The influence of year, period, supersector, and business specific effects on the profitability of South African publicly listed companies

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ABSTRACT

The determinants of profitability should be at the forefront of CEO's, managers and business owners minds. Whether the business takes a stockholder or stakeholder approach profit maximisation is the source for the sustainability of a business. International research has been conducted since the 1970's to establish the effects year, company and industry structure have on the profitability of companies. There is still no consensus as to which variables have the greatest effect on performance of firms.

A quantitative research methodology was followed whereby all organisations listed on the Johannesburg Stock Exchange were categorised into their respective Supersectors for the period 1983 to 2008. The performance measures of return on assets, return on equity and return on capital employed were then calculated for all companies and analysed across year, period, company, interaction of company and year, interaction of company and period and finally against Supersector.

Five of the six hypotheses in the Variance Component tests showed a variation and one did not. Of these, Supersector was seen as having no variance, and hence no impact on the profitability of firms. Year, period, company and the interactions of these showed significant variance in determining profitability. These results show that year, period (pre and post apartheid) and company do have an effect on the profitability of listed companies. This study allows for Corporate Strategists to focus their efforts on the areas that will have the greatest impact.

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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I am that much closer to finding the light switch.

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1.1 BACKGROUND

At no point in time has the subject of corporate profitability become more significant than in the current economic meltdown when many companies are failing, some with an enviable track record of decades. Banks, financial intermediaries and automobile companies are filing for bankruptcies at an alarming rate threatening the stability of the world economy. Yet in these gloomy times there are examples wherein industries have survived without a corporate fatality as some banks and even automobile companies have endured. In South Africa for example we haven't had a single failure of banks. In the automobile industry Toyota and Honda have largely survived without multi-billion dollar bailout packages. This raises a key question: What are the determinants of firm profitability?

The issue of determinants of firm profitability has been a central question for practitioners and academics for the last fifty years. The discussion has focused on three main determinants: industry, firm uniqueness or strategy and parent – subsidiary relationship. In the 1970s and 1980s the discussion was along a conceptual line with few empirical studies to verify the assertion of different advocates. The leading advocate of the industry school war Porter (1980) who argued that industry structure was the main determinant of firm profitability. Rumelt (1981) argued that it was the firm strategy that was the key determinant of firm profitability. Prahalad and Hamel (1996) suggested that it was the corporate-subsidiary relationship which determined the firm's profitability. The conceptual debate was resolved by a series of empirical studies by

Schmalensee (1985), Rumel (1981) and Porter (1980). These studies were based on US data. There have been no studies done on South African data in this way. The South African context is different to the United States of America in many ways. The key differences are the following:

1. The apartheid system resulted in isolation of South Africa and its industries and firms from international competition. This seriously constrained the competitiveness of South African industry.
2. The discovery of diamonds and gold attracted big capital into South Africa. This gave rise to big players dominating in many industries.
3. The apartheid system, isolation from the world and presence of big players gave rise to many conglomerates.

These differences provide reason to hypothesise that the empirical findings of the US may not be applicable to South African context. Comparing these results pre and post apartheid would also give insight into the effects that these patterns have on companies and an economy as a whole. The proposed study is to establish the determinants of firm profitability in South Africa. This study uses data for the last twenty five years of firms listed on the Johannesburg Stock Exchange to find the answers.

This study will be of significant benefit to Chief Executive Officers (CEOs) board members and business owners in designing their business strategies.

1.2 THE RESEARCH PROBLEM

One of the CEO's major interests over his or her tenure is to understand the effects of Industry, time and business specific effects on the profits that they can

expect to receive. However, there is conflicting research around the determinants of firm performance, “one view is based primarily on an economic tradition, emphasising the importance of external market forces in determining firms’ success. The other line of research builds on the behavioural and sociological paradigm and sees organisational factors and their fit with the environment as the major determinants of success” (Hansen, 1989, p. 402). The empirical studies done by McGhan, Porter and Rumelt (1981) have weakened the industrial economist view and have led the academic community to believe that the efficiency of a firm is what determines its success. It is essential to determine how South African companies fare in regard to these two schools of thought, as this will explain how South African company performance reacts to external forces and hence how Corporate Strategy can be implemented in a more accurate manner to try to enhance company performance.

Rumelt says that industry has been the “dominant unit of analysis” (1991, p. 4) within organisational economics, and hence it has been used to understand effects on profitability. This arose from “Schmalensee seeking to resolve a conflict within industrial economics between economists who emphasise a classical focus on industry and market power as a primary determinant of profitability and a revisionist school that emphasises efficiency of firms” (Brush, 1998). However, “the field of business strategy offers a contrary view: it holds that the most important impediments are not the common property of collections of firms but arise instead from the unique endowments and actions of individual corporations or business units” (Rumelt, 1991, p. 6). These “two schools with

significant influence in strategic management, have been at odds with one another regarding the magnitude and persistence of firm effects. The resource-based view argues that firm heterogeneity is significant and persistent, whereas industrial organisation suggests that industry effects dominate over time" (Mauri and Michaels, 1998, p. 215). It is therefore of interest to both the business and academic communities to see which school the empirical data supports within South Africa.

1.3 OBJECTIVES OF THIS RESEARCH

The objective of the research is to provide empirical evidence on the impact that year, period (Pre-1994 and Post-1994), company, the interaction of company and year and finally Supersector classification, have on the profitability of Johannesburg Stock Exchange listed companies. Strategic research has indicated that industry performance and corporate parent involvement has had little to do with the profitability of a company. Much investigation has taken place in the United States of America. Some of the studies show little correlation between how a company performs and the performance of the industry or corporate parent and others studies show a large correlation. It is therefore of strategic interest to determine whether any such correlations exist within South African publicly listed companies in order to determine where best to utilise strategy execution for maximum returns.

1.4 SCOPE AND LIMITATIONS OF THIS RESEARCH

1.4.1 Scope

The scope of this research will deal with a study originally performed by Rumelt (1991) and later updated by McGahan and Porter (1997) that analysed the importance of year, industry, corporate parent and business specific effects on the profitability of U.S. firms. The study was a quantitative one in which the major model $r_{i,k,t} = \mu + \gamma_t + \alpha_i + \beta_k + \phi_{i,k} + \varepsilon_{i/k,t}$ by Rumelt (1991) was used. The study was carried out on US public corporations within specific four digit Standard Industrialisation Codes categories. This research will replicate the Porter (1997) study within a South African context by taking a census of all Johannesburg Stock Exchange listed companies. Corporate Parent analysis, however, has been dropped from the equation due to data limitations. The Johannesburg Stock Exchange is not large enough to track corporate parent ownership across industry and time effectively. However, the period analysed has been increased to a twenty year period to reduce the potential error rate that would be experienced in a study with a shorter time frame. This also allows the researcher to analyse effects pre and post apartheid.

In doing so, the researcher will be able to determine if the South African firm is affected by the collective or by business unit performance. This will also allow him to see how effective strategy making is at an industry or corporate parent level and if strategists are better suited at implementing strategy at a business unit level. This area of study has much importance for business in South Africa. Business will be able to understand through empirical quantitative analysis

whether or not their strategy creation, execution and implementation are at all viable at an executive level. Also CEO's and executives in business will be able to understand where best to put their strategic efforts for maximum impact and most importantly, be able to determine whether poor performance is related to the current industry either international corporate parent's effects or the lack of efficiency of the firm. In the current day and age it is all too easy for leaders of companies to blame the economic environment for poor performance. Through this study it will be possible to determine of what aggregate variance year, period (Pre-1994 and Post-1994), company, the interaction of company and year/period and finally Supersector classification has on the profitability of Johannesburg Stock Exchange listed companies.

Johannesburg Stock Exchange Super Sector classification was adopted as opposed to the Standard Industrialisation Codes classification. This has allowed for a "finer grain" (McGahan and Porter, 1997, p. 19) analysis and hence is more accurate than the broad four digit Standard Industrialisation Codes code used. The census of all companies was tested and thus error rates and bias should be negligible.

1.4.2 Potential Limitations

The potential limitations of the research project can be summarised as follows.

- Corporate Parent effect and hence involvement can not be tested due to lack of usable data.
- Utilising secondary data that has not been created specifically for the purpose of this study could result in flawed tests.

- All Johannesburg Stock Exchange listed companies were tested. The banking sector may have skewed the data due to their unique debt to equity ratio. However, a true reflection of the South African corporate landscape was desired.

2. LITERATURE REVIEW

2.1 CORPORATE STRATEGY

2.1.1 DEFINITION OF CORPORATE STRATEGY

If one adopts Andrews' (1987) view of the purpose of Corporate Strategy one sees it is a pattern of decisions that moves a firm to its desired goals, both economic and non economic. One also sees that "Literature on strategic management typically distinguished between business and corporate strategy. Business strategy deals with the ways in which a single-business firm or an individual business unit or a large firm competes within a particular industry or market. Corporate strategy deals with the ways in which a corporation manages a set of businesses together" (Bowman and Helfat, 1997, p. 3). This sums up the difference between the two areas concisely and is important in order for the researcher to contextualise this study. The study is looking at the effects of year, period, company and Supersector along with business specific effects and hence should be able to prove the variances of each on profitability.

This being the case, the question then is, where best to make these decisions? This is a vital question within the context of this entire analysis, as one will be able to determine, once all the data has been analysed within the McGahan and Porter (1997) model, which areas actually do affect firm performance. In so understanding these effects one can place the strategic emphasis at these levels.

The Resource Based View which "over the past 15 years…has become one of the standard theories in strategy "(Hoopes, Madsen and Walker, 2003, p. 898), it asks the question of how firms within the same industry vary in "performance over time" (Hoopes *et al*, 2003, p. 890). The objective within this analysis is not to debate the Resource Based View itself, but it does allow one to understand why, within the analysis by McGahan and Porter (1997) analysis, industry only counted for a 19% variance in profitability. Within an analysis of South African publicly listed companies, it will be interesting to see if a similar correlation towards a Resource Based View approach indeed exists. The Resource Based View shows that firms within the same or similar industries differ due to resources and capabilities. Also, in order for these to be a "source of competitive advantage they must be valuable, rare and isolated from imitation or substitution" (Hoopes *et al*, 2003, p. 891). Surely industry dynamics have a great deal to do with what is allowed to be substituted or imitated? However, when looking at the heterogeneity of an industry one has to assume that the rules of the game apply to all the players, otherwise the industry is not in fact an industry, but is a sub-industry of a greater whole.

Globally there is much data and information around markets and industries but how useful is it really when it only counts 19% of firm performance. There is an juxtaposition between markets and resources in that "we have a rich taxonomy of markets and substantial technical and empirical knowledge about market structures. In contrast, 'resources' remain an amorphous heap to most of us" (Wernerfelt, 1995, p. 173). This understanding was posed by the original founder of the Resource Based View ten years after publishing the initial paper.

There is much truth in that little is understood about resources and resource alignment, although much work has been done around this to date. One can deduce that much of strategy must be focused at a more granular and detailed level. This may mean that corporate parent and industry actually have little effect on the success of a firm and that there may be a need to focus our efforts at the coal face of business, that being the business unit.

2.2 INDUSTRY STRUCTURE AND PROFITABILITY

2.2.1 INDUSTRY LEVEL vs FIRM LEVEL DRIVERS

The study by McGahan and Porter (1997) suggests that the effect of industry only counts 19% of the aggregate variance in profitability. This is a very interesting finding and creates many questions around the effectiveness of Corporate Strategy and the long established view of Industrial Economics that industry has strong and direct effects on a firm's performance. It is apparent that "firm effects and industry effects capture the degree of heterogeneity within an industry. They underlie several important concepts in strategic management, such as distinctive competence and competitive advantage" (Mauri and Michaels, 1998, p. 218).

When one looks at the popular models on industry structure, such as Five Forces (Porter, 1980) and the Value Net (Branden-burger and Nalebuff, 1996, p. 261) one sees that there are indeed interrelated industry dynamics. The issue then becomes "(1) Do the effects of industry forces vary across firms in an industry? (2) Given such variation, how can industry forces lower or raise the heterogeneity in performance among firms?" (Hoopes *et al*, 2003, p. 888). If

one looks at the first question one can certainly answer yes, as some players within an industry may produce more, and hence be less price sensitive, or there may be one player that has a larger market share, this all shows that "defending against industry forces does not depend on a firm's value or cost position per se (Porter, 1980), but on the difference between the firm's value offering and its cost" (Hoopes *et al*, 2003, p. 887) this clearly shows that industry effects at large have little significance in relation to the profitability of firms.

Looking at the answer to the second question one sees that "given competitive heterogeneity, industry forces lower or raise performance variance only in special circumstances, for example, when strong firms face buyers (or suppliers) that are proportionately more powerful than those faced by weaker competitors. Strong firms' investments in productivity innovations that increase value or decrease cost generate heterogeneity in the firms' resources and capabilities." (Hoopes *et al*, 2003, p. 887). Again it is clear that under special circumstances this exists, however generally industry forces in fact do not lower or raise performance of firms.

This is in accordance with the firm based view that competitive advantage, and thus profits, stem from the unique internal differences that exist within the firm and are "difficult to imitate" (Mauri and Michaels, 1998, p. 218). Therefore "These unique strategies and resources, in con-junction with causal ambiguity, create isolating mechanisms that protect the competitive positions of firms against imitation (Lippman & Rumelt, 1982; Reed & DeFillipi, 1990). This

heterogeneity in turn leads to systematic differences in firm performance within the same industry (Mauri and Michaels, 1998, p. 217). This argument is sound as its premises support the conclusion, and the premises could be true.

However the industrial based view sees that "shared industry characteristics such as market structure and imitation of strategies lead to convergence of core strategies and performance among firms in the same industry and differences across industries" (Mauri and Michaels, 1998, p. 217). This dictates that membership of a particular industry actually influences performance, but, according to McGahan and Porter (1997) analysis, only 19% counts for variance in profitability. In regards to this analysis it will be of vital interest to see if the results of this study support the resource based view or reject it, as there can then be a more comprehensive view of the South African corporate landscape.

There is however a solution proposed by Mauri and Michaels (1998) that attempts to take the best of both models and use them in a complementary manner. They believe that "Industry-level drivers that promote homogeneity coexist with firm-level drivers that generate heterogeneity, just as various forms of competition coexist within the same industry" (Mauri and Michaels, 1998, p. 218). They could well be correct and their empirical evidence suggests that this complementary model is possible and does exist as " the results from core strategies support the strong influence of industry-level drivers on research and development and advertising investments, whereas the results for performance

confirm the strong effect of firm-level drivers" (Maurie and Michaels, 1998, p. 219)

2.2.2 SUPERSECTOR

Studies of this nature that were completed in the United States of America utilising New York Stock Exchange (NYSE) information used Standard Industrialisation Codes (SIC) to the fourth digit. These categories "define individual industries and trade within the total organisation market" (Adner and Helfat, 2003, p. 1014). In other words these Standard Industrialisation Codes categories define the groupings into which the raw data will be broken. According to the Standard Industrialisation Codes code methodology, the following are the explanations of the divisions of the Standard Industrialisation Codes codes.

