

Using profitability measures in competition analysis in South Africa

Andrew Sylvester¹

WORKING PAPER - NOT FOR CITATION

Abstract

Recent debate from the UK in particular over both the theoretical correctness and practical ease of application of profitability analyses to competition cases has shed light on where such analysis could be used in South Africa to complement already well developed tools of analysis. Indeed the scenarios identified as being most suitable for profitability analysis are where a dominant firm acquired its dominance through an avenue other than competition and where there are significant barriers to entry such as high capital requirements. While these may be uncommon in the UK there are a number of such industries in South Africa. Furthermore, when the complex monopoly amendments are promulgated, South Africa may follow the example of the MMC in using profitability analysis as part of the relevant set of analyses. While profitability analyses may find more applications in South Africa, instabilities in underlying variables and low liquidity on the JSE may make it an even less accurate measure than it is in theory. If South Africa is to follow the UK in making use of profitability analysis more frequently on a wider set of cases, practitioners and authorities need to be cautious of these differences. This paper sets out the leading profitability framework and the potential problems with its use. It goes on to highlight areas where its application in South Africa may require additional sensitivities, using the JSE as an example.

1. Introduction

In July 2003 Oxera published a discussion paper commissioned by the Office of Fair Trading (OFT) in the UK on *Assessing profitability in competition policy analysis*.² It was intended not only to be a 'practitioner's guide' on how to apply profitability analysis correctly but also to "stimulate debate on this increasingly important, and yet relatively unexplored, branch of competition policy analysis."

Charles River Associates (CRA) responded to the debate in December 2003 with a discussion paper on *The (mis)use of profitability analysis in competition law cases*.³ The authors viewed the accurate calculation of economic profits to be problematic and, in the event that this were possible, the application of these profitability measures to competition law cases to have grave theoretical flaws in almost all situations. As such they conclude that "in general profitability analysis will not provide useful information for competition analysis, and worse yet, is likely to be highly misleading."

¹ Andrew Sylvester is a Junior Analyst with the Competition Commission of South Africa. The views in this paper represent those of the author and not necessarily those of the Competition Commission.

² Oxera (2003)

³ Lind and Walker (2003)

Despite the severe criticisms surrounding the application of profitability analysis to competition policy, the OFT identifies profitability analysis as potential evidence of excessive pricing⁴ and market power⁵. It did however heed the concerns of practitioners and academics by acknowledging situations when excess profits would not be indicative of or as a result of excessive pricing, and that excess profits are not sufficient evidence of market power.

Lind and Walker do however concede that profitability analysis would be useful in a “mature capital-intensive single product commodity industry in which brand names and advertising were not important and very little ongoing innovation is being undertaken.” Likewise Motta and de Streel explain that when there are non-transitory barriers to entry and the monopoly acquired its monopoly position through an avenue other than competition, there is a case for intervention and the use of profitability analysis.⁶ South Africa is better placed than the EU or EU member states to produce real examples of these exceptions given the prevalence of primary and low level secondary industrial activity as well as companies that may have a position of dominance as a direct result of public intervention (either current or historic with subsequent privatisation to a privately held monopoly or dominant firm).

The paper is set out as follows: Section 2 discusses the initial appeal and various potential applications of profitability analysis to competition cases as well as theoretical problems inherent in making such applications; Section 3 discusses how a profitability analysis should be conducted in practice with some of the practical problems briefly discussed; Section 4 presents a case study of a profitability analysis on the JSE using public data; and, Section 5 concludes.

2. Discussion of the arguments surrounding profitability analysis

In a perfectly competitive market companies compete with one another reducing the market price to the point where it is equal to the marginal cost of production. These companies also produce at minimum efficient scale where their average costs equal their marginal cost. If companies have the same cost structures then the result is that all companies earn only normal profits (zero economic profits). Observing positive economic profits in an industry therefore indicates that it is not perfectly competitive. Furthermore, if a firm is earning positive economic profits in the short run, this will be observed by outsiders who will enter the market, resulting in increased output and a lower price in the market.

A profitability analysis that shows that an entire firm, business unit or specific product line consistently earns positive economic profits indicates that they have the ability to price above costs without this resulting in increased competition from entry. This result may be because the market is not competitive and that the firm (or a group of companies) has market power and exercises it by raising prices significantly above the competitive level. Alternatively it may be because one or more of the assumptions that underlie the theory of perfect competition are not upheld in the market under inspection, and hence that the rents that are being earned by this firm are not the result of anticompetitive action. For example, if companies have different cost

⁴ Office of Fair Trading of the United Kingdom (2004a)

⁵ Office of Fair Trading of the United Kingdom (2004b)

⁶ Motta and de Streel (2003)

structures then the competitive market outcome would have the more efficient companies earning positive economic profit with only the marginal firm earning zero economic profit.

The fact that no conclusion can be drawn from a profitability analysis alone does not undermine its usefulness in competition analysis. Oxera caution users of profitability analysis on these grounds and state that it should be used as “one among a number of complementary economic indicators and techniques that can be used together in a competition analysis.”⁷ These would include, but not be limited to such things as market shares, analysis of barriers to entry, comparator prices. Bell et al also remark that it is the norm as opposed to the exception that little can be concluded from individual pieces of analysis alone.

A profitability analysis that shows a firm to not be earning economic profits would also be useful as a defence of a firm that seems to be excessively pricing based on other analysis. The only scenario where a firm that earns no economic profit can be found to be excessively pricing is where that firm has large inefficiencies. Thus profitability analysis is not solely a tool that can be used by competition authorities to identify and prosecute firms, but can also be used in the defence of a firm under investigation.

2.1 Applications of profitability analysis

Alongside use in excessive pricing cases profitability analysis can be used to complement other relevant analysis in a large number of areas. Oxera illustrate this as shown in Table 1 which displays the set of questions whose answers can be informed in part by a profitability analysis.

Table 1: Relevance of profitability analysis in competition policy

Context within competition analysis	Relevant question
Assessing market power or degree of competitiveness in a market	Are profits persistently in excess of the competitive benchmark?
Market definition	Are prices in excess of marginal costs (in which case the ‘cellophane fallacy’ may apply)?
Assessment of entry barriers	Are profits of the firms in the market persistently in excess of the competitive benchmark?
Excessive pricing	Are profits persistently in excess of the competitive benchmark?
Margin squeeze	Is the vertically integrated firm’s downstream operation making excessively low profits?
Predation and cross-subsidy	Are profits excessively low or are prices below the relevant cost floor?
Coordinated effects in merger cases	Is pre-merger profitability in excess of the competitive benchmark (in which case the merger may lead to a further lessening of competition)?
Failing-firm defence in merger cases	Is the acquired firm so unprofitable that it is likely to exit the market?
State aid	Is the state investment or grant making a normal market return such that a private investor would have made the same investment?
Quantification of damages and determination of fines	To what extent have the perpetrators profited from the infringement; and to what extent have the victims forgone profits?

Source: Oxera (2003: 1.3)

Profitability analysis was also extensively used by the UK Monopoly and Mergers Commission (MMC) in complex monopoly cases prior to such provisions being replaced by market

⁷ Oxera (2003)

investigation provisions. Complex monopoly provisions have been included in the most recent amendment to the Competition Act which has not yet been promulgated.

2.2 Theoretical problems with applying profitability analysis to competition analysis

The major theoretical problems when using firm profitability in competition analysis surrounds the fact that there are a number of reasons why a firm may make positive economic profits. Bishop and Walker explain that there are 3 categories of reasons why a firm may make economic profits⁸:

1. rewards for taking risks and innovating (Schumpeterian rents);
2. rewards to a competitive advantage such as superior efficiency or better management (Ricardian rents); and,
3. the result of having and exercising market power.

Inferring market power and an abuse thereof simply from the observation of economic profits thus does not take into account the potential for the source of those profits being from the first two potential reasons. These first two issues are discussed in sub-sections 2.2.1 and 2.2.2 respectively.

Another potential theoretical problem arises where a firm is observed to earn positive economic profits in a market, while supplying another market at a lower price and overall does not make economic profits. The loss in the second market is incurred in order to gain large economies of scale and is necessary for this firm to operate in the long term. This issue is explored in sub-section 2.2.3.

