

Merger Simulations: A Compliment to Market-Share Brightlines

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Abstract

One of the core functions of a competition authority is to regulate combinations. The trade-off between the enhanced synergies that accrue from a merger vis-à-vis the increase in monopoly power of the merging entity over the market needs to be worked out. Antitrust scholars have evolved heuristic techniques such as merger simulations which provide a systematic screening mechanism for mergers ex-ante, in order to avoid the situation of an appreciable adverse effect on competition. We employ the PCAIDS methodology to the recent Holcim-Lafarge merger proposal in the Indian context. Competition Commission of India's methodology of merger regulation is critically analysed and the recommendations to move towards more empirical, data-driven methods is prescribed. Merger simulation results suggest that with the incorporation of efficiency considerations, there is a high degree of likelihood that the Holcim-Lafarge merger be approved without modifications, at a 5% brightline threshold for unilateral price increase among the merging brands, with Pan-India as the relevant geographical market. With Eastern-India as the relevant market, the predicted price increases clearly violate the brightline of 5%, in consistency with the CCI order of merger approval with divestment.

Keywords: merger simulation, PCAIDS

JEL classification: **K210, L410, C80**

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Merger Regulation – The Need

In contemporary times, when firms are looking to achieve rapid growth in the shortest possible time-frame, mergers and acquisitions have become a buzzword in the industry. Firms benefit from their collective synergies and achieve economies of scale, offering quality products and passing on the benefits of cost-reduction to their customers.

But M&As needn't always lead to a socially desirable outcome; they increase the concentration in an industry which could lead to two sub-optimal outcomes. Firstly, such a scenario could increase the probability of a player becoming dominant and thereby abusing its dominant position. The second case could be that the increase in concentration provides a congenial environment for cartels to sustain and engage in anti-competitive practices. Therefore, merger regulation is an essential part of ensuring that potential market failure outcomes are nipped at the bud ex-ante.

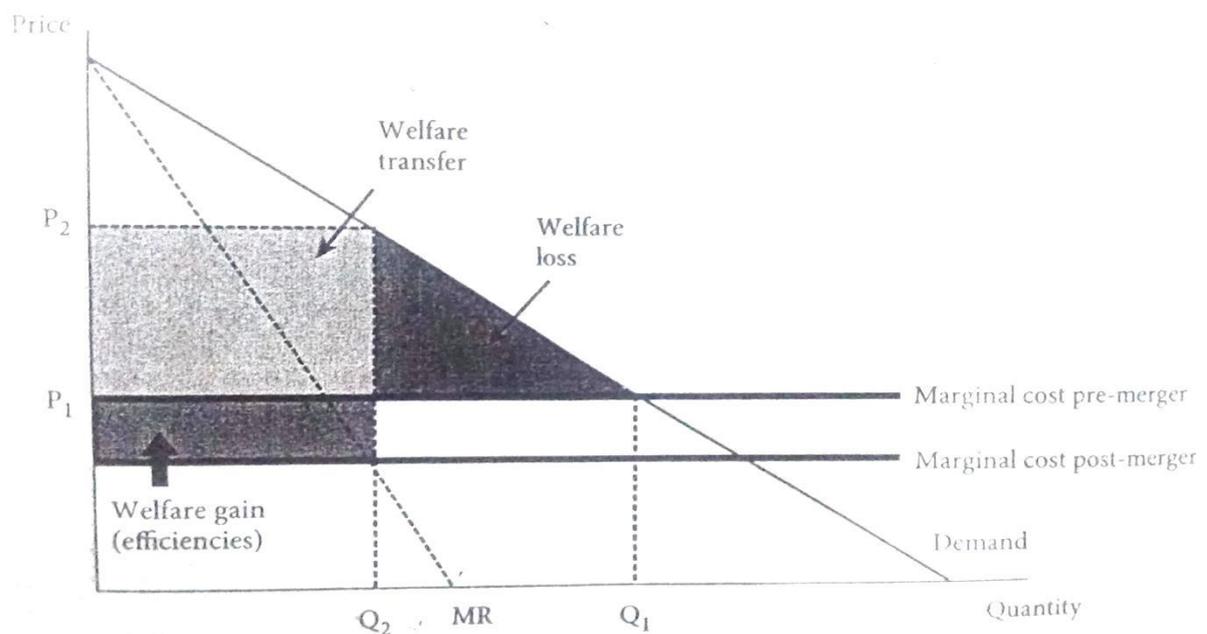


Figure 1: Efficiencies versus Market Power in Mergers (Source: (Neils, Jenkins, & Kavanagh, 2011))

The above figure captures the effects of a merger; while there is lowering of the marginal cost of production post-merger, there is a dead-weight loss created due to a reduction in the quantity of production. Also, with increase in prices, there is greater exploitation of the consumer surplus by the post-merger entity.

In India, Section 5 & 6 of the Competition Act, 2002, deal with combinations and their regulation, i.e., mergers and acquisitions. The Competition Commission of India (CCI) is the apex authority to prevent practices that could have an appreciable adverse effect on competition in the country. This paper undertakes a review of a method of screening, namely merger simulation, used by regulators to ex-ante check for adverse effects on competition if the merger is approved.

Concentration Measures – An Insufficient Consideration

The standard tool used by regulators in merger regulation is market shares, and how these would change with the merger under consideration. Market shares are used as an input in the measurement of market concentration.

