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DEVELOPMENTS IN UNILATERAL EFFACTS ANALYSIS: PRICE PRESSURE TESTS

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Abstract

Arguably the most significant development in horizontal merger assessment in recent years, particularly in the UK and the US, has been the increased use of price pressure tests/indices, which use a relatively limited amount of data from the merging parties and a simple formula to provide an indication of whether a merger is likely to give rise to an increase in prices, i.e. to cause upward pricing pressure. These indices are intended to better capture the extent to which the merging parties are close competitors and hence may be more informative than traditional market share based screens when assessing the prospects for a merger to give rise to unilateral effects in a differentiated products setting.

The first part of the paper will review the economics of horizontal mergers and explain the underlying economic intuition upon which pricing pressure indices are based. The paper will then set out the most commonly used of these indices and describe how they may be implemented, elaborating on the empirical inputs and assumptions required, drawing on relevant case law where appropriate. Finally, the paper will comment on the likely future implications of using these indices for merger assessment in South Africa, and the extent to which price pressure indices may be probative regarding the prospects for unilateral effects more generally.

Overview

Price pressure tests/indices are attracting increasing attention and debate, particularly in the US and UK, as an approach to assessing the unilateral effects of horizontal mergers. Indeed, this is reflected in horizontal merger guidelines in these jurisdictions and in their use in recent merger assessments, particularly mergers in the fast moving consumer goods sector. Notably, these approaches have also been adopted in merger assessment in South Africa, in the context of the *Masscash/Finro* (2010) merger.

The growing popularity of these approaches when assessing the prospects for unilateral effects is largely based on the view that in markets where products are differentiated traditional market share based screens may fail to adequately capture the closeness of competition between the merging parties, and their rivals, and therefore the incentives that the merged entity may have to raise prices post-merger. Indeed, in contrast to market share based approaches, which attempt to infer the likelihood that a merger will lead to higher prices from the merging parties' post-merger market shares and the overall level of concentration in a defined relevant market, price pressure indices attempt to answer the question more directly by using data from the merging parties and a simple formula to predict whether or not a merger is likely to give the merged entity the incentive to raise prices, i.e. to give rise to upward pricing pressure.

However, while it is broadly accepted that pricing pressure tests provide greater insight than market shares, there is nevertheless considerable debate as to how the results of these tests should be interpreted. While many practitioners, including but by no means limited to those individuals that have developed the various approaches we describe below, consider that such tests can play a role as a first filter when assessing whether a merger warrants further scrutiny (much like market shares do currently), others have advocated their use as more dispositive evidence of unilateral effects.

As such, the purpose of this paper is to provide an overview for practitioners of the underlying economic intuition and the assumptions on which three particularly popular variants of price pressure tests, namely upwards pricing pressure ("UPP"), the gross upwards pricing pressure index ("GUPPI"), and illustrative price rise ("IPR"), are based, in order to inform a discussion of what the role of such tests should be in merger analysis. We then present our own views on these approaches and how we consider they should be utilised and interpreted going forward.

The Economics of Differentiated Products Mergers

The primary concern with horizontal mergers, i.e. mergers between competitors, is that the merger will give rise to anticompetitive unilateral effects. The term unilateral effects refers to the possibility that the merging parties will, after the merger, have the incentive and ability to unilaterally worsen their competitive offers as a result of the loss of the rivalry between them.[1] In most cases, the concern is that the deterioration in competition between the firms

[1] Another possibility, not considered here, is that a horizontal merger may give rise to a lessening of competition through coordinated effects. This refers to a situation in which the merger changes the nature of competition within the market in such a way as to enable the merged firm and one or more of its rivals to reduce the intensity of competition between them by tacitly coordinating their conduct.

will take the form of a price increase (by one or both parties to the merger), though it might equally come in the form of lower product quality or service, reduced innovation, or some other dimension along which the firms compete.

The intuition underlying the unilateral effects concern is based upon the key concept that when a firm increases prices, a proportion of its customers will divert from it to rivals, and that such diversion will thus disincentivise the firm from increasing prices, since doing so will result in a loss of sales, and hence profits.[2] However, following a merger with a competitor, a proportion of those lost sales, i.e. those sales that would have been lost to that competitor, are now no longer lost to the merged entity. In other words, a proportion of the lost sales and profits are "internalised" as a result of the merger, meaning that any given price increase will be less likely to be unprofitable, thus potentially conveying an incentive to increase prices.

