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Relative importance of asset allocation versus security selection in South Africa

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RELATIVE IMPORTANCE OF ASSET ALLOCATION VERSUS SECURITY SELECTION IN SOUTH AFRICA

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A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Business Administration

Johannesburg
June 2006

ABSTRACT

The relative importance of the asset allocation decision versus the security selection decision in the investment process has been the subject of fierce debate over the last two decades. There is a common misconception that the asset allocation decision is the more important decision between the two.

This misconception was created by a study that assessed the level of active asset allocation decisions taken by investment managers of a specific sample group of retirement plans, relative to their respective benchmarks.

This research employs an alternative methodology to assess whether the asset allocation decision is indeed superior to security selection in the investment process.

The main finding of the research is that while the security selection decision may generate a wider dispersion of returns than the asset allocation decision, which could imply greater importance, it is at the expense of greater risk. On a risk-return basis, relative to a benchmark, there is no evidence that either decision has a greater importance in the investment process.

DECLARATION

I, Vimal Chagan declare that this research report is my own, unaided work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

_____

Vimal Chagan

30 June, 2006

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to:

- My supervisor, Frank Durand, for his guidance, support and advice during the course of this research.

- My wife, Babita, who offered me her love, support and understanding throughout the MBA process.

- Michelle Beckwith and Leon Meintjes, from MSCI Barra, for the provision of data and certain calculations, integral to the research report.

- Andrew Forde and his team at PeregrineQuant, for the provision of data used to verify results.

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1. INTRODUCTION

1.1 Purpose of the study

The purpose of this research was to investigate the relative importance of the asset allocation decision versus the security selection decision in the investment process in South Africa.

1.2 Context of the study

The performance of a portfolio of assets over a set period of time can be attributed to three main decisions: the asset allocation decision, the market timing decision and the security selection decision. Normally, the investment policy statement of the portfolio is determined with reference to its investment objectives and at a particular level of risk (Kuenzi, 2003).

Brinson, Hood & Beebower (1986:136) showed that the asset allocation policy, or benchmark, across 91 funds, "… explained on average fully 93.6 per cent of the total variation in actual plan return." They measured the extent to which the actual fund return was influenced by the fund benchmark return. Jahnke (2000) stated that many financial advisors had misinterpreted this result to mean that the asset allocation policy explained over 90 percent of a portfolio's performance, in the absence of a benchmark.

Hensel, Ezra & Ilkiw (1991) stated that the security selection decision was also an important determinant of performance. Ibbotson & Kaplan (2000) showed that the importance of the asset allocation decision varied according to the question being posed.

Kritzman & Page (2002:203) showed "… that choosing stocks within the equity component of a portfolio is substantially more important than choosing a portfolio's exposure among stocks, bonds and cash." This report analyzed the relative importance of the asset allocation decision versus the security selection decision in the South African market.

1.3 Statement of the problem

The purpose of this research was to investigate the relative importance of the asset allocation decision versus the security selection decision in the investment process.

1.4 Subproblems

The first subproblem was to determine the performance variation achieved by simulating random portfolios and varying only the asset allocation decision or only the security selection decision.

The second subproblem was to determine the active risk dispersion achieved by simulating random portfolios and varying only the asset allocation decision or only the security selection decision, versus a passive benchmark of 60 percent in South African Equities, 30 percent in South African Bonds and 10 percent in South African Cash.

The third subproblem was to determine the information ratio dispersion achieved by simulating random portfolios and varying only the security selection decision or only the asset allocation decision, versus a passive benchmark of 60 percent in South African Equities, 30 percent in South African Bonds and 10 percent in South African Cash.

1.5

DELIMITATIONS

This report was limited to South African equity instruments only, over the period 1997 to 2004. South African bond and cash instruments were represented by their respective market indexes. Transaction costs and other fund management charges were not considered in this research report.

1.6 Assumptions

The assumption was that there was sufficient data available to conduct a statistically significant analysis of the problem.

1.7 Definition of Terms

The term “asset allocation” is defined as the percentage of total assets invested in equities, bonds and cash, both domestically and internationally.

The term “security selection” is defined as the “decision of how an asset class portfolio should be invested in each of the available securities making up the asset class” (Hensel *et al*, 1991:66).

