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Lost in Translation: The use and abuse of diversion ratios in unilateral effects analysis

It is widely recognised that diversion ratios can provide a useful tool when analysing the unilateral effects of a merger. When firm A loses sales as a result of any given price increase, the diversion ratio from A to B measures the proportion of those lost sales that are captured by B. Following a merger between A and B, the merged firm takes account of the fact that B recaptures a part of the sales lost by A, and this relaxes the constraints on the pricing decision of the firm. The higher the rate of diversion between A and B, the stronger is the pre-merger constraint that the firms exert on one another and, thereby, the greater the risk of a substantial lessening of competition (SLC).

In principle, a reliable diversion ratio approach dispenses with any need to measure the relevant market because it measures directly the extent of the competitive constraints that disappear due to the merger. However, there are many pitfalls in using diversion ratios to make predictions of the impact of a merger on competition. This Brief illustrates these pitfalls with reference to the UK Competition Commission (CC) investigation of the transaction in which Somerfield acquired 115 grocery stores from Morrisons.[1] The CC concluded that the merger would result in a SLC in 12 locations, and required Somerfield to divest a store in each case.[2]

The CC's approach to unilateral effects analysis

The transaction did not raise any issues at the national level as Somerfield's post-merger national market share was around 6%, ranking well behind the Big 4 UK supermarket retail groups. The case was also distinct from the CC's previous recent experience in grocery retail mergers, the 2003 Safeway Inquiry, for the fact that it involved mid-range rather than large one-stop stores.

The CC recognised that its previously developed methodology based on fascia counts within isochrones would not be appropriate to evaluate the transaction.[3] Due to the fact that the merging stores and their competitors were highly differentiated both in geographic and product space, an approach based on traditional market share analysis would fail to capture important qualitative aspects of the way competition operates. Therefore, the CC opted for an approach, based on diversion ratios, that sought to measure the specific unilateral effects of each store acquisition.

The main building block for the CC's assessment was a consumer survey, commissioned from NOP, which was answered by around 100 shoppers at each of 56 acquired stores where significant overlaps occurred. In particular, the CC used the answers to the question "if this store had not been available which store would you have used instead?" coupled with the respondents' spend in the acquired store, to compute a revenue-weighted diversion ratio.[4]

It was broadly common ground between Somerfield and the CC that an approach based on diversion ratios could be an appropriate way to frame the analysis, and that the survey – although not perfect – generated useful information on the closeness of competition between retail outlets.

Translating diversion ratios to SLC

However, the next step in the CC's analysis, whereby it sought to convert diversion ratios to a predicted effect on competition, was highly controversial. For each overlap store, the CC combined the diversion ratio and the store's gross margin through the application

of what it described as an "illustrative" price rise formula. In essence, it found that any merging stores which had diversion ratios above 14.3% generated a post-merger price rise in excess of 5%, and so the 14.3% diversion ratio was selected as the *de facto* threshold for an SLC finding.

The CC's illustrative price rise model was in effect a simplified merger simulation exercise. It relied on the assumption that Somerfield chooses prices at each store according to the *Lerner equation*, which requires that the (percentage) gross margin of the store is equal to the inverse of the own price elasticity of demand faced by that store.[5] This allowed the CC to derive an estimate of the pre-merger demand elasticity for each store. The diversion ratio was then used to estimate how far that store's demand elasticity would reduce post-merger, and (assuming that the post-merger prices chosen by Somerfield would once again satisfy the Lerner condition) the model then provided a mechanistic link between any positive diversion ratio and a predicted post-merger price rise.[6]

This methodology led to predicted price increases ranging from 7% to an eye-watering 1,898% in the 12 locations where the CC identified an SLC.[7]

Reality checks (1) – price/concentration evidence

The fact that in one store the CC's model predicted Somerfield would seek to charge £8.00 for a can of Coca-Cola that had previously been on offer for 50p ought to suggest an immediate need for some kind of reality check to ensure that the model was properly calibrated.

The first such check would be to assess how Somerfield's actual pricing differed in locations where it already operated stores with no close rivals. The intuition behind this approach is immediately appealing – it looks to the prices charged in existing "monopoly" locations to "simulate" the effects of the merger in locations where competition was eliminated by the transaction.