Table 1: SIC Code Levels

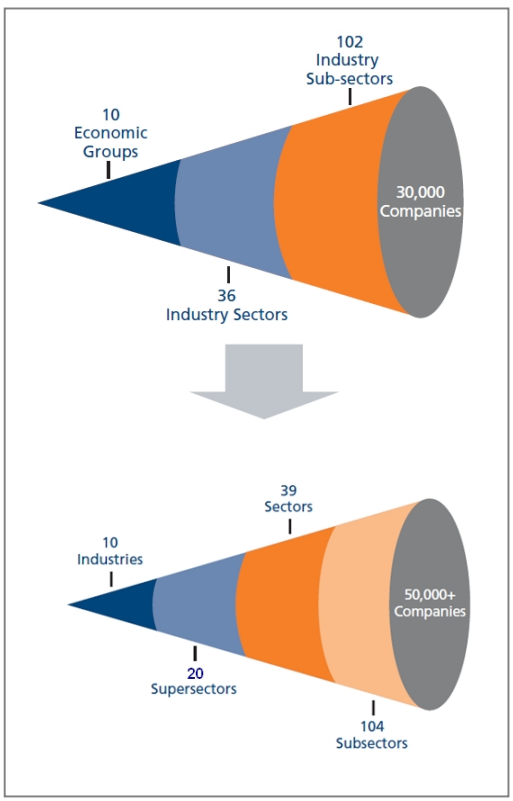
SIC CODE	Level of economic activity
First Digit	Major Division
Second Digit	Division
Third Digit	Major Group
Fourth Digit	Group
Fifth Digit	Sub Group

Source: *South African Companies and Intellectual Property Registration Office (CIPRO, 2009)*

However, there is not a comprehensive list of Standard Industrialisation Codes categories for Johannesburg Stock Exchange listed data for a twenty year period. The Johannesburg Stock Exchange adopts the same classifications as the UK based Financial Times / Stock Exchange index of 100 main share (FTSE 100). In 2005 Supersectors were created in order to further refine the classifications (Profiles Handbook, 2009). The Supersectors utilised are at a

more granular level than that of the Standard Industrialisation Codes used on the study by McGahan and Porter (1997), as Supersector are equivalent to a Standard Industrialisation Codes of the fifth digit and the McGahan and Porter (1997) study only utilised the fourth digit code. The new tier sits between the Industry tier (previously the Economic Group) and the Sector tier and comprises twenty Supersectors. (Profiles Handbook, 2009). **Figure 1** shows the creation of these Supersectors.

Figure 1: Development of the FTSE Global Classification System to the Industry Classification Benchmark



Source: *Profile Stock Exchange Handbook (2009)*

The detailed list of the classifications used can be seen in **Table 2** below:

Table 2: Definitions of ICB Supersectors

Supersector	Description
Oil & Gas	Covers companies engaged in the exploration, production and distribution of oil and gas, and suppliers of equipment and services to the industry.
Chemicals	Encompasses companies that produce and distribute both commodity and finished chemical products.
Basic Resources	Comprises companies involved in the extraction and basic processing of natural resources other than oil and gas, for example coal, metal ore (including the production of basic aluminium, iron and steel products), precious metals and gemstones, and the forestry and paper industry.
Construction & Materials	Includes companies engaged in the construction of buildings and infrastructure, and the producers of materials and services used by this sector.
Industrial Goods & Services	Contains companies involved in the manufacturing industries and companies servicing those companies. Includes engineering, aerospace and defence, containers and packaging companies, electrical equipment manufacturers and commercial transport and support services.
Automobiles & Parts	Covers companies involved in the manufacture of cars, tyres and new or replacement parts. Excludes vehicles used for commercial or recreational purposes.
Food & Beverages	Encompasses those companies involved in the food industry, from crop growing and livestock farming to production and packing. Includes companies manufacturing and distributing beverages, both alcoholic and non-alcoholic, but excludes retailers.
Personal & Household Goods	Companies engaged in the production of durable and non-durable personal and household products, including furnishings, clothing, home electrical goods, recreational and tobacco products.
Health Care	Includes companies involved in the provision of healthcare, pharmaceuticals, medical equipment and medical supplies.
Retail	Comprises companies that retail consumer goods and services including food and drugs.
Media	Companies that produce TV, radio, films, broadcasting and entertainment. These include media agencies and both print and electronic publishing.
Travel & Leisure	Encompasses companies providing leisure services, including hotels, theme parks, restaurants, bars, cinemas and consumer travel services such as airlines and car rentals.
Telecommunications	Includes providers of fixed-line and mobile telephone services. Excludes manufacturers and suppliers of telecommunications equipment.
Utilities	Covers companies that provide electricity, gas and water services.
Banks	Contains banks whose business is primarily retail.
Insurance	Encompasses companies which offer insurance, life insurance or reinsurance, including brokers or agents.
Financial Services	Comprises companies involved in corporate banking and investment services, including real estate activities.
Technology	Companies providing computer and telecommunications hardware and

Supersector	Description
	related equipment and software and related services, including internet access.
Investment Instruments	An investment instrument, other than an insurance policy or fixed annuity, issued by a corporation, government, or other organisation which offers evidence of debt or equity.
Other	Any sector not falling within the above sectors is placed here.

Source: JSE Handbook (2009)

The use of Supersectors will allow for research to be re-analysed over long periods of time to determine whether the findings of previous research can reasonably be expected to reflect a significant influence. It can be seen that this is the case as Ramanujam and Varadarajan (1989) state that structural features of industries, in this case Supersector, tend to change little or if change occurs, it will tend to occur slowly.

2.4 PERIOD

The study takes a linear analysis of twenty years. During this time South Africa has seen much change in its socio-economic landscape, from a closed isolated market to and emerging one that is competing globally. It is plain that "the economic history of South Africa is strewn with extraordinary instances that demonstrate the need to lock financial capital down. Enormous destruction occurred within this country because of the failure of the apartheid regime to regulate the flows of finance" (Bond, 2003, p. 281)

There was huge market concentration during the pre 1994 period in South Africa. However there has been a massive decline of this over the past two decades "South Africa's three largest investors in 1990 – Anglo American,

Sanlam and SA Mutual – between them controlled an overwhelming 75% of the Johannesburg Stock Exchanges market capitalisation at the time. Today the three investment giants' interests have slumped to below 25% of Johannesburg Stock Exchange market capitalisation in the wake of unbundling strategies motivated by competition legislation, and a quest for tighter focus" (McGregor, 2009, p. 2). According to Rossouw (1997), the South African economy was dominated by six large conglomerates which accounted for 80% of the Johannesburg Stock Exchange market capitalisation. The reasons for the high degree of capitalisation was due to the fact that the South African government prohibited South African companies from foreign investment , and strict exchange controls prohibited the organisations from investing offshore. Add sanctions to these and this reveals that South African organisations could only grow through diversification internally resulting in very large diversified conglomerates.

Hitt, Ireland and Hoskisson (1999) show that there are reasons for companies to diversify that are value neutral. **Table 3** below summarises this and shows that external incentives have affected the profitability of South African companies drastically.

Table 3: Internal and external incentives for diversification

Internal Incentives	External Incentives
Low Performance: Companies that have had poor performance over a prolonged period of time might be willing to take greater risks in an attempt to improve performance thereby diversifying into new business	**Antitrust Regulation:** Regulation either promoting or inhibiting diversification plays a role. The regulation could encourage either diversification in unrelated business due to strict regulation to encourage competition and thus avoid monopolisation, or the regulation might be more conducive to takeovers and mergers within the same industries.
Uncertain future cash flows: Companies operating in mature industries might find it necessary to diversify as a defensive strategy to survive over the long term.	**Tax Laws:** Tax laws could encourage companies to rather reinvest funds as opposed to distribute the funds to shareholders. Higher personal takes encourage shareholders to want the companies to retain the dividends and use the cash to acquire new businesses as opposed to distribution to shareholders.
Risk Reduction: Companies that have synergy between business units face greater risk as the interdependencies between the business units increase the risk of corporate failure. Diversification could reduce the interdependency and hence reduce the risk.	

Source: *Hitt, M, Ireland & Hoskinsson, R. (1999)*

An example of the massive change that has taken place is Sanlam which "back in 1990 had a controlling stake in 64 listed companies across diverse sectors. In stark contrast, it is today a financial services-focused company with a stake exceeding 25% in only four Johannesburg Stock Exchange-listed entities" (McGregor, 2009). In **Appendix 1** we can see the movements of concentration, diversification and ownership.

2.5 THE PERFORMANCE MEASURES USED IN RESEARCH

Within the literature and studies performed in this area, performance measures to determine profitability were used. Although the studies did utilise different

performance measures, the most common performance measures used were Return on Equity and Return on Assets.

Schmalensee (1985) examined accounting profits by utilising three performance measures. He focused on one single year, 1975, and concentrated only on manufacturing firms. The two performance measures used were:

- Profitability Measures
    - Return on Equity (ROE); and
    - Return on Capital (ROC).

Six years later in 1991 Rumelt “extended Schmalensee’s approach by including data for all available years, 1974 through 1977.” (McGahan & Porter 1997)”. The performance measures used in this study were:

- Profitability Measures
    - Return on Equity (ROE); and
    - Return on Assets (ROA).

Finally in 1997 McGahan and Porter performed the same study over a period of 14 years, 1981 to 1994. They also refined the study by analysing all sectors in the American economy, but not the financial sector. The performance measures they used in there study were:

- Profitability Measures
    - Return on Equity (ROE); and
    - Return on Assets (ROA).

2.5.1 RETURN ON ASSETS (ROA)

Selling and Stickney (1989) drew on profitability ratios such as return on assets (ROA) to demonstrate the effect an industry environment has on a firms profitability. Selling and Stickney (1989) suggest that ROA is affected both by operating leverage as well as the product life cycle. Essentially Selling and Stickney (1989) show that there is a lag effect between the ROA of the firm and the standard product lifecycle graph. Selling and Stickney (1989) see a firms environment, and its strategies designed to operate within that environment, as factors which affect the firms ability to increase ROA. Selling and Stickney (1989) see ROA as a measure of a firm's success in using assets to generate earnings independent of the financing of those assets.

Rothschild (2006) shows the ROA equation as follows:

$$ROA = M\,\mathrm{arg}\,in \times Velocity\,,$$

Where $M\,\mathrm{arg}\,in = \dfrac{\mathrm{Pr}\,ofit}{Sales}$ and $Velocity = \dfrac{Sales\,\mathrm{Re}\,venue}{Assets}$.

Selling and Stickney (1989) use the following equation:

$$ROA = \mathrm{Pr}\,ofitM\,\mathrm{arg}\,in \times AssetTurnover\,,$$

Where $\mathrm{Pr}\,ofitM\,\mathrm{arg}\,in = NetIncome + \dfrac{(1 - CorporateTaxRate)(InterestExpense)}{\mathrm{Re}\,venues}$

and $AssetTurnover = \dfrac{\mathrm{Re}\,venues}{AverageTotalAssets}$.

For the purposes of this study, ROA was established using Rothschild's (2006) definition.

2.5.2 RETURN ON EQUITY (ROE)

Stead (1995) states that ROE can be regarded as the ultimate performance ratio for ordinary shareholders. Rapport (1986) sees ROE as one of the most widely used measures of corporate financial performance. De Wet and Du Toit (2006) calculate ROE as the profit after tax and preference dividends divided by the book value of the ordinary shares or equity. De Wet and Du Toit (2006) show that the ROE calculation is comprised of the following components:

$$ROE = \frac{Earnings}{Sales} \times \frac{Sales}{Assets} \times \frac{Assets}{Equity}.$$

However, there are shortcomings of ROE and they are shown below in **Table 4**:

Table 4: De Wet and Du Toit Shortcomings of ROE

Shortcomings	Explanation of Shortcomings of ROE as a Measure
1.	Earnings can be manipulated legally within the Generally Accepted Accounting Principles (GAAP). Thus, the ROE may not be a truly accurate reflection of the performance.
2.	ROE is calculated after the cost of debt before taking into account the cost of own capital.
3.	Asset turnover may be affected by inflation. Thus even if assets are not being utilised more effectively, asset turnover may appear to be higher than it is.
4.	ROE does not consider the timing of cash flows and thus may overstate returns that only have occurred in the short term and thus may not be sustainable in the long run.
5.	ROE is seen as a short-term performance measure and companies that focus too heavily on this measure may find that they overlook longer term opportunities that might increase shareholder value.

Source: *de Wet and du Toit, Shortcomings of ROE*

2.5.3 RETURN ON CAPITAL EMPLOYED (ROCE)

Firer, Ross, Westerfield and Jordan (2004), show that ROCE is sometimes used in place of Return on Assets, and that this is incorrect. ROCE is actually synonymous with Return on Net Assets, where Net Assets are defined as total assets minus total liabilities.

According to Silberston and Solomons (1952), ROCE is calculated as follows:

$$ROCE = \frac{EBIT}{TotalAssets} - CurrentLiabilities$$

$$= \frac{Operating\ \Pr ofit}{EquityShareholdersFunds}.$$

Silberston and Solomons (1952) believe that ROCE is the best primary ratio to identify monopolies in the market place. They go on to say that ROCE is used to calculate whether companies are making unreasonably high profits. This was the case during the pre-1994 period in South Africa where few firms made obscene profits and this trend has continued to this day within the telecoms and oil industries.

These three primary ratios are used to measure the profitability across all values. The reason for analysing all three is that all three have their pro's and con's and by analysing them together, the trend and hence variance analysis will be more accurate.

3. RESEARCH HYPOTHESES

Balnaves and Caputi (2001) describe correlational hypotheses as hypotheses that test two or more variables to determine if they are related. Therefore in this case, the dependant variables are ROA, ROE and ROCE, and the independent variables are years, companies, periods and Supersectors. The hypotheses are tested using an ANOVA analysis. The ANOVA analysis tests the null hypothesis of equal means of the dependent variable across levels of the independent variable. For these hypotheses the dependent variable is ROA, ROE and ROCE and the independent variable is year, company, period and Supersector.

Hypothesis 1: Mean ROA is not equal across all years.

Hypothesis 2: Mean ROA is not equal across all periods.

Hypothesis 3: Mean ROA is not equal across all Supersectors.

Hypothesis 4: Mean ROE is not equal across all years.

Hypothesis 5: Mean ROE is not equal across all periods.

Hypothesis 6: Mean ROE is not equal across all Supersectors.

Hypothesis 7: Mean ROCE is not equal across all years.

Hypothesis 8: Mean ROCE is not equal across all periods.

Hypothesis 9: Mean ROCE is not equal across all Supersectors.

This is stated formally as follows:

The null Hypothesis (Ho): Mean ROA (ROE; ROCE) is equal across all (years; periods; Supersectors).

The alternate Hypothesis (Ha): At least one (year; period; Supersector) has significantly different ROA (ROE; ROCE).

Ho is rejected at the 5% significance level if the p-value of the ANOVA test is less than 0.05.

The hypotheses below are tested using Components of Variance analysis. The hypothesis is supported if the maximum likelihood estimate of the proportion of variance explained by the year is greater than 0.

Hypothesis 10: The year of measurement explains a portion of the variation in mean return on assets/return on equity/return on capital employed.

Hypothesis 11: The period of measurement (Pre-1994 or Post-1994) explains a portion of the variation in mean return on assets/return on equity/return on capital employed.