In seeking to evaluate the likelihood of unilateral effects, or at the very least apply a first filter to such assessments, competition authorities have traditionally relied on the parties' post-merger market shares and the market share increment that results from the merger. The basic intuition behind this is that market shares may in theory reflect that a firm possesses market power and hence the ability to increase prices, as well as the extent to which firms exert competitive constraints upon one another. In other words, the larger the market shares of the merging parties the greater the extent to which, following a price increase, sales lost by one would divert to the other (i.e. the firms would be close competitors), and thus the greater the proportion of lost profits that are internalised as a result of the merger.

However, market shares are unlikely to provide a reliable indication of competitive constraints and the prospects for unilateral effects in situations where firms are differentiated, for example, by price, geography, quality, range, service or product branding. The reason for this is that market share-based screens implicitly use market shares as a measure of competitive closeness/diversion, while in practice they are often unlikely to provide a good proxy for diversion. Market shares may therefore often fail to capture the extent to which lost profits will be internalised as a result of the merger, and thus the merging firms' incentives to raise prices post-merger (see Majumdar and Murgatroyd, 2009).

For example, consider a market containing three firms; A, B and C, possessing market shares of 20%, 60% and 20% respectively. If market shares were reliable indicators of diversion, and thus the extent to which lost profits would be internalised as a result of the merger, then if firm A were to increase prices, three quarters of the sales it loses would be diverted to firm B, and only one quarter would be diverted to firm C. This would indicate that a merger between firm A and firm B would be more likely to give rise to unilateral effects than a merger between firm A and firm C. However, suppose that in reality firm C is a much closer competitor to firm A than firm B, and in fact would capture 80% of firm A's lost custom, with firm B capturing only 20%. This would indicate that, in stark contrast to the implications one might draw from market shares, a merger between firm A and firm C would be considerably more likely to give rise to unilateral effects than a merger between firm A and firm B.

[2] Indeed, if it were profitable for a firm to raise prices pre-merger one would expect it to already have done so.

In an attempt to better capture the concepts of closeness of competition, several variants of so-called price pressure tests/indices have been devised. These indices seek to provide greater insight into the likelihood for mergers to give rise to unilateral effects by using a small number of key parameters likely to materially affect the prospects for unilateral effects. Specifically, such tests make use of diversion ratio estimates to provide an insight into the likely scope for lost sales and profits to be internalised as a result of a merger, and economic margins to provide an insight into the profits lost through diversion to other competitors, as well as the extent to which customers are in general price sensitive. These key parameters are then combined within a stylised economic framework (incorporating various assumptions) to estimate whether a merger is likely to give rise to upwards pricing pressure, and in some cases attempt to quantify the extent of such pressure.

However, it is important to remember that, irrespective of whether differentiation exists, a complete analysis of unilateral effects must also take into account other competitive constraints that may prevent price rises occurring post merger, such as the scope for dynamic supply responses from existing and potential rivals, and strategic responses by the customers. For example, to the extent that barriers to entry and/or expansion in the relevant market are low, or that it is easy for rivals to reposition their competitive offerings to compete more closely with those of the merging parties, the merged entity will in any event be unlikely to be able to profitably raise prices post-merger. Similarly, if buyers are able to exercise countervailing power post-merger, this can also be expected to mitigate the prospects for the merger to result in unilateral effects.

Overview of Price Pressure Indices

In this section we provide an overview of the various price pressure indices that have been developed. Specifically, we outline three measures that have attracted particular attention from antitrust practitioners:

- Upwards Pricing Pressure (UPP);
- Gross Upwards Pricing Pressure Index (GUPPI); and
- Illustrative Price Rise (IPR)

We provide a brief summary of these below, in each case describing how the index is calculated and how the results can be interpreted.

Upward Pricing Pressure (UPP)

The first pricing pressure index we consider is the simple UPP measure proposed by Farrell and Shapiro (2010). Farrell and Shapiro describe UPP as an “economic alternative to market definition” and argue that it is likely to be substantially more informative of the prospects for mergers between producers of differentiated goods to give rise to anticompetitive effects than standard screens based on concentration measures. This can be best understood in the context of US merger control, where mergers are frequently

assessed by courts, where market definition plays a critical role and where there continues to exist a strong presumption that mergers with high market shares are anti-competitive.

