

THE COMFORTS AND DISCOMFORTS OF USING QUANTITATIVE TESTS AND OTHER TOOLS IN DEFINING ANTITRUST MARKETS WITH COMPLEX COMPETITIVE DYNAMICS: A REVIEW OF EVIDENCE FROM A COMPLAINT AND TWO MERGERS

Genna Robb (GennaR@compcom.co.za),

Ratshidaho Maphwanya (RatshidahoM@compcom.co.za) and

Tapera Gilbert Muzata (GilbertM@compcom.co.za)¹

*Competition Commission of South Africa*²

Abstract

The relevant market is defined by considering the response of customers to a SSNIP (normally taken as 5 – 10%) on the candidate product(s) or region(s). A number of commonly employed tools seek to aid in this analysis including the analysis of transport costs, the degree of inter-regional trade flows, natural experiments and differences in the level and direction of price movements in different regions. Whilst in some settings quantitative tools (especially price tests) can be informative, their blind application without regard for market dynamics at play can be misleading. Indeed a major criticism of the use of price tests for market definition has been that they are a fairly blunt tool, incapable of dealing robustly with real-world complexities and therefore providing quite limited assistance to the competition analyst. This paper seeks to illustrate, through discussion of three pertinent cases – the case against several dairy processors and the MTO/Boskor and Tsogo Sun/Gold Reef mergers – the dangers of relying too heavily on a quantitative analysis and improperly designed natural experiments to define geographic markets when there are complex competitive dynamics at play. In particular, the cases highlight that when there are concerns of existing anti-competitive conduct, the use of traditional tests may not be appropriate.

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¹ Acted as the Competition Commission's economic expert in one of the case studies used in this paper, the MTO/Boskor merger.

² This paper represents the views of the authors and not the Commission.

I INTRODUCTION

The primary objective for any competition authority (CA) is preventing either mergers or practices (either cartels or abusive conduct) that result in a substantial lessening of competition (SLC). This assessment of the SLC test is commonly framed into a two-step process; firstly, identification of the market(s) concerned and secondly, assessment of the competitive effects arising from the merger or conduct. Our paper is concerned primarily with the first element of the assessment, that is, the exercise of market definition.

Market definition is concerned with the exercise of identifying products which exert a competitive constraint on the products of the parties under investigation. It is not an end in itself, but forms an intermediate step in the competitive assessment, focussing attention on the main competitive constraints which are relevant to the analysis and providing a means of screening, via market shares, the degree of market power held by the parties (Bishop and Walker, 2010:109). The standard approach to this exercise is known as the Hypothetical Monopolist Test, which is also known as the SSNIP test. It asks the question of whether a hypothetical monopolist over a certain group of products would be able to profitably increase prices by a small but significant amount (typically taken to mean 5-10%). If so, then the group of products forms a separate market as there are no significant constraints from products outside the market (Bishop and Walker, 2010:112).

Once these competitive constraints are understood, the relevant market provides a framework within which a robust assessment of the effect on competition can take place. Therefore it is not surprising that often in anti-trust litigation or during the normal course of a CA's work, the scope of the relevant market forms a key area of dispute between the merging parties or perpetrator of the conduct and the CA (case examples include the MTO/Boskor merger, the Tsogo Sun/Gold Reef merger, and the Woodlands and others vs. the Competition Commissioner enforcement case).

Over the years a range of quantitative tests have been suggested which can aid to a greater or lesser extent in this analysis. Amongst these tests are price tests, price-concentration tests, critical loss or diversion ratio analysis, shipment data tests and transport cost tests. These vary significantly in terms of their degree of sophistication, data requirements and suitability for the task at hand. Where they are similar, however, is that they require careful use and interpretation, as well as appropriate data, in order to provide informative results. All are best used alongside and when supported by a detailed qualitative analysis of the markets in question. If these rules are not adhered to, the result will potentially be unreliable and tests may produce perverse results. Natural experiments have also received some attention over the years and are also useful in assisting the competition analyst undertaking the exercise of market definition. Equally, the use of results of natural experiments has to be undertaken contextually with a clear understanding of the circumstances under which such experiments were undertaken. This allows for a proper interpretation of the results of such experiments and helps prevent spurious inferences.

The objective of our paper is to illustrate, using case studies from some recent South African cases, some of the potential pitfalls in the use of quantitative tests and other alternative tools for market definition, particularly in complex markets. Section II provides a brief review of economic literature on the use of quantitative tests and natural experiments in market definition, highlighting some specific difficulties which arise in the use of the tests relevant to our case study examples. Section III then presents the three selected case studies and discusses some of the problems experienced with using quantitative tests in these cases. Section IV provides some concluding remarks.

II QUANTITATIVE TESTS AND NATURAL EXPERIMENTS IN MARKET DEFINITION

(a) Quantitative tests

In order to ensure that any quantitative analysis gives useful results, certain principles should be followed. Empirical analysis should be based on clear economic theory which implies testable propositions which are intuitive and replicable (Bishop and Walker, 2010: 482). Any assumptions made in the analysis should be made clear. Furthermore, the analysis should be grounded in a detailed qualitative assessment of factual, documentary and qualitative evidence (Davis and Garces, 2010). Quantitative evidence alone will rarely be sufficient to support a finding and that qualitative analysis provides ‘both a necessary basis for quantitative work and a source for vital reality checks regarding the conclusions emerging from empirical work’ (Davis and Garces, 2010). Care should be taken to identify the correct tool for the task at hand as those which are too simplistic or too sophisticated may lead to implausible results.

Bishop and Walker (2010: 483 – 485) list some common problems with quantitative tools. First there is the lack of available data which is a problem often encountered by competition authorities and which can severely limit the extent of the quantitative analysis which can be performed. The authors suggest that the best approach is to use the tools which are available whilst being aware of their deficiencies and potential weaknesses. Secondly, historic data (the data usually available to the competition authority) is not necessarily appropriate for predicting future behaviour. It is necessary therefore to keep in mind possible future changes to behaviour on the part of suppliers and customers and the impact which this may have on the analysis. Finally there is what is termed the “garbage in, garbage out” problem. This focusses on the appropriateness of the data used – for example in many industries list prices may be easily available but are an inappropriate indicator of prices actually paid by customers.

