During the recent Sasol/Engen (Uhambo) merger hearing, the Tribunal had to consider the impact that this merger would have on the competitive landscape of the South African economy. They were guided in this task by expert reports from no less than nine economists/economic consultancies. This Research Note takes the Uhambo case as an example to illustrate the value that can be added by proper economic analysis.

ECONEX was the economists for Masana Petroleum Solutions.

1. Introduction

During the period 3-31 October 2005, the Competition Tribunal heard evidence on the proposed merger between two large oil companies Sasol Oil and Engen. The final decision prohibiting the merger was released on the 23rd of February 2006. The 204-page decision gives a comprehensive overview of the oil industry and the complicated relationships and regulatory history of this strategic sector. During the hearing it emerged that the outcome of this case would depend primarily on three issues.

- Foreclosure;
- Demand growth rates of white fuel; and
- Logistics.

During the hearing, the Tribunal heard from seventeen witnesses, of whom six were economists or economic experts (including the economist of the Competition Commission). Furthermore, the Tribunal considered a total of fourteen witness statements, of which three were written by economic experts.

The role of economists in these proceedings is not always well understood and often criticized. Economists’ contribution is often in the form of very complicated econometric models which then becomes a point of contention as it is true that any economic model is only as good as its assumptions. The Uhambo case has been no different and the divergence of economic models and econometric evidence caused the Tribunal to remark in their final decision that: “Garbage in; garbage out” is the caution customarily urged upon those who rely on econometric and other statistical techniques and while not all of the data used in the parties’ model is to be so characterised, some of it does appear sufficiently contrived to warrant that description”. The current note aims to show that on a very basic (and crucial) point of the Uhambo analysis, economic analysis was able to provide conclusive evidence based on standard economic theory.

2. Main Issues

2.1 Market Definition

It became clear during the hearing that the outcome of the case depended on the profitability of foreclosure. There was some consensus on the basics of the oil industry structure and market definition. The Tribunal took the view that since their analysis showed that the merger will lead to a substantial lessening of competition in the markets for petrol and diesel, it was not necessary to further examine all the other petroleum product markets (e.g. bitumen, heavy fuel oils, LPG, jet fuel, etc.). There was therefore not the usual dispute about the relevant product market, that often emphasises the role of the economist in demarcating the relevant market for competition purposes. Similarly, the definition of the relevant geographic markets was relatively straightforward. The history of the Main Supply Agreement (MSA) implied a separate geographic market known as the ‘inland market for refined fuels’. The Tribunal found that the geographic upstream market is inland (the so-called market for ‘bulk supply’), and that the geographic downstream (retail) market is national.

Given the fact that there was no real dispute on market definition, it was common cause that Uhambo would have controlled 82% of the output of refined

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1 Par. 237, p. 83 of the Tribunal decision.
2 Par. 169, p. 61 of the Tribunal decision.
3 Par. 187, p. 65 of the Tribunal decision.
4 This is a concept that was introduced primarily by the Economic expert for Caltex, Prof. Shefman.
fuel products in the inland geographical market and that its retail network would account for approximately 40% of inland fuel sales.

2.2 Vertical Issues - Foreclosure

The Uhambo merger presented horizontal as well as vertical concerns. Given the high market shares in both the upstream and downstream markets that Uhambo would have obtained, the impact on both the upstream and downstream markets would ordinarily have to be examined. However, given the Tribunal’s definition of the relevant upstream market as the inland market, there was no horizontal overlap between the Sasol and Engen refineries (Engen owns the Enref refinery which is situated at the coast). At the retail level, the horizontal effect would have been a total national market share of 34% of petrol sales and 36% of diesel sales, for Uhambo. Although this was considered to be an important issue, the focus throughout the hearing was on the vertical issues raised by the proposed merger.

The primary economic concern with vertical mergers is the ability of the merged firm to ‘foreclose’ its rivals and to ‘raise rivals’ costs’. In the case of Uhambo, the majority of the economists focused on the issue of potential foreclosure. The vertical issue was clear – the merger would combine the substantial upstream refining capacity of Sasol with the significant wholesale and retail capacity of Engen. This immediately raised the prospect of input foreclosure, and the Tribunal also chose this as their main focus. However, in order to prove that foreclosure would be profitable, the economists built some sophisticated models to present various foreclosure scenarios. The economist for the merging parties, Dr. Stillman, demonstrated in his model that foreclosure would not be profitable. This was disputed by the economists for the other oil companies who presented models that showed that foreclosure would be profitable.