To illustrate how UPP is implemented, consider a merger between two firms, A and B, which each produce a single product, A and B, respectively, and which compete with one another on price. The net UPP for firm A resulting from the merger is given by the following expression:

$$UPP_A = d_{AB}(p_B - c_B) - \theta_A c_A$$

where d_{AB} is the pre-merger diversion ratio from firm A to firm B, $p_B$is the pre-merger price of firm B, c_A and c_B represent the firms' pre-merger marginal costs, and θ_A is the percentage reduction in firm A's marginal cost that results from merger-specific efficiency gains. UPP for firm B is given by an equivalent expression so that there are two UPP measures in any merger involving two single-product firms.

The first term on the right-hand side of the equality, $d_{AB}(p_B - c_B)$, captures the upward pricing pressure that results from the internalisation of lost sales, and equates to the product of the diversion ratio from firm A to firm B and the absolute margin earned by firm B. The second term on the right-hand side of the equality, $\theta_A c_A$, captures the downward pricing pressure from the reduction in firm A's marginal costs of production that results from the merger.

If the former is greater than the latter, $UPP_A > 0$, and the merger is said to give rise to net upwards pricing pressure for firm A, holding the price of firm B (and of all other competing products) constant. The same analysis is then conducted with respect to firm B, with Farrell and Shapiro proposing that mergers that give rise to net upward pricing pressure for both firms (i.e. where $UPP_A > 0$ and $UPP_B > 0$), or where results are mixed and where the positive result applies to a "significant" product/firm, should be subject to closer scrutiny.[3]

Notably, UPP indicates simply whether the price of the product in question is likely to increase or decrease as a result of the merger, and does not seek to provide an indication of whether this price change is likely to be large or small, meaning that it cannot even in principle be used as dispositive evidence for a finding that a significant lessening of competition via unilateral effects is likely. Indeed, Farrell and Shapiro draw particular attention to the fact that UPP is intended to provide a screen and does not seek to calculate post-merger equilibrium. Moreover, it is important to acknowledge that this approach, like the other approaches outlined below, is focussed solely on the demand-side and does not provide any scope to evaluate the prospects for dynamic supply responses such as new entry of product repositioning.

Gross Upward Pricing Pressure Index (GUPPI)

A variation of UPP which has attracted particular attention is the GUPPI introduced by Salop and Moresi (2009) and Moresi (2010). Notably, the GUPPI measure has been adopted in

[3] Notably UPP, and indeed all the indices described here will, in the absence of efficiencies always predict some degree of upwards pricing pressure where there exists non-zero diversion between the merging parties, by construction. The case has therefore often been made that if UPP were to be used in practice as a first filter in merger assessment, a minimum efficiency credit should be assumed.

the 2010 update of the US Horizontal Merger Guidelines (although this particular name for the metric is not used in the guidelines).[4]

As in the case of UPP, there will be two GUPPI measures for a merger involving firms A and B that produce differentiated products. The GUPPI for firm A, for instance, measures the incentive of firm A to raise the price of product A, holding the price of firm B (and of all other firms/products) constant.[5] Following the same example and notation as above, the GUPPI for firm A is defined as:

$$GUPPI_A = \frac{d_{AB}(p_B - c_B)}{p_A}$$

where d_{AB} is the quantity diversion ratio from firm A to firm B, $p_A$and $p_B$are firm A and firm B's prices respectively, c_B represents firm B's marginal costs, with all values evaluated at their pre-merger levels. The GUPPI for firm B is defined equivalently. It is clear from the expression above that the GUPPI is essentially the UPP measure, but ignoring the potential for merger-induced efficiencies and scaling the upward pricing pressure effect by the price of firm A.

GUPPI can then be used to attempt to estimate post merger price increases by measuring (or often assuming) how the firm in question's prices change with change with changes in its marginal costs (i.e. it requires a measure of the firm's pass through rate).[6] This makes it possible to estimate the extent of post-merger price increases because implicit in the pass through rate is an assumption as to the shape of the firms' respective demand curves.

Specifically, if firm A's pass-through rate is given by ρ_A, then an approximation of the percentage price increase arising from the merger is given by $\rho_A GUPPI_A$ (i.e. a fraction, ρ_A, of the gross upward pricing pressure resulting from the merger would be passed on to A's customers in the form of a price increase). As such, the estimated post-merger price increase for firm A is given as:

$$\frac{\Delta P_A}{P_A} = \rho_A \, GUPPI_A = \rho_A \frac{d_{AB}(p_B - c_B)}{p_A}$$

As such, the GUPPI approach makes it possible, in principle, to address the question of whether a merger will be likely to give rise to a significant lessening of competition (e.g. a price rise of above 5%) via unilateral effects. However, estimating a pass through rate is not a straightforward task, and indeed as Farrell and Shapiro note, it is this difficulty that led them to develop their UPP measure in the first place.