Overall the guidance reinforces the point that quantitative tests can be useful tools in a competition analysis, but should be used carefully, and with a clear idea of the appropriateness of the available data, to complement a detailed qualitative analysis.

In the following sections we consider some of the strengths and weaknesses of two particular types of quantitative test often used in geographic market definition which are relevant to the case studies below.

i. Price tests

The term price tests encompasses a range of price-based tests including simple correlation analyses and more sophisticated econometric methods such as stationarity tests, Granger causality tests and cointegration tests. All of these proceed from the intuitive argument that if two products (or in the case studies below, regions) are in the same market, their prices should move together over time. These tests, and correlation analysis in particular, are attractive to practitioners due to this relatively simple intuitive explanation and because data requirements are low.

However, a number of criticisms have been levelled at these tests, some of which are more serious than others. First, price tests are not a direct test of the key market definition question described above (Bishop and Walker, 2010: 540). In other words, the tests do not directly answer the SSNIP question. This stems from the problem that price tests are set up to identify economic markets rather than anti-trust markets. An economic market is as described by Stigler and Sherwin (1985): “A market for a good is the area within which the price of a good tends to uniformity, allowance being made for transportation costs”. This suggests that an economic market is determined by arbitrage and transaction costs (Nieberding, 2009). This, however, does not accurately capture the nature of an anti-trust market which, as discussed above, is concerned with the idea of competitive constraints.

An economic market is not the same thing as an anti-trust market for two main reasons. First, the prices of products in two regions which impose a competitive constraint on each other need not “tend to uniformity” if there are quality differences between them. Second, even if prices of two products do “tend to uniformity” this is not sufficient to conclude that they constrain one another since other factors such as common cost factors or demand conditions may be driving the similarity of pricing. Indeed one of the major criticisms of the use of price-based tests for market definition is that it can lead to “false positives” which describes the situation where two price series appear to be correlated due to the fact that both are being driven by common input costs or demand factors (Davis and Garces, 2010:175). This may lead to the conclusion that two products are in the same market when in fact they impose no competitive constraint on one another at all. Furthermore, if the two series each have a trend, there is the possibility of spurious correlation indicating a relationship where none exists (Davis and Garces, 2010: 176-177).

Froeb and Werden (1993) raise the concern that price tests do not allow for any asymmetry in market definition (often a reality in practice), since there is only one answer to the correlation question, not an answer for each product or region.

Finally, a complication with correlation analysis is the need to establish a level beyond which the degree of correlation is considered indicative of products being in the same market (Lexecon). A correlation indicates a degree of substitution between the products, but it is not clear at what threshold correlation coefficients become significant enough to conclude that products are in the same market. It is therefore necessary to establish a benchmark which the correlation results can be compared to, using products which are accepted to be in the same market.

Ultimately, Bishop and Walker (2010) conclude that correlation analysis can be useful in defining markets when interpreted correctly, but correlation between the prices of two products is a necessary rather than a sufficient condition for them to be considered to be in the same market. They also note that whilst more sophisticated econometric tests are often hailed as solving the problems associated with correlation analysis in practice they often provide little improvement on the simpler test. This is due to their low degree of power and often perverse results, and also the fact that they are based on the same basic principle of arbitrage as price correlation analyses.

ii. Shipment data

Tests based on shipment data rely on the intuition that product flows between regions indicate that they place a competitive constraint on each other (Bishop and Walker, 2010: 669). Similarly to the correlation analysis discussed above, they are intuitive, quick and simple to calculate and perhaps for this reason have been used quite extensively by the European Commission.

The main weakness of this type of test is again that they do not directly address the issue of competitive constraint. Furthermore, they suffer from a problem of asymmetry since large trade flows indicate a wide market but the absence of large trade flows doesn't necessarily lead to the conclusion that the market is narrow (Bishop and Walker, 2010).

A notable failure of this type of test has been in the treatment of hospital mergers in the US (Davis and Garces, 2010: 199). The courts had tended to accept merging parties' patient flow analysis using the Elzinga-Hogarty (EH) test in defining the relevant market, leading to the market being defined widely. Subsequent research by the agencies on the outcomes of several key cases shed doubt on the EH test as an appropriate method of defining markets in hospital mergers particularly, but possibly also more widely.

(b) Natural experiments

Natural experiments can be seen as ‘revealed preference’ and **can** provide direct evidence of substitution between products based on the past behaviour of consumers in response to changes in the relative prices of products in the candidate market (Padilla and O’Donoghue, 2006:70). If following a change in relative prices consumers reacted by switching to alternative products or geographic regions, then the scope of the relevant market is likely to be broader than the candidate market.

Natural experiments can also take the form of firms in a particular candidate market experimenting with price changes and observing how consumers respond to such changes. This appears to be at the core of the Tsogo Sun/Gold Reef merger through the merging parties’ Free Play Promotion. As we discuss and show below, the design of such experiments plays a critical role in the results that are observed and the usefulness of such experiments in defining antitrust markets. This is particularly the case where a sample of consumers is selected for the experiment. Like price tests, there is need for a body of qualitative evidence to support the results of such experiments, for instance the characteristics of the consumers selected for the experiment. The risk here is that the characteristics of the selected consumers may be such that the design and results of the experiment do not answer the questions that the SSNIP test seeks to answer thereby leading to potentially misleading conclusions. This point was at the core of the dispute between the Commission and the merging parties in the Tsogo Sun/Gold Reef merger.

III CASE STUDIES

(a) The dairy industry

The dairy processing industry was recently the subject of an investigation by the Competition Commission in which one focus area was the way in which the processors procured raw milk from farmers. The geographic market definition was important to the analysis of the conduct and the case was later used by Boshoff (2006, 2011) as an example of where quantitative methods, price tests in particular, can be helpful in defining geographic markets.

i. Background to the sector

As noted above, this case study is concerned with how dairy processors procure milk from producers of raw milk. The market for the supply of raw milk is highly fragmented (as of January 2006, there were 4,181 milk producers active in South Africa), whereas the market for processed dairy products is more concentrated. There are around 250 firms in the dairy processing industry in South Africa producing a wide range of dairy products, but there are fewer than 10 major producers who make up a very large proportion of sales and, crucially, of raw milk purchased. Furthermore, the major processors do not all have production facilities in all parts of the country. Typically each region is dominated by a small sub-set of the major processors. From a milk-buying perspective this suggests that the degree of market power possessed and exerted by the processors in a given region may be high.