Hypothesis 12: The particular company measured explains a portion of the variation in mean return on assets/return on equity/return on capital employed.

Hypothesis 13: The interaction of company and year of measurement explains a portion of the variation in return on assets/return on equity/return on capital employed. (This interaction is a measure of the change in ROA for a company across years, which might be more predictive than looking at year in isolation or company in isolation.)

Hypothesis 14: The interaction of company and period pre- and post-1994 of measurement explains a portion of the variation in return on assets/return on equity/return on capital employed. (This interaction is a measure of the change in ROA/ROE/ROCE for a company across years, which might be more predictive than looking at year in isolation or company in isolation.)

Hypothesis 15: The Supersector classification explains a portion of the variation in return on assets/return on equity/return on capital employed.

4. RESEARCH METHODOLOGY

4.1 RESEARCH DESIGN

The research design used for the study was experimental research. Welman and Kruger (2005) define experimental research as research where the units of analysis are exposed to something to which they otherwise would not have been subjected. True experimental research is conducted where the researcher has optimal control over the research situation, and where the researcher can assign the unit of analysis randomly to groups of design (Welman and Kruger, 2005)

There are two sections to the research design study. Firstly the researcher performs ANOVA tests on hypotheses one through to twelve to check if there is a significant difference in the mean return across levels of the independent variables (year, company, period and super sector). Then the researcher can perform a Components of Variance analysis, in order to calculate the proportion of variance in the return measures (ROA, ROE and ROCE) that is attributable to each of the independent variables(year, company, period and Supersector).

4.2 UNIT OF ANALYSIS

The unit of analysis was the percentage return on assets, the percentage return on equity and the percentage return on capital employed of all companies listed on the Main Board of the Johannesburg Stock Exchange during the 26 year period from 1983 to 2008. The ROA, ROE and ROCE data for this list of companies was obtained from McGregor BFA.

4.3 POPULATION OF RELEVANCE

Welman and Kruger (2005) define a population as an entire collection of cases or units about which one wishes to make conclusions. The population of relevance was all currently listed companies over this period. No sample was taken and all the companies were included. The ROA, ROE and ROCE for all the companies over this period were obtained from McGregor BFA. This resulted in a dataset of 10,531 observations for all the companies over all the years. In addition to data captured on the percentage ROA, ROE and ROCE, the companies were categorised into one of twenty Supersectors according to the Johannesburg Stock Exchanges Supersector classification.

4.5 DETAILS OF DATA COLLECTION

Publicly available secondary data was used. All of the data utilised in this study was obtained from McGregor BFA. This data included the full list of Johannesburg Stock Exchange listed companies, their return on assets for each year, and their Supersector classification over twenty five years. Over this time companies listed and de-listed and the number of listed companies was not constant over time as can be seen in the descriptive output in chapter five. Also some observations were dropped due to trimming of top 10% and bottom 10% to eliminate the outliers. These are the only reasons for sample variation. This variation of sample size has no negative effect on the statistical output as separate ANOVA and Component of Variance tests were performed for each year, ensuring that the sample size was stable for that year, also the tests account for any fluctuations in sample size as long as it is over 30 observations, which in all cases it was.

4.6 PROCESS OF DATA ANALYSIS

Descriptive statistics are presented which detail the mean and measures of spread of ROA, ROE and ROCE for the years under consideration and for each of the Supersector classifications. Components of Variance analysis is carried out to determine the levels at which variation is introduced into the ROA, ROE and ROCE measurements. The analysis investigates the proportion of variability in ROA, ROE and ROCE that is attributable to each of the following factors:

1. year;
2. period (Pre-1994 and Post-1994);
3. company;
4. the interaction of company and year; and
5. Supersector classification

Although the study by McGahan and Porter (1997) took Corporate Parent as one of the independent variables, this analysis has excluded this variable due the lack of data. Upon investigating Corporate Parent ownership it was clear, once the data had been gathered, that it was not sufficient to perform a linear test. This was because there was not enough corporate ownership data to analyse across years, companies and Supersectors. Too often the Corporate Parent data did not last for more than four years before divesture, unbundling or a merger took place, and all too often this happened across Supersector not allowing one to analyse corporate parent across time and industry.

4.6.1 DESCRIPTION OF DATA TRIMMING

Tukey (1962) discusses the uses for winsorisation when dealing with moderate to large samples. Due to the large data set being analysed it was necessary to exclude any outliers that could potentially skew the results of the analysis. In order to exclude potential outliers from the analysis the top 10% of values and the bottom 10% of values for each of the return measures were excluded from the analysis.

4.6.2 DESCRIPTION OF ANOVA ANALYSIS

ANOVA analysis is done to ascertain whether the independent variables that are being tested as possible contributors to the overall variation in ROA, ROCE and ROE have an effect on the mean levels of ROA, ROCE and ROE. It is also a logical first pass investigation to determine whether the variables that are included are suitable to be included in a Components of Variance analysis. The ANOVA analysis indicates whether the variables are predictive of the dependent variable by testing whether there is a significant difference in mean levels of the dependent variable across levels of these variables. If the ANOVA indicates that there is no significant difference in mean levels of the dependent variable (ROA, ROE, ROCE) for the independent variable, this would suggest that there is no need to do the second order test (Components of Variance analysis) to determine what proportion of the variance this independent variable explains.

The reason we are testing this is because there is no point in us including the independent variable e.g. year, in the Components of Variance analysis being done later if we have statistical evidence that is it has no effect on mean ROA, ROE or ROCE.

The hypotheses tested by the ANOVA test are:

Ho: Equal means of ROA, ROE, ROCE across all levels of independence; and

Ha: At least one category has unequal means.

If the p-value is less than 0.05, then the Ho is rejected, at the 5% significance level, meaning that there is no evidence that the means are equal for the groups. This means further that the independent variable being tested has an effect on the mean of the dependant variable i.e. there is statistical evidence that there is a mean variation.

4.6.2.1 DESCRIPTION OF BONFERRONI ANALAYSIS

Bonferroni Multiple Comparison tests are carried out to identify which years or groups of years and which Supersectors or groups of Supersectors have ROA, ROE and ROCE which differs significantly from the general mean level of return. All the analysis can be found under appendix 2 on the data disk.

4.6.3 DESCRIPTION OF COMPONETS OF VARIANCE ANALSYSIS

Components of Variance models are used to calculate the proportion of variation in a dependent variable of interest that is explained by one or more random effects of independent factors. The main output of this analysis is the

variance components table which summarises the proportions of variance attributable to the main effects of the random variables and any interaction terms.

According to Searle (2006: p. 48), the following inputs are required for a Component of Variance analysis.

1. One quantitative dependent variable. The dependent variable in this study is ROA, ROE and ROCE.
2. Categorical random factors. The random factors tested in this model are, the year, the period of measurement, the company, the interaction of company and year, interaction of company and period and the Supersector.

The model estimated is called a random effects model. The random effects factors are variables whose levels are seen as a random sample of all possible levels in the population (only some of all possible categories for the variable are measured).The random effects in the components of variance model are categorical variables whose levels are actually assumed to be samples from the population of all categories of that variable.

Searle (2006: p. 181) goes on to show four main methods by which to estimate a variance components model:

1. Analysis of variance;
2. Maximum Likelihood Estimation;
3. Minimum norm unbiased estimators (MINQUE); and
4. Restricted Maximum Likelihood Estimation (REML).

This study utilises number 2, Maximum Likelihood Estimation. The aim of the analysis is to estimate the proportion of variance that can be ascribed to each of the factors below. In the model, the dependent variable is ROA, ROE and ROCE and the predictor variables that are tested are:

- Year;
- Period
- Company
- Company*Year;
- Company *Period;
- Supersector; and
- Error.

Company*Year is a variable that measures the interaction of company and year and what effect this has on return on assets i.e. company is not considered in isolation, rather one considers the development of each fixed companies' ROA, ROE and ROCE over the years and calculate the proportion of variance in ROA, ROE and ROCE that is explained by this interaction of company and year. The same is done for Company*Period.

The error term is included in every variance components estimation model and is a measure of how well the model explains the variance in the variable being decomposed into variance components. If the proportion of variance explained by the error term is high, say 80%, this implies that 80% of the variance in the dependent variable being analysed is explained by other extraneous factors that

have not been included in the model, and the variables that have been included only account for 20% of the variance in the dependent variable.

4.7 HYPOTHESES TESTED

The statistical method selected to determine if there was a significant difference between the means was the analysis of variance or ANOVA with variance of component analysis using Maximum Likelihood estimation. The process steps were performed as outlined by Berenson and Levine (1996) below.

- The null hypothesis ***(Ho)*** was stated.
- The alternate hypothesis ***(Ha)*** was stated.
- The significant level alpha ***(α)*** was chosen.
- The sample size ***(n)*** was determined from the performance data.
- The ***ρ***-value was calculated from the statistical software used. The statistical software used in the research was Statistical Analysis System (SAS) software.
- The ***ρ***-value was compared with the significant alpha ***(α)*** level.
- The outcome of the test determined if the null hypothesis ***(Ho)*** was going to be rejected or not. The following rules were applied to the observed ***ρ***-value:
    - if $\rho \geq \alpha$, the null hypothesis ***(Ho)*** was not rejected; and
    - if $\rho < \alpha$, the null hypothesis ***(Ho)*** was rejected.

The ANOVA test with the *ρ*-value approach used above assumed a sample distribution to be normally distributed. Berenson and Levine (1996) have stated

that for most population distributions, the sampling distribution of the mean would approximately be normally distributed if a sample of at least 30 were selected. Hence in this case the sample size is always greater than this number and should reflect strong statistical mean variation. In order to accept or reject hypotheses 10 through to 14, a Components of Variance analysis using maximum likelihood estimation (ML) was performed.

4.8 LIMITATIONS OF STATISTICAL TECHNIQUES USED

ANOVA only indicates whether or not there is a significant difference in mean return between the groups but doesn't show the detail of where the differences lie, i.e. which levels of the independent variable make up this difference. These differences can be determined using post - hoc multiple comparison tests such as Bonferroni t- tests. However, the results of these tests are included in appendix 2.

There are also limitations in the performance measured used. Accounting anomalies and changes in accounting practices from GAAP to IFRS may affect the profitability measures, however every effort has been taken to make sure this limitations is reduced due to the large data set and multiple performance measures being used.

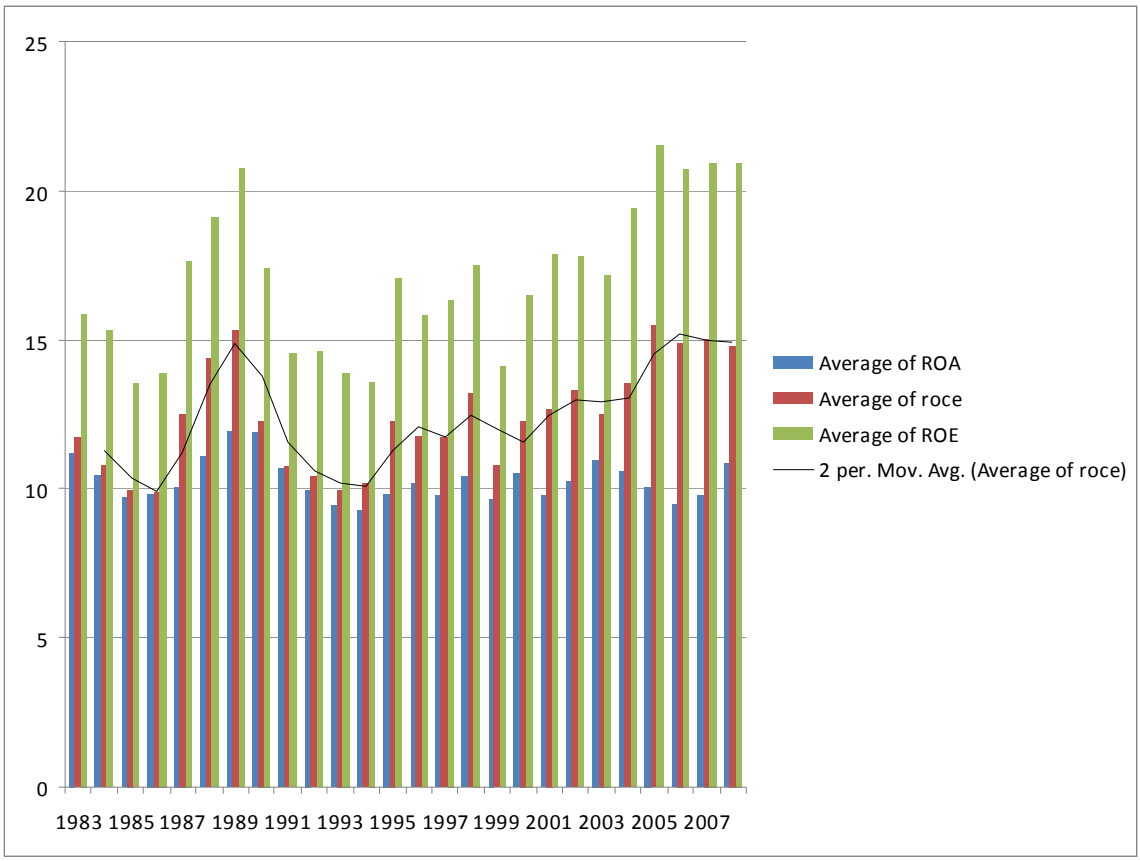
Survival bias may affect the results as unprofitable companies drop out of the sample, however with the sample size increasing three fold over the twenty five year period the effect should be negligible.

5. RESULTS

5.1 MACRO DESCRIPTIVE STATISTICS BY YEAR, PERIOD AND SUPERSECTOR

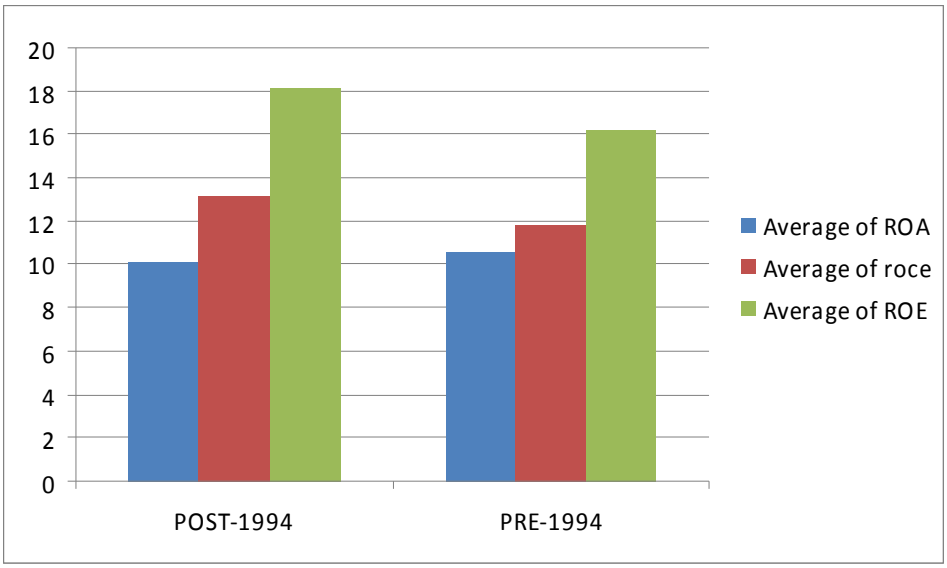
The figure below shows the average ROA, ROCE and ROE over the twenty five year period.