2.2.1 Rewards for taking risks and innovating

It is well documented in the literature that the potential to earn positive economic profits is necessary to incentivise innovation by companies. Not only do they need to cover the upfront investments in research and development, but they also need to be compensated for the risk that the product would not have been successful. In fact the opportunity to become a monopolist and charge monopoly prices is argued by Justice Scalia in *Trinko* to be a necessary component of the free-market, and it is only when the monopolist uses anticompetitive conduct, presumably to retain or extend their monopoly position, that an abuse arises.

The mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system. The opportunity to charge monopoly prices—at least for a short period—is what attracts “business acumen” in the first place; it induces risk taking that produces innovation and economic growth. To safeguard the incentive to

⁸ Bishop and Walker (2010:97)

*innovate, the possession of monopoly power will not be found unlawful unless it is accompanied by an element of anticompetitive conduct.*⁹

While the OFT is less accepting of monopolists pricing to the full extent of their market power, they do agree with the need to not curb the incentives to innovate. In their draft guidelines on the assessment of conduct they state that:

*prices and profits may be high in markets where there is innovation. Successful innovation may allow a firm to earn profits significantly higher than those of its competitors. However, a high return in one period could provide a fair return on the investment in an earlier period required to bring about the innovation. These costs include investment in research and development and should take into account the risk at the time of the investment that the innovation might have failed.*¹⁰

Here the OFT identifies that the risk of the investment ex ante is important when analysing profitability. Using ex post risk to value the profits of the firm when there were large ex ante risks will overstate the economic profits.

This point is exemplified in the MMC report into the Video Games market in the UK. Part of their analysis involved a profitability analysis of Nintendo and Sega which showed them to have been significantly profitable. The MMC used income statement ratios in forming their conclusion that “[Nintendo] and [Sega] have been highly profitable in the five-year period to 1994 although less so in the last of these years, 1993/94.”¹¹ This was taken as contributing evidence that “a scale monopoly operated in favour of Sega, and that a complex monopoly existed in favour of Sega and Nintendo.”¹² This was problematic not only because of the poor profitability measures used and the short period of time analysed, but also because these companies operate in an innovative industry and require a positive economic profit over and above the cost of research and development in order to offset the chance that the investment would have failed. This is made clear by the fact that Atari, Commodore and Philips experienced failed investments in this industry. Furthermore, while the MMC would not have had this insight at the time, the industry was shown to be competitive through the exit of Sega and the entry of Sony and Microsoft.

In dynamic and innovative industries it is important to use the ex ante risk when undertaking a profitability analysis. This can be done either by valuing the investment as the cost of investment divided by its probability of success and using the ex post risk in calculating cost of capital, or by using the ex ante risk in calculating the ex post cost of capital thereby inflating the cost of capital to reflect the ex ante risks that investors incurred. Both these solutions are difficult if not impossible to calculate as the firm making the investment would be unsure of the probability of success, and the ex ante risks are very difficult to identify¹³. In these industries,

⁹ Verizon Communications Inc. v. Law Offices of Curtis V. Trinko, LLP

¹⁰ Office of Fair Trading of the United Kingdom (2004a)

¹¹ MMC (1995: para 2.54 and 2.55)

¹² Lind, Muysert and Walker (2002)

¹³ The ex ante risks would be the Beta value of the firm prior to the success of the project. This is difficult to measure as it may be a project within a larger set of operations and so only the Beta of the operations would be identifiable

and when the ability to value ex ante risks is impossible or inaccurate, it would be prudent to weight direct evidence on competitive behaviour and barriers to entry above evidence that these firms are significantly profitable following the success of their innovation.

2.2.2 Rewards to a competitive advantage

Lind and Walker¹⁴ present a sector return analysis of the FTSE 500 companies and show that the difference between return on equity and the cost of capital on average is positive for most of the sectors, and very large in a number of them, for the 1998-2000 period. While the period is somewhat short for drawing conclusions, and the indicator (ROE less cost of capital) is not ideal, and it also seems that they have used net book values less intangibles which is the incorrect method of valuing assets¹⁵, their point is valid: most firms make positive economic profits.

This is not a damning observation. Companies within a market generally do not conform to the perfectly competitive market assumptions and have differently sized plants using different technologies and different ratios of inputs producing differentiated products. In such markets, even where they are competitive, it would be expected that at least some companies earn positive economic profits on aggregate in the long run. Those companies earning positive economic profits would be those that structured their firm and production process in a more efficient manner than the others. Only some of these differences may be observable to outsiders. As such it may be difficult for entry to compete away the rents earned by the most efficient companies especially if potential entrants also observe companies in the same market earning economic profits that are very small or negative in the short run. The competitive pressure will more likely come from existing competitors' attempts to replicate more the efficient production processes. The ability of the more efficient companies to earn positive economic profits in the long run then depends on the degree to which the efficiency enhancing technology is proprietary or can be kept from competitors. It may also be that the less efficient process is significantly different to the more efficient process and would require writing off assets such that the upgrade would no longer be profitable.

The reason that all these conceded points do not constitute damning criticism of profitability analysis is that profitability analysis should never be an argument that stands only on its own merits. There is a significant difference between a firm with a small market share earning positive economic profits because it is more efficient other producers, and a firm that earns far larger positive economic profits in a market in which it is a near monopoly due to high entry barriers and is selling at far higher margins in the market concerned than other markets.

and not the risks specific to the investment. Otherwise, it may be that the innovation is coming from a start-up in which case the financing is unlikely to be through a listing and hence no observable risk measure could be attained.

¹⁴ Lind and Walker (2003)

¹⁵ Asset values should include intangible assets, and net book value is not always the correct basis from which to start valuing assets. This is touched upon in sub-section 3.1.2 and explained in detail by Oxera (2003: ch5)

2.2.3 High domestic prices and low export prices required to cover large fixed costs

The previous example of a firm pricing high in a market in which it has market power whilst pricing lower in another market, perhaps because it is a price taker in that market, is still not without potential defence. Calcagno and Walker¹⁶ argue that a firm may need to undertake price differentiation and earn large profits in one market in order to cover the losses from the second market, and that the firm may need to supply the second market in order to produce higher volumes and sufficiently harness economies of scale¹⁷. Without the price differentiation, it is argued, such a firm would not be able to cover its large fixed costs and would cease operations in the long term¹⁸. Figure 1.

Figure 1 illustrates a hypothetical scenario of a firm that is a monopolist in the domestic market facing the full domestic demand (D_{SA}) constrained by imports at the import parity price level (IPP). This firm is a price taker in the international market and can supply unlimited volumes at the export parity price (EPP).

The demand facing the firm is thus IPP to every domestic consumer who is willing to pay greater than IPP, the consumers' willingness to pay where it is less than IPP and greater than EPP, and thereafter EPP because it would prefer exporting over selling to domestic consumers with a willingness to pay that is less than EPP.

The marginal revenue function before taking imports and exports into account is the MR_{SA} line which is dotted between a quantity of 0 and Q_1 , and solid between Q_1 and Q_2 . Imports constrain price to a maximum of IPP and thus the firm is essentially a price taker between 0 and Q_1 with marginal revenue being IPP and then discontinuous at Q_1 where marginal revenue continues in the normal monopoly model at MR_{SA} . The option to export any unit at EPP results in EPP becoming the marginal revenue curve for any point where MR_{SA} is below EPP. In Figure 1 EPP is always above MR_{SA} after Q_1 thus the firm will choose to sell the first additional unit after Q_1 to the export market as opposed to reducing the domestic price and selling it domestically.

The marginal costs of the firm are shown by MC. Two scenarios of average total costs are used in discussions. These are shown as ATC_1 and ATC_2 in Figure 1.