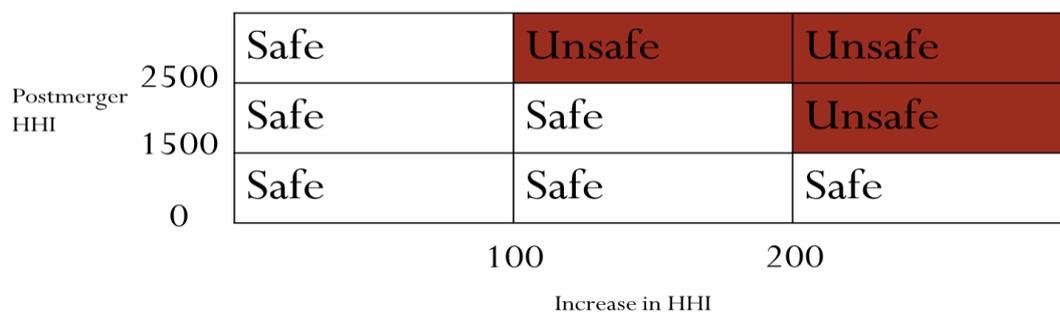


Figure 2: Safe Harbors for Mergers in the US (Source: DoJ and FTC, 2010)

Merger regulation based solely on market concentration is reminiscent on the Structure-Conduct-Performance paradigm. The world has since the 1970s and 80s acknowledged the drawbacks of such thinking and there have been several refinements to the above paradigm and also the development of competing paradigms.

There could be several situations where mere market concentration considerations may lead to undesired outcomes as far as competition is concerned. One such situation is when a merger reduces competition significantly but does not create a dominant position (Neils, Jenkins, & Kavanagh, 2011). An instance of this nature played out in the FTC v HJ Heinz Co case, which involved the merger of Heinz and Beechnut, the second and third largest suppliers in the US baby food market, behind Gerber, which accounted for 65% of market share. Most retailers stocked Gerber products alongwith either Heinz or Beechnut. The merger, by making Heinz and Beechnut a single entity, eliminated competition between them; competition which used to put pressure on Gerber pre-merger.

A second situation where concentration considerations are insufficient is when a large company acquires a small but aggressive company (Ibid.). Acquisition of tele.ring by T-Mobile Australia illustrates this situation. The above acquisition involved the combination between the second and the fourth largest player in the Austrian mobile telephony market. Their post-merger market share was 30-40%, which was lesser than that of the market leader, Mobilkom, having close to 45% market share. Nevertheless, tele.ring was considered a maverick due to its surprising strategies and imposed competitive pressures much greater than its market share of 15%.

A third situation leading to the inadequacy of concentration measures is the efficiency considerations that need to be accounted for in a merger (Ibid.). Post-merger, the reduction in marginal cost needs to be quantified in order to assess the consequences of the merger, and this is not achieved by resorting merely to analysis of concentration in the particular relevant market.

Merger Simulation: A Cost-Benefit Analysis

Merger simulations are a set of quantitative techniques that enable competition authorities to predict price effects of mergers in the market. They have been used to assess the merger-specific efficiencies necessary to compensate for the predicted price increase and thereby propose a suitable level of divestiture (Rubinfeld, 2010).

Traditionally, there are two steps to executing a merger simulation; firstly, own and cross price elasticities are arrived at through the estimation of a demand model. Secondly, one computes the first order conditions for post-transaction profit maximization of the new, post-merged organization (Rubinfeld, 2010). Several models of simulation pose different data requirements. When sufficient data is available, one can resort to estimation of demand equations, while, when there is a constraint on the availability of data, the workaround is to make additional assumptions about demand and proceed with the simulation (Epstein & Rubinfeld, 2001).

The BLP Model uses widely available product-level and aggregate consumer-level data and gives accurate predictions. It, however, makes use of maximum-likelihood method of estimation, which can prove difficult to apply (Nevo, 2000). The AIDS (Almost Ideal Demand Systems) has a more structured approach as it begins with specification in functional form. However, it involves estimation of dozens of coefficients and is very demanding as far

as data is concerned. Also, there is the risk of not landing up with the ‘right’ signs during the estimation of own-price and cross-price elasticities (Hausman, Leonard, & Zona, 1994).

The antitrust logit model would only require data on market shares, level of substitutability between products and an estimate of the market demand elasticity. However, the flipside to this model is the assumption that the cross elasticity is identical across products, an assumption which may not necessarily hold for differentiated goods (Nevo, 2000). The PCAIDS (Proportionality-Calibrated Almost Identical Demand System) model, which is an improvement over the AIDS model in terms of demands on data, makes use of the same parameters as does the antitrust logit model, viz., market share data, own price elasticity of demand of one product and market demand elasticity (Epstein & Rubinfeld, 2001). Although they seem similar in their data requirements, the antitrust logit model and the PCAIDS model more often than not would yield different results. To overcome the problem of ‘identical’ cross-price elasticities across products, a nesting parameter could be introduced (Rubinfeld, 2010).

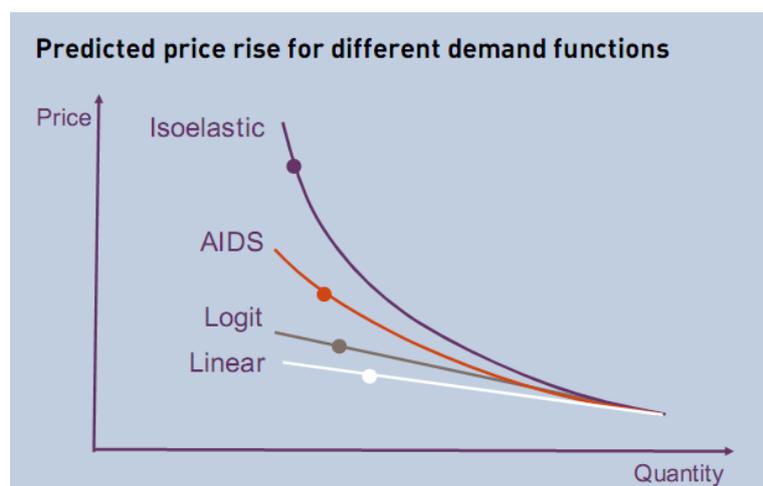


Figure 3: Predicted Price Rise for Different Demand Functions (Source: Oxera, 2010).

