of the last 12 planning consents received for RMX plants, 11 were by independent RMX producers.

89. The main parties told us that a new RMX plant could typically cost between £[✂] million and £[✂] million, depending on the size, and type, of plant required and whether the plant was on an existing or greenfield site. Including planning and infrastructure costs (excluding the cost of securing land), Lafarge estimated that a ‘medium-sized’ RMX plant (eg with capacity of 60 cubic metres per hour) would cost between £[✂] million and £[✂] million. Anglo American added that the capital requirements for volumetric trucks were substantially lower than those associated with setting up a fixed RMX plant, and estimated that a new volumetric truck would cost around £[✂], and second-hand volumetric trucks would cost from around £[✂]. Anglo American added that the cost of RMX plants may also be lower through the availability of second-hand plants or sale and leaseback arrangements, [✂].

90. Third parties’ capital cost estimates for a new RMX plant were broadly in line with estimates from the main parties. Allen Newport told us that it was aware of recent examples of plants being set up ‘at relatively low cost’, and that its own RMX plant had a capital cost of around £0.3 million (ten years ago). Hanson provided us with

some examples of the cost of new RMX plants, which ranged from £0.9 million to £3.1 million depending on site-related factors, eg the plant's model and capacity. It told us that this illustrated the wide range of capital costs that could be incurred when opening a new site.

RMX: economic access to inputs

91. The vertical integration of the majors in respect of cement and aggregates into RMX was identified by some third parties as an important barrier to entry, whereby the new entrant could be vulnerable if it was dependent for its cement supplies on vertically integrated operators which were also its competitors in RMX.

92. Costain told us that it would be 'very difficult for new companies to come into the [RMX] market without serious financial backing and support', and explained that 'vertical integration is part of how ... competition is not allowed into the market', where the new entrant might have to source its aggregates and cement inputs from its competitors at uncompetitive prices resulting in a price for RMX which was higher than the market could bear.

93. Hillhouse Quarry Group held a similar view and told us that whilst it was relatively easy to set up an RMX plant, the main barrier was the ability of a new entrant to source cement economically for its RMX production, since:

> cement is the key element to ready-mix [RMX] and without that you have no real control ... For us even though we have aggregates, we would still be totally reliant on that third party to give us the cement and if that cement was prohibitive for us to do so in terms of operating a new business and a new location, it would be very, very difficult. In fact, it wouldn't be applicable.

94. The importance of securing cement supply was also highlighted by Besblock, a manufacturer of concrete products, which told us that it used to buy cement from Tarmac until Tarmac unexpectedly decided to stop supplying it with cement entirely in order to supply cement to its own concrete products division. [✄] Anglo American added that the comment made by Besblock had no relevance to our assessment of the barriers to entry in the RMX market since dependency on cement would only create a barrier to entry if cement was in scarce supply. Anglo American added that given the level of overcapacity in the cement industry and availability of imports, new RMX entrants would have little difficulty in obtaining cement, and hence the barriers to obtaining economic access to cement inputs were low. Furthermore, Anglo American told us that Besblock had successfully switched to other sources of cement, indicating that alternative suppliers were available.

95. Cemex disagreed with the view that new entrants would have difficulty sourcing aggregates and cement, and told us that for new entrants there were 'plenty of options' to get raw materials.

96. Anglo American told us that these assertions were inconsistent with independent RMX producers substantially growing their market share at the expense of the majors during 2007 to 2010; new entry into RMX production in Great Britain; and results from our survey, which stated that over 80 per cent of RMX customers viewed vertical integration as not important, which Anglo American told us implied that vertical integration did not give RMX suppliers any material competitive advantage. Anglo American added that a large number of RMX producers were not vertically integrated (especially in relation to cement as an input). Lafarge said that RMX producers could obtain cement from suppliers which were not RMX competitors and also from importers in addition to domestic cement producers.