Raw milk producing regions of South Africa can be broadly split into the coastal and inland areas in terms of the economics of dairy farming in these two regions. It is more expensive to engage in dairy farming in the inland regions since more feed is required as there is less natural pasture. Other factors which limit the scope of the relevant geographic market include the fact that raw milk is expensive to transport since it must be refrigerated at less than 4°C (transport cost to value ratio is high and requires specialised trucks) and that is highly perishable, having to be used within 48 hours. This feature of the industry suggests that the relevant geographic market in terms of assessing market power is certainly smaller than national, and may be regional.

What Boshoff (2006, 2011) seeks to test are the relevant geographic market boundaries of the sub-regions in the coastal milk producing region of South Africa (particularly encompassing the Western Cape (W), the Eastern Cape (E), and the Southern Cape (S)).

ii. Boshoff's assessment

In his first (2006) paper, Boshoff looks at a small amount of descriptive evidence on milk flows between regions and then uses stationarity tests to test the market definition hypothesis which this suggests. The data used is the average monthly milk price for each region as calculated by the industry body SAMILCO. The product flow information is taken from the transfer volumes of one major milk processor between four of its plants. This shows that there were negligible flows between regions in general, but occasional large flows. In particular, the author cites the example of an incident of milk being transported from the Southern to the Northern region in order to discipline farmers in the Northern region who were demanding high prices. He argues that this seems to support a finding that the market is larger than regional.

Stationarity tests are then conducted on the ratio of prices between the different regions, W:E and S:E. The W:S ratio is excluded from the analysis since during this period farmers in the Southern Cape complained that the differential with prices in the Western Cape was greater than the transport cost and processors agreed to adjust prices in response. The results suggest that the ratios are indeed stationary except at long lag lengths (and, oddly, at a lag length of two periods in respect of the S:E ratio) which the author attributes to a natural loss of power due to the sub-optimal lag length. Panel stationarity tests also give the result that the ratios are stationary. On the basis of these two types of evidence, the author concludes that there is either a single market for the three regions, or that there are two markets, where the Eastern Cape is separate to the other two regions.

In terms of the quantitative assessment, he extends the earlier analysis in the updated (2011) paper by considering a much wider range of price tests including correlation analysis, Granger causality tests and the autoregressive distributed lag (ARDL) bounds test. The price series are corrected for seasonality. In addition, the paper tries to apply newer versions of the various tests with improved small sample properties. These tests are applied to the original data, giving rather conflicting results.

There is no two regions whose prices are consistently shown to exhibit a relationship (whether short-run or long-run), but the results for the Southern and Eastern Cape region are the most consistent across tests. Overall, the author concludes that there is either a single market for all three regions or two markets where the Western Cape is separate to the other two regions. This contradicts the findings of his earlier paper. Despite this, the author concludes that "while no single price test offers conclusive evidence on the market, the combination of results offer a rich picture useful for market definition purposes". Rather, it seems to us that these results confirm the view of Bishop and Walker (2010), that more sophisticated price tests do not necessarily represent an improvement.

iii. Some complications with the price test analysis

Price tests such as price correlation tests and stationarity tests are based on arbitrage theory. As discussed by Boshoff (2011, p.25 - 26), prior to the 2005 institutional change in prices between the Southern Cape and the Western Cape, the price differential between the two regions was in excess of the transport cost. Pricing charts provided by Boshoff (2011, p.26) show that this endured from about July 2003 through to at least April 2005. This price differential should have triggered arbitrage by dairy farmers to supplying the Western Cape instead of the Southern Cape.

A look at the insignificant volumes of trade (transfers) across regions estimated by Boshoff (2011, p.23 - 24) suggests that this arbitrage was not taking place. This raises a serious

question regarding the applicability of these price tests to the markets considered by Boshoff. In particular, the market at hand potentially violates the principle (of arbitrage) underlying the tests employed by Boshoff (2006, 2011). This is despite the fact that, as Boshoff (2011) states, that at the beginning of 2004 dairy farmers threatened to divert their milk supply from the Southern Cape to the Western Cape.

Boshoff (2011) appears to focus primarily on the options available to processors and pays little attention to those that are available to dairy farmers in the event that they face an exercise of monopsony power by processors, that is, what Boshoff (2011) terms the small, but significant decrease in prices (SSNDP). By not addressing the options available to dairy farmers, Boshoff (2011) misses the opportunity to paint a complete picture about the very institutional details that Hosken and Taylor (2004) refer to and that could render the usefulness of price tests and their conclusions in the selected markets different.

In particular, we observe the fragmented nature of dairy farmers and the lack of coordination between them as a critical factor in assessing the options and viability thereof in terms of making a SSNDP unprofitable. Whereas it may be cheaper for processors to transfer milk from one central point (say Plant A in region X) to another point (say Plant B in region Y), the same economies are unlikely to be enjoyed by an individual dairy farmer producing a smaller volume on their farm. The dairy farmers will most certainly incur higher transport costs which serve to limit the options available to them. It is therefore not too surprising that there would be limited trade flows across regions.

In addition, dairy farmers also face the constraint that they would need to keep their milk refrigerated at below 4°C and have it processed within 48 hours failure of which entails product losses for the dairy farmers. It is also important to note that unlike the processors, dairy farmers are more likely to not possess the assets required to transport raw milk such as specialised trucks with tanks able to keep the raw milk refrigerated at temperatures less than 4°C. As such in the event of a SSNDP by milk processors in a particular region, dairy farmers are likely to be constrained in terms of switching to alternative regions.

Contrary to Boshoff's reasoning and conclusions from the period prior to the 2005 institutional change, our view is that the events leading up to these changes paint a contrary picture. In particular, the fact that processor(s) in the Southern Cape were able to sustain prices lower than those paid by processors in the Western Cape (differential in excess of transport cost) for such a sustained period suggests that there was an exercise of monopsony/buyer power by the processors in the region without the consequence of raw milk being diverted to other regions by dairy farmers. An important question arises in light of the 2004 threats by dairy farmers to start diverting milk to the Western Cape: had the purchase price of raw milk become so low that regions that would otherwise not have been alternatives now appeared to be feasible? In other words, was there now a cellophane fallacy in the Southern Cape market?