1.8 Importance of the study

The relative importance of the asset allocation decision versus the security selection decision was never analyzed in the South African market. The results of Brinson *et al* (1986) have been widely misquoted in the South African investment community, as it has been in international markets. Kritzman & Page (2002) opened a whole new dimension in the way this

problem could be analyzed. The results of this research report adds to the knowledge and information base of the South African investment management and asset consulting communities, by assessing the relative importance of the asset allocation decision versus the security selection decision in South African financial markets.

2. LITERATURE REVIEW

2.1 Introduction

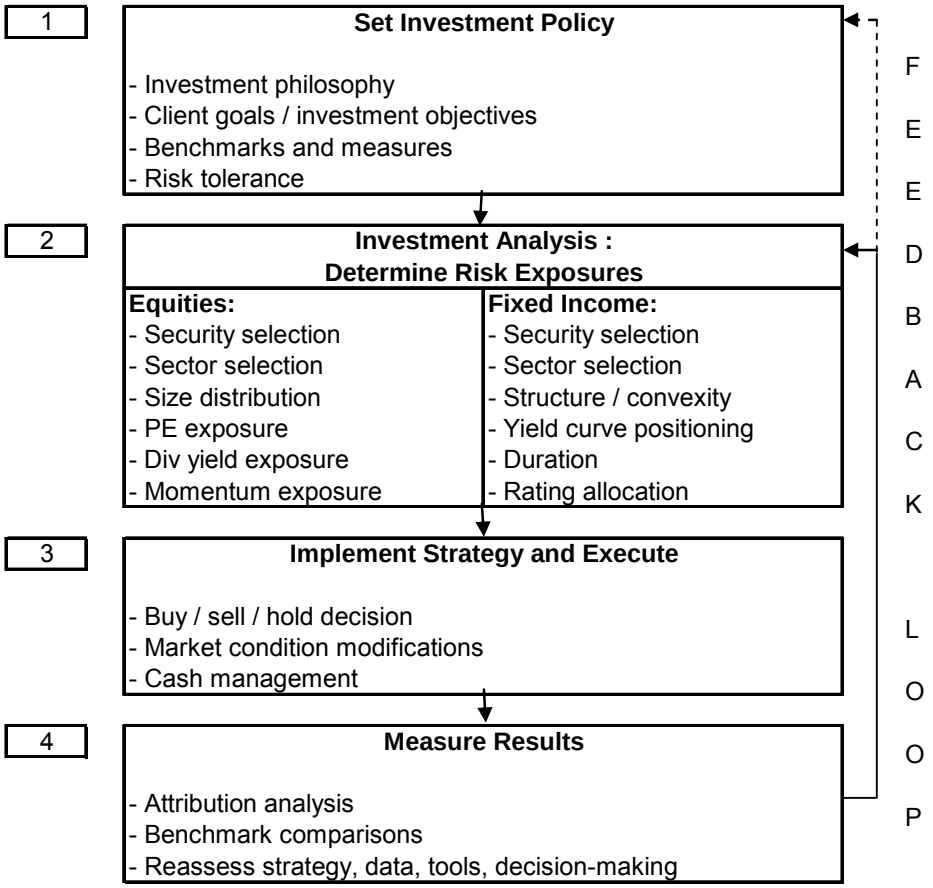
The first part of the literature review discussed the various debates on the importance of the asset allocation decision, given the establishment of an investment policy. The literature was presented, as far as possible, in chronological order. This was necessary to maintain a logical flow as each new study tended to build on previous studies.

The second part of the review discussed an alternative approach to evaluating the relative importance of the asset allocation decision versus the security selection decision.

2.2 Conventional Wisdom and the Asset Allocation Debate

The four basic elements of an institutional investment process are: "1) investment policy; 2) generation of alpha estimates, investment decision-making, and security / factor overweighting and underweighting; 3) execution; and 4) performance measurement and attribution" (Kuenzi, 2003:48). This is represented diagrammatically in Figure 1.

Figure 1: General Institutional Investment Process Flow



Kuenzi (2003)

The key step in the process is Step 1 with the setting of an investment policy. Brinson *et al* (1986) showed that the setting of an investment policy was the key determinant to the results achieved in Step 4. Step 1 measured the appropriateness of the chosen benchmark as a function of the client's liability profile. This benchmark is normally derived in an asset-liability modeling exercise, which may include matching and / or immunization strategies. Step 4 is the performance measurement and attribution of the portfolio's assets over a set period of time. Fama (1972) formulated a method for evaluating investment performance by separating the return achieved by security selection, which he referred to as selectivity, from asset allocation, which he referred to as timing.