RMX: barriers to expansion

Expansion based on existing capacity

97. We set out below the evidence from third parties on their ability to increase output within their existing production capacity. Brett Group told us that it would be able to increase output within a six- to nine-month time frame in response to increases in the market price, subject to the availability of new trucks and suitable drivers, but would only do so if increased volumes were considered to be 'sustainable in the longer term'. Brett Group added that in the last five years it had not significantly increased its RMX output since this would require it to 'invest in truck capacity in an uncertain market'. Breedon Aggregates told us that in the last five years, it had increased output at some of its RMX plants to 'capture available demand' albeit some of its plants had also seen volumes fall. It added that, given its current 'significant excess capacity', it did not need to expand the capacity of its RMX plants. The Concrete Company, an independent RMX producer, told us that it would be able to increase its output and capacity almost immediately in response to market price increases. Lafarge also told us that its RMX plants were 'rarely capacity constrained'.

98. The CC's customer survey also suggested that only 2 per cent of RMX competitors claimed to have been operating at full capacity in the last 12 months, and nearly half had a lot of spare capacity.

Expansion based on increased capacity

99. In relation to expansion through increased production capacity, Brett Group told us that any increases in plant capacity could take more than nine months and require significant capital investment.

100. Lafarge told us that expansion of capacity at its RMX plants usually involved the replacement of the existing plant in its entirety, which would give rise to similar costs

for capacity expansions as for a new plant. Anglo American added that an alternative expansion strategy would be to invest in volumetric trucks as a complement to fixed and site plants (or to expand the fleet of volumetric trucks by existing volumetric truck operators). It told us that the increasing number and competitiveness of volumetric truck-based RMX producers was reflected by BDS estimates that in 2010 volumetric trucks accounted for approximately 9 per cent of all RMX sales in the UK.

RMX: conclusions on the relevant barriers to entry and expansion

101. Our conclusions on the relevant barriers to entry and expansion are set out below. Our views on whether they act as countervailing factors that would prevent or reduce an SLC that might otherwise arise as a result of the proposed JV are set out in Section 6 of the report.

102. We concluded that the initial capital requirement for a new RMX plant of between £0.3 million and £3 million was generally not considered to be a significant barrier to entry, in particular since the range of capital costs for 'efficient'-sized entry was considerably lower for RMX than for any of the other relevant products. Our survey results also suggested that the scale of production could be small and that there were no significant, if any, benefits from economies of scale: 38 per cent of RMX competitors produced more than 20,000 cubic metres a year, whilst 29 per cent produced between 7,500 and 19,999 cubic metres and 33 per cent less than 7,500 cubic metres. Evidence from third parties suggested that the main perceived barrier to entry was the entrant's ability to have reliable and economic access to aggregates and cement, the two key inputs in the RMX production process.

103. Given the relatively significant barriers to entry into aggregates and cement identified above, we considered it unlikely that any new entrant into RMX would also be able to begin self-supplying its aggregates or cement requirements.

104. We also considered that notwithstanding the relatively low capital cost of setting up an RMX plant, the likelihood of new entry was low given weak market demand and significant excess capacity in the RMX market, which increases the ability of incumbents to increase output readily (based on existing capacity).

105. However, in relation to barriers to expansion based on capacity increases, we noted that the cost of expanding production capacity may be similar to the cost of setting up a new plant, which may reduce the incentives of incumbents to expand their RMX plant capacity. Given weak market conditions and current excess capacity, we did not consider it likely that any significant expansion would take place unless market conditions significantly improved and were perceived to be sustainable.

Part 2: Future entry plans

106. Dudman is active as an importer of cement into Great Britain, and has operational import terminals in four locations, namely Shoreham in West Sussex, Howden in East Yorkshire, Lowestoft in Suffolk, and Garston (opened in September 2011) in Liverpool. Dudman also owns Dibles Wharf in Southampton, which is understood to be rarely used. Lafarge told us that Dudman imported cement from the Republic of Ireland (Lagan) and from Germany.

107. In their initial submission, the main parties told us that they were aware that:

(a) Dudman had announced proposals to rehabilitate the former Blue Circle cement works in Shoreham for cement production; and

(b) Dudman was in the process of setting up a new cement import terminal in Montrose in Scotland.