There are few who feel that merger simulations do not capture well the supply-side elements. As per a study, several practitioners resort to application of the Bertrand Model, which fails to aptly capture the dynamics of the real world. The author makes use of the US Airline industry to put forth his case (Peters, 2006). Another point to be noted is that efficiencies are not highlighted as much as potential harm in the case of proposed mergers. This asymmetrical treatment both in US and EU jurisdictions may owe its origin to the institutional friction between economists and lawyers in antitrust agencies. The ideal treatment of a proposed merger is to weigh symmetrically the probability-adjusted net-

present value of merger risks with the probability-adjusted net-present value of efficiency gains. It is only through the implementation of the above that regulators may be able to ensure that socially-desirable mergers are not withheld and vice-versa (Crane, 2011).

Considering some of the cases where such models were used, in *United States v Interstate Bakeries Corp and Continental Baking Co.*, a Bertrand oligopoly model was employed in addition to logit demand specifications. The predicted price increases under this approach were 5-10% for the merging parties and 3-6% in the overall market. Merger simulation was not relied on in court, as the parties ultimately reached an out-of-court settlement (Kavanagh, 2011). Also, in European Commission's case of *Kraft's acquisition of Cadbury*, a detailed econometric merger simulation was conducted. A differentiated goods Bertrand model was considered and a nested logit demand system was employed. The model predicted a price increase of less than 1% in the UK and Irish markets, and the Commission thereby concluded that the proposed operations will not lead to significant price increase in the UK and Ireland (EC, 2010).

To sum up the discussion on merger simulations, the PCAIDS model seems the most parsimonious, given its lenient data requirements and the appeal as far as obtaining the 'right' signs for own-price and cross-price elasticities is concerned. The jurisprudence on merger regulations is at a very nascent stage in a country like India, and hence there is a huge research gap in this regard. Hence, carrying out a merger simulation using the PCAIDS method on a recently approved combination with modifications in the Indian context may be worthy on more than one account. Firstly, there is dearth of literature pertaining to merger simulations in India. Also, it could serve as a recommendation to the Competition Commission of India to incorporate merger simulations as part of their merger regulation policy, as they have always been shy of resorting to empirical methods in their investigations and inquiries. Below, we present the analysis of the merger simulation exercise applied to a recent merger between Holcim and Lafarge.

Holcim-Lafarge Merger: The Timeline

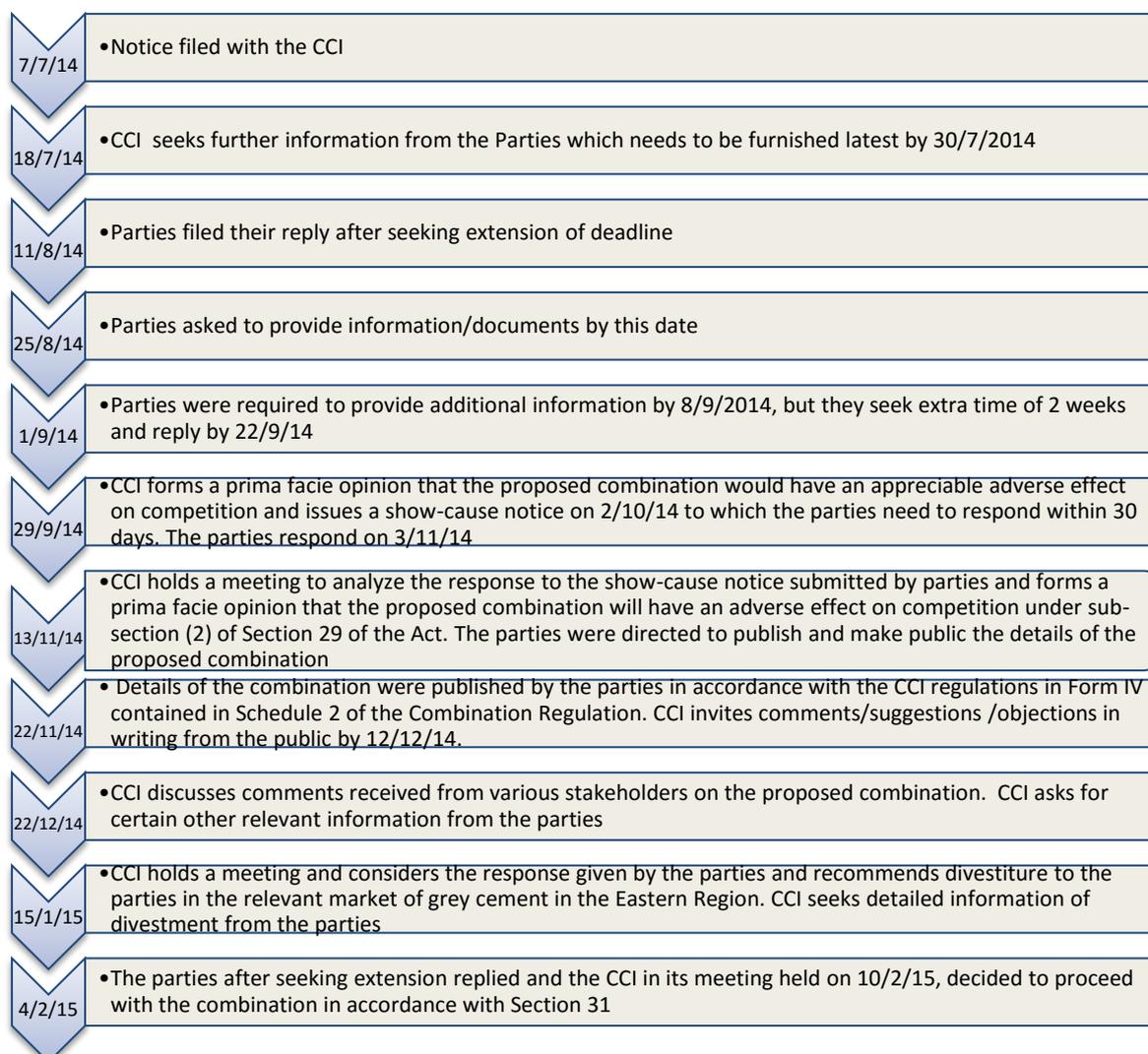
The parties involved, namely Holcim Ltd. and Lafarge S.A., filed a notice about the proposed combination with the Competition Commission of India on the 7th of July, 2014.⁴ Holcim is a global producer of cement and other construction material such as RMC (Ready Mixed