Figure 2- ROA, ROCE & ROE returns over twenty years



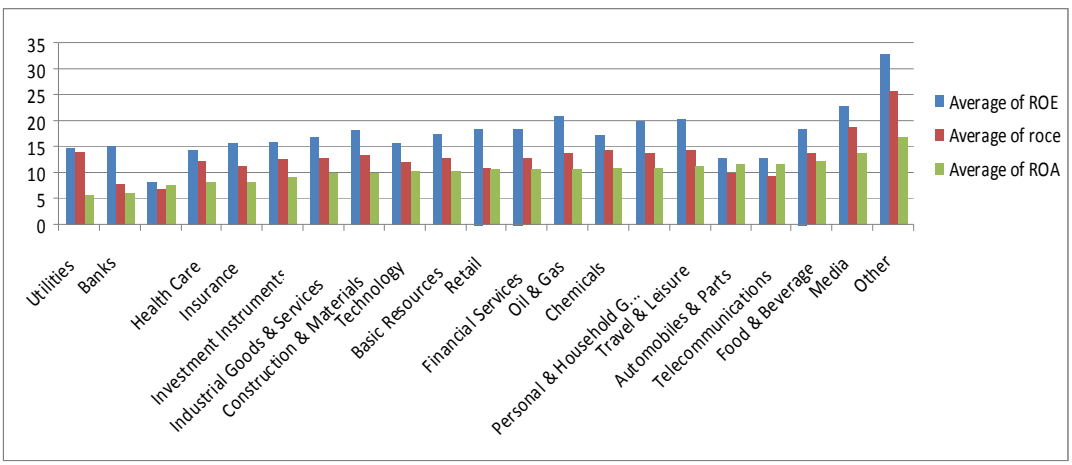
ROA, ROE and ROCE were considered over two periods. The pre-1994 period spans from 1983 to 1993. The post-1994 period spans from 1994 to 2008. ROE and ROCE is lower during the pre-1994 period as can be seen below.

Figure 3- ROA, ROCE, ROE returns pre & post 1994



Johannesburg Stock Exchange listed companies are categorised into 20 super sectors. The effect of Supersector is quite evident below. For example utilities have a low average return on assets throughout the period considered, whilst the Media and Health Care sectors have a mean return on assets which is significantly higher than that of the other sectors. The Other is high as the Alexander Forbes Preferance Share Investment ltd, is actually listed and has an average return of 30%.

Figure 4- ROE, ROCE & ROA returns by Supersector



5.2. DETAILED DESCRIPTIVE STATISTICS

Tables 6, 7 and **8** show the number of observations included in each year, period and Supersector by ROA, ROE and ROCE. This is after trimming off the bottom 10% and top 10% of values through winsorisation.

Tables 9 to **17** show the mean ROA, ROE and ROCE for each year, period and Supersector, as well as the standard deviation and the 95% confidence interval of ROA, ROE and ROCE for each year. The table below shows the general layout of the descriptive data.

Table 5: Layout of descriptive data

Dependant Variable	Independent Variable
ROA	Year
	Period
	Supersector
ROE	Year
	Period
	Supersector
ROCE	Year
	Period
	Supersector

Table 6: Number of observations by year for ROA, ROE and ROCE

Number of Observations	
Year	*N*
1983	63
1984	60
1985	58
1986	66
1987	85
1988	99
1989	111
1990	108
1991	116
1992	111
1993	115
1994	120
1995	130
1996	130
1997	136
1998	154
1999	160
2000	155
2001	153
2002	159
2003	164
2004	168
2005	171
2006	164
2007	198
2008	224

Table 7: Number of observations by period for ROA, ROE and ROCE

Between-Subjects Factors		
		N
PERIOD	POST-1994	2386
	PRE-1994	992

Table 8: Number of observations by Supersector for ROA, ROE and ROCE

Between-Subjects Factors		
		N
Supersector		23
	Automobiles & Parts	5
	Banks	82
	Basic Resources	599
	Chemicals	87
	Construction & Materials	335
	Financial Services	453
	Food & Beverage	224
	Health Care	20
	Industrial Goods & Services	554
	Insurance	135
	Investment Instruments	99
	Media	53
	Oil & Gas	22
	Other	2
	Personal & Household Goods	131
	Retail	208
	Technology	201
	Telecommunications	8
	Travel & Leisure	120
	Utilities	17

Table 9: Standard deviations and confidence intervals by year for ROA

Year				
Dependent Variable: ROA				
			95% Confidence Interval	
Year	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
1983	11.230	.640	9.975	12.485
1984	10.471	.656	9.185	11.757
1985	9.759	.667	8.451	11.067
1986	9.836	.625	8.610	11.063
1987	10.091	.551	9.010	11.171
1988	11.083	.511	10.082	12.084
1989	11.953	.482	11.008	12.899
1990	11.923	.489	10.965	12.882
1991	10.716	.472	9.791	11.641
1992	9.953	.482	9.007	10.898
1993	9.440	.474	8.512	10.369
1994	9.273	.464	8.363	10.182
1995	9.866	.446	8.993	10.740
1996	10.174	.446	9.301	11.048
1997	9.768	.436	8.914	10.623
1998	10.437	.409	9.634	11.240
1999	9.702	.402	8.915	10.490
2000	10.537	.408	9.737	11.337
2001	9.775	.411	8.969	10.580
2002	10.278	.403	9.488	11.068
2003	10.986	.397	10.209	11.764
2004	10.601	.392	9.833	11.370
2005	10.069	.389	9.307	10.831
2006	9.534	.397	8.756	10.312
2007	9.798	.361	9.090	10.506
2008	10.884	.339	10.219	11.550

Table 10: Standard deviations and confidence intervals by period for ROA

PERIOD				
Dependent Variable: ROA				
			95% Confidence Interval	
PERIOD	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
POST-1994	10.149	.104	9.944	10.354
PRE-1994	10.639	.162	10.321	10.957

Table 11: Standard deviations and confidence intervals by Supersector for ROA

Supersector				
Dependent Variable: ROA				
Supersector	*Mean*	*Std. Error*	*95% Confidence Interval*	
			Lower Bound	*Upper Bound*
	7.414	1.037	5.380	9.448
Automobiles & Parts	11.569	2.225	7.207	15.932
Banks	5.816	.549	4.739	6.894
Basic Resources	10.362	.203	9.964	10.761
Chemicals	10.998	.533	9.952	12.043
Construction & Materials	10.127	.272	9.594	10.660
Financial Services	10.611	.234	10.153	11.070
Food & Beverage	12.123	.332	11.471	12.775
Health Care	7.973	1.112	5.792	10.154
Industrial Goods & Services	10.054	.211	9.639	10.468
Insurance	8.235	.428	7.396	9.075
Investment Instruments	9.003	.500	8.023	9.983
Media	13.874	.683	12.534	15.214
Oil & Gas	10.712	1.061	8.632	12.791
Other	16.854	3.518	9.956	23.751
Personal & Household Goods	11.028	.435	10.176	11.880
Retail	10.592	.345	9.916	11.268
Technology	10.231	.351	9.543	10.920
Telecommunications	11.651	1.759	8.202	15.100
Travel & Leisure	11.282	.454	10.392	12.173
Utilities	5.682	1.207	3.316	8.048

Table 12: Standard deviations and confidence intervals by year for ROE

Year				
Dependent Variable: ROE				
Year			*95% Confidence Interval*	
	Mean	*Std. Error*	*Lower Bound*	*Upper Bound*
1983	15.880	1.515	12.909	18.851
1984	15.300	1.553	12.255	18.344
1985	13.531	1.579	10.435	16.627
1986	13.924	1.480	11.022	16.827
1987	17.667	1.304	15.109	20.224
1988	19.153	1.209	16.783	21.523
1989	20.778	1.142	18.540	23.016
1990	17.429	1.157	15.160	19.698
1991	14.555	1.117	12.365	16.744
1992	14.609	1.142	12.371	16.847
1993	13.917	1.122	11.718	16.116
1994	13.619	1.098	11.467	15.772
1983	15.880	1.515	12.909	18.851
1984	15.300	1.553	12.255	18.344
1995	17.069	1.055	15.000	19.137
1996	15.846	1.055	13.778	17.914
1997	16.333	1.031	14.311	18.355
1998	17.537	.969	15.637	19.437
1999	14.108	.951	12.244	15.972
2000	16.517	.966	14.623	18.412
2001	17.871	.972	15.965	19.778
2002	17.797	.954	15.927	19.667
2003	17.222	.939	15.380	19.063
2004	19.447	.928	17.627	21.266
2005	21.553	.920	19.750	23.356
2006	20.712	.939	18.870	22.553
2007	20.954	.855	19.278	22.630
2008	20.947	.804	19.371	22.522

Table 13: Standard deviations and confidence intervals by period for ROE

PERIOD				
Dependent Variable: ROE				
			95% Confidence Interval	
PERIOD	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
POST-1994	18.119	.250	17.628	18.609
PRE-1994	16.249	.388	15.489	17.010

Table 14: Standard deviations and confidence intervals by Supersector for ROE

Supersector				
Dependent Variable: ROE				
			95% Confidence Interval	
Supersector	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
	8.179	2.537	3.204	13.154
Automobiles & Parts	12.964	5.442	2.294	23.634
Banks	15.110	1.344	12.475	17.745
Basic Resources	17.429	.497	16.454	18.404
Chemicals	17.079	1.305	14.521	19.637
Construction & Materials	18.126	.665	16.823	19.430
Financial Services	18.290	.572	17.169	19.411
Food & Beverage	18.389	.813	16.795	19.983
Health Care	14.222	2.721	8.887	19.557
Industrial Goods & Services	16.954	.517	15.940	17.968
Insurance	15.498	1.047	13.444	17.551
Investment Instruments	15.858	1.223	13.460	18.256
Media	22.657	1.672	19.379	25.934
Oil & Gas	20.786	2.594	15.700	25.873
Other	32.756	8.605	15.885	49.627
Personal & Household Goods	20.043	1.063	17.958	22.127
Retail	18.394	.844	16.740	20.049
Technology	15.688	.858	14.006	17.371
Telecommunications	12.788	4.302	4.353	21.224
Travel & Leisure	20.305	1.111	18.127	22.483
Utilities	14.679	2.951	8.892	20.466

Table 15: Standard deviations and confidence intervals by year for ROCE

Year				
Dependent Variable :ROCE				
			95% Confidence Interval	
Year	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
1983	11.708	1.228	9.301	14.115
1984	10.817	1.258	8.351	13.283
1985	9.944	1.279	7.436	12.452
1986	9.882	1.199	7.531	12.233
1987	12.553	1.057	10.481	14.625
1988	14.434	.979	12.514	16.354
1989	15.303	.925	13.490	17.116
1990	12.286	.938	10.448	14.124
1991	10.780	.905	9.007	12.554
1992	10.448	.925	8.635	12.261
1993	9.974	.909	8.192	11.755
1994	10.223	.889	8.479	11.966
1995	12.303	.855	10.627	13.978
1996	11.807	.855	10.132	13.483
1997	11.711	.835	10.073	13.349
1998	13.210	.785	11.670	14.749
1999	10.801	.770	9.291	12.311
2000	12.302	.783	10.768	13.836
2001	12.691	.788	11.147	14.236
2002	13.325	.773	11.810	14.840
2003	12.518	.761	11.026	14.009
2004	13.570	.752	12.096	15.044
2005	15.514	.745	14.054	16.975
2006	14.944	.761	13.452	16.435
2007	15.036	.692	13.679	16.394
2008	14.830	.651	13.554	16.106

Table 16: Standard deviations and confidence intervals by period for ROCE

PERIOD				
Dependent Variable: roce				
			95% Confidence Interval	
PERIOD	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
POST-1994	13.168	.202	12.773	13.563
PRE-1994	11.789	.313	11.176	12.401

Table 17: Standard deviation and confidence interval by Supersector for ROCE

Supersector				
Dependent Variable: ROCE				
			95% Confidence Interval	
Supersector	*Mean*	*Std. Error*	*Lower Bound*	*Upper Bound*
	6.804	2.039	2.807	10.801
Automobiles & Parts	10.030	4.372	1.458	18.603
Banks	7.701	1.080	5.584	9.817
Basic Resources	12.696	.399	11.913	13.479
Chemicals	14.456	1.048	12.401	16.511
Construction & Materials	13.475	.534	12.427	14.522
Financial Services	12.920	.459	12.019	13.820
Food & Beverage	13.888	.653	12.607	15.169
Health Care	12.119	2.186	7.833	16.405
Industrial Goods & Services	12.837	.415	12.023	13.652
Insurance	11.097	.841	9.448	12.747
Investment Instruments	12.539	.983	10.612	14.465
Media	18.648	1.343	16.015	21.281
Oil & Gas	13.772	2.084	9.686	17.859
Other	25.560	6.913	12.006	39.114
Personal & Household Goods	13.656	.854	11.981	15.330
Retail	10.943	.678	9.614	12.272
Technology	11.973	.690	10.621	13.326
Telecommunications	9.246	3.457	2.469	16.024
Travel & Leisure	14.278	.892	12.528	16.028
Utilities	14.118	2.371	9.469	18.768

5.3 ANOVA RESULTS

5.3.1 ANOVA ROA BY YEAR (HYPOTHESIS 1)

Table 18: ANOVA results for Hypothesis 1

Tests of Between-Subjects Effects					
Dependent Variable: ROA					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	1485.043[a]	25	59.402	2.301	.000
Intercept	315352.547	1	315352.547	12216.816	.000
Year	1485.043	25	59.402	2.301	.000
Error	86525.139	3352	25.813		
Total	445883.378	3378			
Corrected Total	88010.182	3377			
a. R Squared = .017 (Adjusted R Squared = .010)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROA from the general mean level for at least one of the years. Therefore hypothesis 1 is rejected. This shows that year is a good explanatory variable for ROA. See Appendix 2 (Bonferroni Analysis) to identify the specific years that differ.

5.3.2 ANOVA ROA BY PERIOD (HYPOPTHESIS 2)

Table 19: ANOVA results for Hypothesis 2

Tests of Between-Subjects Effects					
Dependent Variable:ROA					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	168.293[a]	1	168.293	6.468	.011
Intercept	302791.578	1	302791.578	11637.095	.000
PERIOD	168.293	1	168.293	6.468	.011
Error	87841.889	3376	26.020		
Total	445883.378	3378			
Corrected Total	88010.182	3377			
a. R Squared = .002 (Adjusted R Squared = .002)					

The p-value shown by Sig. Above shows statistically there is a significant difference in mean ROA between the periods. Therefore hypothesis 2 is rejected. This shows that period is a good explanatory variable for ROA. See Appendix 2 (Bonferroni Analysis) to identify the specific years that differ.