It is important to note that the artificial manipulation of the market by a processor following the threats from dairy farmers shows that the milk processors in the Southern Cape have the ability to exercise monopsony/buyer power by either reducing or raising the price they pay dairy farmers for raw milk. A further example of processors' attempts to maintain and reinforce their monopsony power is indicated in their willingness to behave irrationally in the short term in order to secure long-term market power and low prices. They appeared to be prepared to import milk from further afield, even if it was not the most economical in terms of transport costs, in order to discipline local farmers. There is evidence of Parmalat doing exactly that in June 2003 when they discontinued purchasing milk in the northern region after an increase in farm milk prices (Boshoff, 2011: 24). This is a clear example of a major processor irrationally incurring very high transportation costs in order to discipline farmers in a particular region.

In addition, processors located in other regions upon realising that dairy farmers located in the Southern Cape were willing to accept prices so low that it was cost effective to purchase and transport the raw milk from them would have been expected to import raw milk into the regions in which they were paying higher prices. However, Boshoff's (2011) evidence does not show that this was the case. These facts suggest that the Southern Cape is a relevant geographic market separate from the Western Cape. It is also interesting to note, as we do below, that some of the pricing tests reach similar conclusions particularly for the Western Cape and Eastern Cape.

The price tests themselves produced some rather confusing results. There are no two regions whose prices are consistently shown to exhibit a relationship (whether short-run or long-run). Furthermore, the author's attempts to explain these problems are unconvincing. For example, in terms of a short-run relationship, there was a significant result for both correlation and Granger-causality (although the correlations were relatively low) in the case of the Southern and Eastern Cape and Western Cape and Eastern Cape price relationships. The author argues that a "chain-of-substitution argument" can be used to establish that all three regions fall in the same market. However, this makes little geographical sense since the Southern Cape is located between the Western Cape and the Eastern Cape. The result that prices in the Western Cape and the Eastern Cape have a short-run relationship, while prices in the Western Cape and Southern Cape do not, therefore makes little sense. A similar problem is faced when testing for a long-run relationship, with geographically inconsistent results being obtained. In addition, the stationarity test and bounds test appear to give directly opposite results.

We also note here that the price correlations reported by Boshoff (2011) are not high enough to provide certainty that the regions form one market. In particular we note that price correlation coefficients for the Western and Southern Cape regions and the Western and Eastern Cape regions are both 0.5 respectively which is not high enough to provide any comfort to an anti-trust analyst. The correlation coefficient for the Eastern and Southern Cape regions is estimated at 0.7 and again this is not a coefficient which provides a high level of comfort. Rubinfeld (2010) notes that where correlation coefficients are high after de-trending data and stationarity is also found, then one can be more comfortable that two products or regions are in the same market. The problem in this case is that firstly the correlation coefficients are not convincingly high and secondly the results of the stationarity tests are not very consistent across all the regions. So even if stationarity was to be established, the relatively low correlation coefficients observed do not provide much comfort in terms of concluding that the three regions are in the same market.

In addition to the rather unlikely results of the tests, the use of price tests in this market can be criticised from a theoretical perspective. Firstly, as discussed above there is a possibility of "false positives" when looking at price series. In this case it is likely that the input costs faced by dairy farmers would be similar across geographic regions, particularly across regions as closely located to one another as the Western, Southern and Eastern Cape regions. For example, animal feed is a major cost component and is driven largely by the price of maize. This is a cost which tends to vary nationally rather than regionally.

Demand conditions could also be argued to be similar across regions, since demand for raw milk is mostly driven by demand for processed dairy products and hence by income levels, which are driven at least to some extent nationally and which can also be transported much greater distances than raw milk. The markets for some processed dairy products are likely to be national. Thus, both costs and demand conditions could potentially follow a similar pattern across regions, indicating that there is a plausible possibility of "false positives".

A further criticism of the price test approach to market definition may apply in this case. As noted above, competition markets are not always symmetric, particularly in the case of geographic markets where transport costs combined with distance or travel time may

influence how great a constraint two firms in different locations place on each other. Price tests can only tell us whether the price series in two randomly designated areas (in this case the different Cape regions) exhibit a relationship or not, when in practice the constraints faced by each processor may be much more nuanced and not be influenced by accepted geographic boundaries.

Furthermore, the conduct itself could bias the results of the price tests. A lack of price variation could be due to collusion keeping prices in line, rather than competition between processors.

iv. Other qualitative evidence

The evidence of processors themselves suggested that due to high transport costs it is important for processors to source raw milk as near as possible to their processing plants, such that raw milk markets are regional in nature. Most of the major processors appeared to have identified a range of distinct local markets in which they purchased milk and to have had different price structures which applied to each region.

Further support for the idea of regional markets was given by milk producers who stated that the choice of processors to whom they can sell their raw milk is limited to those active in their region. The relevant industry bodies, MPO and SAMPRO also divided the country up into regions: specifically, the MPO recognised the Western Cape, Southern Cape, Eastern Cape, Free State, KwaZulu-Natal, Northwest, Gauteng, and Mpumalanga as distinct regions. SAMPRO defines a similar set of regions, except that it recognised the Northern Cape as a distinct region and treated the Western Cape and Southern Cape as one region.

Data on transport costs suggested that at the prevailing average raw milk price at the time, a 5% price increase would have translated into a viable transport distance of only a few hundred kilometres, and evidence on the actual distance over which processors collected raw milk suggested that in reality, the majority of producers were located no more than 150km to 200km away from the processing facilities.

Finally, as noted above, significant price differentials were observed between the different regions, and in particular between the Western and Southern Cape regions which Boshoff focuses on. Data showed that prices in the Western Cape had been consistently higher than prices in the Southern Cape and that the differential had changed over time. Furthermore, according to processors, the milk produced in the Southern Cape was of superior quality to that produced in the Western Cape and the flow of milk had generally been from the Western Cape to the Southern Cape. However, throughout the period there had been a lower price for raw milk in the Southern Cape than the Western Cape. This suggests that neither product quality nor demand and supply conditions can account for the price differences observed, which may support a conclusion that they are distinct regional markets with different competitive conditions.

v. Conclusion

These qualitative observations paint a more coherent picture than the price tests, all pointing to the conclusion that there are distinct regional markets. In reality, however, it may not be very useful to delineate strict geographic boundaries, as it seems likely that distance determines the degree of competition between processors for the purchase of raw milk. In this case, the common range in which processors appear to compete in procuring raw milk within a range of a few hundred kilometres. In this sense, the qualitative assessment is clearly of greater value to a competition analysis, since it considers the critical nuances of competition in the relevant markets in a way in which the more mechanistic price tests cannot.