⁴ Competition Commission of India. (2015). Order on the Proposed Merger Between Holcim and Lafarge, Retrieved from <http://www.cci.gov.in/May2011/OrderOfCommission/CombinationOrders/C-2014-07-190.pdf>, p.1

Concrete), aggregates, asphalt, pre-cast concrete products, etc. In India, Holcim operates through its two indirect subsidiaries, i.e., ACC Limited and Ambuja Cements Limited and is present in the product segments of cement, RMC and aggregates.⁵ Lafarge is also a global producer of cement and other construction material such as RMC, aggregates, asphalt, pre-cast concrete products, etc. Lafarge’s presence in the product segments of cement, RMC and aggregates in India is via its indirect subsidiaries, Lafarge India Private Limited and Lafarge Aggregates & Concrete India Private Limited.⁶

The line of events as far as the case is concerned could be summarized as follows:

Figure 4: The chronology of events in the Holcim-Lafarge merger proceedings⁷



⁵ Ibid., p. 2.

⁶ Ibid.

⁷ Source: Holcim-Lafarge Order, dated 30/3/2015, Retrieved from:

<http://www.cci.gov.in/May2011/OrderOfCommission/CombinationOrders/C-2014-07-190.pdf>

The timeline makes it clear that the merger regulation by the CCI is an ex-ante measure, and thereby nips any threat to competition in the bud rather than providing remedial measures on a later date. Another interesting to note is what transpired on 29/9/14, when the CCI formed a prima facie opinion that the proposed combination will have an adverse effect on competition in India in the relevant market, the burden of proof is on the plaintiff. In this case, the parties, viz., Holcim and Lafarge had to respond to the show-cause notice issued by CCI claiming that the proposed combination will have an appreciable adverse effect on competition.

Coming to the crux of the order of the CCI, it is important to analyse the consideration of the relevant product market, relevant geographic market and the assessment of appreciable adverse effect on competition concerns. Firstly, coming to the assessment of the **relevant product market**, Section 2(t) of the Competition Act defines the relevant product market as “*a market comprising all those products or services which are regarded as interchangeable or substitutable by the consumer, by reason of characteristics of the products or services, their prices and intended use*”. CCI decided that the relevant product market is that of grey cement. CCI decided not to include white cement as there are physical differences between grey and white cement and the concerned parties are into the manufacture of grey cement only in India.

Although not applicable in the current case, as the relevant product market is quite obvious, traditionally if one were to use economic reasoning, a fundamental way of tracing substitutes is to estimate the cross price elasticity of demand. Substitutes would have a significant positive cross price elasticity of demand. However, CCI has not resorted to any empirical estimation/technique to arrive at substitutes and thereby define the relevant product market in many of the previous cases as well. Even in the Sun-Ranbaxy merger case, CCI did not resort to any empirical estimation to arrive at the relevant market. It may seem naïve to draw implications about jurisprudence by just citing two merger orders of the CCI, but, the fact of the matter is that CCI has so far shied away from employing any empirical technique⁸ in determining the relevant product market.

Coming to the **relevant geographic market**, Section 2(s) of the Competition Act defines it as “*a market comprising the area in which the conditions of competition for supply of goods or provision of services or demand of goods or services are distinctly homogenous and can be distinguished from the conditions prevailing in the neighbouring areas*”. Cement being a homogeneous commodity which is bulky, there would be significant transportation costs

⁸ A popular technique used for determining the relevant product market is the SSNIP (Small but Significant Non-Transitory Increase in Price) Test, also sometimes referred to as the Hypothetical Monopolist Test

associated with transporting it from one place to another. Hence, the relevant market would be localized. In the CCI order, there is a reference to the Elzinga Hogarty (EH) Test. The EH Test, although popularly used in antitrust proceedings to determine the geographic boundaries of a market, is not bereft of drawbacks. Firstly, it does not factor in the supply elasticity of the exporting region, and hence cannot identify accurately antitrust markets⁹. Secondly, the 90% brightline used as the catchment threshold, in spite of being traditionally adopted, does not have any economic reasoning behind it (Scheffman & Spiller, 1988).

The order specifies that the parties had proposed two relevant markets, namely, the North-Western region comprising Rajasthan, Haryana, West Uttar Pradesh, Delhi and Gujarat and the Eastern region comprising the states of Chhattisgarh, Odisha, West Bengal, Bihar and Jharkhand. While CCI had no objections to the way the North-Western Region was defined, it felt that the parties had defined the Eastern region very broadly, and hence, redefined the boundaries of this market to include the above-mentioned States. CCI in this regard is worthy of praise as it has acknowledged the drawbacks of the EH Test and redefined the Eastern Region to ensure that the market is not specified in an overly wide manner.

CCI, in its order, proceeded with investigating **appreciable adverse effect on competition concerns** in the Eastern region, firstly, by making use of concentration indices. Herfindhal-Hirschman Index (HHI)¹⁰ was used for this purpose. HHI relies solely on market shares for its computation. It has been estimated that in terms of current installed capacity the pre combination HHI of around 1500 increases to 2280 post combination, witnessing an increase of 780.¹¹ Similarly, in terms of installed capacity, likely to be in operation in the end of 2015, the pre combination HHI of 1328 increases to 1953 with a change in HHI of 625. Therefore, it is evident that the transaction brings about a huge change in the HHI score of the market, implying greater market power for the merged entities.

CCI also cited certain factors like high entry barriers, low countervailing buyer power, oligopolistic nature of the industry and no measurable efficiency enhancement to establish that the combination would potentially have an appreciable adverse effect on competition in the relevant market for grey cement in the Eastern region.