5.3.3 ANOVA ROA BY SUPER SECTOR (HYPOTHESIS 3)

Table 20: ANOVA results for Hypothesis 3

Tests of Between-Subjects Effects					
Dependent Variable:ROA					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	4922.767[a]	20	246.138	9.945	.000
Intercept	41667.877	1	41667.877	1683.517	.000
Super_Sector	4922.767	20	246.138	9.945	.000
Error	83087.415	3357	24.750		
Total	445883.378	3378			
Corrected Total	88010.182	3377			
a. R Squared = .056 (Adjusted R Squared = .050)					

Supersectors. Therefore hypothesis 3 is rejected. This shows that year is a good explanatory variable for ROA. See Appendix 2 (Bonferroni Analysis) to identify the specific super sectors that differ.

5.3.4 ANOVA ROE BY YEAR (HYPOTHESIS 4)

Table 21: ANOVA results for Hypothesis 4

Tests of Between-Subjects Effects					
Dependent Variable:ROE					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	21645.292[a]	25	865.812	5.986	.000
Intercept	865723.459	1	865723.459	5985.202	.000
Year	21645.292	25	865.812	5.986	.000
Error	484846.606	3352	144.644		
Total	1549262.139	3378			
Corrected Total	506491.898	3377			
a. R Squared = .043 (Adjusted R Squared = .036)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROE from the general mean level for at least one of the years. Therefore hypothesis 4 is rejected. This shows that year is a good explanatory variable for ROE. See Appendix 2 (Bonferroni Analysis) to identify the specific years that differ.

5.3.5 ANOVA ROE BY PERIOD (HYPOTHESIS 5)

Table 22: ANOVA results for Hypothesis 5

Tests of Between-Subjects Effects					
Dependent Variable:ROE					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	2448.966[a]	1	2448.966	16.403	.000
Intercept	827615.992	1	827615.992	5543.241	.000
PERIOD	2448.966	1	2448.966	16.403	.000
Error	504042.932	3376	149.302		
Total	1549262.139	3378			
Corrected Total	506491.898	3377			
a. R Squared = .005 (Adjusted R Squared = .005)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROE between the periods. Therefore hypothesis 5 is rejected. This shows that period is a good explanatory variable for ROE. See Appendix 2 (Bonferroni Analysis) to identify the specific years that differ.

5.3.6 ANOVA ROE BY SUPERSECTOR (HYPOTHESIS 6)

Table 23: ANOVA results for Hypothesis 6

Tests of Between-Subjects Effects					
Dependent Variable:ROE					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	9393.315[a]	20	469.666	3.172	.000
Intercept	119548.587	1	119548.587	807.334	.000
Super_Sector	9393.315	20	469.666	3.172	.000
Error	497098.583	3357	148.078		
Total	1549262.139	3378			
Corrected Total	506491.898	3377			
a. R Squared = .019 (Adjusted R Squared = .013)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROE from the general mean level for at least one of the super sectors. Therefore hypothesis 6 is rejected. This shows that year is a good explanatory variable for ROE. See Appendix2 (Bonferroni Analysis) to identify the specific super sectors that differ.

5.3.7 ANOVA ROCE BY YEAR (HYPOTHESIS 7)

Table 24: ANOVA results for Hypothesis 7

Tests of Between-Subjects Effects					
Dependent Variable:roce					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	10248.446[a]	25	409.938	4.318	.000
Intercept	457354.122	1	457354.122	4817.991	.000
Year	10248.446	25	409.938	4.318	.000
Error	318193.031	3352	94.926		
Total	878695.368	3378			
Corrected Total	328441.477	3377			
a. R Squared = .031 (Adjusted R Squared = .024)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROCE from the general mean level for at least one of the years. Therefore hypothesis 7 is rejected. This shows that year is a good explanatory variable for ROE. See Appendix 2 (Bonferroni Analysis) to identify the specific years that differ.

5.3.8 ANOVA ROCE BY PERIOD (HYPOTHESIS 8)

Table 25: ANOVA results for Hypothesis 8

Tests of Between-Subjects Effects					
Dependent Variable:roce					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	1333.188[a]	1	1333.188	13.759	.000
Intercept	436412.441	1	436412.441	4504.100	.000
PERIOD	1333.188	1	1333.188	13.759	.000
Error	327108.289	3376	96.892		
Total	878695.368	3378			
Corrected Total	328441.477	3377			
a. R Squared = .004 (Adjusted R Squared = .004)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROCE between the periods. Therefore hypothesis 8 is rejected. This shows that period is a good explanatory variable for ROCE. See Appendix 2 (Bonferroni Analysis) to identify the specific years that differ.

5.3.9 ANOVA ROCE BY SUPER SECTOR (HYPOTHESIS 9)

Table 26: ANOVA results for Hypothesis 9

Tests of Between-Subjects Effects					
Dependent Variable:roce					
Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
Corrected Model	7572.601[a]	20	378.630	3.961	.000
Intercept	66324.580	1	66324.580	693.902	.000
Super_Sector	7572.601	20	378.630	3.961	.000
Error	320868.876	3357	95.582		
Total	878695.368	3378			
Corrected Total	328441.477	3377			
a. R Squared = .023 (Adjusted R Squared = .017)					

The p-value shown by Sig. above shows statistically there is a significant difference in mean ROCE from the general mean level for at least one of the super sectors. Therefore hypothesis 9 is rejected. This shows that year is a good explanatory variable for ROCE. See Appendix 2 (Bonferroni Analysis) to identify the specific super sectors that differ.

5.4 COMPONENTS OF VARIANCE ANALYSIS RESULTS

Two components of variance models were tested for each dependent variable.

The first model was:

Variance (return) = variance (company) + variance (year) + variance (company*year) + variance (Supersector)

The second model was:

Variance (return) = variance (company) + variance (period) + variance (company*year) + variance (Supersector)

The reason two different models were tested was to ascertain whether the period classification pre-post 1994 was more predictive than looking at each year in isolation. The difference can be seen in model two highlighted in green. The models are compared by looking at the overall percentage of variance attributed to the error term for each model. The model with lower error variance is the better model. Model 1 has a lower error variance than model 2 in all cases.

5.4.1 ROA MODEL 1 (HYPOTHESIS 11, 12, 14, 15)

Table 27: Variance Component Analysis results for ROA Hypotheses 11, 12, 14, 15

Maximum Likelihood Estimates		
Variance Component	*Estimate*	*Estimate*
Var(Company)	13.53263	42.64%
Var(PERIOD)	0.16796	0.53%
Var(Company*PERIOD)	3.41016	10.74%
Var(Supersector)	0	0.00%
Var(Error)	14.62896	46.09%

Hypothesis 11 is accepted as period accounts for 0.53% of the variation of profitability.

Hypothesis 12 is accepted as company accounts for 42.64% of the variation of profitability.

Hypothesis 14 is accepted as the interaction of company and period accounts for 10.74% in variation of profitability.

Hypothesis 15 is rejected as Supersector accounts for 0% variation in profitability.

5.4.2 ROA MODEL 2 (HYPOTHESIS 10, 12, 13, 15)

Table 28: Variance Component Analysis results for ROA Hypotheses 10, 12, 13, 15

Maximum Likelihood Estimates		
Variance Component	*Estimate*	*%*
Var(Company)	16.18125	50%
Var(year)	0.44734	1%
Var(Company*year)	0	0%
Var(Supersector)	0	0%
Var(Error)	15.4551	48%

Hypothesis 10 is accepted as year accounts for 1% of the variation in profitability.

Hypothesis 12 is accepted as company accounts for 50% of the variation in profitability.

Hypothesis 13 is rejected as the interaction of company and year accounts for 0% variation in profitability.

Hypothesis 15 is rejected as Supersector accounts for 0% variation in profitability

5.4.3 ROE MODEL 1 (HYPOTHESIS 11, 12, 14, 15)

Table 29: Variance Component Analysis results for ROE Hypotheses 11, 12, 14, 15

Maximum Likelihood Estimates		
Variance Component	*Estimate*	*%*
Var(company)	74.4347	32.89%
Var(PERIOD)	0	0%
Var(company*PERIOD)	29.20851	13%
Var(Super_Sector)	0	0.00%
Var(Error)	122.6534	54%

Hypothesis 11 is rejected as period accounts for 0% of the variation of profitability.

Hypothesis 12 is accepted as company accounts for 32.89% of the variation of profitability.

Hypothesis 14 is accepted as the interaction of company and period accounts for 13% in variation of profitability.

Hypothesis 15 is rejected as Supersector accounts for 0% variation in profitability.

5.4.4 ROE MODEL 2 (HYPOTHESIS 10, 12, 13, 15)

Table 30: Variance Component Analysis results for ROE Hypotheses 10, 12, 13, 15

Maximum Likelihood Estimates		
Variance Component	*Estimate*	*%*
Var(company)	98.00583	42.62%
Var(year)	4.75069	2.07%
Var(company*year)	0	0.00%
Var(Supersector)	0	0.00%
Var(Error)	127.17327	55.31%

Hypothesis 10 is accepted as year accounts for 2.07% of the variation in profitability.

Hypothesis 12 is accepted as company accounts for 42.62% of the variation in profitability.

Hypothesis 13 is rejected as the interaction of company and year accounts for 0% variation in profitability.

Hypothesis 15 is rejected as Supersector accounts for 0% variation in profitability.

5.4.5 ROCE MODEL 1 (HYPOTHESIS 11, 12, 14, 15)

Table 31: Variance Component Analysis results for ROCE Hypotheses 11, 12, 14, 15

Maximum Likelihood Estimates		
Variance Component	*Estimate*	*%*
Var(COMPANY)	51.41591	37.65%
Var(PERIOD)	0.17423	0.13%
Var(COMPANY*PERIOD)	20.24425	14.82%
Var(Supersector)	0	0.00%
Var(Error)	64.74395	47.40%

Hypothesis 11 is accepted as period accounts for 0.13% of the variation of profitability.

Hypothesis 12 is accepted as company accounts for 37.65% of the variation of profitability.

Hypothesis 14 is accepted as the interaction of company and period accounts for 14.82% in variation of profitability.

Hypothesis 15 is rejected as Supersector accounts for 0% variation in profitability.

5.4.6 ROCE MODEL 2 (HYPOTHESIS 10, 12, 13, 15)

Table 32: Variance Component Analysis results for ROCE Hypotheses 10, 12, 13, 15

Maximum Likelihood Estimates		
Variance Component	*Estimate*	*%*
Var(company)	67.37696348	48.53%
Var(year)	2.10820795	1.52%
Var(company*year)	68.21801993	49.14%
Var(Supersector)	0	0.00%
Var(Error)	1.128999775	0.81%

Hypothesis 10 is accepted as year accounts for 1.52% of the variation in profitability.

Hypothesis 12 is accepted as company accounts for 48.53% of the variation in profitability.

Hypothesis 13 is accepted as the interaction of company and year accounts for 49.14% variation in profitability.

Hypothesis 15 is rejected as Supersector accounts for 0% variation in profitability

6. DISCUSSION OF RESULTS

6.1 GENERAL COMMENTARY ON EXPECTED PROFITABILITY RETURNS IN SOUTH AFRICA

The descriptive data on ROA, ROE and ROCE ,as well as the standard deviations below, are analysed at the macro level. The intention here was not to find out why the fluctuations occur but to find out in what areas they do, allowing the researcher then to test the hypotheses that followed, hence recreating the necessary condition to run the McGahan and Porter (1997) study in South Africa.

When looking at the macro descriptive section in figure two it can be seen that all profitability measures are on or over 10% returns. The only area that is lower is ROA which may be an indication of relatively poor asset utilisation. The fact that all profitability measures are on or above the 10% mark is to be expected as the cost of capital is high in South Africa compared to the United States of America, where lending rates are much lower. This is a very significant sign that the profitability measures used in this study are accurate. If one looks at the point where the returns as a whole are the lowest one can see that between 1993 and 1995 they are the lowest. Again this makes sense as one can see the period of massive capital loss during the first democratic elections which took place in 1994 ending apartheid. Through evidence one can see that extremely turbulent times affect returns negatively. Again this is another sign that the data is accurate and trending correctly.

When looking at figure three it is evident that pre-1994 average returns are less than those post-1994, barring the ROA average which is actually higher but not significantly so. This is interesting as it may be showing that market concentration actually leads to poorer returns. During the 1980's and early 1990's all listed corporate entities were controlled by a few large family owned businesses. One can deduce that during times of concentration, returns are lower when organisations are becoming fat and lethargic with little competition and large diversification into unknown industries. However, the returns are higher post-apartheid possibly because the organisations are now facing competition locally as well as abroad and they have to responds by being lean and efficient ultimately increasing returns. However, a more detailed investigation is needed in this area as to why this is the case.

When looking at Figure Four one can see the average returns of all the profitability measures across the Johannesburg Stock Exchanges Supersectors. It is evident that utilities have healthy ROE and ROCE returns but very poor ROA. One would expect high ROCE returns due to the discussion in section 2.5.3, this performance measure is sensitive to profits in market concentration. This could be due to poor asset utilisation pre-1994, however further detailed investigation into this area would need to take place. It is apparent that investment The really interesting areas for investors though are the four sectors with the greatest ROE returns: media, travel & leisure, personal household & goods and oil & gas all have the highest ROE. Oil & gas is expected due to Sasol's propriety technology and the extremely high oil prices over the past twenty years. One of the reasons for this is due to what Porter (1980) called

bargaining power. Porter (1980) goes on to say that when an industry is dominated by a few companies and is more concentrated than the industry it sells to and when the industry is not obliged to contend with other substitute products for sale to the industry, they will generate large profits. However, the others need more investigation as to why they have the highest returns. When looking at the highest ROA returns, which are of interest to business owners and CEO's alike, it is clear that media, food & beverage, telecommunications and automobiles and parts have the highest ROA. Telecoms would be expected, as within that business model assets are heavily sweated and they are protected through licensing agreements, however further investigation is needed for the other areas.instruments and financial services outperformed the banks as a whole. The McGahan and Porter (1997) study did not take banks into account due to their large market caps and uncommon debt to equity structures. However, it was decided to keep them in the study in this case as due to the Supersector classification they could be easily hived off if need be.

6.2 DETAILED DESCRIPTIVE ANALYSIS

The detailed descriptive statistics in section 5.2 shows that the number of observations in tables one, seven and thirteen for year in ROA, ROE and ROCE increases three fold. This is due to the growth of the Johannesburg Stock Exchange over the past twenty years. Even though a census was taken by trimming the data the researcher removed the top and bottom 10%, eliminating the outliers. The number of observations by period stays the same for all profitability measures. Ultimately the results show that there are highs and lows in the means across all profitability measures. This is a strong indication as to

the high accuracy of the data and its suitability to be used in the Variance of Component analysis. It is clear that throughout the descriptive statistics in section 5.2 that there is a high standard deviation meaning that the data is spread out over a large range of values, this is a very positive result in utilising Variance analysis and allowed the study to continue with the current data set.

The post hoc Bonferroni test results in Appendix 2 show the mean difference between mean ROA, ROE and ROCE for the years and Supersectors is significant if the p-value of the test (given by the Sig. value) is less than 0.05. This will also be evident from the 95% Confidence interval for the difference which will not include zero if the difference is statistically significant. It can be seen that many zero values do not occur during the periods of 1993, 1994 and 1995 showing that these values are statistically significant. This reflects a time of political instability which affected companies' performance and the data at that time.