Using a similar framework as in Figure 1 and following the methodology advocated by Fama (1972), Brinson *et al* (1986) conducted a performance attribution study using 91 pension plans in the SEI Large Plan Universe. Using quarterly data over 40 consecutive quarters, they decomposed the overall performance of each pension plan into contributions from investment policy, market timing and security selection, using various regression equations. They concluded that the average unadjusted R-squared's across the 91 pension plans, for investment policy alone was 93.6 percent, with a maximum of 98.6 percent and a minimum of 75.5 percent. Investment policy and timing accounted for on average 95.3 percent of the variation of returns over time. Investment policy and security selection explained 97.8 percent of the variation of returns over time. The results do make intuitive sense in that the Bayesian prior of setting the initial asset allocation, would be a large influence on the end result. This also suggested that any security-specific selection decision was preceded, either implicitly or explicitly, by an asset allocation decision. Therefore, Brinson *et al* (1986) calculated the degree of active management undertaken by investment managers relative to the benchmark.

Brinson, Singer & Beebower (1991) updated the results of Brinson *et al* (1986) by further expanding on the performance attribution framework and for changes in portfolio risk characteristics. Using 82 large pension plans over the 10 year period ending 1987, they concluded that "investment policy explained, on average, 91.5 percent of the variation in quarterly total plan returns" (Brinson *et al*, 1991:40). This supported the findings of Brinson *et al* (1986). Furthermore, they found that "using a simple 60 / 40 equity / bond mix as a passive benchmark for all the funds resulted in virtually the same average results" (Brinson *et al*, 1991:46).

Hensel *et al* (1991) challenged a major assumption of Brinson *et al* (1986) and Brinson *et al* (1991), where the results were based on the practices of the average pension plan. They claimed that some investors could take large security selection bets that would have "a greater impact on the achieved returns of these investors than asset allocation policy" (Hensel *et al*, 1991:65). Furthermore, they contended that the asset allocation decision will have the greatest impact on performance, if there is no pre-stated investment policy. If however, there was a pre-determined asset allocation policy, then any deviation from this policy "may have a sizeable impact on total return, but nothing like the dominance frequently (and erroneously) attributed to it" (Hensel *et al*, 1991:71).

Jahnke (1997), while not disagreeing with the importance of the asset allocation decision, questioned three aspects of Brinson *et al* (1986) and Brinson *et al* (1991):

1. Both papers focused on volatility of returns, when they "… should be more concerned with the range of likely outcomes …" (Jahnke, 1997:109). This gave an investor an idea of likely outcomes, instead of a more intangible volatility figure.
2. No consideration was given to costs.
3. Jahnke presumed that both papers advocated a long-term, fixed-weight asset allocation policy, which in his view was incorrect. "Asset allocation should be viewed as a dynamic process" (Jahnke, 1997:111) and should change according to the nature of the liabilities and the changes in the risk-return profile of the capital markets.

In defense of both Brinson *et al* (1986) and Brinson *et al* (1991), Singer (1997) responded to each of these comments, sequentially:

1. The coefficient of determination, viz. R^2, is not a volatility measure but rather a measure of dependency between the independent variable, being the investment policy, and the dependent variable, being actual returns. Furthermore, he believed that there was a role for looking at the range of outcomes as well.

2. He agreed that the exclusion of costs was a flaw in the research due to impracticability, but believed did not detract from the overall result.
3. He stated that Jahnke misinterpreted the conclusions of the original papers, which does not advocate a long-term, fixed asset allocation policy. He concurred with Jahnke (1997) on the issue of taking views on markets and investing accordingly.

In summary, both authors agreed that financial intermediaries do a great disservice to their clients if the asset allocation policy was not reassessed on an ongoing basis. Jahnke (2000:63) stated that "understanding the absolute and relative importance of the factors that determine portfolio returns is of obvious importance to investors interested in the quality of their investment decision-making and the impact of their investment decision-making on the livelihood of achieving financial goals." Therefore, it appeared as though Jahnke's only point of divergence from Brinson *et al* (1986), Brinson *et al* (1991) and Singer (1997) was the choice of statistic used to measure the importance of the asset allocation decision.