⁹ Alfred Marshall's classical definition of markets would refer to an area in which "prices of the same goods tend to equality with due allowance for transportation costs", while markets in the antitrust sense would be the smallest group of producers possessing potential market power (Scheffman & Spiller, 1988)

¹⁰ It is measured by squaring the market shares of firms in an industry. Greater the market power, larger the index and smaller the competition. It ranges between 0 and 10,000.

¹¹ As per the US Department of Justice Guidelines, a pre-merger HHI of 1500 indicates a moderately competitive market. Transactions that are likely to increase the HHI by more than 200 are presumed likely to enhance market power. URL - <http://www.justice.gov/atr/public/guidelines/hhi.html>

In Form IV, submitted by the parties, reference was made to the synergies that would accrue as a result of the transaction, amounting to approximately Euro 1.4 billion on full run-rate basis over three years.¹² The details regarding the efficiency gains do seem ambiguous, but, nevertheless, CCI has not made any special attempt to quantify the same in an orderly manner. This seems rather logical as the burden of proof is on the defendant and not the regulator or the plaintiff.

Juxtaposing the efficiency gains with the appreciable adverse effect on competition could provide a better picture of the actual result of the transaction, thereby enabling CCI to make better judgements in furthering competition in the country. It is in this context that merger simulations have gained popularity among competition regulators across the globe.

The Holcim-Lafarge Merger Simulation: A PCAIDS Approach

PCAIDS is an improvement over the AIDS model, not only in terms of lesser data requirement, but also due to the fact that it yields own and cross price elasticity measures that are closer to reality and which have signs consistent with economic theory.

Traditionally, as per the AIDS model, market share, s_i expressed as a percentage of total revenue of all firms would be a function of the natural logarithm of prices of all brands in the relevant market. Assuming that there are three brands in the relevant market, this would turn out as follows (Epstein & Rubinfeld, 2001):

$$\begin{aligned}
 s_1 &= a_1 + b_{11} \ln(p_1) + b_{12} \ln(p_2) + b_{13} \ln(p_3) \\
 s_2 &= a_2 + b_{21} \ln(p_1) + b_{22} \ln(p_2) + b_{23} \ln(p_3) \\
 s_3 &= a_3 + b_{31} \ln(p_1) + b_{32} \ln(p_2) + b_{33} \ln(p_3)
 \end{aligned}
 \tag{1}$$

The coefficients b_{ij} are inevitable in estimating the effects of a proposed merger. The three ‘own coefficients’, namely b_{11} , b_{22} and b_{33} are closely related to own price elasticities of demand and have the same sign. The six other ‘cross-effect coefficients’ have the same sign as cross price elasticities (Epstein & Rubinfeld, 2001). The ultimate objective of a merger simulation methodology would be to determine the changes in the market share of each brand post the transaction. These changes can be arrived at by differentiating the above equations as follows:

$$ds_1 = b_{11} \ln(dp_1/p_1) + b_{12} \ln(dp_2/p_2) + b_{13} \ln(dp_3/p_3)$$

¹² Retrieved from Form IV submitted by the merging parties as on 22nd of November, 2014, URL: http://www.lafarge.in/Holcim_Lafarge_Form_IV_Final_21_November_2014.pdf

$$ds_2 = b_{21} \ln (dp_1/p_1) + b_{22} \ln (dp_2/p_2) + b_{23} \ln (dp_3/p_3) \quad (2)$$

$$ds_3 = b_{31} \ln (dp_1/p_1) + b_{32} \ln (dp_2/p_2) + b_{33} \ln (dp_3/p_3)$$

A linear relationship seems to exist between the change in the share of each brand (ds) and the percentage change in the three prices (dp/p), where the b's provide the weights.¹³ Rather than the cumbersome econometric estimation of the diversion ratios, proportionality could serve as a proxy to compute aggregate diversion ratios¹⁴. This is precisely the proposition offered by calibrated demand-simulation models. These models drastically reduce the number of parameters to be estimated and are especially useful in contexts wherein there is inadequacy of data. However, in the case of differentiated products, the diversion ratios may not be captured appropriately by this method. Cement, nevertheless, being more or less of a homogeneous good, does not pose any constraints on the above methodology.

What the proportionality methodology does is to divert sales in proportion to the market share possessed by firms pre-merger. The proportionality method reduces the number of unknowns in (2) from 9 to 3. The only quintessential elements that need to be known are the three 'own-effect coefficients', from which the other six 'cross-effect coefficients' can be obtained. Going further, it could be noted that not even the n (or even n-1) own-effect coefficients need to be known. The own effect coefficient, say for Brand 1, is as follows:

$$b_{11} = s_1 (\epsilon_{11} + 1 - s_1 (\epsilon + 1)) \quad (3)$$

More generally, the own effect coefficient for one brand can be determined from the industry elasticity and own price elasticity for the brand¹⁵ (Epstein & Rubinfeld, 2001). In equation (3), s_1 is the market share of Brand 1, ϵ_{11} is the own price elasticity associated with Brand 1 and ϵ is the industry elasticity. All other own-effect coefficients can be determined as multiples of b_{11} , as follows:

$$b_{ii} = (s_i/(1-s_1) (1-s_i)/s_1) \cdot b_{11} \quad (4)^{16}$$

Once the b_{ii} coefficients are known, all cross-effect coefficients can be computed¹⁷. Say, for instance, $b_{12} = -s_1/(s_1 + s_3) \cdot b_{22}$ and $b_{13} = -s_1/(s_1 + s_2) \cdot b_{33}$ (Epstein & Rubinfeld, 2001).

¹³ Price changes will also affect the total size of the market (Epstein & Rubinfeld, 2001)

¹⁴ Aggregate diversion ratios are the fraction of lost sales from a price increase of one product in the candidate market that are captured by all the other products inside the candidate market. For a candidate market consisting of just two products, the aggregate diversion ratio is simply the diversion ratio to the other product in the candidate market. More generally, the diversion ratio formula is as follows:

$D_{AB} = (E_{AB}/E_A)(x_B/x_A)$, where D_{AB} is the diversion ratio from Brand A to Brand B, E_A is the own price elasticity of Brand A, E_{AB} is the cross price elasticity of Brand A with respect to Brand B and x_B and x_A are the unit sales of Brands B and A respectively (Shapiro, 1996).