6.3 DISCUSSION ON HYPOTHESIS

6.3.1 HYPOTHESES 1 to 9

The Anova test results in section 5.3 reveal that independent variables are good predictors in determining whether there is variability. This is due to the fact that all hypothesis tests show that there is in fact a difference in mean ROA, ROE and ROCE by year, period and supersector. This actually shows that the raw data set of twenty five years can be used to perform a Component of Variance analysis. This was the major purpose of these tests.

6.3.2 HYPOTHESIS 10: YEAR

In all instances i.e. ROA, ROE, ROCE there was a variation hence the hypothesis was accepted. The average percentage of year variance sits at 1.53%. This has been empirically proven with an average error rate of 34.72%. The higher the error rate the less predictive the variables. In other words if we have an error rate of 80% it means that 80% of variance is explained by variables that we have not tested. In this case we can see that the error rate is very low and hence the variables we have used are very strong at showing the effects on company profitability. This finding is interesting as we see that year is very weak in effecting a company performance. It was expected that it would be a strong variable due to the volatility of the socio-economic history in South Africa, which may have had a negative effect on the profit abilities of companies listed on the Johannesburg Stock Exchange. Period i.e. pre-1994 and post-1994 may show more of an effect.

6.3.3 HYPOTHESIS 11: PERIOD

There is a variance in ROA and ROCE, however, ROE reflects no variance and we reject the hypothesis. All tests have a low error rate averaging at 49.16%, showing that our tests are accurate. One would expect there to be a variation as within the macro descriptive section there was a significant increase in ROE and ROCE. As there is no variation for ROE we can assume that period has had little effect for shareholders returns. Ultimately there is a variance though averaging at 0.66%, although small it is an important finding. This is due to the belief by many that isolated companies that dominate the market perform

poorly, the results of hypothesis 11 shows that this is not the case. Further investigation would be needed to address this issue. An option would be to remove some of the larger industries such as the banks to see if the results would be different.

6.3.4 HYPOTHESIS 12: COMPANY

Company is tested in both models one and two. Even though model one has the lower error rate in all cases, if one looks at all results there is a strong variance in all cases of ROA, ROE and ROCE across both models. There is an average variance at 42.39%. The variance is highest in model two ROA which is 50% and lowest in model 1 ROE 32.89%. This shows that company has a very large impact on profitability. What does this mean exactly? In the McGahan and Porter (1997) study they have a variable called business specific. Within this study the term company is preferred due to ease of understanding. McGahan and Porter (1997) go onto say that business specific effects comprise of diversity in market share, differentiation, heterogeneity in fixed assets, differences in organisational processes, differences in organisational effectiveness and differences in managerial competence. So it is expected that this variance of company should be large as regardless of the external environment internal performance still plays a large role in the profitability of a company.

6.3.5 HYPOTHESIS 13: INTERACTION OF COMPANY AND YEAR

In testing the hypothesis it was decided to also test interactions between variables. The first of these is to test the interaction between company and year. The results are 0% for both ROA and ROE alike, hence we rejected hypothesis 13 in this regard. However, there is a large variance for ROCE which is 49.14% accompanied with a very low error rate in that model. ROCE takes net assets into account, this could be the explanation as to why the large variance has occurred in only one performance measure as the accumulation of assets by firms would have a greater impact on this profitability measure. Asset accumulation took place on a large scale during the pre-1994 period. However, the fact that two of the three performance measures showed no variance we have to reject this hypothesis, and say that the interaction of company and year has no significant effect on the variability of profitability.

6.3.6 HYPOTHESIS 14: INTERACTION OF COMPANY AND PERIOD

In all instances there is a variance shown when looking at the interaction of company and period. On average we have a variance of 12.85% and a low average error rate of 49.16%. These results are very interesting and show why interactions were also chosen, on its own period resulted for little variance, looking at the interaction with company we can see that that variance is a great deal stronger. This is not just a case of averaging out in the sense that company showed a strong relationship and hence pulled up the period variance. The test for interaction was run completely separately, as in all the tests, and purely the interaction was assessed. So this test shows that the company

needs to perform within a set period. The company must respond to external circumstances in the correct manner. The manner in which the company can respond is also known as strategy. Hence we can argue that strategy does indeed play a major role when trying to improve the profitability of a firm, as strategy takes the external i.e. period and internal i.e. company and attempts to align the two in such a way that the company becomes profitable. This is otherwise known as the resource based viewed discussed in depth in chapter two, this finding is significant in supporting that school of thought.

6.3.7 HYPOTHESIS 15: SUPERSECTOR

In all instances of ROA, ROE and ROCE and across models one and two there was no variance in regards to Supersector. This is saying that the Supresector, or the industry as it is known in the McGahan and Porter (1997) study, does not account for any effects. This could be as a result of using the Supersector methodology as described in chapter two. The original studies utilise the standard industrialised codes or Standard Industrialisation Codes methodology to the fourth digit. The Supersector method is at a more granular level and could have resulted in being to detailed to find a variance.

7. CONCLUSION AND RECOMMENDATIONS

7.1 BACKGROUND

Corporate strategy is one of the fundamental choices a manager and CEO has to make in the pursuit of profits. The question of what effect time, industry and company actually have on the profitability of companies is one that has been researched and debated from the early 1970's. One sees that much research has been performed in an international context. However, consensus as to the effects these variables have has not been reached, and some of the results are contradictory.

In South Africa no study of this nature has taken place before. Although analysis has been done on time and industry effects over five years, no study that takes a twenty five year data set with three profitability measures and a number of variables has been conducted. On top of this South Africa has a very unique history, from economic isolation to international competition. The question was how much effect did these periods have on companies and the economic landscape as a whole.

This research study was conducted to determine if there is an effect on profitability due to year, industry, period, company and interactions of these.

7.2 FINDINGS

The research was conducted on all listed companies on the Johannesburg Stock Exchange for the period 1983-2008. The research fundamentally had two stages. The first was to test the performance measures to see if the data was fit to use in a Components of Variance analysis. Then the Components of Variance analysis was performed. The variance in year, period, company, interaction of company and year, the interaction of company and period and Supersector was then measured to find if there was an effect, and to what extent this effect occurred.

Within a study of this nature it would be expected that accounting errors would have a serious impact on the results. However, with the very long time period of the data set and the use of three performance measure, ROA, ROE and ROCE, these errors can largely be excluded and hence the profitability findings can be accepted with relatively high levels of confidence. This study was not just prudent in its analysis due to the above but also due to the many hypotheses tested both within the ANOVA tests and the Variance of Component analysis work, as interactions of the variables were also taken into account.

In the McGahan and Porter (1997) study it shows that year, industry and business specific effects account for a 2%, 19% and 32% variance in profitability. The analysis was performed under an error rate of 48.40%, whilst this study has an aggregated error rate of only 41.92% showing that this analysis is more accurate in its chosen variables. The results within this study

show that year, industry (Supersector) and business specific effects account for 2%, 0% and 42% variance in profitability respectively. This research finds exactly the same variance in year as the McGahan and Porter (1997) study and has a close variance figure in regards to the business specific effects. More specifically however, this study also took into account period, interaction of company and period, interaction of company and year. These additional tests accounted for 1%, 13% and 17% in variance respectively. The interaction findings are of particular interest as they strengthen the Resource Based View argument. One can see that there is a strong variance in profitability when company and period are aligned or not aligned. How deep or shallow this alignment is will determine if this variance in profitability is positive or negative. This argument is strengthened as year alone i.e. no interaction only counts for 2% variance and period only 1%.

Due to five of the six tests, in the Variance Component analysis, returning statistically significant results one can see that this strengthens the findings of the McGahan and Porter (1997) findings that the chosen variables have an effect on profitability. This is important as we can now make the assumption that the methods and practices that effect profitability in international companies can now be applied to a South African context. So if the methods and practices are successful in other countries we can say that they would also work in a South African context. However, the evidence found on year and period variance, although small, must be considered to be specific to this country, showing that generic management practices do not always work.

7.3 IN SUMMARY

It is therefore found that all the ANOVA tests, hypotheses one to nine, have varied means and hence the data can be used for variance of component analysis test. Further hypotheses ten through fourteen can be accepted and hypothesis fifteen (Supersector) has been rejected. This research proves that year, period, company, interaction of company and year/period cause variations in profitability. Hence management must take the above variables into consideration when deciding on their specific strategies.

7.4 RECOMMENDATION

The study utilised international research methodologies with South African data. The research above has taken a long time period and six variables into account and has shown statistical significance for five of them. Further studies could be performed using the same performance measurement data, but use other variables.

Another variable to be considered would be corporate parent. However, as discussed in section 4.6 the data set is not complete enough to perform a rigorous study, on top of this the McGahan and Porter (1997) study showed very little percentage variance. This said the economic landscape of South Africa is very different to that of the US and one may find a stronger variance percentage.

Further investigation into why different performance measures, ROA, ROE and ROCE have varied results specifically in both areas where there is such fluctuations such as company year interaction, would be advisable. Research of this nature would allow the competition commission insight into unfair market concentration and help to make the South African economy a more competitive and hence more efficient one. This would also give further insight into the periods of pre and post apartheid as one could understand through further analysis the true effects of economic isolation. This could be achieved by utilising variables such as market share and market concentration or diversification and inequality and growth. Combining these variables with this current study could prove to be very powerful.

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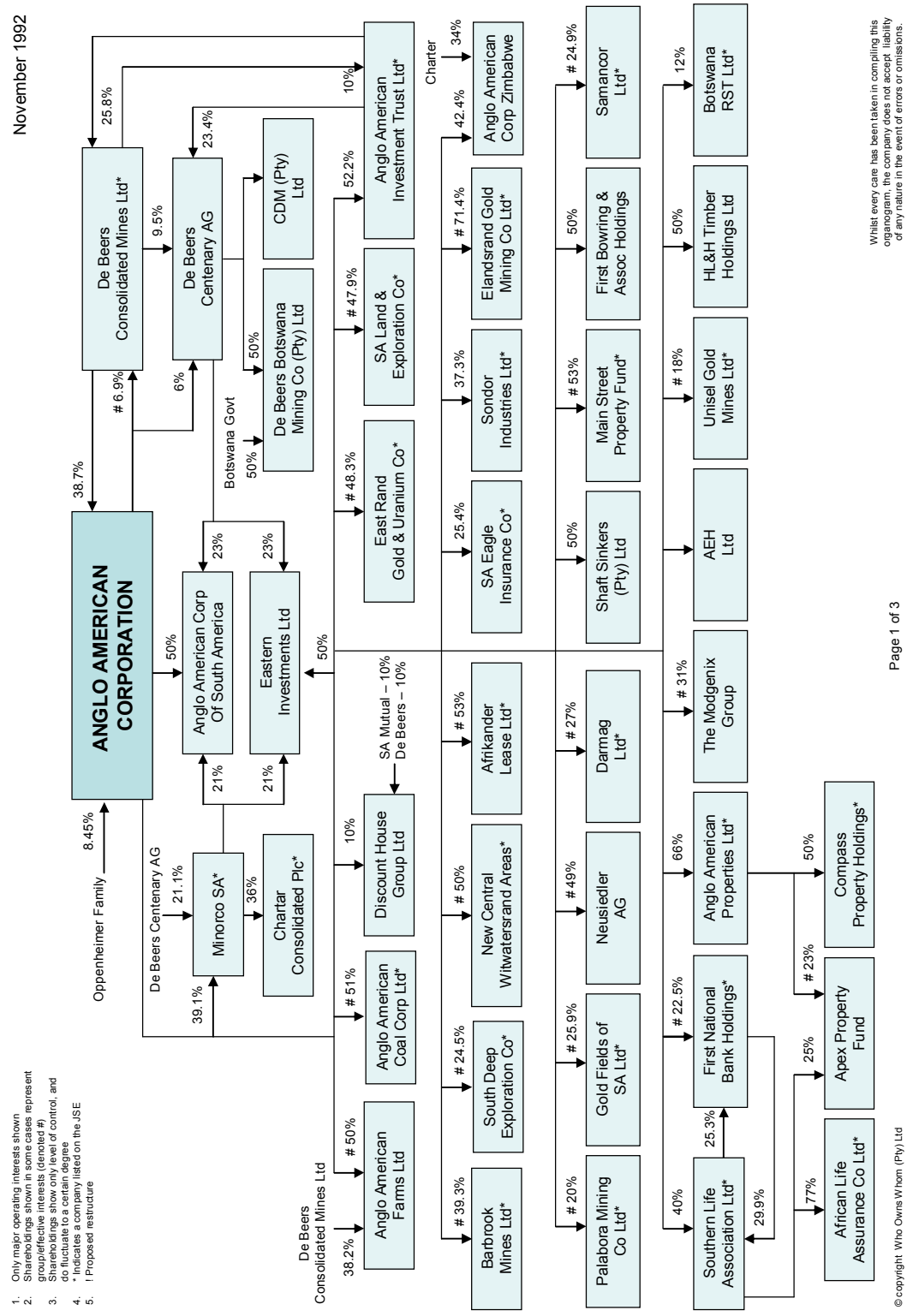
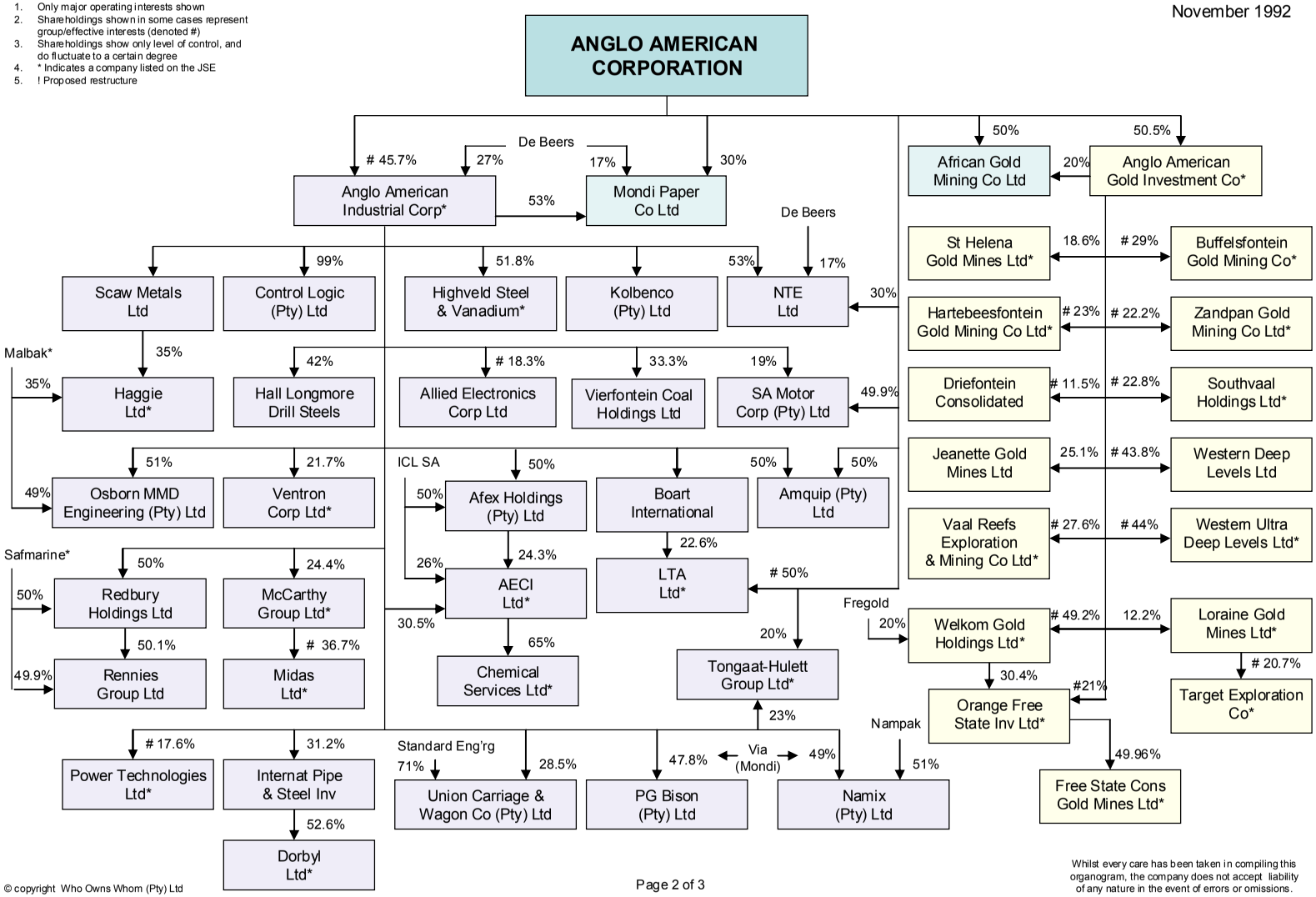
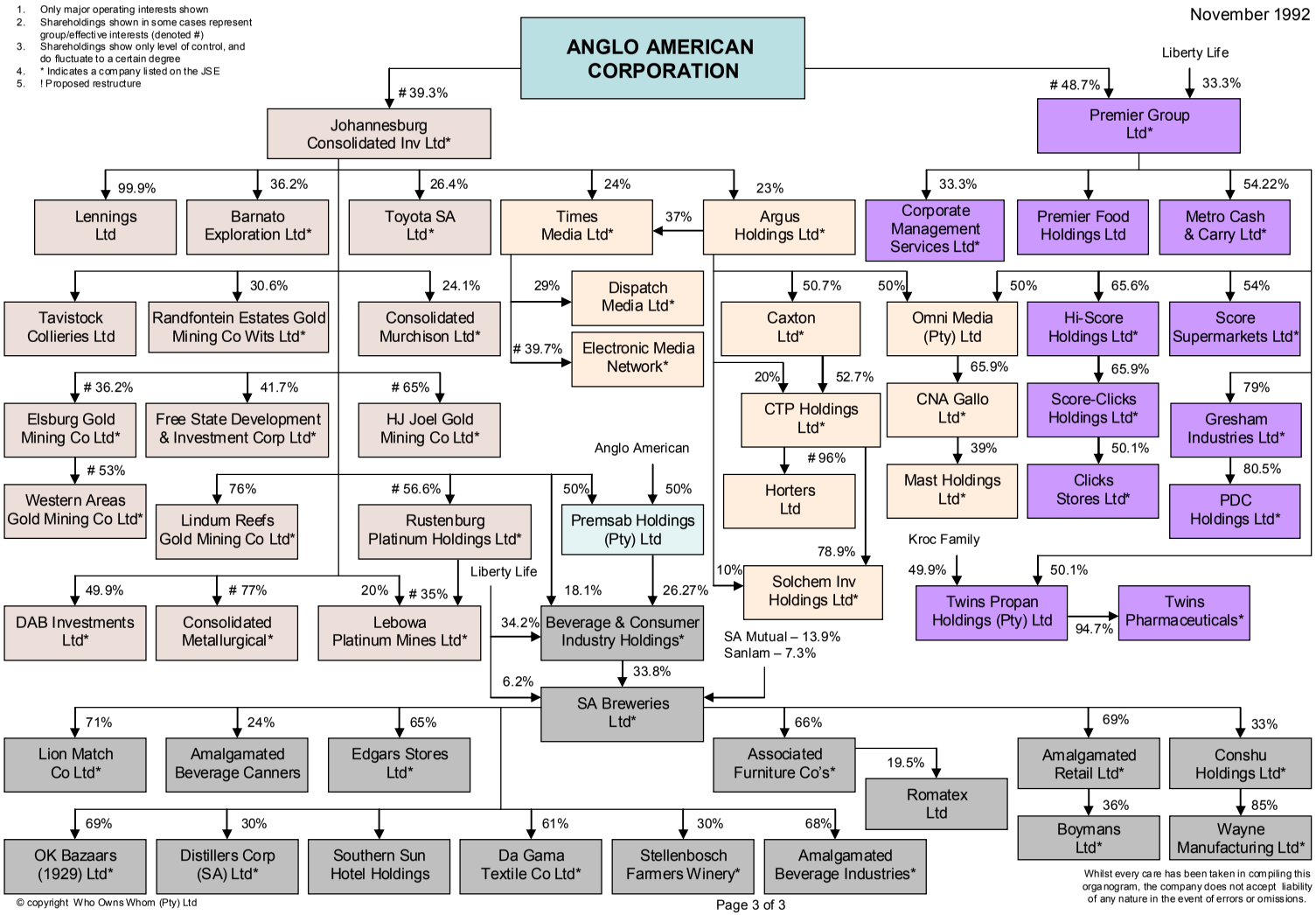
APPENDIX 1: MOVEMENT OF MAJOR JSE SHAREHOLDERS PRE 1994