[4] In the language of the guidelines, the measure is based on comparing the "value of sales diverted" as a result of the price increase to "the lost revenues attributable to the reduction in unit sales resulting from the price increase".

[5] It is also possible to calculate a "Uniform" GUPPI that measures the incentive to raise the price of products A and B together by the same percentage price increase – see Salop and Moresi (2009).

[6] Specifically, the single firm pass through rate is the amount by which a firm's price would increase relative to the increase in its marginal cost, holding the marginal cost of all other firms in the industry constant. Jaffe and Weyl (2010) note that care needs to be taken when estimating or measuring the appropriate pass-through rate as what is relevant is neither the pre-merger nor the post-merger pass through rate - though the true value may lie close to these.

In addition, and much like the UPP measure presented above, the GUPPI test does not incorporate the potential for dynamic competitor responses. It is also not straightforward to incorporate efficiency savings in the GUPPI calculation.

Illustrative Price Rise (IPR)

The final class of price pressure indices we consider are illustrative price rise (IPR) measures. The basis for such measures is set out in Shapiro (1996), some ten years prior to the more recent work on UPP and GUPPI. Here, Shapiro used a range of strong assumptions in order to provide simple formulas that estimated percentage price increases that would result from a merger, but required only two inputs, the pre-merger margin and the pre-merger diversion ratio.

Like GUPPI, IPR provides an estimate of the magnitude of a price increase, but differs from UPP and GUPPI in a number of respects. First, UPP and GUPPI examine the incentives for the merging parties to increase prices holding the price of the other merging parties' product fixed, while IPR models take into account the feedback effects in the prices of the merging parties' products (but still not the prices of rivals). Second, rather than using a pass-through parameter to estimate the magnitude of a price increase, IPR measures assume a particular functional form of demand, such as linear demand or isoelastic (i.e. constant elasticity) demand.[7]

Specifically, the IPR for symmetric firms with linear demand is given by:

$$IPR_{linear} = \frac{md}{2(1-d)}$$

and for constant elasticity (isoelastic) demand the equivalent is given by:

$$IPR_{isoelastic} = \frac{md}{1-m-d}$$

where $m = \frac{p-c}{p}$ is the pre-merger (symmetric) margin for firm A and B and d is the pre-merger diversion ratio from product A to product B (which is assumed to be equal to the level of pre-merger diversion from product B to product A). Notably these formulae assume symmetry between the merging parties and that the merger does not give rise to efficiencies, although alternative formulae that account for these factors can be derived. For example, both Shapiro (2010) and Hausman, Moresi and Rainey (2010) set out iteration of the linear demand formula above allowing for asymmetries between firms. Shapiro also incorporates efficiencies into the formula, but in doing so does normalise the units of both products such that their demand curves have a slope of -1.

Although IPR may seem substantively different to GUPPI by comparing formulae alone, the two measures are in fact very similar. To see this consider the GUPPI formula presented above, and impose the same assumptions used in the construction of the IPR for linear

[7] Linear demand assumes that customer's become more sensitive to price changes (i.e. demand becomes more elastic) as prices increase. Isoelastic demand, as the name implies, assumes that customers' demand elasticity is the same at all price levels. Thus, starting from any particular price level, demand for the firm's product will fall more quickly if demand is linear than if demand is isoelastic.

demand, namely that firms are symmetric and that demand is linear, which gives rise to a pass through parameter of 0.5, then rearrange and simplify.

$$\frac{\Delta P_A}{P_A} = \rho_A \, GUPPI_A = \rho_A \frac{d_{AB}(p_B - c_B)}{p_A} = \frac{1}{2}\frac{d(p_B - c_B)}{p_A}\frac{p_B}{p_B} = \frac{1}{2}\frac{d(p_B - c_B)}{p_B}\frac{p_B}{p_A} = \frac{md}{2}$$

As such, GUPPI is the same as IPR other than for the fact that IPR is further scaled by a factor of $\frac{1}{1-d}$, which may be interpreted as the additional price increase that arises as a result of factoring in the feedback effects of a price increase by one of the merging parties on the price of the other merging party.

Like GUPPI, the IPR approach makes it possible in principle to evaluate whether a merger is likely to give rise to a significant lessening of competition via unilateral effects. However, it suffers from many if not all of the same shortcomings, such as that its results are sensitive to changes in the underlying assumptions, and that it does not incorporate an assessment of dynamic competitor supply responses.