(b) MTO/Boskor merger

i. Background to the case

This was a merger in the forestry and sawmilling industry and involved the acquisition of a sawmill (Boskor) by a dominant supplier of sawlogs, an input into sawmilling, who was also active at sawmilling level (MTO). Geographic market definition was a key point of contention. Although the product market definition was not a seriously debated issue, it had implications for geographic market definition given that transport costs affected different product segments to different extents. When the Commission first considered the case in 2007, it concluded on a broad downstream geographic market encompassing not only the Western, Eastern and Southern Cape regions, but also KZN and the northern regions (Gauteng, Mpumalanga, Limpopo and North West). This was due to anticipated shortages of sawlog supply in the Western Eastern and Southern Cape.

Following a successful appeal by a third party, the merger was remitted back to the Commission for further investigation. During the second assessment, the Commission concluded on a narrower downstream geographic market. It is during the second assessment that price tests – correlation and stationarity tests - were considered by the merging parties and the Commission. Unfortunately the merits of the price tests were not tested by South African courts because the merging parties decided to abandon the merger midway through the trial, but not before evidence from their factual witnesses had been heard.

ii. Summary of results of price tests employed in the merger

High correlation coefficients were observed for both nominal and inflation-adjusted lumber prices, suggesting that the downstream market was broad. Table 1 shows the correlation coefficients including those after removing the trend from the data as all regional lumber indices exhibited a trend.³

Table 1: Correlation coefficients for the Western Cape relative to KZN and Northern regions

Time period	Basis on which correlation coefficients are calculated					
	Real lumber prices		First difference of real lumber prices		First difference of nominal lumber prices	
	Gau ⁴ /WC	KZN/WC	Gau/WC	KZN/WC	Gau/WC	KZN/WC
Jan 01 – Dec 05	0.9633	0.9615	0.6257	0.1931	0.4850	0.0890
Jan 07 – Nov 09	0.7499	0.7592	0.4966	0.2977	0.3568	0.1150
Jan 01 – Nov 09	0.9630	0.9723	0.4489	0.1828	0.2932	0.0644

Source: Analysis based on Crickmay regional data and StatsSA PPI data for Agriculture, forestry, fishing and mining

Notably the correlation coefficients for real lumber prices are significantly high in excess of 0.75. However, after removing the trend from the three regional price series the correlation coefficients decline significantly to a high of approximately 0.63 across the three periods considered and are as low as 0.06 for the January 2001 – November 2009 period when the Western Cape is compared to the KZN. This results in confusion as to the usefulness of price correlation tests for geographic market definition in this merger. As in the case of the dairy industry, there seems to be perverse results here especially when one compares the results of correlation analysis for Gauteng (Northern regions) and the Western Cape relative

³Despite acknowledging the potential for ‘false positives’ arising from common influences, the merging parties only corrected for inflation.

⁴ Gauteng indicates the price for timber delivered in Gauteng mainly from Mpumalanga, NW, and Limpopo. We note here that Gauteng is not a production region, but a major consumption area.

to those of the Western Cape and KZN. The correlation coefficients for the de-trended price series are higher for Western Cape/Gauteng compared to Western Cape/KZN despite the KZN being much closer to the Western Cape than Gauteng. This makes little logical sense.

The analysis also included stationarity tests that were conducted by the Commission. The results of the Commission's analysis suggested that at the 5% level of significance, all three tests reject the null hypothesis of non-stationarity suggesting a broader downstream geographic market.

iii. Challenges with price tests in the merger

One of the key challenges economists are faced with in trying to undertake price tests is obtaining a representative price series to use. This was a key challenge in the *MTO/Boskor* merger. At face value, the existence of the industry-used lumber price index (LPI) which was also available at a regional level appeared to mitigate the problem. However, it also had challenges. First, the LPI is an average drawn out of prices where there is a wide range between the maximum and the minimum prices charged. Secondly, in a market where there are products of different dimensions and segments, taking averages masks the salient features of each product line. Transport costs would also have varying effects on the ability to transport products over longer distances.

The results of the price correlation tests, presented in the preceding section, show significant variation depending on whether one controls for potential common influences such as inflation and the presence of a trend in the regional series. The results range from suggesting a broader market that includes KZN and the Northern regions to suggesting narrower markets. Potential common influences arise from sawmills reacting in the same way to changes in input prices, for example, the price of sawlogs, national wage negotiations through a bargaining council, national electricity pricing, and national fuel price changes. It is also expected that correlation would be high where prices and price escalations are subject to a common benchmark e.g., the LPI. It appears to us that the forestry industry considers the Crickmay LPI in their business decisions.

In this merger, price correlation tests were also unlikely to be able to deal with asymmetries in market definition. For instance, transport costs were lower when transporting sawn timber from the Cape regions to the Northern and KZN regions relative to transporting timber to the Cape region. This is due to greater demand for transport services from inland areas towards coastal areas than towards inland areas. In this instance, the Cape regions were likely to constrain pricing in the Northern and KZN regions but not necessarily the other way round. With low correlation coefficients after correcting for common influences, it leaves little comfort that stationarity tests indicated broader markets. In addition, the existence of a stationary series indicates a single geographic market only if the price series of at least one region is non-stationary and the price series were not subject to common shocks. This was not the case in this merger.