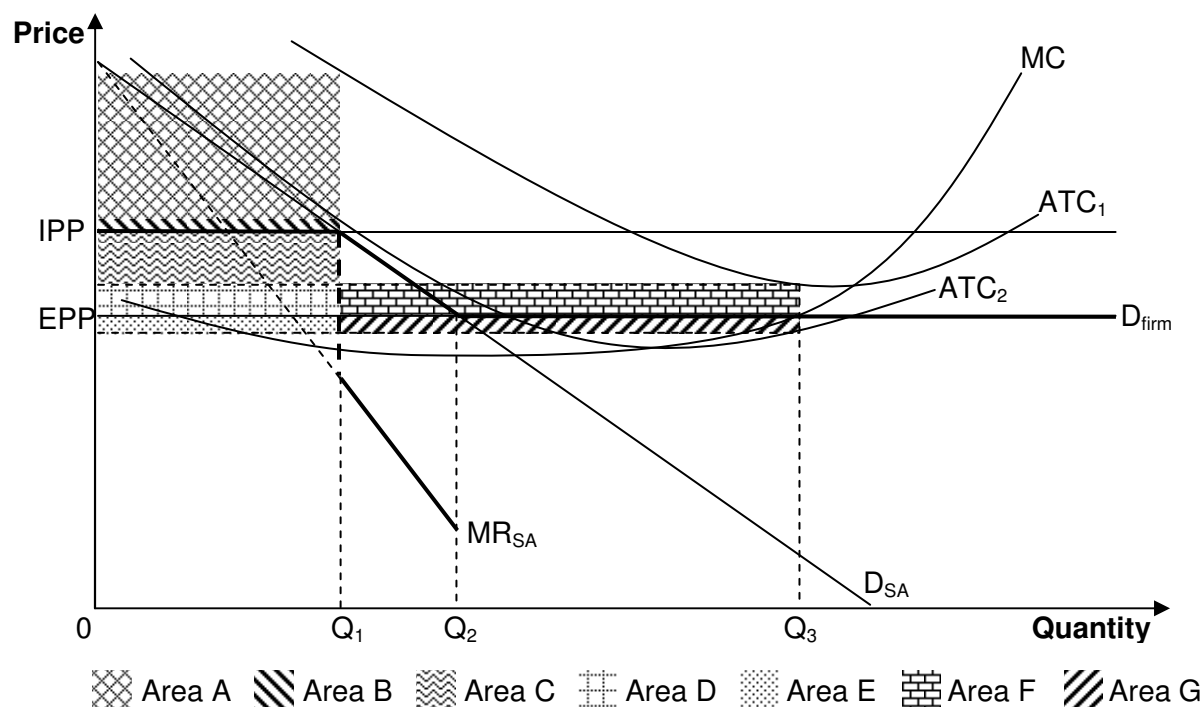
Figure 1Figure 1.

¹⁶ Calcagno and Walker (2010)

¹⁷ Calcagno and Walker raise these arguments in the context of the Harmony Mittal case where Mittal was pricing domestic sales higher than export sales. The validity and application of this argument to the Harmony Mittal case is not covered in this article, rather what is explored is the general theory of the argument and how it may complicate interpretations of any profitability analysis.

¹⁸ Although they may continue in the short term as long as they cover their variable costs.

Figure 1: Hypothetical cost and revenue curves¹⁹



A profit maximising firm absent any legislation restricting pricing would choose to supply Q_1 into the domestic market resulting in a domestic price equal to IPP, and selling the difference between Q_3 and Q_1 into the export market at EPP. These output decisions would be independent of whether average total costs were ATC_1 or ATC_2 . If average total costs are ATC_1 (scenario 1) then profits from domestic sales are shown by area C and losses from exports are shown by area F. If average total costs are ATC_2 (scenario 2) then profits from domestic sales are shown by area C, D and E and the profits from exports are shown by area G.

The potential defence postulated by Calcagno and Walker of a price discriminating firm that earns economic profit in one market but losses in another is depicted by the first scenario where the profits extracted at the expense of domestic consumers are used to cover the losses on exports.²⁰ If the firm were not allowed to price discriminate it could sell Q_1 at a price of IPP to earn a loss of area A plus area B or sell Q_3 at EPP and earn a loss equal to area D and area F. The firm would shut down if it were not able to price discriminate. With price discrimination the relative sizes of area C and area F need to be identified in order to identify whether the firm is profitable or unprofitable in total.

This argument can become somewhat complicated given the degree of specificity required. For example ATC_2 is also consistent with a firm with high fixed costs and with a loss making monopoly outcome in the domestic market absent any exports (loss equal to area B). Scenario

¹⁹ The intuition of this figure is from Calcagno and Walker figure 1 and 2, however it is somewhat altered.
²⁰ Alternatively one can think of exports making a positive contribution to profits even though they do not cover average total costs (Calcagno and Walker).

2 however results in profits both from exports and domestic sales when volumes are at Q_3 . Therefore, despite the fact that the firm has substantial fixed costs and cannot break even without realising economies of scale brought about by exporting, it could sell at a single price of EPP into both domestic and export markets and remain profitable.

A profitability analysis on the domestic sales alone would show positive economic profits being earned in both scenario 1 and scenario 2. It may then, under very specific circumstances, be justifiable to also conduct a profitability analysis for a combined domestic and export market even where the relevant geographic market has been identified as only the domestic market. Even if it is shown that the firm makes large positive economic profits from both markets together, it remains feasible that the domestic market earns large profits and the export market earns small losses. Therefore while it may, given other complementary analysis, transpire that the firm is charging an excessive price in the domestic market, it would not be advisable to remedy it by imposing export parity pricing upon their domestic sales because this would overshoot the mark.

Profitability analysis goes a long way in informing the validity of a defence of charging a far higher price in one market than in another brought about by the need to cross subsidise losses which the firm must incur in order to gain economies of scale. It doesn't however provide conclusive results on the matter. Further complimentary analysis on cost functions need to be explored in such situations.

It is not surprising that this issue was explained by Calcagno and Walker in the context of a large South African industrial firm that is not characterised as being in an innovative or dynamic market and which is likely to have high fixed costs of operation, as opposed to a case from the US, EU or an EU member state. This is not because of some difference in South Africa's legislation, but rather because this scenario is peculiar to markets with insufficient domestic demand to sustain the firm. It is more likely that these arguments will repeat themselves in a South African case before being used being used in the US or EU, if ever. For their part the competition authorities would need to ensure that this highly specific potential defence is not abused by companies that make profits in both the domestic and export markets or whose cost functions do not display the requisite characteristics.

3. The correct framework for conducting profitability analysis

The UK is one of the few jurisdictions where profitability analysis is explicitly recognised as being able to add value to competition analysis.²¹ The OFT guidelines on the assessment of conduct suggest the use of a number of measures when identifying whether or not a firm has earned positive economic profits:

- *Economic measures of profitability include the internal rate of return (IRR) and net present value (NPV). When an undertaking's IRR exceeds its cost of capital or when its NPV is greater than zero, this implies that its profitability exceeds its cost of capital.*

²¹ Oxera (2003)

- *Given that the period over which prices are alleged to be excessive may be less than the economic lifetime of an activity, it may be more appropriate to employ measures such as return on sales, gross margins, 'truncated IRR', return on capital employed, and market valuations.*
- *Evidence on how an undertaking's profitability compares with that of similar undertakings operating in a competitive market may also be considered.²²*

The OFT correctly identifies a pure NPV or IRR approach as being unusable when the analysis is being performed over a portion of the lifespan of the assets. They then suggest using income statement ratios as potential replacements when the analysis is for a specific period of the assets life. These however do not include any cost of capital and hence do not fully take into account the costs, and very importantly the risks, of the operation. They may however be useful when information, particularly relating to assets, is not available or inaccurate. In such instances income statement ratios could be compared with those of other similar companies. Comparisons of these sorts however cannot definitively identify whether or not a firm is making positive economic profits.

Oxera correctly identify NPV and IRR as the correct measures for profitability analysis and, to the extent that the analysis is only being conducted over a portion of the assets productive life, the NPV or IRR should be truncated rather than not used at all. The OFT does indeed identify a 'truncated IRR' approach in their draft guidelines. It is not surprising then to find that these are the most frequently used project profitability measures in investment decisions in corporate finance.²³

The NPV and IRR approaches are to take the relevant cash flows and discount them to a single point in time (the beginning of the period is generally used), and make a comparison to see if the project is profitable. NPV does this by discounting at the weighted average costs of capital (WACC) and should the value at the beginning of the period be positive then the project is profitable. IRR discounts at the rate at which the project will have a zero NPV and this rate is compared with the WACC of the firm. If the IRR is higher than the WACC then the project is profitable. For competition analysis the IRR results are more easily interpreted because the base of comparison is the normal return required from the firm. Thus the degree to which the firm is more profitable than is necessary to operate in the long run is exactly the IRR compared with the WACC. Therefore the truncated IRR methodology is most relevant for use in competition policy analysis.