In the celebrated Staples/Office Depot merger case in 1997, the US FTC successfully employed a similar approach to unilateral effects analysis in a merger of competing office superstores. In that case, the FTC found that retail prices were 9% higher in towns where there was only one office superstore than in towns where there were two or more local rivals operating this format. It used this result (which was supported by documentary evidence of how the merging parties set lower prices when they competed with each other) to predict an SLC in locations where the merger brought together the only office superstores under common ownership.

In the Somerfield case the analysis was helped by the fact that Somerfield employed a flexible tier-based pricing system that allowed prices in its stores to take account of a number of factors varying throughout its diverse store portfolio. Within this system, Somerfield had adequate freedom to take account of different levels of local competition when setting the prices of each store.

A price-concentration study conducted by Somerfield across its existing estate of stores did indeed find a clear (if weak) relationship between the price level and the level of local concentration. A comparison of price indices showed that in local "monopoly" stores Somerfield on average charged a price premium of less than 1% over those stores which faced competition from three fascias.

The CC's empirical analysis focused instead on the relationship between store margins and local concentration levels.[8] It also found that concentration had a statistically significant impact, but indicated a predicted price increase of less than 2% in a location when the local "monopoly" outcome was compared with the location with two competing outlets. Thus, even the "merger to monopoly" scenario under the CC's margin-concentration study implied a price rise below the 5% that the CC had taken as the threshold for an SLC finding. These empirical checks indicated local monopoly price

effects that were way below the predictions in the CC's illustrative price rise model. Such results raise serious questions about the reliability of the CC's theoretical model.

Reality check (2) – market share as a cross-check

Although conventional notions of market share and market definition had been rejected by the CC's approach, it is still possible to use market shares as an alternative cross-check on the diversion ratio threshold employed by the CC. Transforming a diversion ratio value to a market share figure by way of analogy to a symmetric homogenous product market helps to put that value into context. Consider, for example, a well-defined homogenous product market with eight symmetric firms, each with a share of 12.5%. If one firm were to raise price unilaterally, the assumption is that its demand would shift to the other 7 suppliers in equal proportions, which implies a diversion ratio to each of those competitors of 14.3% – precisely the diversion ratio threshold that the CC used in its analysis.

The CC's decision acknowledged this read-across between the diversion ratio and market shares in the homogenous goods case. However, it argued that a merger of any two of the firms in an 8-firm symmetric oligopoly would create a post-merger market share of 25% (i.e. 2 x 12.5%). The CC contended that its threshold was therefore consistent with its own merger guidelines which state that mergers resulting in market shares less than 25% are less likely to raise competition concerns.

However, given the gross margins required for running a viable grocery store business the CC's illustrative price rise formula converts any diversion ratio above 14.3% to a price increase of more than 5%.[9] In effect, therefore, when the CC's methodology is converted to its market share equivalent it implies a clear prohibition threshold set at "8 to 7" mergers (i.e. mergers that reduce the number of significant suppliers from 8 to 7).

The application of the CC's simple algebraic model was therefore inconsistent with the safe harbour presumptions that are widely acknowledged to underpin credible merger enforcement.[10] Indeed, it was even inconsistent with the CC's own methodology for selecting the 56 overlap stores that were subjected to the diversion ratio analysis. In a first stage screening process applied by the CC, locations where there were 4 or more competing grocery retail fascias post-merger were not even included in the sample for consideration. If that screening rule performed its stated task of catching "all of the acquired stores where there may be a potential competition problem" it is implicit that 8 to 7, 7 to 6, 6 to 5 and 5 to 4 mergers are not problematic in grocery retailing. That was the approach previously taken in the CC's Safeway merger investigations, and it is also consistent with common observation on the kinds of mergers that give rise to SLC.

What failed: theory or its application?

How could the analysis yield predictions which so clearly failed important and readily available reality checks: does the fault lie with the theory used, or with the way it was applied? The CC's model is superficially appealing because it can generate predictions based on extremely limited (and apparently verifiable) inputs. However, the very restrictive assumptions on which the model relies means that the model lacks robustness in a number of critical areas. Whilst the diversion ratio estimates derived by the CC provide some useful information, they do not provide a rich enough source on their own to generate reliable SLC conclusions.