The validity of these results was also to some extent negated by the fact that the tests failed to account for the form of competition between firms in the market. Evidence exists in this market that local competition matters and that there are other important factors for competition other than price. These factors include service - delivery lead times and delivery sizes. These factors require that firms invest in smaller delivery trucks in order to carry out prompt and smaller deliveries to customers. This affects the ability of distant regions to competitively service the Cape region. There was also evidence that there is need for local presence as some of the competitors in other regions had resorted to, albeit with limited

success, maintaining depots/warehouses in the Cape region as an attempt to enhance their ability to provide good service.⁵

This taken together with evidence of limited trade flows from other regions into the Cape region suggested that the latter region is a separate market. This is not to say there were no trade flows from other regions into the Cape region. The Commission's 2007 investigation provided evidence that some of the suppliers in the Northern regions were supplying sawn timber to the Cape region, but that these were small volumes of usually higher value, appearance grade timber, one of the segments in sawn timber. Notably, these fetch higher prices and are not affected by transport cost to the same extent as standard grades. There were also indications that some of the products transported from other regions were in short supply in the Cape region.

It is perhaps useful at this point to consider the extent to which transport and other related costs are likely to hinder switching to other regions and thus make a SSNIP profitable. In sawn timber, particularly construction timber, the finished product requires treatment if it is to be used in coastal regions. This requirement does not strictly hold for inland areas. Table 2 below reflects the significance of transport and treatment costs when one makes a decision to purchase sawn timber from either KZN or the Northern regions.

Table 2: Price increases in the WESC necessary to induce switch to Mpumalanga⁶ and KZN regions

Region	Price change needed to induce switch (%)			
	Dec 09	Nov 09	Oct 09	Dec 06
Mpumalanga	24.6 - 28.7	15.2 - 31.0	17.4 – 18	16.2 - 20.7
KZN	15.8 - 19.0	6.8 - 14.3	9.4 - 15.4	13.7-28.0

Source: Analysis based on Crickmay pricing data for S5 38x114mm L (highest prices for each region) for deliveries into Cape Town

These results suggest that transport and treatment costs are a significant deterrent to switching between regions for both customers in the Western Cape and suppliers in other regions. Using pricing data available for a firm located in the Southern Cape and another firm that owns sawmills in KZN and the Northern regions to conduct the same analysis, the results suggest that transport costs are a significant constraint to switching to other regions (Table 3).

Table 3: Price increases in the SC necessary to induce switch to Mpumalanga and KZN regions

Region of origin	Price change needed to induce switch (%)		
	Dec-09	Nov-09	Oct-09
Mpumalanga (sawmill W)	32.3	32.1	31.3
KZN (sawmill X)	19.6	17.7	20.3
KZN (sawmill Y)	22.1	22.7	24.8
Eastern Cape (Sawmill Z)	18.6	20.6	21.2

Source: Analysis based on 38x114mm L

These results are more or less in line with those obtained using the LPI. There was certainly acknowledgement of the significance of transport costs in the strategic documents of the merging parties and by firms that are located in other regions. These transport and treatment

⁵ Such evidence is recognised in other jurisdictions (see for instance the US merger guidelines, pp. 14 – 15 and the ICN merger guidelines, p. 28)

⁶ Mpumalanga is one of the production regions in the Northern regions.

costs perhaps explain the low volumes of product flow from other regions into the Cape region and suggest a separate geographic market.

iv. Conclusion

It is apparent that in the *MTO/Boskor* merger the evidence from price tests is mixed and at best inconclusive. For instance, in this market where common influences are a reality which leads to high observed correlation coefficients, there is a real risk of drawing spurious inferences if a competition analyst relies primarily on such tests. After correcting for these common influences (inflation and the trend among other qualitative observations), the observed correlation coefficients significantly decline suggesting that the high correlation coefficients are a result of common influences and not competition between regions. The results after correcting for common influences appear to be in line with results from transport and related cost analysis, as well as trade flow analysis.

Notably some of the results are not logical. For instance, after correcting for inflation and the trend, correlation coefficients are higher for Northern regions compared to KZN when in fact the latter region is nearer to the Cape region. This merger shows that a competition analyst faced with the possibility of using these potentially useful tools to define markets should exercise caution before accepting the conclusions drawn from such tests. Especially in cases where average prices are used and where other evidence does not corroborate the findings from the price tests.

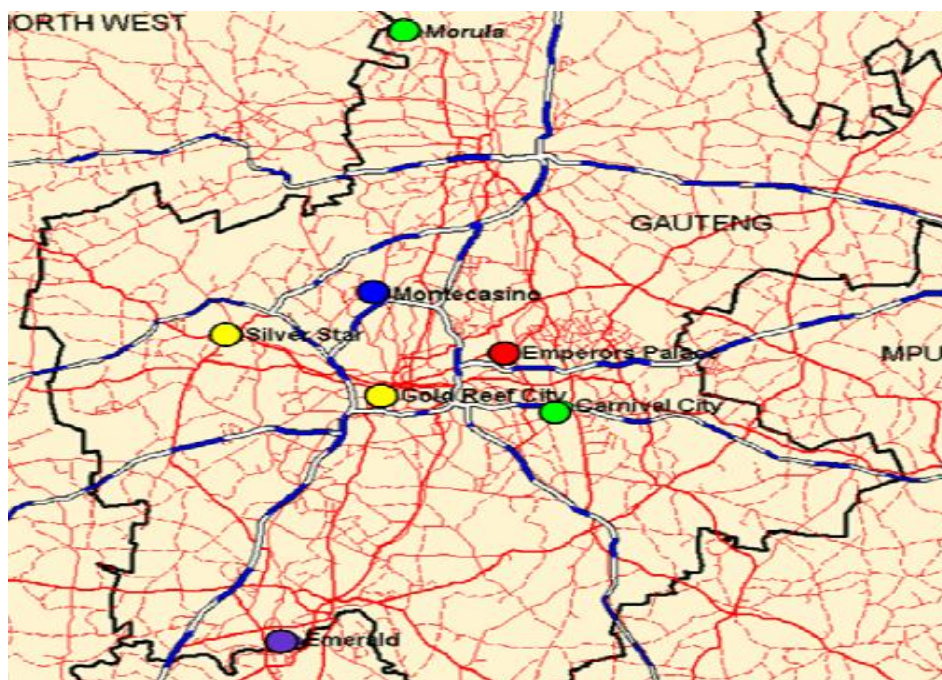
(c) Tsogo Sun/Gold Reef Resorts

i. Background to the sector.