The truncated IRR requires a comparison with the firm WACC while the truncated NPV requires it as an input. WACC is essentially the proportion of assets financed by equity multiplied by the cost of equity and the proportion of assets financed by debt multiplied by the cost of debt and is given by²⁴:

²² Office of Fair Trading of the United Kingdom (2004a),

²³ The "capital budgeting" decision in corporate finance

²⁴ Equation 1 is the simplified form of the WACC equation with only a single equity and debt instrument. Indeed it is normally the case that there would also be preference share equity and various types of debt with different costs.

$$WACC = \frac{E}{A} \cdot (R_f + \beta(MRP)) + \frac{D}{A} \cdot i \dots\dots\dots(\text{Equation 1})$$

...where E is the value of equity, A is the value of assets, R_f is the risk free rate, β is the firm beta risk measure, MRP is the market risk premium, D is the value of liabilities, and i is the cost of debt being the interest rate available to the firm.²⁵

The truncated IRR is calculated from equation 2 below:

$$A_0 = \sum_{t=1}^{t=N} \left(\frac{C_t}{(1+r)^t} \right) + \frac{A_N}{(1+r)^N} \dots\dots\dots(\text{Equation 2})$$

...where A_0 is the value of assets at the beginning of period; t is the time period, C_t is the cash flow for time period t , r is the IRR which is the output of the calculation, and A_N is the asset value at the end of the period.

While IRR is superior in interpreting the degree to which profits exceed normal profits and may lend insight into the severity to which the firm was pricing excessively, it is not a monetary value. For damages estimates it may be useful to also calculate the truncated NPV. This may also be necessary where the truncated IRR produces multiple solutions²⁶.

The truncated NPV can be calculated from equation 3 below:

$$NPV = -A_0 + \sum_{t=1}^{t=N} \left(\frac{C_t}{(1+d)^t} \right) + \frac{A_N}{(1+d)^N} \dots\dots\dots(\text{Equation 3})$$

...where A_0 is the value of assets at the beginning of period; t is the time period, C_t is the cash flow for time period t , d is the discount rate which is WACC, and A_N is the asset value at the end of the period.

While truncated IRR and truncated NPV are the most correct methods of undertaking a profitability analysis, comparing return on capital employed (ROCE) with the firm's WACC is commonly used. This may not only be because of the ease of calculation, but because it depicts profitability per year. It is not clear from either the IRR or the NPV forms of analysis whether the

These then expand the formula to include additional costs for weighting but take on the same form of the equation. Furthermore this equation includes in the cost of equity the capital asset pricing model (CAPM) formula that identifies that the greater systematic risk inherent in the investment the greater the expected return of the shareholder. Unsystematic risk is excluded from investor expectations because it is eliminated through diversification. Also the introduction of taxation results in two WACC calculations . After tax WACC is given by: $WACC = \frac{E}{A} \cdot (R_f + \beta(MRP)) + \frac{D}{A} \cdot i(1 - t_c)$; and pretax WACC is given by: $WACC = \frac{E}{A} \cdot (R_f + \beta(MRP)) \left(\frac{1}{1-t_c} \right) + \frac{D}{A} \cdot i$ where t_c is the corporate tax rate.

²⁵ The risk free rate, firm beta and market risk premium are covered in sub-section 3.1.1. MRP is also referred to as the equity risk premium (ERP).

²⁶ An IRR calculation can produce multiple solutions when there is a change in sign on the net cash flows for a period. There may be for example a cash outflow at the beginning of the investment, positive cash flows following the investment, and another large outflow perhaps to upgrade or maintain the investment, or perhaps at the end of period for decommissioning. In such situations two different rates of discount may result in a zero NPV. Where one is larger than WACC and the other is less than WACC, an NPV analysis may be useful in proving that the higher IRR solution is the correct one, and vice versa.

economic profits are earned in every time period or more, cyclically, or sporadically. ROCE is calculated as ratio of profits to the capital employed show by equation 4²⁷:

$$ROCE = \frac{EBIT_t}{(A-CL)_t} \dots\dots\dots(\text{Equation 4})$$

...where $EBIT_t$ is earnings before interest and taxes in period t , A is total assets and CL are the current liabilities.²⁸

ROCE however does not accurately measure economic profits as it is based on accounting principles. Specifically ROCE diverges from true cash flows given the inclusion of depreciation as an expense and the accounting practices surrounding recognition of revenues and expenses which may, for example, be included in the period of accrual and not when actually received. Furthermore ROCE is more sensitive to fluctuating asset values and requires these to be calculated for every year as opposed to NPV and IRR which only require asset values at the beginning and end of the period.²⁹

ROCE is not, however, as far removed from the IRR as it may initially seem. Kay shows that the ROCE, after cash flow corrections and annual weightings, equates to the IRR.³⁰ This then is no different from calculating the IRR in the first place as all the data required for the IRR calculation is used in the weighted ROCE calculation and the output is a single figure that sheds no light on how profitability has changed over time.

The ideal profitability measures are then the truncated IRR and truncated NPV with ROCE used as a complimentary analysis to show the change over time.

3.1 Practical problems with profitability analysis

The primary set of practical issues that undermine the credibility of profitability analysis relate to the inability to translate accounting data, on which profitability analysis is based, into values usable for economic purposes. Bishop and Walker as well as Padilla and O'Donoghue point to the work of Fisher and McGowen that conclude³¹:

There is no way in which one can look at accounting rates of return and infer anything about relative economic profitability or, a fortiori, about the presence or absence of monopoly profits.

Instead it is necessary to modify the accounting data, particularly the value of assets, in order to make the results informative in an economic analysis. Indeed this may even provide only a

²⁷ Oxera (2003, para 4.42) identify that the denominator in the ROCE calculation for period t is the capital employed in period t . It is however also calculated based on capital employed in period $t-1$ or sometimes the average of the capital employed in period t and $t-1$. The average is perhaps the most correct because it reflects how capital employed grew over the year in generating the EBIT. This may not however be accurate when capital employed grew asymmetrically (large growth at the end of the year for example).

²⁸ Assets less current liabilities is taken to be the capital employed of the firm as current liabilities are not generally used to finance productive assets.

²⁹ Oxera (2003, para 4.43 and 4.44)

³⁰ Kay (1976)

³¹ Bishop and Walker (2010, p99) and Padilla and O'Donoghue (2006, 631)

snapshot of profitability which may be an inaccurate proxy for economic profits when the investments profitability is expected to change significantly over time. This logic stems from theory on product life cycle. It may for example transpire that an investment produces negative economic profits even in the years after investment and only begin to produce positive economic profits after the product has “matured” substantially. This may be because any additional product developments and improvements have been made by then, marketing costs have started reducing and volumes have increased substantially. This issue of a “mature” product is not well established in the economic literature, however it confirms the need to take a longer term perspective on profitability analysis rather than undermining its application altogether.

Of paramount concern then for the profitability analysis to have any credibility in a proceeding is the need to ensure that the data are accurate in measuring their intended purpose. The various inputs into the WACC calculation are discussed in sub-section 3.1.1, the means by which assets should be valued is briefly discussed in sub-section 3.1.2, and the allocation of costs and revenues between business units is highlighted in sub-section 3.1.3.

3.1.1 Complications with the calculation of WACC

The Finnish Market Court (FMC) overturned a finding by the Finnish Competition Authority (FCA) against the Port of Helsinki for changing excessive prices (passenger fares). The FCA based its conclusions on the fact that the Port of Helsinki had been earning large positive economic profits on this operation. While it has already been acknowledged in this paper that basing any conclusions on profitability alone is dangerous, the FMC also criticised the analysis because of the sensitivity of results to small changes in the data used. As such the FMC concluded that “profitability calculations can serve as an indication, but only if there is also other evidence supporting the claim of excessive pricing.”³² This not only makes it necessary to be careful in sourcing data on the risk free rate of return, the firm beta and the market risk premium, but also to test to see how sensitive the results are to changes in these data.