1. Only major operating interests shown
2. Shareholdings shown in some cases represent group/effective interests (denoted #)
3. Shareholdings show only level of control, and do fluctuate to a certain degree
4. * Indicates a company listed on the JSE
5. ! Proposed restructure

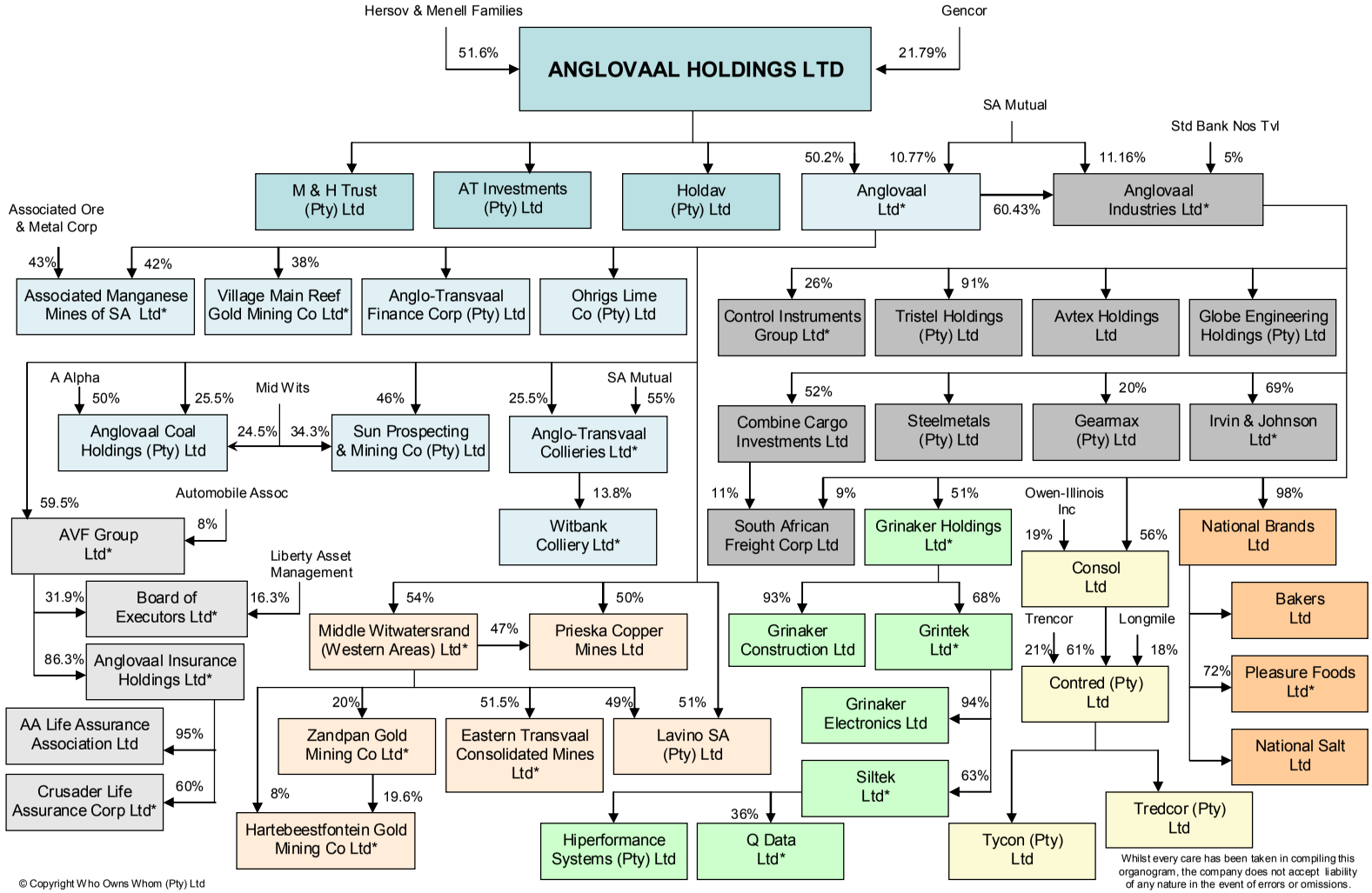
November 1992





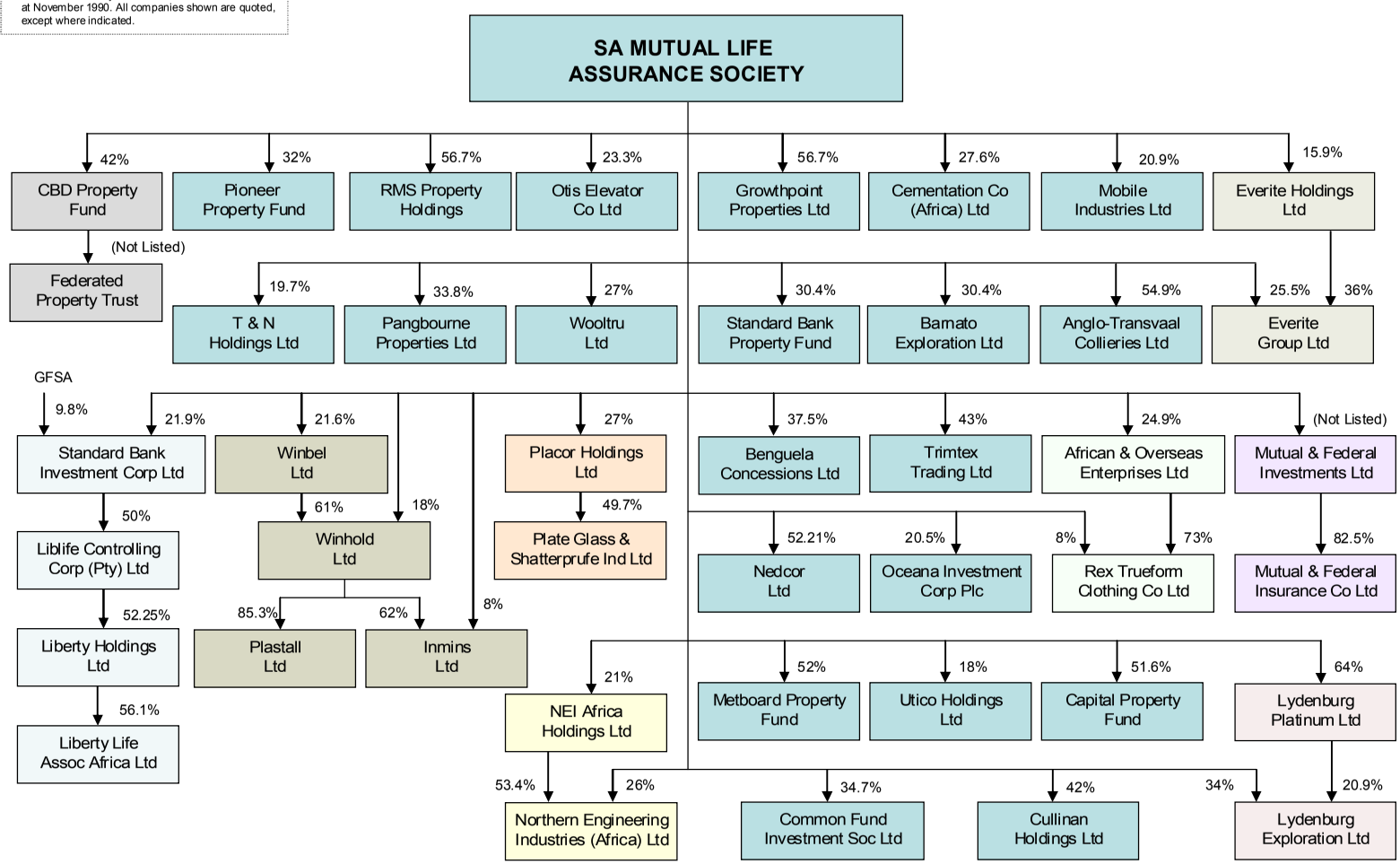
1. Only major subsidiaries / associate shown
2. * Indicates a listed company