This was a merger between Tsogo Sun and Gold Reef Resorts both of which are active in the market for casino gaming and associated leisure facilities in South Africa. The Tsogo Group owns and operates seven casinos and entertainment complexes located throughout South Africa. Gold Reef Resorts owns, operates and invests in a number of hotels, casinos, conference facilities and theme parks in South Africa. Of specific relevance to the transaction was the fact that Tsogo Sun owns and operates Montecasino and also that Gold Reef owns and operates Gold Reef City and Silverstar, all of which are in the Gauteng province.

When casino gambling was legalised in the mid-1990s, 5 licenses were initially issued by the Gauteng Gambling Board (GGB), these were: Montecasino (Tsogo) in Fourways, north of Johannesburg, Gold Reef City (Gold Reef Resorts) in Booysens, south of Johannesburg, Emperor's Palace (Peermont) located close to O.R. Tambo International Airport to the east of Johannesburg, Carnival City (Sun International) in Boksburg south-east of Johannesburg and Emeralds (LCI) in Vanderbijlpark in the far South of Gauteng. A border change in 2003 meant that Morula casino (which had previously been a part of North West) became part of Gauteng and in 2007 the Silverstar casino was opened in Mogale City west of Johannesburg. The GGB approved casino licenses on condition that the casinos were in 'ideal' locations relative to each other – a deliberate attempt to limit competition between the casinos with the aim of ensuring the viability of all the casinos in the province and hence maximize licensing fees for the gambling board and investment by the casinos. The merging parties submitted information that showed that of all the casinos in the Central Gauteng region, only Emperors Palace and Carnival City are within 20 minutes of each other, the rest are more than 30 minutes apart. The figure below shows a map of the Gauteng with the locations of the casinos.

Figure 1: Map of Gauteng casinos



Source: RBB Non-Confidential Expert Report

In general all casinos have both gaming machines (slots) and tables. The largest source of revenue for casinos is the slot machines. Casinos generally house a variety of associated leisure facilities. These include restaurants, bars, nightclubs, theatres, cinemas, resorts, hotels, gyms and golf courses. The rationale for having these facilities on site at the casinos was a point of contention during the merger trial.

ii. Market Definition Assessment⁷

Although the product market is not our primary point of attention, we note that disagreements between the Commission and the merging parties covered both the product and geographic market definition. While the merging parties argued for a broader entertainment and leisure market comprising of casinos, cinemas, restaurants, golf courses etc. The Commission argued for a narrower product market definition for casinos. The Commission's argument was based on casinos having leisure facilities as a tool to attract more customers to the casino and hence not considering other providers of said leisure activities as competitors – the Commission therefore considered the associated leisure facilities as a complementary offering to the gambling offering.

The merging parties proposed a very narrow geographic market that includes only the areas in the immediate surroundings of the casino while the Commission posited a geographic market as wide as central Gauteng. Although the merging parties employed several tools to identify the boundaries of the geographic market, we only consider the Free Play promotion, which the merging parties suggested could be a proxy for the SSNIP test in the merger.

iii. The Free Play promotion

Free play was a promotional experiment introduced by Montecasino towards the end of 2007 in anticipation of the entry of Silverstar casino.⁸ The promotion was structured such that a

⁷ This subsection does not aim to provide an intensive assessment of the arguments presented under the market definition but rather to provide a summary of the conclusions presented by both parties.

group of Montecasino's biggest spending customers were offered a loyalty rebate if they maintained or increased their spending at the casino compared to spending from a previous period. Another group of customers with a spending level just below the first group were not offered the promotion and with the aim of using them as a control. Montecasino tracked the resulting changes in visit frequency and spend-per-night in order to gauge the effectiveness of the promotion. The rationale for choosing customers residing in the West Rand (next to Silverstar) was to curtail an expected exodus of these customers from Montecasino to Silverstar. The merging parties argued that the results from the promotion can be used as a proxy for the SSNIP test.

The Commission and the merging parties did not agree on the interpretation of the results. The merging parties were of the view that results showed that the promotion had been unsuccessful as they observed no material difference in the defection rates from Montecasino to Silverstar for the group who were offered the promotion and the control group. The merging parties argued that this showed that Montecasino was not in competition with Silverstar as customers had not responded to a price decrease (relative price increase at Silverstar) by staying with Montecasino. The Commission however interpreted the results differently. The Commission argued that although the promotion did not stop customers from switching to Silverstar, those that were given the promotion switched to Silverstar at a slower rate compared to those that were not offered the promotion. The Commission cited that the promotion had a positive impact of reducing losses (of customers) for Montecasino by 9%. The Tribunal accepted the Commission's interpretation of the results.

iv. Criticism of using the Free Play promotion as a proxy for a SSNIP test

The main criticisms of the promotion as a market definition tool was, however, not the interpretation of the results but rather the design and evidential weight that it should hold in a merger proceeding. The Commission expressed dissatisfaction at the merging parties using the Free Play promotion as a proxy for the SSNIP test; this was based on what the Commission perceived to be bias in the sample selection process particularly for the West Rand leg of the promotion. The SSNIP test aims to assess whether the price increase by a hypothetical monopolist's (HM) would cause the marginal customer to switch to competing products. It is not necessary that all the customers switch to alternative supply under a SSNIP, only that enough customers must switch to render the price increase unprofitable. It is therefore necessary to consider the behaviour of marginal consumers; these are the customers that are most likely to switch in response to a relative price increase (Bishop and Walker, 2010: 119). In the context of the merger these are consumers that were indifferent between going to Montecasino and going to Silverstar prior to the price increase. If we consider this from a geographic location perspective then these would be customers who live in the areas directly in between Montecasino and Silverstar and hence face the same travel conditions going to either of the two casinos.

Montecasino offered the promotion specifically to customers who lived very close to the location where Silverstar was about to open. In choosing customers who are closest to Silverstar, the merging parties ensured that they chose customers who were least likely to remain at Montecasino after the opening of Silverstar. The sample was therefore always likely to contain the most infra-marginal of (Silverstar's future) customers. The SSNIP test intends to capture whether marginal consumers would switch their business given price increase by the HM. Infra-marginal consumers do not face the same incentives the SSNIP test attempts to engage. Customers who live right on the doorstep of a casino are the least likely to switch to another casino in the event of a price increase by their 'home' casino. The

⁸ The Free Play promotion was offered to customers residing in the areas around Silverstar and also to customers residing in Pretoria. We have discussed both under the same umbrella however focus is one the West Rand leg of the promotion.

sample was biased towards infra-marginal customers and hence the SSNIP test was more likely than not to yield negative results.