The risk free rate is the rate investors can earn without incurring any risk. This is generally taken to be long term government bonds (R157 government bond in South Africa). The return on the market is taken to be the return calculated from the all share index on the JSE as it by definition has a Beta value of 1. The market risk premium is then the difference between what the market portfolio (with $\beta=1$) and the risk free rate.

Figure 2 shows a stable yield on the R157 bonds and a less stable market return. The market risk premium is thus calculated as the average over a sufficiently long period. Using the ten year period from 2000 to 2009 the average market return was 14.81%, the average risk free rate was 9.13% resulting in a market risk premium of 5.68%. The complication that arises here is that there is no consistently applied period used to calculate these averages. Table 2 shows that when different historic periods are applied the MRP result can be drastically different. If the 3 years from 2007 to 2009 are used then the MRP is -1.7% whereas if the 6 years from 2004 to 2009 are used then the MRP is 12.4%. While a longer period would be more conservative it

³² Padilla and O’Donoghue (2006, 631)

would be prudent, especially in more volatile markets, to include a sensitivity analysis of the MRP in any profitability analysis.

Figure 2: South African risk free rate (R157) and equity returns (Allshare returns)



Source: I-net

Table 2: Average returns and MRP for different historic periods from 2009

	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year
Average R157	8.0%	8.0%	7.9%	7.9%	8.1%	8.4%	8.7%	9.1%
Average allshare	6.4%	14.2%	20.0%	20.3%	19.1%	15.3%	16.7%	14.8%
MRP	-1.7%	6.2%	12.1%	12.4%	11.0%	6.9%	8.0%	5.7%

Source: Authors calculations using inet data

The final contentious input required in the calculation of WACC is the equity beta of the firm. This is a measure of systematic risk specific to the firm and measures how returns in the firm's equity move together with returns to the market. This is a simple regression of the firm returns to that of the market³³:

$$R_M = e + \beta R_A \dots\dots\dots(\text{Equation 5})$$

³³ While the use of CAPM remains the preferred measure for the uses in competition economics and indeed more widely in corporate and investment finance, the use of a multi-factor model (specifically Fama French models) has emerged as a potential improvement to the single factor model.

...where R_M is the market return, e is the error term, β is the co-efficient on the independent variable and is the firm equity beta, and R_A is the firm's return.

Here again there is a lack of a firm consensus on what data to use when calculating a firm's equity beta. These centre around: the duration of historic data used; the frequency of observation (daily, monthly etc.), what should be used to measure the market return; and, the treatment of outliers.

The equity beta estimates for ArcelorMittal South Africa (AMSA), African Bank Investments Limited (ABIL) and the JSE Securities Exchange (JSE) are shown in Table 3, Table 4, and Table 5 based on ten and a half years, 5 years and three years of historic data respectively. It is evident that the duration of historic data used and the periods used for calculation make significant differences in the equity beta estimates.

Bloomberg calculates an equity beta for AMSA of 1.23³⁴ and for ABIL of 1.03³⁵, and Reuters calculate an equity beta for AMSA of 1.34³⁶ and for ABIL of 0.86^{37, 38}. While point estimates may be appropriate for use in finance, it may be prudent to use sensitivities of the equity beta based on a confidence interval approach for use in a profitability analysis. This is more problematic in South Africa because the JSE is significantly less liquid than its counterparts in the US and Western Europe. This results in potentially far wider confidence intervals and hence less certainty in the calculation of a firm's cost of capital.

Table 3: Beta estimates based on a 10 and a half year history, close 1999 - end June 2010

	Daily		<i>n</i>	5 - daily		<i>n</i>	Monthly		<i>n</i>	Quarterly		<i>n</i>
AMSA	1.08		2241	1.29		447	1.32		103	1.36		34
95% c.i.	1.01	1.16		1.11	1.47		0.93	1.72		0.63	2.08	
ABIL	0.74		2735	0.62		546	0.64		125	0.56		41
95% c.i.	0.67	0.80		0.47	0.78		0.32	0.95		-0.02	1.13	
JSE	0.54		1061	0.56		211	0.97		48	1.16		16
95% c.i.	0.47	0.62		0.36	0.76		0.36	1.59		-0.50	2.82	

Source: Own calculations using inet data

Table 4: Beta estimates based on a 5 year history, 2005 to 2009

	Daily		<i>n</i>	5 - daily		<i>n</i>	Monthly		<i>n</i>	Quarterly		<i>n</i>
AMSA	1.10		1304	1.21		261	1.46		60	1.44		20
95% c.i.	1.01	1.19		1.01	1.40		1.06	1.86		0.45	2.42	
ABIL	0.81		1304	0.78		261	0.77		60	0.39		20
95% c.i.	0.73	0.88		0.62	0.94		0.37	1.16		-0.28	1.06	
JSE	0.56		933	0.60		186	0.96		42	1.17		14
95% c.i.	0.48	0.64		0.37	0.83		0.29	1.64		-0.71	3.06	

Source: Own calculations using inet data

³⁴ From Bloomberg online for ticker ACL:SJ

³⁵ From Bloomberg online for ticker ABL:SJ

³⁶ From Reuters online for symbol ACLJ.J

³⁷ From Reuters online for symbol AFRVF.PK.

³⁸ These are all within the 95% confidence interval of the estimates based on a five year history.

Table 5: Beta estimates based on a 3 year of history, 2007 to 2009

	Daily		<i>n</i>	5 - daily		<i>n</i>	Monthly		<i>n</i>	Quarterly		<i>n</i>
AMSA	1.17		784	1.22		157	1.35		36	1.73		12
95% c.i.	1.06	1.28		0.96	1.47		0.84	1.86		0.35	3.11	
ABIL	0.81		784	0.79		157	0.64		36	0.00		12
95% c.i.	0.72	0.91		0.59	0.98		0.15	1.12		-0.60	0.59	
JSE	0.52		784	0.62		157	0.91		36	0.76		12
95% c.i.	0.44	0.61		0.39	0.86		0.31	1.51		-0.59	2.11	

Source: Own calculations using inet data

3.1.2 Asset valuations³⁹

Correctly valuing a firm's assets is a pivotal component of a profitability analysis because it forms both the start and end points of any truncated IRR or NPV analysis. Oxera explain in detail the correct methods for valuing an asset with the conclusion that they:

should be valued on the lower of the replacement cost or economic value, where its economic value is determined by the higher of its PV of its future earnings or its net realisable value.

They further discuss the complexities that arise when a firm has invested in intangible assets such as branding. These, because they increase the future cash flows of a firm, should be included in the total asset value. Valuing intangible assets cannot be based on market valuations given that they would then, in a circular fashion, result in the firm making exactly normal profits. Oxera discuss various methods that can be used to estimate the value of assets and maintain that, like with tangible assets, the methods should reflect the "value-to-the-owner" approach.⁴⁰ Ultimately however these valuations remain estimates at best and a sensitivity analysis should be run on them when using them in a profitability analysis.

3.1.3 Cost and revenue allocations

It is often the case that the profitability is question is of a business unit or specific product and not the entire firm. In circumstances such as this it would be necessary to allocate common and joint costs of the firm to the specific business unit or product line. Furthermore, to the extent that there is bundling of products sold, revenues would need to be allocated to each product within the bundle. Lastly, where a firm on sells a product to a subsidiary for resale, or one business unit produces a component and on sells it to another business unit within the firm to produce the product in question, a market based transfer price needs to be calculated to avoid misplacing any potential rents. For a full discussion on these issues and the methods used to estimate cost and revenue allocations in these situations see the relevant section in Oxera.⁴¹

³⁹ For a comprehensive discussion on asset valuations see Oxera (2003: para 5.01 to 5.47)

⁴⁰ Oxera (2003: para 5.29 to 5.32)

⁴¹ Oxera (2003: para 6.01 to 6.55)

4. The JSE Limited (JSE) Case Study

4.1 Overview of the JSE

The JSE is a financial products exchange which facilitates the buying and selling of securities by the market. The firm provides trading, clearing and settlement of equities, derivatives, interest rate products and other associated instruments. In providing these financial services the JSE is licensed in terms of the Securities Services Act. The JSE has managed to increase its product offering to include this broad spectrum of products through both product development and acquisition.⁴²

In 2001 the JSE acquired SAFEX Clearing Firm (SAFEX) and in 2009 the Bond Exchange of South Africa (now called BESA as it is no longer an exchange).