Evensky, Jahnke & Surz (2000) pointed to the futility of trying to establish these importances, as the results would vary depending on the frame of reference. Jahnke believed that the investment policy statement, as per Figure 1, should not include an explicit asset allocation policy, as this tended to be abused by financial intermediaries to absolve themselves of any responsibility relating to the asset allocation decision. He believed that financial intermediaries should be actively reassessing whether the asset allocation decision decided upon was relevant to changing market conditions and their client's risk-return profiles.

Ibbotson & Kaplan (2000) were of the view that the importance of the asset allocation policy was dependent on how the question was phrased and on what needed to be explained. Firstly, they stated that "… asset allocation explains about 90 percent of the variability of a fund's returns over time …"

(Ibbotson & Kaplan, 2000:32). This result confirmed the results of Brinson *et al* (1986) and Brinson *et al* (1991) and was based on calculating how much of the variability of fund returns was explained by the variability of policy returns. Secondly, asset allocation "… explains only about 40 percent of the variation of returns among funds" (Ibbotson & Kaplan, 2000:32). This statistic was calculated by comparing the 10-Year compounded annual return across all funds against its benchmarks and establishing the R-squared statistic across this regression. Thirdly, "… asset allocation policy explains a little more than 100 percent of the level of returns" (Ibbotson & Kaplan, 2000:32). This statistic was calculated as the ratio of compound annual benchmark return to compound annual fund return. As the ratio was greater than one, it suggested that funds, on average, underperformed their benchmarks.

Rekenthaler (2000) summarized the asset allocation debate by drawing upon the conclusions of the papers mentioned in this literature review. The first conclusion was that different investors invested differently and were exposed to varying degrees of the asset allocation decision. Brinson *et al* (1986) and Brinson *et al* (1991) were based on large pension plans, which generally employed different investment strategies than the common investor. The second conclusion was that pension plans tended not to engage in significant market timing away from their stated asset allocation and tended to invest in diversified blue-chip securities, which offered returns similar to the market. Therefore, security selection can only be more significant if it were engaged in a more aggressive manner.

Statman (2001:135) concluded that "asset allocation is important, and so is … security selection, but they are important in different ways." He also attacked financial advisors for the manner in which they shied away from actively managing the asset allocation decision.

2.3

A Different Way of Approaching the Problem

Given the inconclusiveness of the literature available thus far, Kritzman & Page (2002) built upon the conclusions of Hensel *et al* (1991), Rekenthaler (2000) and Statman (2001) to arrive at a different methodology for calculating the relative importance of the asset allocation versus the security selection decision. Kritzman & Page (2002:203) stated that the reason investors believed the asset allocation to be more important was that "they fail to distinguish between the consequences of investor behaviour and the opportunity set offered by the capital markets." They believed that the separation of the strategic asset allocation policy, which takes the liability profile of the client into account, from the actual investment policy, would offer investors a whole new world of investment opportunities and outcomes.

They agreed with Clarke, de Silva & Thorley (2002), in that the imposition of constraints on the investment manager reduced the opportunity set and decreased the risk-adjusted returns of Fund.

Using a bootstrapping technique on historical asset classes and security returns and analyzing the range of likely returns, Kritzman & Page (2002) concluded that the security selection decision is more important than the asset allocation decision. They asserted that the industry's unwillingness to engage meaningfully in security selection was a result of them reducing their business risk.

An interesting feature of their research was that they preempt criticisms of the methodology used by discussing some of the likely objections that may be raised. One of these and perhaps the most important is the unusually high tracking error that could result from a purely randomly selected portfolio of securities, but this was found to be in an acceptable range for an actively-managed portfolio.

Kritzman & Page (2002) concentrated on the asset allocation, sector selection and security selection decisions within five countries, viz. Australia, Germany, Japan, the United Kingdom and the Unites States of America. Using the same methodology, Kritzman & Page (2003) considered global asset allocation, global sector selection, country allocation, country sector selection and security selection and once again showed that security selection was the most important determinant of performance.