This highlights the usual controversy around economic analysis, there will always be economic experts who will argue for and against certain mergers or prohibited practices. But the outcome of the models depends on the assumptions. The foreclosure models all had to make certain assumptions regarding the aspects of demand growth for retail petrol and diesel and the current state of the logistics infrastructure. The aim of this note is to show that economists were able to settle the issue of demand growth, and therefore the likelihood of foreclosure.

Foreclosure, although ultimately the decisive factor in the Uhambo decision, will not be further dealt with here. It should be briefly stated though, that the Tribunal finally decided that the ‘credible threat’ of foreclosure was enough to prohibit the merger. In their own words: “Neither the Tribunal, nor the Commission, nor the merging parties, nor the intervenors, can decide with absolute certainty – beyond all reasonable doubt – whether or not foreclosure will be profitable. We can however say with confidence that it is a credible threat.”

2.3 Logistics

The other important issue was the state of logistics. The Tribunal noted that whereas under the MSA, the oil companies had to purchase all their inland requirements from Sasol, the fact that they were free to import product post-MSA did not mean that it was truly a free market. “However what was previously constrained by agreement, is now constrained by logistical capacity – the inland marketers may import product from the coast, but because of inadequate logistical capacity they are only able to supply a portion of their needs.” Although logistical capacity was the other vital leg of the foreclosure models, ultimately the state of logistics were to be determined from the evidence of the factual witnesses of the various oil companies. Economists could not testify as to the true state of the logistics capacity and had to accept the evidence provided to them by the oil companies.

2.4 Demand growth for retail petrol products

The demand growth for petroleum products is the focus of the current note. There were widely divergent views on the demand growth rates forecasted for petrol and diesel. Yet, the forecasting of demand growth rates is not a Herculean task for economists who should consider this as part of their basic toolkit. Economists know that the demand for any retail product is generally a function of the price of the product, income of consumers, the size of the population and the price of substitutes or complimentary products.

About ECONEX

ECONEX is an economic consultancy that offers quality analysis in the fields of Competition and Trade Economics. The company was co-founded by Dr. Nicola Theron and Prof. Rachel Jaffa during 2005. Both these economists have a wealth of consulting experience in the fields of Competition and Trade Economics and they also teach courses in Competition Economics and International Trade at the University of Stellenbosch. ECONEX maintains close ties with the University of Stellenbosch and also cooperates on various projects with a number of academic associates.

The combined experience of our staff members places ECONEX in a position to offer the best possible advice to clients who are involved in competition or trade related legal proceedings. Our approach is to combine a thorough academic understanding of the theoretical issues with the practical requirements of our clients, in order to deliver a superior, yet accessible product.

For more information on our services, please visit our website www.econex.co.za
3. Demand growth rates for petrol and diesel - Economic theory

As the demand growth rates for petrol and diesel were one of the main issues considered by the Competition Tribunal, it is important to ask what value can be added by economists forecasting such growth rates. Before considering the variety of growth rates that were presented to the Tribunal by the various parties, it is important to say one or two things about the estimation of petrol and diesel demand.

The economist that has to estimate such growth rates will ask as a first step, based on economic theory, what might determine the demand for a specific product. This question must be answered with reference to the general determinants of demand, as set out above. The next step would be to look at the literature to ascertain what other researchers have found to be relevant determinants.

The demand for petrol is a well-researched topic in economic theory. The literature shows that both price and income have an effect on the amount of petrol purchased by consumers. But the consensus in the literature is that the income elasticity is generally higher than the price elasticity. This means that the income variable – in both the petrol and diesel demand functions – has a stronger correlation with demand than the price variable. In other words, petrol and diesel sales (in volume terms) are more sensitive to changes in consumer income (or GDP) than to changes in the real price of petrol or diesel.

The extent to which strong economic performance will affect fuel demand is quantified by the income elasticity of the demand for fuel. More simply, the income elasticity measures the response of motorists to an increase in income. This is assumed to be a positive relationship. Graham and Glaister (2002:1) in a comprehensive survey found that the long-run income elasticity of fuel demand falls in the range of 1.1 to 1.3, and between 0.35 and 0.55 in the short-run.