The JSE replaced the “open outcry trading floor” with an automated trading system called Johannesburg Trading System (JET) in 1996 (replaced by SETS hosted by the LSE in 2002) and also automated the dissemination of firm announcements and other relevant news through the Securities Exchange News Service (SENS) in 1997. Between 1999 and 2002 the JSE, together with the large banks in South Africa, continued the automation of the trading process by launching STRATE which dematerialised trades and replaced it with electronic settlement.⁴³ As such physical shares no longer needed to be authenticated and transferred in order to settle a trade. These improvements contributed substantially to making the product development that followed possible. These included the launch of various Satrix products, single stock futures, Yield-X interest rate products, launch of the Alt-X board, various exchange traded funds, amongst others.

Amidst this overhaul of JSE systems, product development and acquisition of other securities exchanges in South Africa, the JSE demutualised on 1 July 2005 and in June 2006 listed on the JSE main board. Prior to the demutualisation only authorised users of the JSE or traders could own interests in the JSE, however after mid 2005 this opportunity was afforded to any member of the public.

4.2 JSE weighted average costs of capital – the perfectly competitive benchmark

Equity beta estimates for the JSE from Table 4 were used⁴⁴ along with the analysis on risk free rates and the market risk premium from sub-section 3.1.1. The cost of debt was estimated from the interest expenses and the average long term debt of the JSE.⁴⁵ Lastly the proportions of assets financed through debt and equity were sourced from JSE annual reports. Figure 3 shows estimates of WACC over time where the upper and lower limits on the 95% confidence interval of the equity beta calculation were used as sensitivities of WACC to beta estimates, and an

⁴² JSE annual reports

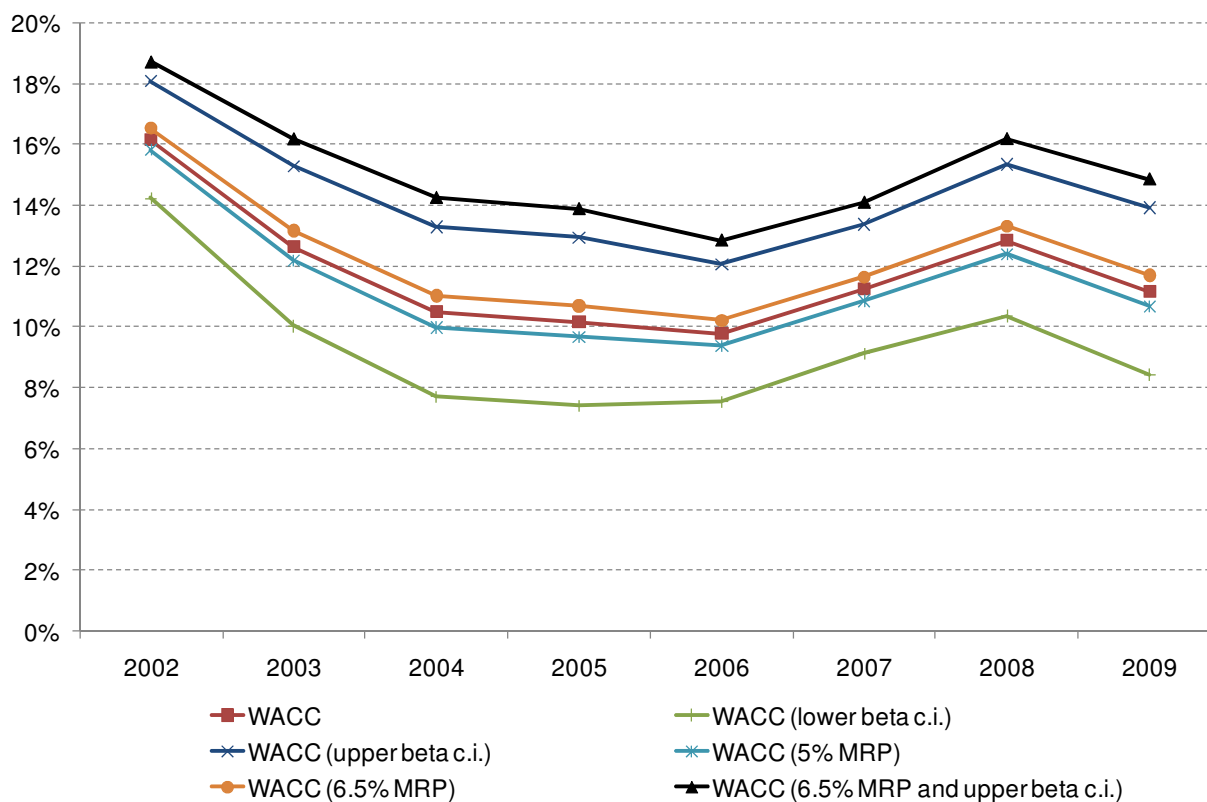
⁴³ The JSE owns 44.55% of STRATE Limited (2009 JSE Annual Report)

⁴⁴ This was for the one month estimates on a 5 year history taking the p value as well as the upper and lower values of the confidence intervals for the purposes of sensitivity analysis.

⁴⁵ This was used as a conservative estimate. It is likely to be lower given that some forms of current liabilities may incur interest expenses.

MRP of 6.5% and 5% were used as sensitivities on WACC to the MRP of which is 5.7% in the standard WACC calculation (labelled as “WACC”). The highest WACC in every period is unsurprisingly given by the WACC with the upper sensitivities of MRP and equity beta and shall be used as the benchmark despite the fact that it may be overly conservative.

Figure 3: WACC calculations for the JSE, 2002 - 2009



Source: Own calculations using data from JSE Annual Reports

4.3 JSE profitability analysis

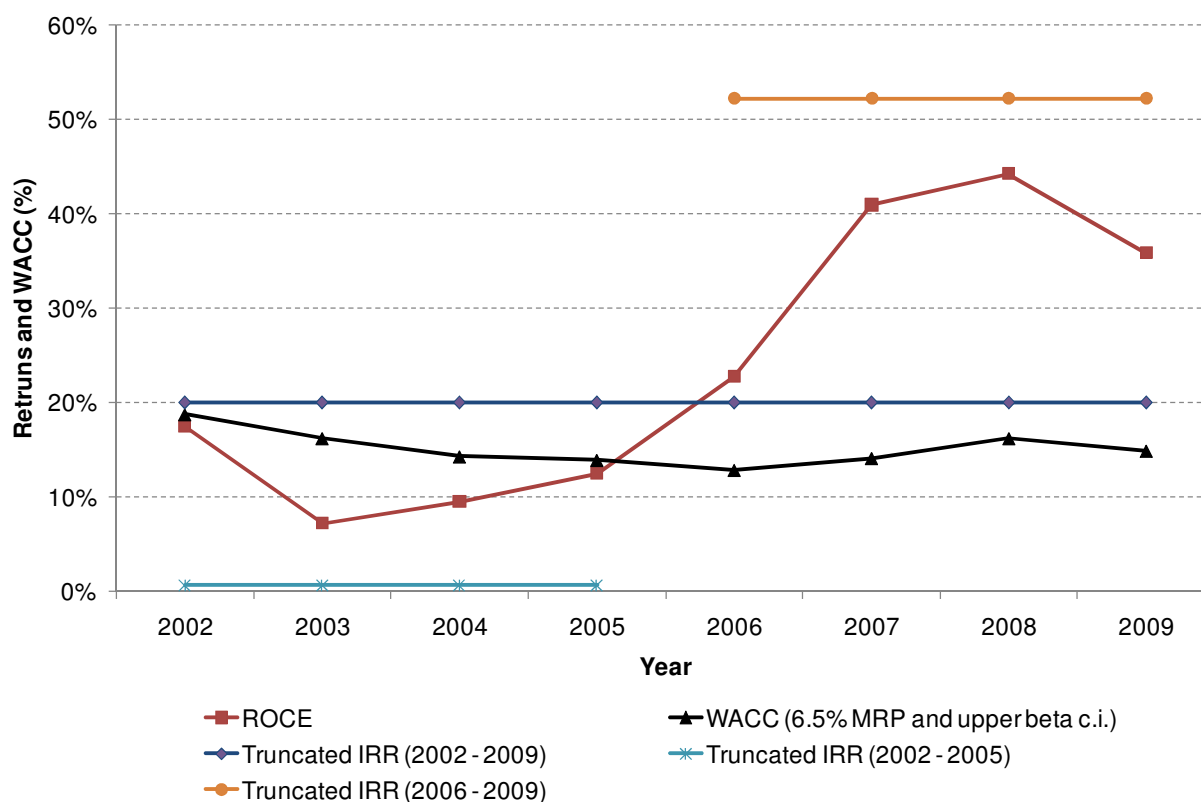
The cash flows generated by the JSE for the 2002 to 2009 period produce a truncated IRR of 20.00%.⁴⁶ This is not significantly higher than the upper sensitivity of WACC for the same period which was 15.13%. Subsequent to the acquisition of SAFEX in 2001 it seems that the JSE has only produced moderate positive economic profits and that these may be driven to a large extent by reductions in the cost of debt and the risk free rate over the period that reduced WACC from almost 19% to just under 15%. This assumes that the correct starting point is the acquisition of SAFEX.