108. [✄]

109. [✄]

110. [✄]

111. [✄]

112. [✄]

113. [✄]

114. [✄]

115. [✄]

116. [✄]

Glossary

80% catchment area	The distance from production sites within which 80 per cent of external customer volumes are delivered.
Act	The Enterprise Act 2002.
Aggregate Industries	Aggregate Industries UK Limited, the UK operations of Holcim Limited, a global building materials producer, which is listed on the SIX Swiss Exchange. Aggregate Industries produces and supplies a wide range of construction materials in the UK, including **aggregates**, **asphalt**, **RMX** and precast concrete products, as well as importing and supplying **cement** and providing a national road surfacing and contracting service.
Aggregates	The granular base materials used (including as a constituent of **RMX**) in the construction of roads, buildings and other infrastructure, including **primary aggregates**, **secondary aggregates** and **recycled aggregates**.
Anglo American	Anglo American plc. With a primary listing on the London Stock Exchange, Anglo American is the ultimate parent company of the **Tarmac Group** and **Tarmac**.
Asphalt	Produced from **aggregates** and a viscous binding agent, usually bitumen, and primarily used in asphalt surfacing and maintenance activities.
BDS	BDS Market Research Limited, a source of market data on (among other things) **aggregates**, **RMX** and **asphalt**.
BL&C	Buxton Lime and Cement, **Tarmac**'s **lime** and **cement** company. BL&C is based in Buxton and comprises a quarry and stone plant, a **lime** plant and a **cement** plant.
Base (surveys)	The base shown on any outputs or reported figures from survey information is the total number of responses on which quoted statistics are calculated (based).
CC	Competition Commission.
Cement	Also referred to as 'Portland cement' or grey cement. Produced from a mixture of finely ground **limestone** or chalk, clay and sand, which is heated almost to melting point (around 1,450°C) in a large rotating kiln. The cement clinker that emerges is then ground to a fine powder or combined with other **cementitious products** to produce different grades of product. It is used as a binder in building materials including **RMX**. It can be supplied either in bulk or bagged. There are three main types or grades of grey cement: **CEM I, CEM II, CEM III**.
Cementitious material	Any of various building materials which are capable of a hydraulic reaction with water to form a solid crystalline structure. Includes **cement** and **GGBS**. See also **pozzolanic material**.

Cementitious products Substances which can be added to **cement** made from clinker to create different types **cement** such **CEM II** and **CEM III**. As used in this report, this term encompasses **cementitious materials**, **pozzolanic materials** and materials (such as **limestone**) which have little cementitious or pozzolanic properties.

Cemex Cemex UK Operations Limited, the UK operations of Cemex SAB de CV, the global building materials company which is listed on the Mexico stock exchange. Cemex produces, distributes and sells **cement**, **asphalt**, **RMX** and **aggregates** in Great Britain.

CEM I, CEM II, CEM III Types of grey **cement**. **CEM I** is made from ground cement clinker and a small percentage of **gypsum** to control the material's setting time when mixed with water. **CEM II** contains between 6 and 35 per cent **PFA**, **limestone** or **GGBS**. **CEM III** contains between 36 and 95 per cent **GGBS**.

Chemical stone See **high purity limestone**.

Concrete A building material consisting of a mix of **aggregates**, **cement** and water. See also **RMX**.

Crushed rock **Primary aggregates** made from crushing rock. In addition to high **PSV** aggregates (such as granite and gritstone), crushed rock aggregates include softer **limestone** and other rock types.

Delivered price Price per unit of measure based on gross revenues divided by sales volumes. The delivered price is the total price paid by the customer, ie the **ex-works price** plus distribution and haulage charges.

Diversion ratio The proportion of customers lost by one supplier that switch to a competing provider.

EBITDA Earnings before interest, tax, depreciation and amortization.

EPR Economic Planning Region. The highest tier of subnational division used by the UK Government for economic planning purposes.

ETS The Emissions Trading Scheme, which was introduced by the European Union to help meet its greenhouse gas emissions targets under the Kyoto Protocol. Under the current phase of the scheme (Phase II which ends in 2013), carbon emitting installations are allocated a free fixed annual allowance for carbon emissions, where any excess allowances can be sold or retained by the installation. **Cement** and **lime** plants are installations which are included within this scheme.

Ex-works price Price per unit of measure based on net revenues (gross revenues less distribution and haulage costs) divided by sales volumes. The ex-works price is the price paid by the customer before distribution and haulage costs are added on. See also **delivered price**.

FGD/flue gas desulphurization — The process by which sulphur in waste gases from power stations is reduced. **High purity limestone** is used in powder form, which is then made into a slurry to desulphurize the flue gases. In order to produce the powder, **limestone** is crushed at the quarry site and then ground by the power stations.