The following table provides a summary of the literature on income elasticities:

<table>
<thead>
<tr>
<th>Country</th>
<th>Income Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-run</td>
</tr>
<tr>
<td>Canada</td>
<td>0.12</td>
</tr>
<tr>
<td>US</td>
<td>0.18</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.63</td>
</tr>
<tr>
<td>France</td>
<td>0.64</td>
</tr>
<tr>
<td>Italy</td>
<td>0.40</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.37</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.85</td>
</tr>
<tr>
<td>Japan</td>
<td>0.15</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Source: Graham & Glaister, (2002:7)

The following table summarises the results of studies done on the price elasticity of petrol and diesel demand for the South African economy.

<table>
<thead>
<tr>
<th>Source</th>
<th>Country</th>
<th>Short-term price elasticity</th>
<th>Long-term price elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.A. Cloete &amp; vd M. Smit (1988)</td>
<td>South Africa</td>
<td>-0.25</td>
<td>-0.37</td>
</tr>
<tr>
<td>S.D. Ngumedi (1994)</td>
<td>South Africa</td>
<td>-0.1 to -0.2</td>
<td></td>
</tr>
<tr>
<td>Bureau for Economic Policy Analysis (1999)</td>
<td>South Africa</td>
<td>-0.31</td>
<td></td>
</tr>
<tr>
<td>Bureau for Economic Research (BER) (2003)</td>
<td>South Africa</td>
<td>Petrol -0.21</td>
<td>Diesel -0.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Petrol -0.51</td>
<td>Diesel -0.06</td>
</tr>
</tbody>
</table>

Source: BER, 2004

The tables above show that if there is an increase in income, people earn more and they have more disposable income, which will increase their demand for petrol, as they buy more or bigger cars, or go on more holidays or generally use their cars more. The data on long-term income elasticity suggest that this is approximately a 1:1 relationship. In other words, a 1% increase in income will lead to a 1% increase in the demand for fuel (the income elasticity seems to be higher for diesel than for petrol, but on average the income elasticity is around 1).

The relationship between the price of petrol (or diesel) and the demand for petrol (or diesel) is a negative relationship (indicated by the minus sign on the price elasticities). The economic reason is simple: as the price of a product increases, the demand decreases.

Having found then, based on economic research that there is a strong positive
relationship between income and petrol and diesel demand and a smaller negative relationship between the price and demand, the economist can use a time series for these independent variables to estimate the petrol or diesel demand growth. This is fairly straightforward, as long as good estimates of the forecasted variables can be obtained. The petrol and diesel prices are notoriously difficult to forecast, but there are estimates available. But given the large correlation between income and the demand for petrol, good results could have been obtained by only using the correlation between income and petrol demand. In fact, this approach was used by the economists for Shell.

4. Demand growth rates - estimates of the economists

Using their own models, or alternatively relying on petrol and diesel demand forecasts of economic consultancies such as the Bureau for Economics Research (BER), the economists presented the Tribunal with a range of demand growth rates. A summary of these growth rates are presented in the following table.

Table 3: Estimates of growth rates in petrol demand

<table>
<thead>
<tr>
<th>Source</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBB (for BP)</td>
<td>3%</td>
</tr>
<tr>
<td>Econometrix</td>
<td>2.2%</td>
</tr>
<tr>
<td>Total (2003-2014)</td>
<td>2.2%</td>
</tr>
<tr>
<td>RBB (for Shell)</td>
<td>2%</td>
</tr>
<tr>
<td>ECONEX (for Masana)</td>
<td>3.6%</td>
</tr>
<tr>
<td>Sasol (2006 budget)</td>
<td>1.4%</td>
</tr>
<tr>
<td>Uhamblo business plan</td>
<td>1%</td>
</tr>
</tbody>
</table>

It is clear that there is a wide divergence between the various estimates. It is important to appreciate the sensitivity of the foreclosure models to different growth rates. With low growth rates (such as those estimated by Sasol and Engen), the possibility of foreclosure seems rather remote. Conversely, high demand growth rates especially in the inland market will permit Uhamblo to rapidly gain market share and thus significantly strengthen the ability of Uhamblo to self-deal and to foreclose its rivals to its upstream production. Given the logistics constraints faced by the other oil companies (the pipeline constraints as well as road and rail constraints), this would be a classic strategy of foreclosure.

The Tribunal noted in its decision regarding the growth estimates of the various economists that: “...but surprisingly few have attempted to explain the underlying basis for their estimates”. The Tribunal then continues to state that “A notable, if somewhat unfortunate, exception is Mr. Swart of Sasol who indicated that Sasol had used an observed correlation between the Consumer Price Index and petrol demand to estimate demand growth. However, there is no discernible causal relationship between these variables...” Sasol estimated a petrol demand function, where petrol demand is determined by the consumer price index (CPI) and the real petrol price (including a number of dummy variables).