As previously mentioned, a ROCE analysis is informative insofar as it illustrates profitability over time as opposed to a single value for the entire period. Figure 4 shows that the ROCE for the JSE remained below the WACC following the acquisition of SAFEX and only exceeded WACC in 2006 after which it is never reverted to being below WACC. This suggests that the JSE only

⁴⁶ This was based on balance sheet value of total assets (including intangibles) without any adjustment.

became excessively profitable following its privatisation in 2005. Indeed the truncated IRR values for the 2006 to 2009 period significantly exceed WACC while the truncated IRR value for 2002 to 2005 is well below WACC. The conclusion then is that the JSE has earned large positive economic profits subsequent to privatisation in 2005.

Figure 4: JSE ROCE, WACC and truncated IRR, 2002 to 2009



Source: Own calculations using data from JSE Annual Reports

4.4 Reasons for the JSE's high profitability

It is possible, judging from the shape of ROCE in Figure 4, that the returns in the industry are cyclical and that the period after 2005 till present is simply in a profitable portion of the cycle. This is one of the reasons why the analysis needs to be over a longer period than 4 years.⁴⁷

Another reason may be that the privatisation led to significant efficiency improvements being put in place at the JSE. Figure 5 does show that JSE expenses per equity transaction and per equity derivative transaction did decline after 2005.

Also visible in Figure 5 is that revenues grew far faster than expenses after 2005. And may indicate that the JSE increased prices faster than the rate at which expenses rose. Implicit in

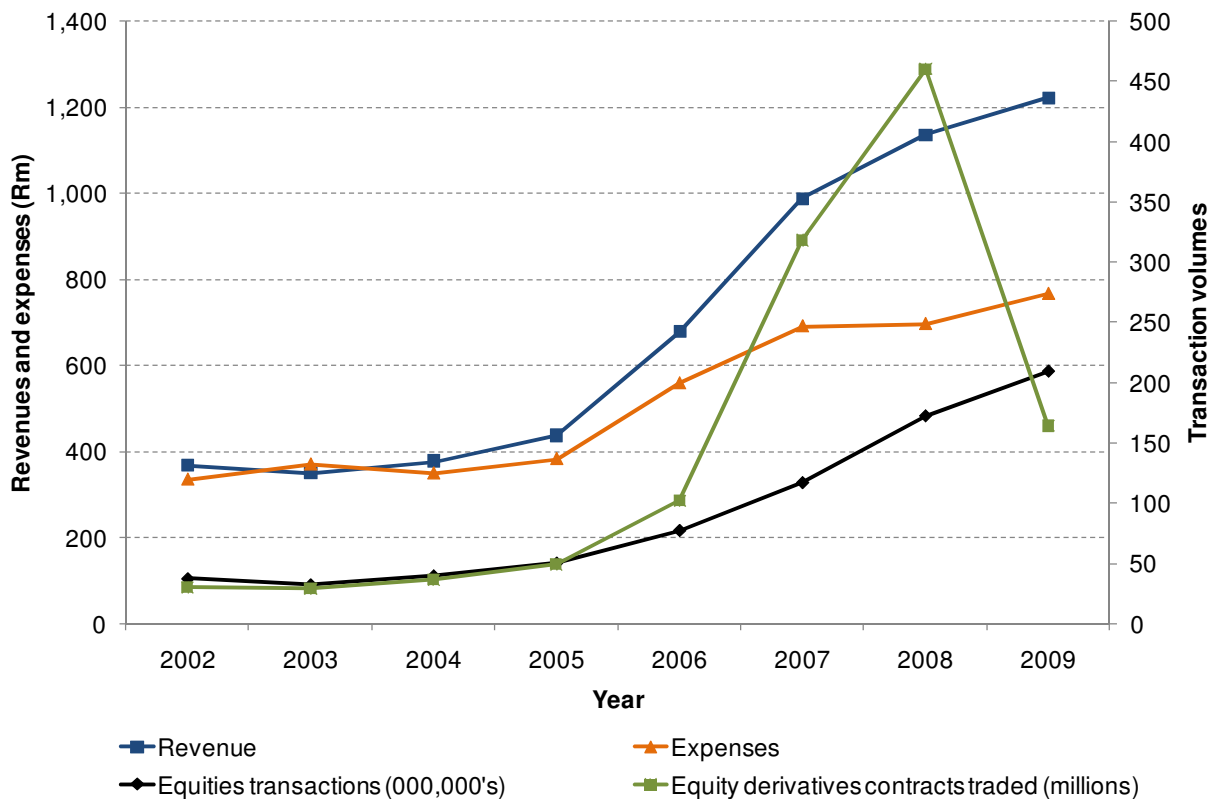
⁴⁷ It is not clear what the cycle would be, if indeed the JSE does follow one. It may not, as one would initially assume, follow the economic cycle. In the recession of 2008 transaction volumes may have been high because of speculators taking short positions, momentum investors exiting positions or value investors expanding on long positions et cetera. As such it would be difficult to speculate on what cycle the JSE may follow, but it would not be sufficient to make a claim that it is not cyclical because it was highly profitable in 2008.

this possible explanation is the anticompetitive concern: that absent any competition, and with the new profit incentive, the JSE used its dominance to extract exorbitant profits at the expense of consumer.

The widening gap between revenues and expenses can be explained by a shift in product mix if more profitable transactions contributed a greater proportion of revenues. It seems that product mix has changed over the period, especially from STRATE ad valorem fees, however it is not possible to identify the expenses and hence profitability per revenue stream from public data.⁴⁸

Lastly the profits may have arisen through economies of scale that became apparent only after volumes increased beyond their 2005 levels. Figure 5 shows that volumes of large revenue streams increased dramatically after 2005.⁴⁹

Figure 5: JSE revenues, expenses, and select transaction volumes, 2002 - 2009⁵⁰



Source: JSE Annual Reports

⁴⁸ See Table 6 and Figure 6 in appendix A

⁴⁹ Equity derivative volumes in 2009 were less than half those in 2008 however this is explained in the 2009 (JSE Annual Report) to not have as pronounced a revenue effect due to the product mix, the lowest revenue derivative sales were not transacted while the high value transactions continued to be made.

⁵⁰ Equity transactions and equity derivative transactions were used because they underlie the equity transaction fees, equity derivative transaction fees and the Risk management, clearing & settlement fees which are the three fastest growing revenue streams over the period and comprise half of total revenue to the JSE in 2009. This is shown in Table 6 and Figure 6 in appendix A.