Risk was also considered in terms of a log wealth utility function, "… which implied that utility increased with wealth but at a decreasing rate." (Kritzman & Page, 2002:211) It assumed that investors have constant relative risk aversion. The utility function is given by:

$$U = \ln(1+\mu) - \left[\frac{1/2\,\sigma^2}{(1+\mu)^2} \right]$$

where:

U = utility
ln = natural logarithm
μ = arithmetic average of yearly returns of unranked portfolios
σ = annualized standard deviation of unranked portfolios.

Kritzman & Page (2003:17)

Staub (2004) questioned whether the asset allocation weightings used by Kritzman & Page (2003) and their usage of a utility function to measure risk were appropriate. Kritzman & Page (2004) stated that the asset allocation weightings used was not important as the results would be similar for different asset allocations. Furthermore, they reiterated that the utility function encompassed both risk and return.

Assoé, L'Her & Plante (2004) used the same methodology as Kritzman & Page (2003) and arrived at a similar conclusion in terms of dispersion of returns.

Instead of using utility functions to assess the risk of the respective strategies, they investigated the active risk and information ratios of each strategy, as defined below. Although the dispersion of active risks was consistent with the dispersion of returns, their findings on the dispersion of information ratios was inconclusive. Assoé *et al* (2004:8) concluded that "… asset allocation, sector allocation and security selection are equally important investment activities for they have an equal potential to generate cross-sectional dispersion of information ratio among sample portfolios."

The active risk of a portfolio is given by:

$$Active\ \ Risk_{Portfolio} = \sqrt{\frac{1}{\left(N_{periods}-1\right)}\sum_{n=1}^{N_{Periods}}\left(R_{Portfolio,n}-R_{Benchmark,n}\right)^2}$$

Assoé *et al* (2004:11)

On the assumption that each period was independent of the next, the active risk could be annualized by multiplying the calculated active risk by the square root of the number of subperiods per annum.

The information ratio is given by:

$$Information\ \ ratio = \frac{\frac{1}{N_{Periods}}\sum_{n=1}^{N_{Periods}}\left(R_{Portfolio,n}-R_{Benchmark,n}\right)}{Active\ \ Risk}$$

Goodwin (1998:34)

As per active risk, this information ratio could be annualized by multiplying the calculated information ratio by the square root of the number of subperiods per annum.

This research report does not use utility functions as a measure of risk, as the information ratio is a more commonly used measure of risk and return versus benchmark.

From the literature review presented, the following propositions are made to solve the stated subproblems:

2.3.1 Proposition 1

The security selection decision is more important than the asset allocation decision for the South African market, as measured by performance variation.

2.3.2 Proposition 2

The security selection decision is more important than the asset allocation decision for the South African market, as measured by the dispersion of active risk.

2.3.3 Proposition 3

The security selection decision is more important than the asset allocation decision for the South African market, as measured by the dispersion of information ratios.

3. DATA REQUIREMENTS

A fine balance between the need for representative data and practicality was found as this research report covers the calendar years 1997 to 2004, i.e. 8 calendar years, which is equivalent to 32 quarters.

The data requirements for propositions one, two and three are:

- Calendar-quarter returns on various market indexes for South African bonds and cash.
- Calendar-quarter returns of the constituents of the JSE Alsi 40 Index, or its successor. Consideration was given to the usage of all the constituents of the JSE All-Share Index, which comprised in excess of 150 securities, but for liquidity concerns and ease of calculation, only the largest and most liquid 40 securities on the JSE were used. The JSE Alsi 40 constitutes approximately 80 percent of the JSE and should be a good proxy for the opportunity set available to investors. Quarterly returns were calculated for securities for the quarter following the quarter-end at which they were constituents of the JSE Alsi40 Index.
- Calendar quarter-end covariance matrices of JSE-listed securities.

3.1 Asset Class Returns

The quarterly returns for South African bonds was that of the Bond Exchange All Bond Index. The data source was the Bond Exchange of South Africa and I-Net Bridge.

The quarterly returns for South African cash was that of the Alexander Forbes Money Market Index. The data source was the Alexander Forbes Group and I-Net Bridge.

3.2 JSE-listed Securities Returns

Quarterly JSE-listed securities returns for the constituents of the JSE Alsi 40 Index was requested from risk model provider-BARRA, PeregrineQuant, a South African investment manager and I-Net Bridge.

This was used to calculate the return of an equally-weighted equities portfolio of securities constituting the JSE Alsi 40 Index.

3.3 Covariance matrices

Quarter-end covariance matrices of JSE-listed securities returns was requested from BARRA.