FOB price — 'Free on board' price—price of a product including the cost of the product and the cost of loading it on to freight vehicles at the point of sale but excluding the cost of transporting the goods from the point of sale to the buyer.

Fly ash — A general term for ash from power stations. See also **PFA.**

FY — Financial year.

GGBS — Ground granulated blast furnace slag. GGBS is a by-product of the blast furnaces used to make iron and is a **cementitious material**. It can be used unground as a coarse aggregate or as a supplementary **cementitious product** (where it can replace up to 70 per cent of **cement** in a concrete mix). **Hanson** is the only supplier of UK-produced GGBS in the UK. See also **CEM I, CEM II, CEM III**.

Grade — The size of aggregate particles. Grade categories used by **Lafarge** and **Tarmac** are:

- 'Fine': aggregate with a particle size of less than 4mm (**Lafarge** definition) or 5mm (**Tarmac** definition).
- 'Coarse': aggregate with a particle size of more than 4mm (**Lafarge** definition) or 5mm (**Tarmac** definition) with no fine material.
- 'Granular': aggregate containing a mixture of coarse and fine material.

Grinding station — A site at which no **cement** clinker is manufactured, but at which clinker (purchased or transferred in from elsewhere) is ground and blended (with the addition of **gypsum**, **limestone**, **PFA** and **GGBS**) to produce **cement**.

Gross revenues — Gross revenues equal the delivered price per unit multiplied by the total unit sales volumes. See also **Delivered price** and **Net revenues**.

Guidelines — *Merger assessment guidelines, CC2 (revised)*, September 2010.

Gypsum — A very soft mineral composed of calcium sulphate dihydrate. In the production of **cement**, clinker is ground with a small amount of gypsum to prevent flash setting.

Hanson — The UK construction and building materials businesses of Hanson and HeidelbergCement AG—Hanson's ultimate parent company, a global provider of building materials listed on a number of German stock exchanges. Hanson supplies heavy building materials to the UK construction industry, including **aggregates**, **asphalt**, **RMX** and **cement**, as well as specialist services in contracting and civil engineering.

High purity limestone (HPL)	A type of **limestone** with a calcium carbonate content of 95 per cent or above, which can be used in the production of **soda ash** and in applications relating to **FGD**. When sold for its chemical properties, high purity limestone is known as **chemical stone**.
HMT	The hypothetical monopolist test. This test is satisfied if a monopoly supplier of the products or services in question would find it profitable to increase prices.
JV	Joint venture.
Kt	Kilotonne or 1,000 tonnes. See also **Mt**.
Lafarge Group	Lafarge SA. Headquartered in Paris and listed on the Paris Stock Exchange, Lafarge SA is the ultimate parent company of **Lafarge**.
Lafarge	**Lafarge Group's** UK construction materials businesses which will be contributed to the **proposed JV** with **Anglo American**.
Lafarge UK Aggregates & Concrete division	**Lafarge Group**'s UK Aggregates & Concrete division (Lafarge Aggregates Limited), which conducts all of **Lafarge**'s UK operations in **aggregates**, **asphalt**, **RMX**, road contracting services and waste disposal.
Lafarge UK Cement division	**Lafarge Group**'s UK Cement division (Lafarge Cement UK plc) which produces and supplies **cement** in the UK.
Lime	Lime is made by heating **limestone** (calcium carbonate) in a kiln at about 1,000°C to produce quicklime (calcium oxide—also known as burnt lime)—driving off carbon dioxide in the process. Lime is generally used for construction and materials (iron and steel manufacture, component of mortars, soil stabilization, aerated **concrete** blocks, and plaster), as well as for agricultural lime (adjusting pH of soil), food and drink, and water treatment.
Limestone	A sedimentary rock composed largely of the minerals calcite and aragonite, which are different crystal forms of calcium carbonate ($CaCO_3$). Limestone is not itself a **cementitious material**, but it is used: *(a)* in the production of the **cement** clinker itself; *(b)* as a minor additional constituent in the production of all **cement** grades, when clinker is ground to produce **cement**; and *(c)* as a **cement** extender in the production of **CEM II** limestone **cement**.
Main party/main parties	**Anglo American** and **Lafarge Group** and their subsidiaries.
The majors	The five largest vertically integrated construction materials companies in the UK, these being (in alphabetic order): **Aggregate Industries**, **Cemex**, **Hanson**, **Lafarge** and **Tarmac**.
Minimix	**RMX** delivery vehicles with a smaller capacity than normal **RMX** trucks (usually $4m^3$ rather than $6m^3$ or $8m^3$).