5. Conclusions and areas for further analysis

Profitability analysis is heavily criticised on theoretical grounds and is fraught with practical problems. Despite these, where it is possible, profitability analysis is a useful tool in understanding the workings of a market or firm. It is not suggested that profitability analysis can be definitive in answering specific competition policy questions such as: is a market operating competitively; or, is a firm pricing excessively. Rather, it should be used to complement other relevant analysis.

The application of profitability analysis in South Africa is no different from that in other jurisdictions, however some of the data used as an input may require additional caution. Specifically the risk free rate and market risk premium may fluctuate to a greater extent than in US and EU markets, and the JSE's lack of strong liquidity may make firm equity betas less reliable. These concerns should not be used as a reason not to use profitability analysis in South Africa, instead sensitivities should be used to accommodate these concerns.

Differences in accounting practices were not discussed in this paper. It seems likely that South African Generally Accepted Accounting Practices, given that they follow International Accounting Standards, are in line with other jurisdictions; however this remains to be seen. Another area that may produce interesting results is the degree to which the use of the Capital Asset Pricing Model produces different results compared to the results when a multi-factor model such as a Fama French type model is used to calculate the cost of capital. Lastly it would be useful to research the economic profitability of companies in South Africa in order to understand what economic profits are being earned by more efficient firms in competitive markets. This would be useful in developing an understanding of what economic profits may be extraordinarily high and those that are acceptably high.

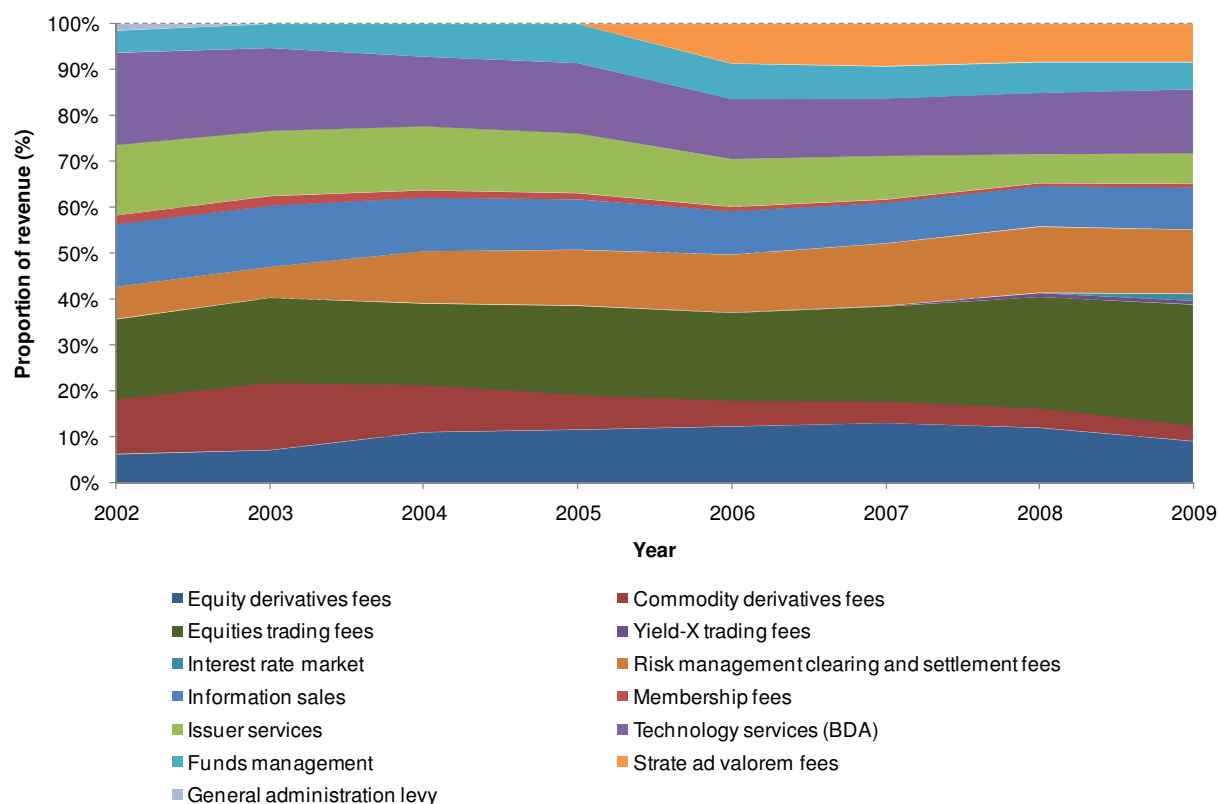
Appendix A

Table 6: JSE breakdown of revenue per revenue stream for 2002 and 2009

Revenue stream	Revenue (ZAR)		Proportion of revenue			CAGR 02-09
	2002	2009	2002	2009	Change	
Equity derivatives fees	22,121	106,700	6.2%	9.1%	2.8%	25.2%
Commodity derivatives fees	43,035	41,241	12.1%	3.5%	-8.6%	-0.6%
Equities trading fees	61,949	309,980	17.4%	26.3%	8.9%	25.9%
Yield-X trading fees	-	9,475	-	0.8%	-	-
Interest rate market	-	18,123	-	1.5%	-	-
Risk man. clearing & settlement fees	24,853	163,663	7.0%	13.9%	6.9%	30.9%
Information sales	48,450	108,773	13.6%	9.2%	-4.4%	12.2%
Membership fees	6,805	8,360	1.9%	0.7%	-1.2%	3.0%
Issuer services	54,879	78,853	15.4%	6.7%	-8.7%	5.3%
Technology services (BDA)	71,648	164,818	20.1%	14.0%	-6.1%	12.6%
Funds management	16,840	69,365	4.7%	5.9%	1.2%	22.4%
Strate ad valorem fees	-	97,830	-	8.3%	-	-
General administration levy	5,253	-	1.5%	-	-	-

Source: Own calculations using data from JSE annual reports

Figure 6: JSE breakdown of revenue per revenue stream, 2002 – 2009



Source: Own calculations from JSE annual reports

References

Oxera (2003), "Assessing profitability in competition policy analysis", OFT Economic Discussion Paper 6, OFT657

Bishop, S. and Walker, M. (2010), *The Economics of EC Competition Law*, Thomson Reuters, London

Bloomberg online, found at: <http://www.bloomberg.com/>, accessed on: 29 July 2010

Calcago, C. and Walker, M. (2010), "Excessive Pricing: Towards Clarity and Economic Coherence", *Journal of Competition Law & Economics*, 00(00), 1-20

JSE Annual Reports (2002, 2003, 2004, 2005, 2007, 2008, and 2009), found at: <http://phx.corporate-ir.net/phoenix.zhtml?c=198120&p=irol-reportsannual>, accessed on: 16 July 2010.

Kay, J.A. (1976), "Accountants Too Could be Happy in a Golden Age: The Accountant's Rate of Profit and the Internal Rate of Return", *Oxford Economic Papers*, 28, 447-60

Lind, R., Muysert, P, and Walker, M. (2002), "Innovation and competition policy", OFT Economic discussion paper 3, OFT377

Lind, R. and Walker, M. (2003), "The (mis)use of profitability analysis in competition law cases", CRA Competition Policy Discussion Paper 9, December

Motta, M. and de Streel, A. (2003), "Exploitative and Exclusionary Excessive Prices in EU Law", Paper presented at the 8th Annual European Competition Workshop, June

The UK Monopoly and Mergers Commission (1995), A report on the supply of video games in the UK

Office of Fair Trading of the United Kingdom (2004a), Assessment of conduct: Draft competition law guideline for consultation, OFT414a

Office of Fair Trading of the United Kingdom (2004b), Assessment of market power, OFT415

Padilla, A.J. and O'Donoghue, O. (2006), *The Law and Economics of Article 82 EC*, Hart Publishing, Portland Or.

Reuters online, found at: <http://in.reuters.com/>, accessed on 29 July 2010

Verizon Communications Inc. v. Law Offices of Curtis V. Trinko, LLP, 540 U.S. 398, 407 (2004).