Practical Application of Pricing Pressure Indices

While the different iterations of pricing pressure indices outlined above require relatively few empirical inputs, and thus at first glance appear straightforward, it is important to acknowledge that there are a number of important issues that must be considered when undertaking their practical application. Most obviously the two key empirical inputs, namely margins and diversion ratios must be estimated or identified directly. However, it is also necessary to consider the appropriateness of the relevant assumptions that underpin the various formulae, and the extent to which it is possible to incorporate efficiencies in the analysis.

In this section we therefore consider each issue in turn, and where possible do so within the context of relevant case law. In particular, we draw heavily upon the analysis of retail mergers in the UK, and from the Competition Tribunal's decision in *Masscash/Finro* (2009), which as a consequence of the nature of the Tribunal process, provides a detailed exposition on many of these key issues.

Diversion Ratios

In order to measure the extent to which sales from one of the merging parties would divert to the other were the former to increase prices it is necessary to estimate diversion ratios. Most commonly, this has been undertaken by surveying the customers of the merging parties and in short, asking them how they would respond were the firm from which they currently purchase to either increase prices by 5%-10%, or cease to exist altogether. The latter question is often used in cases where customers are individuals rather than firms, the intuition being that customers may struggle to come to terms with percentage rather than absolute price changes.

The use of customer surveys may be appealing in so much as they may enable practitioners to assess customer preferences directly, rather than having to infer what customers' likely responses to a price increase would be from observed market facts. However, customer surveys may at times be subject to significant issues.

First, it is only the responses of marginal customers, i.e. those that would respond to a SSNIP, that are relevant for the purposes of assessing whether a merger is likely to give rise to unilateral effects, and as such a survey must be designed in such a way as to effectively enable practitioners to differentiate between marginal and infra-marginal customers. This may be a particular issue in cases where it is anticipated that customers might struggle to interpret hypothetical price changes and hence customers are instead asked how they would respond if the firm from which they currently purchase was no longer available. When faced with such a question (which in effect implies an infinite price increase) even customers that would be infra-marginal to a small price change will be likely to indicate switching. In such cases alternative lines of questioning will be required to identify whether customers are likely to be infra-marginal.

A good example of where such an issue arose is in *Masscash/Finro*. Here the Competition Commission ("the Commission") initially calculated its pre-merger diversion ratios using the responses of all customers to a question regarding to where these customers would switch if their current wholesaler were unavailable. As the Competition Tribunal ("the Tribunal") correctly noted:

> *"The Commission's survey question in fact essentially equates to an infinite price increase. This means that it elicits responses not only from "marginal" consumers who would divert to an alternative supplier in the event of a small but significant price increase, but also from "infra-marginal" consumers who would not divert to an alternative supplier in the event of a small but significant price increase"* (*Masscash/Finro*, 2009, p. 28)

In subsequent evidence presented to the Tribunal by both the Commission's expert and the expert for the merging parties a further survey question was used to help differentiate between marginal and infra-marginal consumers. Specifically, the question asked customers what level of price increase would cause them use the alternative wholesale that they had identified.[8]

Second, a common problem associated with the design and implementation of customer surveys is that they may be prone to biases as a result of the phrasing of specific questions or the structuring of the questionnaire. As such, efforts to where possible eliminate biases, or where biases cannot be eliminated at least understand the nature and sign of the bias, are to be very much encouraged. For instance, in *Masscash/Finro* (2009) it was noted by the merging parties' expert and the Tribunal that the results of the customer survey regarding the extent to which the merging parties were close competitors were substantively

[8] The relevant question asked customers whether they would use the alternative in response to prices increases of 1-5%; 5-10%; 10%-25%; 25%-50%; more than 50% or whether no price increase would be sufficient to make them switch (see *Masscash/Finro*, 2009, p. 29). In an attempt to identify the marginal customers, the Commission included those customers that indicated that they would switch in response to a 1%-10% price increase.

at odds with other sources of evidence, suggesting the possibility of a strong bias. Indeed, the Tribunal pointed to a range of factors that served to differentiate the merging parties from one another, including their respective product ranges and product mixes, customer profiles, locations, delivery and credit terms, and service levels, and which therefore suggested that the merging parties were unlikely to be close competitors (*Masscash/Finro*, 2009, p. 13-15).