Economic theory predicts that inflation (i.e. price increases) erodes the purchasing power of households - in other words, the higher inflation or prices become, the less consumers can afford in volume terms (i.e. with a given budget, they can afford to buy less petrol in volume terms). Increasing inflation will therefore reduce consumers’ demand for petrol, i.e. if anything, there should be a strong negative relationship between inflation and petrol sales. Sasol however in their model found a positive relationship between CPI and petrol demand. The CPI variable in his petrol equation has a positive sign, which in simple terms means that if the prices of food, clothes, cars, etc increase, then people will buy MORE petrol.

This led to Tribunal to conclude regarding the Sasol demand growth rates that: “the variable used by Mr. Swart to predict petrol demand is clearly wrong...” On this basis the low growth rates of Sasol (1.4% in their business plan and 1% in the Uhamblo business plan) can therefore be safely ignored. This immediately increases the likelihood of foreclosure.

The Tribunal then noted further in their decision that: “In our view, common sense would suggest a high degree of correlation between income growth and rates of fuel consumption.” This is indeed the case, as illustrated by the tables above, based on sound economic theory.

This relationship can easily be illustrated by considering the correlation between the change in petrol volumes and the change in GDP over a period of time for South Africa:

Figure 1: Petrol volumes (Vol_Pet) (percentage change) and Real GDP (Y1) (percentage change) – annual data

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More Information

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9 As space is limited, the discussion will only cover petrol, as the same general principles apply to diesel.
10 Par. 256, p. 92 of the Tribunal decision.
11 Par. 257, p. 92 of the Tribunal decision.
The graph clearly shows that there is a strong positive relationship between the two variables. The large reduction in petrol volumes during 2000-2001 is mainly a result of the depreciation of the Rand during that period.

Having established that there is a sound economic basis for explaining fuel demand as a function of income and the interest rate, the economist has to obtain the data on these independent variables in order to estimate a petrol demand function. Any income variable can be used, e.g. GDP growth, although most studies on petrol demand find that real disposable income of households explains petrol demand better than GDP. Although the petrol price is more difficult to estimate and to forecast, there are sources available for this variable.

Forecasts for economic growth in SA are not difficult to obtain. In the ECONEX economic report prepared for the Uhambo hearings, we used the BER forecast of 3.7% average GDP growth between 2005-2009, to calculate the growth rates in petrol demand. In the RBB paper (for Shell) the economists assumed a GDP growth rate of around 3.5% from 2005 to 2010.

Therefore, based on the high economic growth rates expected for SA for the next few years, and the high correlation between GDP and fuel demand, it can be shown that the Uhambo assumption of 1% growth in fuel demand is very conservative, if not unrealistic. The Tribunal also further noted in their decision that income distribution will also affect fuel demand and that this will in turn influence the purchase of motor vehicles. Sales of new vehicles can indeed also be used in estimating a petrol demand function, e.g. as a proxy for income. The following graph illustrates the large increase in sales of passenger vehicles.

**Figure 2: Sales of passenger cars (NAAMSA)**

The graph clearly shows that sales of passenger vehicles have been rather stable up to 2003, followed by a large increase since then, and an upward trend throughout the period.

5. Conclusions

This note has argued, that although the results of Economic models are highly sensitive to the assumptions of the models, this does not mean that such models should not be used. In the case of the Uhambo merger, the most important issue considered by the Tribunal was the possibility or profitability of foreclosure. This in turn was determined mainly by two issues, the growth in fuel demand and the state of logistics. While the second is primarily a factual issue, the first – demand growth – is something which can be estimated by economists. Based on economic theory and standard economic analysis, the Tribunal found that the fuel demand growth rates assumed by Uhambo in their business model are ‘low outliers’. This note has shown that assuming a 1% growth rate for petrol demand when the economy is growing at rates of between 3% and 4% and sales of passenger cars have reached record levels, is indeed conservative, if not totally unrealistic. Changing this assumption in the foreclosure models would raise the profit-ability of foreclosure, and this ultimately led to the Tribunal’s conclusion that foreclosure is indeed a ‘credible threat’ and that the merger should therefore be prohibited.

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5. This income variable makes sense intuitively, as petrol sales to households constitute a large proportion of total petrol sales. Real disposable income is the key driver of demand for most retail products, including petrol sales to households.

13 4.1% (2005), 3.6% (2006), 3.0% (2007), 3.8% (2008), 4.0% (2009).