¹⁵ Please refer (Epstein & Rubinfeld, 2001) for proof of the above proposition.

¹⁶ Ibid

Elasticities can be calculated directly from the values of the b parameters, market share values, s_i , and the industry elasticity (ϵ). Own price elasticity for the i^{th} brand is as follows:

$$\epsilon_{ii} = -1 + b_{ii}/s_i + s_i (\epsilon + 1) \quad (5)^{18}$$

Cross price elasticity of the i^{th} brand with respect to the price of the j^{th} brand is as follows:

$$\epsilon_{ij} = (b_{ij}/s_i) + s_j (\epsilon + 1) \quad (6)^{19}$$

As mentioned earlier, the PCAIDS model could be estimated with data on three parameters, namely, market-share of firms, industry demand elasticity and own-price elasticity of a single product.

Coming to data on market-shares, for the purpose of our estimation, we have used the cement market share data as obtained from CMIE (Centre for Monitoring Indian Economy) Industry Outlook database. The market share with Pan-India relevant market is as follows:

The top five cement firms in the market have been indicated in ascending order of their market concentration and the share of the rest of the industry has been consolidated into a category referred to as ‘All Others Combined’. Below, we also provide market share of companies in Eastern India.

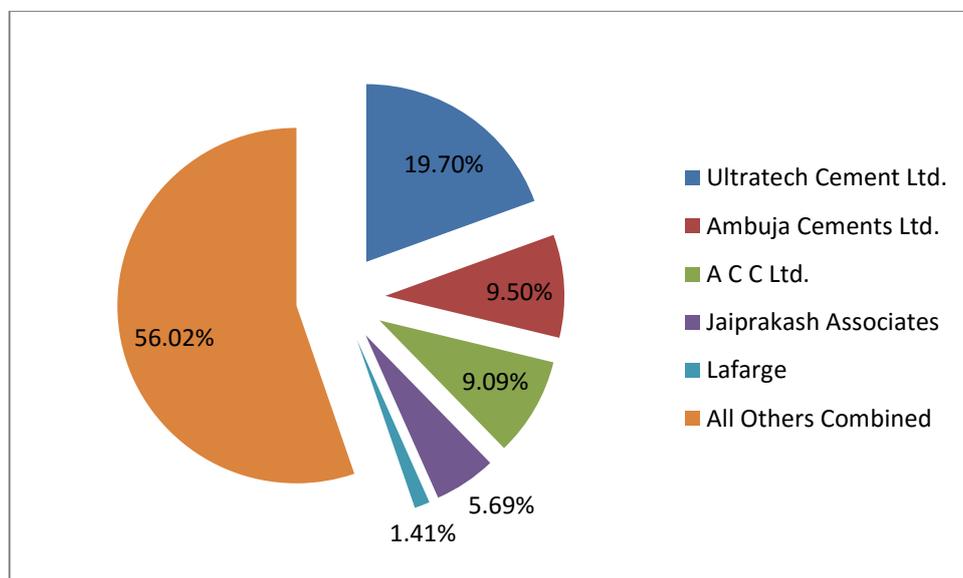


Figure 5: Indian Cement Market Concentration (Pan-India) 2012-13 (Source: CMIE Industry Outlook)

¹⁷ Ibid

¹⁸ Ibid

¹⁹ Ibid

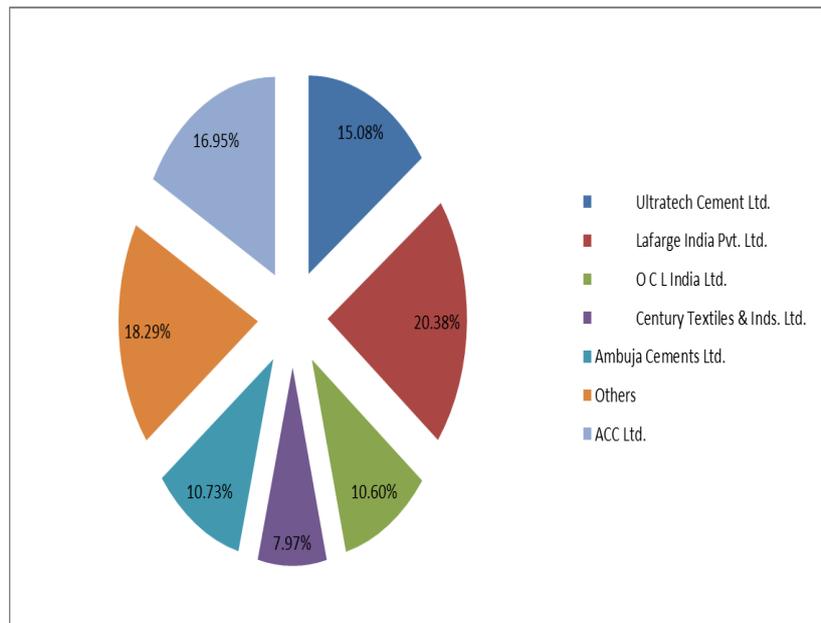


Figure 6: Indian Cement Market Concentration (Eastern-India) 2012-13 (Source: CMIE Industry Outlook)

The next parameter on which data is required is the own price elasticity of one of the brands. For the sake of our analysis, we have considered Ultratech Cement Ltd., which is the market leader. Gross margin²⁰ can be a reasonable proxy²¹ for looking at the own price elasticity of a brand. As per the 2013-14 Annual Report of Ultratech Cement Ltd., the computed gross margin of **22.12%**²², translating to an **own price elasticity of demand of -4.52**²³

One also needs an estimate of industry elasticity of the Indian Cement Industry. This would require data on the price of cement over a period of time and the corresponding change in the demand. While data on price of cement over time is available, a reliable estimate of cement demand in the country would be difficult to come across. This difficulty has been acknowledged by the founders of the PCAIDS model, and they have a work-around solution for the same. They recommend starting with an **industry elasticity estimate of -1**, in the case of unavailability of data of this nature (Epstein & Rubinfeld, 2001).