The specific problems with the CC's methodology stem from over-reliance on a particular approach to the Lerner equation. The CC's chosen interpretation of the Lerner equation assumed an unrealistically short run approach to profit maximisation. While there is nothing wrong in general with the concept that firms seek to maximise profits, the CC's model assumed that the stores are managed with a myopic local pricing perspective that paid no regard to the potential longer-term effects of charging higher prices. However, in

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Gross margins were obtained by deducting only the cost of goods sold from revenues. A business still has to pay rental, labour and distribution costs from these margins. Using the Lerner equation, a gross margin of say 25% implies a demand elasticity of -4. Once the diversion ratio has "reduced" this elasticity, gross margins have to rise to restore the Lerner condition. This is the mechanism used by the CC model.

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This is confirmed by some empirical work on US mergers policy that systematically tracks the levels of concentration at which mergers are challenged by the US authorities. See for example Luke Froeb, "The Use of Economics in Merger Analysis", January 2005, www.ftc.gov/speeches/froeb/050127ibcbrussels1.pdf

multiple grocery retailing maintenance of a brand image and reputation is an important part of competitive strategy.

If retailers set prices according to a slavish pursuit of short-run exploitation of market power in a given locality, this would invite incremental entry by rivals that would threaten their longer term profitability.[11] Given that grocery retailers, in common with most other businesses, need to make business decisions that maximise their expected future profits over a number of trading periods, purely short term pricing policies would also risk alienation of customers who encounter better prices at other stores. The simple version of the Lerner equation applied by the CC, and which was crucial in the CC's translation from diversion ratios to SLC, misses both of these facets.

There are other more detailed technical criticisms that can be levelled at the CC's price prediction model. For example, the CC chose to assume a demand curve with constant elasticity when its own analysis showed that an alternative, linear, demand specification led to price rise predictions lower than the 5% threshold in 5 of the SLC locations.[12] When small (and essentially unverifiable) variations in a model's assumptions make a big difference to the results, it becomes all the more important to ensure that the model's predictions are confronted as far as possible with empirical evidence.

In their influential article on the uses and abuses of merger simulation, a group of respected economists at the US anti-trust agencies summed up this principle as follows:

> *"Any model used to predict the effects of a merger must fit the facts of the industry in the sense that the model explains past market outcomes reasonably well."* [13]

The CC's model plainly did not meet this condition due to the glaring chasm between its predictions that increases in local concentration would significantly raise prices, and the clear empirical evidence that even local monopoly resulted in only marginally elevated prices.

Conclusions

Despite the criticisms we raise here, there is much to commend in the CC's framework of analysis in the Somerfield/Morrisons case. The CC's decision to move away from the mechanistic structural fascia-count approach that had been employed in previous grocery retail mergers is capable of reaching a richer understanding of competitive constraints. Its approach to the estimation of diversion ratios using a relatively simple survey technique, whilst far from perfect, showed how such techniques can shed useful light on consumer preferences that cannot be derived from market shares and drive-times. This, as well as the other work done by the CC on margin-concentration analysis and competitor impacts, illustrates the feasibility of measuring closeness of competition in the context of merger analysis.

However, when it came to translate diversion ratio information to SLC conclusions, the CC approach to the unilateral effects assessment was profoundly unsatisfactory. The empirical analysis was largely disregarded in favour of reliance on a model that was plainly unable to explain existing market outcomes. Like the proud owner of a newly installed (and as yet untested) in-car satellite navigation system, in the final analysis the CC followed the instruction to "take the next sharp left" when its intended destination was plainly visible along the road to the right. In merger control, as in road navigation, it is important to apply the available technology in a framework that recognises its limitations and cross-checks against the market reality.

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For small and medium-sized grocery retailers, the entry conditions are far less material than those that apply to hypermarkets, largely because there is much greater access to suitable trading sites.

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With a linear demand curve, consumer demand is assumed to become more responsive at higher prices.

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Greg Werden, Luke Froeb and David Scheffman, " A Daubert Discipline for Merger Simulation", February 2004, available at www.ftc.gov/be/daubertdiscipline.pdf

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