3.4 Survivorship bias

Survivorship bias existed for JSE-listed securities given ongoing corporate actions. This was dealt with on a case-by-case basis. It did not impose a huge hurdle for calculation purposes, as we used quarterly data only.

4. RESEARCH METHODOLOGY

This research report was a replication study of Kritzman & Page (2002), as adjusted by Assoé *et al* (2004). Hence, the research methodologies employed was in accordance with the respective papers.

To test whether the security selection decision is more important than the asset allocation decision for the South African market, we needed the quarterly returns of South African bonds and cash and the quarterly returns of the securities constituting the JSE Alsi 40 Index, or its successor, which is hereinafter referred to as the “JSE sample”.

We then applied a technique called bootstrapping, which is simply sampling with replacement. "Bootstrapping is a procedure by which new samples are generated from an original dataset by randomly selecting observations from the original dataset. It differs from Monte Carlo simulation in that it draws randomly from an empirical sample, whereas Monte Carlo simulation draws randomly from a theoretical distribution" (Kritzman & Page, 2002:206).

The bootstrapping technique was applied to both the security selection and the asset allocation simulations. The results of these simulations were then compared.

The security selection simulation was as follows:

- Randomly select a security from the JSE sample and determine its total return.
- Replace the randomly selected security into the original sample and repeat this task 99 more times. This implied that same security could have been chosen more than once. Therefore, up to 40 different securities were chosen in total for each quarter.
- Calculate the total return of the selected security portfolio.
- Compute the tracking error of the randomly-selected security portfolio versus the JSE All Share Index, or its successor.
- Compute the portfolio return comprising a 60 percent allocation to the randomly selected security portfolio, a 30 percent allocation to a bond index, viz. All Bond Index, and a 10 percent allocation to a cash index, viz. Alexander Forbes Money Market Index.
- Each quarter, the above steps were repeated 1000 times.
- Calculate the annualized cumulative returns, tracking errors of the equity component, realized active risk and information ratios of the 1000 portfolios and rank them.

The asset allocation bootstrap simulation was as follows:

- Calculate the return of an equally-weighted equities portfolio of securities constituting the JSE Alsi 40 Index.

- Randomly select an index from the equally-weighted JSE Alsi 40 Index, the All Bond Index or the Money Market Index from a sample weighted 60 percent to the equally-weighted JSE Alsi Index, 30 percent to the All Bond Index and 10 percent to the Money Market Index, and determine its total return.
- Replace the randomly selected index into the original sample and repeat this task 99 times. Note that the same index could have been chosen twice.
- Calculate the average total return of the 100 selected indexes. Therefore, the portfolio may have comprised anything from one to three different indexes.
- Each quarter, the above steps were repeated 1000 times.
- Calculate the annualized cumulative returns, realized active risk and information ratios of the 1000 portfolios and rank them.

"The importance of security selection is measured by holding a constant asset mix at a 60 / 30 / 10 allocation among equities, bonds and cash, and calculating variation in return due purely to variation among randomly diversified equities portfolios. Then the importance of asset allocation is measured by holding constant individual security weights and calculating variation in return owing purely to asset allocation variation around an expected allocation of 60 / 30 / 10 to equities, bonds and cash respectively" (Kritzman & Page, 2003:207).

These results were then compared at the 5^{th}, 25^{th}, 75^{th} and 95^{th} percentiles, to avoid extreme data points (outliers) in the analysis. The data was also compared to its averages.

An equally-weighted JSE Alsi 40 Index was used to avoid the case where a random portfolio, which was biased towards equally-weighting each asset, is compared to a market capitalization-weighted index. "Capitalization weighted indexes are less volatile than equally weighted indexes" (Kritzman & Page,

2002:210), which would have reduced the portfolio returns of the asset allocation bootstrap.

Only the equity component of the security selection bootstrap was varied, for ease of calculation. If the bond and cash components were varied as well, more variability would have been introduced into the results. Also, the South African bond market was dominated by two to three Government bonds, with a host of lesser liquid bonds. Therefore, the opportunity set available to investors may not be as great as that offered by the equity market.

5. VALIDITY AND RELIABILITY OF STUDY

Validity of the research project refered to the "accuracy, meaningfulness, and credibility" of the study as a whole (Leedy & Ormrod, 2001:103).