²⁰ Gross Margin = (Revenue – Cost of Goods Sold)/Revenue

²¹ The gross margin formula is analogous to the (P-MC)/P formula yielding the Lerner's Index, which could also be expressed as the reciprocal of the price elasticity of demand.

²² (Sale of Products and Services (Net) – (Cost of Raw Materials Consumed + Purchases of Stock in Trade + Changes in Inventory of Finished Goods, Work-in-Progress or Stock-in-Trade + Power and Fuel + Freight and Forwarding Expenses + Salaries, Wages and Bonus + Consumption of Stores, Spare parts and Components + Consumption of Packing Materials + Repairs to Plant and Machinery + Repairs to Buildings + Rent + Depreciation)) / Sale of Products and Services (Net)

²³ Source: Annual Report of Ultratech Cement Ltd., 2014 (Ultratech Cement Ltd., n.d.).

Once the data on the three above-mentioned parameters are available, we are now in a position to compute both the elasticity and the diversion ratio measures. They have been summarized in the table below as follows for the six brands considered earlier:

Brand	
1	Ultratech Cement Ltd.
2	Ambuja Cements Ltd.
3	ACC Ltd.
4	Jaiprakash Associates Ltd.
5	Lafarge India Pvt. Ltd.
6	All Others Combined

Table 1: The Brand Numbers associated with the various Brands

The PCAIDS coefficients are the diversion ratios for the six brands. The matrix is symmetric and what can be noticed is that the PCAIDS coefficients satisfy adding up and homogeneity properties, as is necessary. This is primarily due to the proportionality assumption that is incorporated in the computation of the PACIDS model.

Table 2 (b) contains the own and cross price elasticities for the six brands. As one goes down a particular column, it can be noticed that the cross elasticities corresponding to a given price, remain the same. This is again due to the proportionality assumption.

PCAIDS Coefficient with Respect to:						
Brand	p₁	p₂	p₃	p₄	p₅	p₆
1	-0.69	0.080623	0.077143	0.048289	0.011966	0.475419
2	0.080623	-0.37688	0.037276	0.023332	0.005782	0.22971
3	0.077143	0.037276	-0.36225	0.022326	0.005533	0.219811
4	0.048289	0.023332	0.022326	-0.23523	0.003465	0.137669
5	0.011966	0.005782	0.005533	0.003465	-0.06094	0.034137
6	0.475419	0.22971	0.219811	0.137669	0.034137	-1.08

Table 2(a): Diversion ratios for the six brands

Now that both diversion ratios and elasticities have been obtained, one could proceed with ascertaining the price rise post-merger. However, it is also essential to consider the probable

efficiency gains that accrue from the merger. As obtained from Form IV submitted by the merging parties, “The Parties expect that the Proposed Transaction would generate synergies of approximately Euros 1.4 billion on full run-rate basis over three years,” (CCI, 2014).

Elasticity with Respect to:						
Brand	p ₁	p ₂	p ₃	p ₄	p ₅	p ₆
1	-4.52	0.41005	0.39238	0.245751	0.06086	2.417999
2	0.84866	-4.96712	0.39238	0.245751	0.06086	2.417999
3	0.84866	0.41005	-4.9851	0.245751	0.06086	2.417999
4	0.84866	0.41005	0.39238	-5.13414	0.06086	2.417999
5	0.84866	0.41005	0.39238	0.245751	-5.32175	2.417999
6	0.84866	0.41005	0.39238	0.245751	0.06086	-2.92789

Table 2 (b): Own and Cross Price Elasticities for the six brands

The AIDS model scores above the linear demand model as well as the iso-elastic model of demand, which are at two ends of the spectrum. While the iso-elastic demand model greatly exaggerates the price rise post-merger, the linear demand model under-estimates the price increase, thereby favouring the merging entities (Oxera, 2010). The AIDS equation to predict the price increase of each merging entity is as follows:

$$\alpha_j = (1/((\varepsilon_{jj}/1 + \varepsilon_{jj}) (1 - \Theta_j^{m*}))) - 1 \quad (7)^{24}$$

α_j represents post-merger price increase per entity, ε_{jj} is the own-price elasticity of demand of the entity and Θ_j^{m*} refers to the post-merger margins, incorporating the effects of cross-price elasticities of the merging brands. If the cross-price elasticities associated with products is small, then Θ_j^{m*} would be roughly equal to Θ_j^m , the post-merger margins (Hausman et al., 1994). As mentioned in Form IV submitted by the merging parties to the CCI, ‘a synergy of approximately Euro 1.4 billion on full run-rate basis over three years,’ is expected to be witnessed.

²⁴ For proof of the proposition, refer (Hausman et al., 1994)

An uphill task in this regard is to quantify the efficiency gains in terms of a reduction in the marginal costs of the Indian operations of the merging entities. Farrell and Shapiro in this regard recommend that competition authorities remain sceptical about simple scale economies as firstly, these could be achieved unilaterally by firms without a merger, and secondly, the pass through of benefits to the consumers is a question mark in this case (Farrell & Shapiro, 2001). Since the data on efficiency gains, as mentioned in Form IV, is not conducive to be translated into reduction in marginal costs, we compute the price increase post-merger in the absence of efficiencies.

With reference to Table 3, the own price elasticity values have been taken from Table 2(b) above, while the gross margins have been computed from the respective annual reports of companies. It is to be noted that for Lafarge, the gross margins were calculated at the global level, since its financial performances specifically pertaining to Indian operations were unavailable. The predicted price increase column displays that among the merging brands, the predicted price increase is in the range of 1.8% to 6.02%. If the competition authorities set up a brightline of say 5%²⁵ for the predicted price increase post-merger, then this merger would have to be modified before it is duly approved by the authorities.