The merging parties argued that the high spending consumers may be classified as marginal because the transport costs are likely to constitute a very small proportion of their overall spend. This may be true as far as their spend is concerned since an increase in transport costs that constitutes a small proportion of their total spend is unlikely to deter them from travelling to a casino that is further away. However these consumers were certainly not marginal as far as their distance from Silverstar is concerned. The decision to gamble at a particular casino is unlikely to be influenced by just the price – convenience is also likely to contribute to this decision. A consumer who stays very close to Silverstar is less likely to switch their gambling from Silverstar, partly due to the increased transport costs, but it may also be down to the inconvenience of having to drive to a casino that is further away. The argument presented by the merging parties may also suggest that such high spending customers are also least likely to react to a price increase and consequently would not be marginal. Although the price increase suggested by the merging parties may have been much larger compared to the additional transport costs, it is likely that a customer who will not respond to the additional transport cost will also not respond (or at least respond less) to an increase in price.

We are also of the view that the Free Play promotion would not have been representative of the full market dynamic as it was only offered to a small segment of the market which was in no way representative of the entire market. In order for inference to be drawn from a SSNIP test it must be performed across the entire market or at the very least on a sample that represents the market. The Free Play discount was only applied to Montecasino's largest spending customers; the rest of the customer base was still gambling at prevailing prices. Market participants were in agreement on the fact that high spending customers make up a very small proportion of the entire gambling population. Any sample that is chosen from these high spending customers would not be very representative of the entire market. This suggests that it may be ambitious to draw inferences about the competitive dynamics that exist between the two casinos from such a limited sample. The test leaves more questions than answers on this aspect.

We also note that the economic logic applied in this instance is not consistent with economic theory. Given a price increase of 20%, if the marginal customer does not switch from the HM then it is unlikely that the customer would switch for a relatively lower 10% price increase. However the converse does not necessarily apply; customer responses to a 20% price increase are likely to be different compared to their response to a 10% price increase. The fact that a (marginal) customer would switch from the HM to another firm/location in response to a 20% price increase does not speak to whether the same customer would switch to the rival firm/location given a 10% price increase by the HM. The results as reported by the Commission showed that some customers responded to the relative price increase at Silverstar by switching to Montecasino. In the context of a SSNIP test, results show that given a 20% increase in the price by Silverstar, customers switched from Silverstar to Montecasino. This however does not tell us if customers would have switched from Silverstar to Montecasino in response to a 5 – 10% increase in the price.

It is also worth noting that the results of this "SSNIP test" may have been diluted by the fact that the customers were well aware that this was only a temporary relative price increase – the price increase was not 'non-transitory'. This surely would have contributed to their decision making. Particularly when we consider that customers had to make a long-term commitment in order to qualify for the lower price, it becomes less convincing as a price reduction. We also find fault in the logic that suggests that the second group of customers who were not offered the promotion can be used as a control in the promotion experiment. It was highlighted during the trial that the second group has an average monthly spend of approximately half that of the group that was offered the promotion. This means that it is

likely that these two groups exhibit different behaviour patterns and hence using the other group as a control may not have been sensible.

We are of the view that all these arguments bring doubt into whether it would be possible to apply the Free Play promotion as a SSNIP test. Although there is still value in observing the results of the test, it would not be wise to apply this test blindly without regard for the qualitative evidence.

v. Other Qualitative Evidence

A closer inspection of the market share figures also shows that the casinos constantly win and lose market share against each other. This is consistent with firms that are in competition with each other. The market share that was gained by Silverstar when it opened was not due to an enlargement of the gambling “pie” but rather redirection of business from other casinos, mainly Montecasino. This is clearly contradictory to the merging parties’ claims that each casino occupies a distinct geographic location which does not overlap with any other casino’s location. In fact the Free Play promotion that was run by Montecasino was an attempt (however unsuccessful) by Montecasino to curtail market share loss to Silverstar. In addition to this the Commission led extensive evidence from other casinos which showed that they definitely consider other casinos as competitors.

The merging parties also presented evidence on the perceived captive areas of the casinos in central Gauteng; they used this to make the point that the casinos have each captured the locations they are located in and hence each of these locations constitute small geographic markets. This static view of the market does not capture the intention of a market definition exercise. Whether or not customers are presently switching between location A and location B does not lead us to conclude on the geographic scope of the markets around these locations. The question we have to answer is whether these customers would switch between the two locations given a price increase at one of these locations. Such a static view of the market simply does not capture this.

vi. Conclusion

The implementation of the Free Play promotion as a proxy for the SSNIP test raises some significant problems as discussed above. Accepting the merging parties’ interpretation of the results would contradict a lot of the qualitative evidence that was presented to the Tribunal. Once again, this example seems to reinforce the message that it is important to have regard to qualitative evidence on important market dynamics when interpreting results of quantitative tests.

IV CONCLUSION

The foregoing discussion illustrates some of the difficulties with applying quantitative tests for market definition in markets with complex dynamics. The first two case studies highlight that price tests can be at best inconclusive and at worst actively misleading when used for the definition of anti-trust markets. The difficulties which they encounter are both theoretical and practical. In both the cases in question, the results obtained from the basket of tests used are inconclusive and at times inconsistent with qualitative evidence. The unquestioning use of these tests can lead to serious problems since it ignores the relevant context of both the industry and the conduct in question, such that the results of the tests become fairly meaningless. A more detailed qualitative assessment reveals a different and much more coherent picture. In the light of this, it seems prudent to view price tests used for market definition in competition analysis with a degree of scepticism unless backed by other evidence. Whilst they may offer some useful information to help confirm or refute a

hypothesis on which products fall into the relevant market, they are clearly no substitute for a detailed qualitative analysis.

The third case study illustrates the dangers of using survey information generated for commercial purposes in a market definition analysis. Whilst some useful insights may be gained on the dynamics of competition, such surveys will rarely talk to the critical market definition question encapsulated in the SSNIP test. As such extreme caution should be applied when interpreting such results as part of a market definition analysis and they should be used in conjunction with, rather than as a substitute for, a sound qualitative assessment.

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