Third, since it is seldom possible to survey the entire population of customers, care must be taken in designing the sampling frame of individuals to be surveyed in order to again minimise biases, but also, and perhaps most importantly, to ensure that the sample is large enough to ensure a good degree of statistical certainty around any estimates that are to be relied upon in subsequent analyses. In particular, it is imperative that the confidence intervals surrounding point estimates are sufficiently narrow such that the inference drawn will not be affected materially if instead of the point estimate, either the lower bound or the upper bound is used.

Indeed this was a critical issue in *Masscash/Finro* (2009) where the confidence intervals surrounding diversion ratio estimates were extremely large. Indeed perhaps most strikingly the calculated revenue diversion ratio from Weirs (Masscash) to Finro was estimated to be 0.561 (i.e. 56% of lost Weirs customers following a price increase would divert to Finro), which might suggest that the parties are close competitors. However, the 95% confidence interval surrounding this estimate spanned 0.041 to 1.000 (i.e. between 4% and 100% diversion), indicating that little statistical confidence could be attached to this point estimate and the conclusion drawn from it, i.e. that the merging parties were indeed close competitors (*Masscash/Finro*, 2009, p. 23-27).

In the alternative to customer surveys, it may also be possible to infer diversion ratios from real world data. For example, in bidding markets bidding data, where firms are ranked in terms of their bids, may provide an indication of the firm that is the next closest competitor to the eventual winner. Studies of customer responses to particular events such as entry, store closure and promotional activity, may provide similar insights. Indeed, such forms of evidence may in fact be preferable to customer surveys in the sense that they typically reflect how customers behave in reality as opposed to how customers state they would behave (i.e. they indicate revealed preferences rather than stated preferences).

However, it is important to remember that such evidence may struggle to differentiate the responses of marginal consumers from those of infra-marginal consumers. For instance, simply because one firm finished second to another in a bidding contest does not mean that the customer in question would switch from the latter to the former if the latter were to increase prices by a small but significant amount.

Margins

Margins serve two key purposes in the formulae described above. First, they measure the amount of gross profit on each sale that the firm in question would lose completely following a price increase, i.e. from sales that are not diverted to the other merging party, but rather are diverted to another competitor (or lost from the market completely). Second, they are used as an indicator of the extent to which customers are price sensitive, the intuition being

that the more price sensitive customers are, the lower margins in a competitive market are likely to be.

However, the extent to which accounting gross margins, which are the margins typically used, provide a reliable indication of price sensitivity depends upon the extent to which the costs upon which they are based accurately reflect true economic costs, and as such extreme caution must be taken when seeking to make use of such accounting information, or indeed seeking to adjust such information to better reflect economic costs. In many instances gross margins will in fact not provide a reliable indicator of price sensitivity, and most importantly will not always reliably indicate low price sensitivity where gross margins are significant.

For example, where firms compete over non-price factors that require firms to incur fixed as well as variable costs, accounting measures of variable cost are likely to understate true economic costs and hence overstate margins. Similarly, the determination of which costs are fixed and variable will invariably depend upon the range of volumes and time horizons over which they are viewed. Intuitively where firms set prices with a view to being competitive in the long term, fixed costs that become variable over the long term should be included in margin calculations. Indeed, in Streetcar/Zipcar (2010) the choice of margin was one of the key points of disagreement between the UK Competition Commission and the merging parties, with the debate in this case being around which costs should be considered to be variable, given the range over which volumes could be expected to vary, and hence be included in margin calculations (*Zipcar/Streetcar*, 2010).

Structural Assumptions

As noted above, part of the appeal of pricing pressure indices is that they are simple to apply (at least at first glance) and require few inputs. However, as is the case with most economic models, viable implementation (i.e. through the simple formulae presented) requires simplification, meaning that a significant number of often highly restrictive assumptions must be made in order to make these indices practicable for everyday use. While there are myriad assumptions underpinning the various pricing pressure indices set out above, there are three that merit particular mention.

First, the pricing pressure indices described above all assume that the firms in question sell only a single product, which is often likely to be a substantial point of divergence between theory and reality. In practice firms often sell multiple products and will often take into account the effects on demand for other products when setting the prices and hence margins for a given product. Such price setting behaviour gives rise to a breakdown in the linkage between the margin (even if properly measured on its own terms in terms of production cost) for a particular product and the extent to which customers of that product are likely to be sensitive to changes in its price (i.e. the elasticity of demand), upon which all these formulae rely.

An obvious example of such pricing behaviour is in grocery retailing, where firms often set low prices for particular products (or even charge below cost) in order to attract footfall and stimulate demand for the other products they sell, upon which they then earn higher

margins. In this context the existence of very low margins for footfall driving products is likely to overstate the extent to which customers are price sensitive in terms of their demand for these products only, and indeed potentially understate the extent to which customers are likely to be sensitive to changes in prices for those higher margin products.