	Own Price Elasticity	Gross Margin	Predicted Price Increase
Ambuja Cements Ltd.	-4.97	0.2458²⁶	5.90%
ACC Ltd.	-4.99	0.2148²⁷	1.81%
Lafarge India	-5.32	0.234²⁸	6.02%

Table 3: Predicted price increase post-merger (Pan-India Relevant Market)

²⁵ The U.S 'Horizontal Merger Guidelines', August 2010, do not specify a brightline threshold that could be used as a screening procedure for predicted unilateral price increases of merging parties.

²⁶ (Revenue from Operations (Net) - Cost of Materials Consumed - Purchase of Traded Goods - Changes in Inventory - Power and Fuel - Freight and Forwarding Expenses - Depreciation - Employee Wages - Consumption of Stores and Spare Parts - Rent - Repairs to Building, Plant and Machinery) / Revenue from Operations (Net). Source: (Ambuja Cement Ltd., 2014)

²⁷ (Revenue from Operations (Net) - Cost of Materials Consumed - Purchase of Traded Goods + Changes in Inventory - Power and Fuel - Freight and Forwarding Expenses - Depreciation - Employee Wages - Consumption of Stores and Spare Parts - Rent - Repairs to Building and Machinery) / Revenue from Operations (Net). Source: (ACC Ltd., 2014)

²⁸ Revenue - Cost of Sales. Source: (Lafarge, 2014)

If the efficiency computations could be incorporated into the predicted price increase calculations, there could be a case where the merger could have been approved without any divestments or modifications, in the scenario that these efficiencies mitigate the predicted price increase levels to less than 5%. It must be noted that for the above analysis, relevant geographic market was taken to be Pan-India.

The same exercise carried out with Eastern-India as the relevant market reveals different results. In this case, the predicted price increases are clearly way above the 5% brightline threshold. Our results therefore are in consistency with the CCI order of approval of merger subject to divestment in the Eastern region due to high concentration in the relevant geographic market.

	Own Price Elasticity	Gross Margin	Predicted Price Increase
Ambuja Cements Ltd.	-4.97	0.2458	11.75%
ACC Ltd.	-4.99	0.2148	6.09%
Lafarge India	-5.32	0.234	7.97%

Table 4: Predicted price increase post-merger (Eastern-India Relevant Market)

Conclusion

Rather than relying only on market share data and concentration indices for merger approval, the CCI should resort to empirical methods like merger simulations as part of their investigation procedure. The PCAIDS methodology does not impose many data restrictions and can be easily computed thereby complement the concentration index brightline that is already being used, in order to provide a clearer picture of the situation. This would firstly add more rigour to the analysis, and secondly, and perhaps the most important rationale is that such a method would capture the effects of a merger ex-ante in totality, including the upward pricing pressure and the efficiency gains and enable the competition authority to take a more informed decision that would enhance the welfare of consumers.

Our results for the Eastern-India relevant market are in consistency with those of CCI, as the upward pricing pressures clearly seem to breach the 5% brightline threshold. It must be mentioned that inability to estimate market elasticity measures may affect the accuracy of our competition.

References

- ACC Ltd. (2014). *Annual Report - ACC Ltd.* Retrieved from http://www.acclimited.com/newsite/finance/annual_report_2014.pdf
- Ambuja Cement Ltd. (2014). *Annual Report - Ambuja Cement Ltd.* Retrieved from <http://www.ambujacement.com/wp-content/uploads/result.pdf>
- CCI. Form IV - Submitted by the Merging Entities (2014). Retrieved from http://www.holcim.com/fileadmin/templates/CORP/doc/LafargeHolcim/Holcim_Lafarge_Form_IV.pdf
- Crane, D. A. (2011). Rethinking Merger Efficiencies. *Michigan Law Review*, 110(3), 347–391.
- EC. (2010). *Kraft Foods/Cadbury (Case COMP/M.5644)*. European Commission.
- Epstein, R. J., & Rubinfeld, D. L. (2001). Merger Simulation : A Simplified Approach With New Applications. *Antitrust Law Journal*, 69.
- Farrell, J., & Shapiro, C. (2001). Scale Economies and Synergies in Horizontal Merger Analysis. *Antitrust Law Journal*. <http://doi.org/10.2139/ssrn.502846>
- Hausman, J., Leonard, G., & Zona, J. (1994). Competitive analysis with differentiated products. *Annales d'Economie et de Statistique*, (34), 159–180. <http://doi.org/10.2307/20075951>
- Kavanagh, G. N. J. (2011). *Economics for Competition Lawyers*.
- Lafarge. (2014). *Annual Report - Lafarge*.
- Nevo, A. (2000). A Practitioner's Guide to Estimation of Random-Coefficients Logit Models of Demand. *Journal of Economics & Management Strategy*, 9(4), 513–548. <http://doi.org/10.1162/105864000567954>
- Oxera. (2010). Innovative Approaches to Modelling Merger Price Rises, (May), 1–6.
- Peters, C. (2006). Evaluating the Performance of Merger Simulation: Evidence from the U . S . Airline Industry. *Journal of Law and Economics*, 49(2), 627–649.
- Rubinfeld, D. L. (2010). Econometric Issues in Antitrust Policies. *Journal of Institutional and Theoretical Economics JITE*, 166(1), 83–87. <http://doi.org/10.1628/093245610790711609>
- Scheffman, D. T., & Spiller, P. T. (1988). Geographic Market Definition Under the U . S . Department Of Justice Merger Guidelines. *Journal of Law and Economics*, 30, 123–147.

Shapiro, C. (1996). Mergers with Differentiated Products. *Antitrust*, 10, 23–30. Retrieved from [http://ejournal.narotama.ac.id/files/Mergers with Differentiated Products.pdf](http://ejournal.narotama.ac.id/files/Mergers%20with%20Differentiated%20Products.pdf)

Ultratech Cement Ltd. (n.d.). *Ultratech Cement Ltd. - Annual Report 2014*. Retrieved from http://www.ultratechcement.com/common/images/downloads/UltraTech_Annual_Report_2013_14.pdf