Mobile asphalt plant	An **asphalt** production plant which can be moved to a job or contract site for the period of the contract.
Mobile RMX plant (also known as a site plant)	A **RMX** plant in modular form that is readily transportable by road. It may be located on a construction site itself or nearby.
Mothballing	The process of deciding to cease production at a site, whilst retaining the site and maintaining it in reasonable working order with reasonable accessibility, such that it could become operational in a relatively short period of time.
MPA	The Minerals Products Association, a trade association for the UK **aggregates**, **asphalt**, **cement**, **concrete**, **lime**, mortar and silica sand industries. Its membership covers 100 per cent of **cement** production in Great Britain, and for the UK, 90 per cent of **aggregates** production and 95 per cent of **asphalt** and **RMX** production.
MQP	Midland Quarry Products Limited, Tarmac's 50:50 JV with Hanson which is involved in quarrying, dry stone processing, production of asphalt, and the supply of **rail ballast**.
Mt	Megatonne or a million tonnes. See also **Kt**.
National Contracting	Tarmac's road surfacing (also known as asphalt surfacing), maintenance and associated services contracting division.
Net revenues	Net revenues equal **gross revenues** less distribution costs.
OFT	Office of Fair Trading.
PCA	Price concentration analysis.
PFA	Pulverized fly ash, a by-product of pulverized fuel (typically coal) fired power stations and a **pozzolanic material**. See also **CEM I, CEM II, CEM III**.
Pozzolanic material	A material capable of reactions to form solid crystalline structures (as for a **cementitious material**) but only in the presence of an alkaline environment.
Precast concrete	A construction product produced by casting **concrete** in a reusable mould or form which is then cured in a controlled environment and transported to a specific construction site to be lifted into place.
Proposed JV	The proposed **JV** between **Anglo American** and **Lafarge Group**, involving the merger of their UK activities in **aggregates**, **asphalt**, **RMX**, **cement**, waste management and asphalt surfacing.
PSV	Polished stone value. An attribute of **aggregates**. The higher the PSV of a particular aggregate, the greater the skid resistance of the **asphalt** produced using that **aggregate**.
Primary aggregates	**Aggregates** quarried from the land or dredged from the sea (the latter are also known as marine aggregates).

Rail ballast	A specific type of crushed rock **aggregate** used as a bedding material underneath railway tracks. These are igneous rocks that are resistant to pressure and breakage.
Rebate	A price reduction applied retrospectively and not affecting the invoice price.
Recycled aggregates	**Aggregates** derived from recycled sources such as demolition sites and construction waste.
Relevant product markets	The markets the **CC** defined for **aggregates**, **asphalt**, **RMX** and **cement** for the purposes of assessing the effect of the **proposed JV** on competition.
RMX/ready-mix concrete	A building material consisting of a mix of **aggregates**, **cement** and water supplied in a ready-mixed form that can be poured and that sets in situ.
Secondary aggregates	**Aggregates** produced as the by-products of other industrial or mining activities.
SLC	Substantial lessening of competition.
Soda ash	Sodium carbonate, a vital ingredient in the manufacture of glass and many household cleaning products. **High purity limestone** is required for the production of soda ash.
Tarmac	**Anglo American**'s UK construction materials businesses which will be contributed to the **proposed JV** with **Lafarge Group**.
Tarmac Group	The UK and international operations of **Anglo American**'s construction and building materials arm. Tarmac Group is an international heavy building materials producer which operates in the UK and the Middle East. See also **Tarmac** and **TBP**.
TBP	Tarmac Building Products Limited, a subsidiary of **Tarmac Group**. TBP is active in the production of heavy building materials such as mortar, **concrete** blocks, bagged **aggregates**, binding products, sports surfaces and foundry sands. It is not part of the **JV** arrangements.
TOH	Theory of harm.
Variable profit/variable profit margin	Variable profit equals net revenues less variable costs. Variable profit margin equals variable profit as a percentage of **net revenues**.
Volumetric truck	A vehicle which carries **aggregates**, **cement** and water in separate compartments to be mixed into **concrete** at the customer's site.