Second, all of the pricing pressure indices described above are derived from economic models based on differentiate product Bertrand competition. While it may not be unreasonable to assume such a form of competition in many industries, this does not discharge the responsibility placed upon those seeking to make use of pricing pressure indices to consider whether such a model of competition is truly appropriate for the merger they are seeking to assess. Notably while the intuition behind the pricing pressure indices set out above may be applied to various different forms of competition, the eventual formulae may differ substantially from the formulae present in the bulk of the relevant literature, and may thus add a significant degree of unappealing complexity that detracts from the core reasoning behind the use of such indices in the first place.[9]

Third, the above formulae for both GUPPI and IPR require an assumption to be made as to the functional form of demand.[10] However, obtaining a sufficient understanding of the market in question to make an informed decision as to the appropriate functional form of demand is likely to be extremely difficult in practice. Indeed if such empirical data were available to reliably estimate the functional form of demand for a particular firm in a particular industry it is highly questionable as to why a pricing pressure index was being used in an instance where more sophisticated econometric techniques could be applied.

Moreover, the adoption of different assumed functional forms of demand can give rise to manifest differences in the outputs of pricing pressure formulae, to the extent to which a merger may appear highly problematic based on one assumed formed of demand, but relatively unproblematic if an alternative assumption is adopted. The point was acknowledged by the Tribunal in *Masscash/Finro* (2009), where it noted that there was "no qualitative or quantitative evidence was provided in this case in support of an isoelastic demand assumption", and hence the Tribunal focussed solely on the more conservative linear demand assumption.[11] The point is also similarly evidenced by the fact that IPRs calculated using isoelastic demand have been found to be unrealistically high in some previous cases. For example, in Somerfield/Morrison's (2005), the UK Competition Commission estimated, using IPR, that the merger would result in one of the stores concerned increasing its prices by 1,898% (*Somerfield/Morrison*, 2005)

Efficiencies

A further issue that is although notionally the pricing pressure indices described above enable reductions in marginal cost as a result of the merger to be incorporated into the

[9] For an exposition of the use of UPP analysis in industries characterised by quantity competition, see Moresi (2009)

[10] The reason for this is that in order to provide an indicator of the magnitude of upwards pricing pressure rather than simply whether there is upwards pricing pressure or not (as is the case with UPP), it is necessary to assume how consumers will not only respond to changes in price right at the margin, but also how they will respond as price changes become larger. In the case of IPR this is explicit in that there are different formulae for different forms of demand, while in the case of GUPPI the assumed form of demand is incorporated in the pass through parameter.

[11] See *Masscash/Finro* (2009, p.33), where the Competition Tribunal notes that: "Thus the demand system used to predict post merger price effects should conform to the available evidence. However, no qualitative or quantitative evidence was provided in this case in support of an isoelastic demand assumption. Therefore the Tribunal does not consider isoelastic demand relevant and it will not be discussed any further in these Reasons."

analysis, it is important to recognise that this is not particularly straightforward. First, expanding the formulae to incorporate efficiencies is not necessarily a straightforward task even in principle. Second, and perhaps more importantly, it may often be difficult to reliably quantify efficiencies and thus incorporate them in practice, even if they could be incorporated in principle. These difficulties may therefore often result in efficiencies being overlooked from these formulae, although, as described above, merger-specific efficiencies may be expected to work against unilateral effects and are nonetheless a critical consideration in any analysis.

Implications for Merger Analysis

Based on the discussion provided above, it is clear that there are a number of reasons why price pressure indices should not be considered to constitute dispositive evidence. Indeed, as Shapiro (2010, p. 729) notes:

> *"The value of diverted sales is an excellent simple measure for diagnosing or scoring unilateral price effects, but it cannot capture the full richness of competition in real world industries. Indeed, as stressed above, all of the quantitative methods discussed here must be used in conjunction with the broader set of qualitative evidence that the Agencies assemble during a merger investigation."*

Moreover, this view was shared by the US Second Circuit Court of Appeals ("the court") in the recent merger between two primary health plan providers, the HIP Foundation and Group Health Incorporated (*City of New York v. Group Health Inc.,* 2010), where the court ruled that the use of pricing pressure tests was not an appropriate substitute for the adoption of the conceptual framework for defining relevant markets and assessing competition. Specifically the court noted that:

> "*While the city [plaintiff] explains the upward pricing pressure test's usefulness in assessing the impact of a merger, it does not explain how the test can substitute for a definition of a relevant market in the pleadings"* (p. 15)

In particular, the fact that price pressure indices are so highly sensitive to changes in assumptions and key inputs means that not only must they be evaluated rigorously on their own terms, but that they should also not be considered in isolation, but rather as part of a broader body of evidence. Where alternative forms of evidence exist, and indeed where such alternatives may contradict the outputs of pricing pressure formulae, it is important that both authorities and practitioners maintain a balanced overview of the available evidence in order to ensure that the conclusions drawn remain realistic. The use of the results of price pressure tests as dispositive evidence, or indeed adoption of any form of rebuttable presumption of anti-competitive harm on the basis of pricing pressure evidence alone, is thus clearly inappropriate.

Moreover, it also follows as a matter of economic logic that it is not possible to conclude that a merger is likely to give rise to unilateral effects absent a thorough analysis of the potential for supply-side responses such as expansion, entry and brand repositioning. Indeed, to

become too focussed on the merging parties and to ignore the prospect for such dynamic competitor responses may often serve to substantially overstate the likelihood for a merger to give rise to unilateral effects.

However, pricing pressure indices may provide a useful way in which to organise two pieces of information, namely diversion ratios, and profitability, that are likely to be highly relevant in the assessment of mergers in differentiated product settings. As such, and notwithstanding the above points, pricing pressure indices may in future serve to provide a useful initial screen regarding the prospect of unilateral effects (where the required inputs are readily available), and indeed be considerably more informative in this regard than a simple analysis of market shares where products are differentiated.

References

Farrell J., and C Shapiro, 2010, "Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition", The B.E. Journal of Theoretical Economics 10(1)

City of New York v. Group Health Inc., 2010, United States Court of Appeals for the Second Circuit, Docket No. 10-2286-cv, available at: http://www.crowell.com/pdf/ManagedCare/City-of-New-York-v-Group-Health-Incorporated-HIP-Foundation-Health-Insurance-Plan-Greater-New-York.pdf

Hausman, J., S. Moresi and M. Rainey, 2010, "Unilateral Effects of Mergers with General Linear Demand," Economic Letters, available at: http://crai.com/uploadedFiles/Publications/Unilateral%20Effects-of-Mergers-with-GeneralLinear-Demand-Hausman-Moresi-Rainey.pdf

Jaffe S., and E.G. Weyl, 2010, "The First Order Approach to Merger Analysis",

Majumdar A., and R. Murgatroyd, 2009, "Looking beyond market shares: the theory, evidence and meaning of closeness of competition in the manufacture, wholesale and retail of fast-moving consumer goods in South Africa and Europe".

Masscash / Finro, 2009, Masscash Holdings and Finro Enterprises, Case number 04/LM/Jan09, Reasons for the Competition Tribunal's decision, available at: http://www.comptrib.co.za/cases/large-merger/retrieve_case/1083

Moresi, S., 2009, "Cournot Competition and the UPP Test", HMG Review Project – Comment, Project No. P092900

Moresi, S., 2010, "The Use of Upward Pricing Pressure Indices in Merger Analysis", The Antitrust Source, February 2010

Salop, S.C. and S Moresi, 2009, "Updating the Merger Guidelines: Comments" and "Updating the Merger Guidelines: Hearing Statement" available at: http://www.ftc.gov/os/comments/horizontalmergerguides/index.shtm

Shapiro, C., 1996, “Mergers with Differentiated Products”, Antitrust, Spring 1996. See also: http://www.usdoj.gov/atr/public/speeches/shapiro.spc.htm.

Shapiro, C., 2010, “The 2010 Merger Guidelines: From Hedgehog to Fox in Forty Years”, Antitrust Law Journal, vol. 77

Somerfield/Morrison, 2009, UK Competition Commission, “Somerfield plc and Wm Morrison Supermarkets plc: a report on the acquisition by Somerfield plc of 115 stores from Wm Morrison Supermarkets plc”, available at: http://books.google.co.za/books?vid=ISBN0117035963

US Department of Justice and the Federal Trade Commission, Horizontal Merger Guidelines, 19 August 2010

Zipcar/Streetcar, 2010, UK Competition Commission, “*Final Report on the Completed Merger between ZipCar Inc and Streetcar Limited*”, available at: http://www.competition-commission.org.uk/inquiries/ref2010/zipcar_streetcar/pdf/final_report.pdf