September 1991



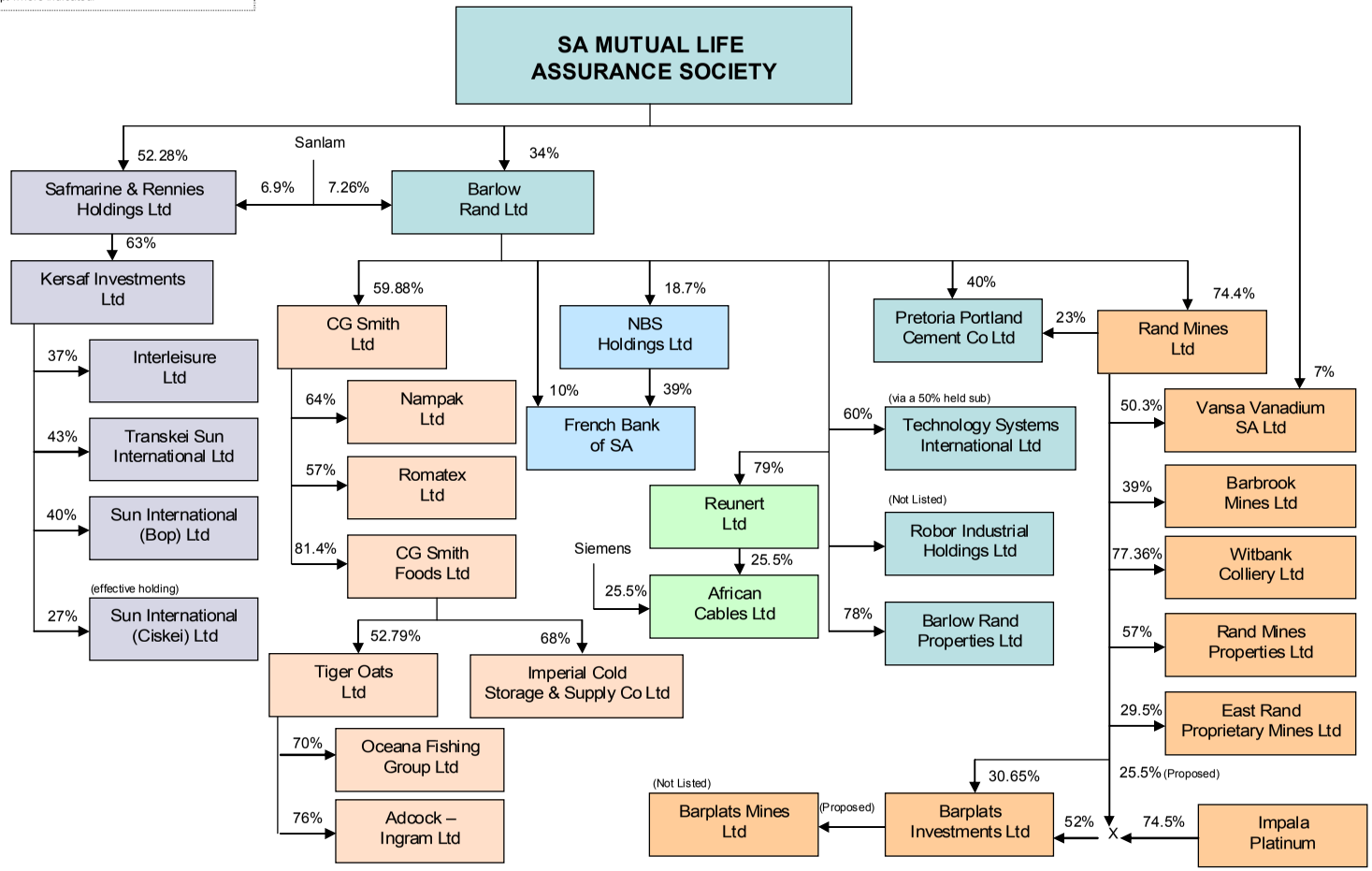
*This chart shows the quoted interests of SA Mutual >= 19%. Percentages will fluctuate & are only intended to show level of interest at November 1990. All companies shown are quoted, except where indicated.

November 1992



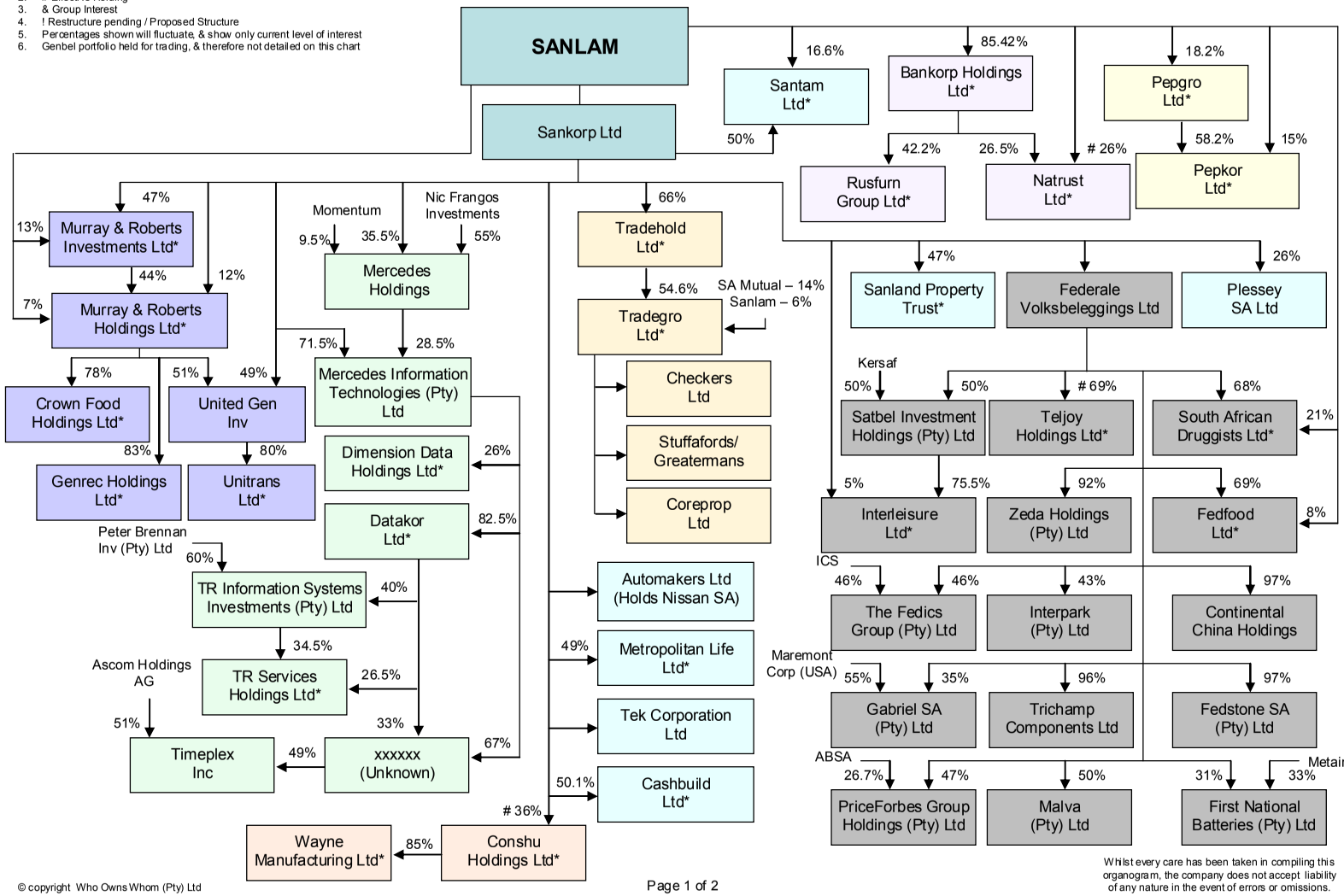
*This chart shows the quoted interests of SA Mutual >= 19%. Percentages will fluctuate & are only intended to show level of interest at November 1990. All companies shown are quoted, except where indicated.

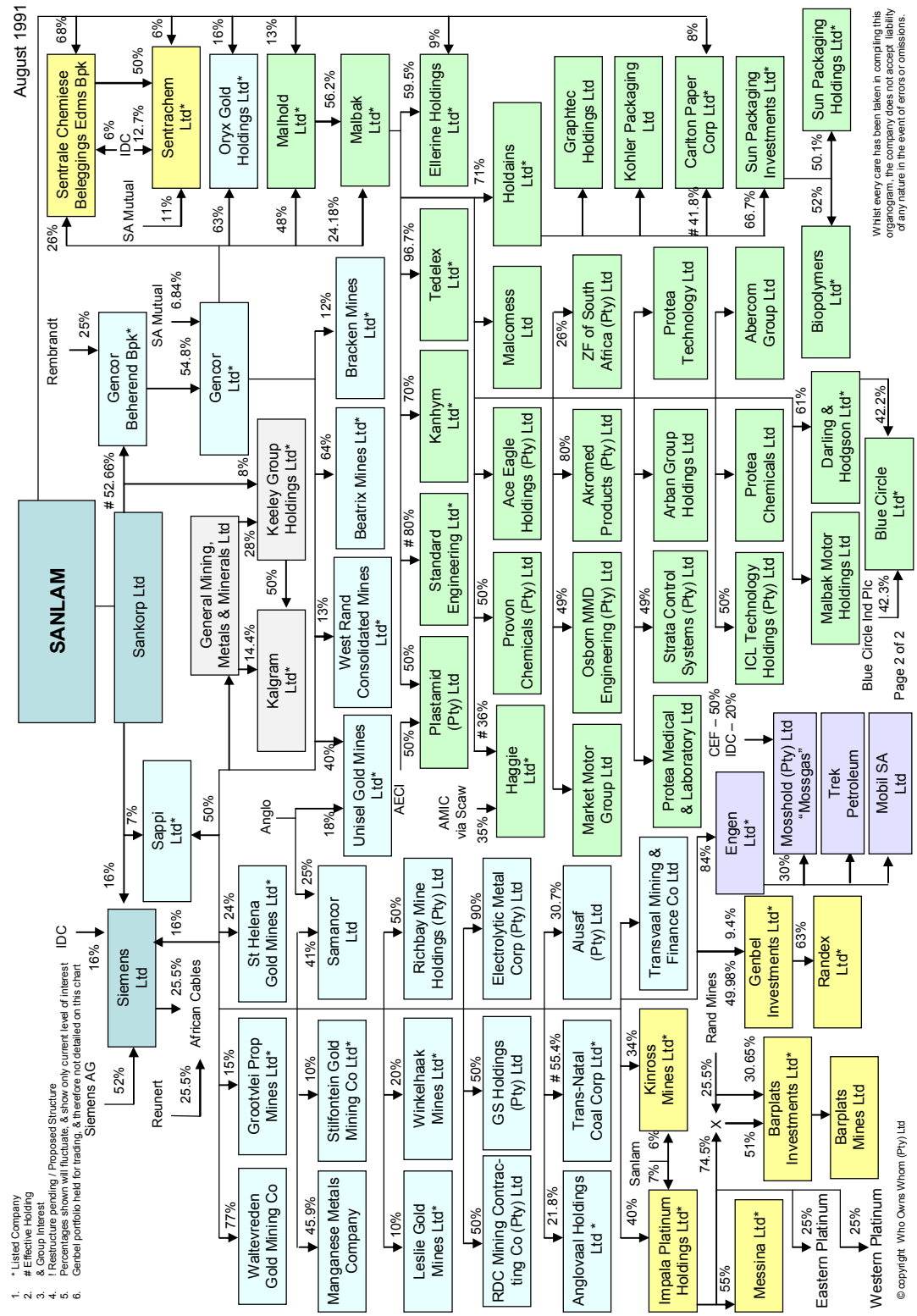
November 1992



1. * Listed Company
2. # Effective Holding
3. & Group Interest
4. ! Restructure pending / Proposed Structure
5. Percentages shown will fluctuate, & show only current level of interest
6. Genbel portfolio held for trading, & therefore not detailed on this chart

August 1991




August 1991
SANLAM
Rembrandt
25%
Gencor Beherend Bpk*
SA Mutual
6.84%
54.8%
Gencor Ltd*
52.66%
Sankorp Ltd
Sentrale Chemiese Beleggings Edms Bpk
68%
26%
SA Mutual
11%
6%
IDC
12.7%
50%
Sentrachem Ltd*
Oryx Gold Holdings Ltd*
16%
63%
Malhold Ltd*
13%
48%
Malbak Ltd*
56.2%
24.18%
Ellerine Holdings Ltd*
9%
59.5%
71%
Holdains Ltd*
Graphtec Holdings Ltd
Kohler Packaging Ltd
Carlton Paper Corp Ltd*
8%
41.8%
Sun Packaging Investments Ltd*
66.7%
Sun Packaging Holdings Ltd*
52%
50.1%
Biopolymers Ltd*
Tedelex Ltd*
96.7%
Malcomess Ltd
ZF of South Africa (Pty) Ltd
26%
Protea Technology Ltd
Abercom Group Ltd
Darling & Hodgson Ltd*
61%
Malbak Motor Holdings Ltd
Blue Circle Ltd*
42.2%
Blue Circle Ind Plc
42.3%
Page 2 of 2
Bracken Mines Ltd*
12%
Kanhym Ltd*
70%
Ace Eagle Holdings (Pty) Ltd
Akromed Products (Pty) Ltd
80%
Arban Group Holdings Ltd
Protea Chemicals Ltd
Beatrix Mines Ltd*
64%
80%
Standard Engineering Ltd*
Provon Chemicals (Pty) Ltd
50%
Osborn MMD Engineering (Pty) Ltd
49%
Strata Control Systems (Pty) Ltd
49%
ICL Technology Holdings (Pty) Ltd
50%
West Rand Consolidated Mines Ltd*
13%
Plastamid (Pty) Ltd
50%
36%
Haggie Ltd*
35%
AMIC via Scaw
Market Motor Group Ltd
Protea Medical & Laboratory Ltd
CEF – 50%
IDC – 20%
Mosshold (Pty) Ltd "Mossgas"
30%
Trek Petroleum
Mobil SA Ltd
Keeley Group Holdings Ltd*
28%
8%
Kalgram Ltd*
14.4%
50%
General Mining, Metals & Minerals Ltd
Unisel Gold Mines Ltd*
40%
AECI
Engen Ltd*
84%
Transvaal Mining & Finance Co Ltd
Alusaf (Pty) Ltd
30.7%
Richbay Mine Holdings (Pty) Ltd
50%
Electrolytic Metal Corp (Pty) Ltd
90%
Anglo
18%
Samancor Ltd
41%
St Helena Gold Mines Ltd*
25%
24%
Sappi Ltd*
50%
7%
16%
Siemens Ltd
16%
IDC
25.5%
African Cables
Reunert
25.5%
Siemens AG
52%
Waltevreden Gold Mining Co
77%
Manganese Metals Company
45.9%
Leslie Gold Mines Ltd*
10%
RDC Mining Contracting Co (Pty) Ltd
50%
Anglovaal Holdings Ltd *
21.8%
Grootvlei Prop Mines Ltd*
15%
Stilfontein Gold Mining Co Ltd*
10%
Winkelhaak Mines Ltd*
20%
GS Holdings (Pty) Ltd
50%
Trans-Natal Coal Corp Ltd*
55.4%
Impala Platinum Holdings Ltd*
40%
Sanlam
7%
6%
Kinross Mines Ltd*
34%
Messina Ltd*
55%
Eastern Platinum
25%
Western Platinum
25%
74.5%
X
Rand Mines
25.5%
Barplats Investments Ltd*
51%
30.65%
Barplats Mines Ltd
Genbel Investments Ltd*
49.98%
9.4%
Randex Ltd*
63%
1. * Listed Company
2. # Effective Holding
3. & Group Interest
4. ! Restructure pending / Proposed Structure
5. Percentages shown will fluctuate, & show only current level of interest
6. Genbel portfolio held for trading, & therefore not detailed on this chart
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APPENDIX 2: BONFERRONI DATA (SEE DATA DISC)

The Bonferroni tests are very long and can be viewed on the disc accompanying this study.

APPENDIX 3: GRAND MEANS

The table below shows the overall mean of ROA and the 95% confidence interval for overall mean ROA.

ROA Grand Mean			
Dependent Variable: ROA			
		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
10.313	.093	10.130	10.496

The table below shows the overall mean of ROE and the 95% confidence interval for overall mean ROE.

ROE Grand Mean			
Dependent Variable: ROE			
		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
17.087	.221	16.654	17.521

The table below shows the overall mean of ROCE and the 95% confidence interval for overall mean ROCE.

ROCE Grand Mean			
Dependent Variable: roce			
		95% Confidence Interval	
Mean	Std. Error	Lower Bound	Upper Bound
12.420	.179	12.069	12.771