5.1 Internal Validity

According to Leedy & Ormrod (2001:103), internal validity refered to the extent to which the researcher was able to draw "accurate conclusions" from the study. This involved reducing the possibility that the research results came about due to reasons other than those concluded in the study. Therefore, we 1000 simulations were used to ensure that the results achieved were valid and were not due to statistical bias from the randomly generated portfolios. Also, the internal validity was improved as the methodologies used in this research report were the same as the methodologies used in similar studies in the United States of America. The finding of similar results to the overseas studies served as a validity check.

5.2 External Validity

External validity referred to the extent to which generalizations into other

areas could be made from the results of a specific study (Leedy & Ormrod, 2001). One method used to improve the external validity was to use a representative sample.

The sample in this study has been drawn from all available securities and market indexes in the industry.

5.3 Reliability

Reliability examined how consistent results were within a study (Leedy & Ormrod, 2001). Several reliability checks were put in place, in particular on the various data used.

6. PRESENTATION OF RESULTS

This section presents the results obtained from the analysis of the data.

6.1 Proposition 1 – Dispersion of Annualised Returns

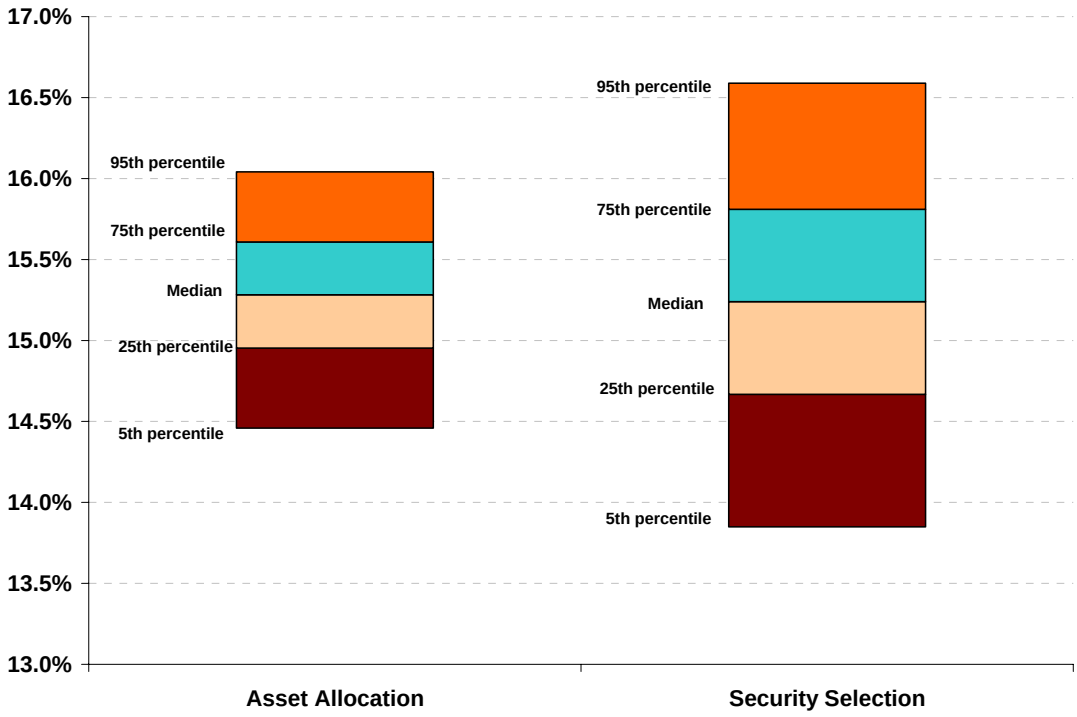
Table 1 summarizes the dispersions of annualized returns for both the asset allocation and the security selection simulations, for the analysis period being calendar years 1997 to 2004. The median results are similar, which was expected, as both simulations were carried out relative to the same benchmark, i.e. a portfolio consisting of 60 percent in an equally-weighted equity index, 30 percent in bonds and 10 percent in cash. Also, the security selection simulation had greater variability in returns than the asset allocation simulation.

Table 1: Returns dispersion summary statistics

	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile
Asset Allocation	14.46%	14.95%	15.28%	15.61%	16.04%
Security Selection	13.85%	14.67%	15.24%	15.81%	16.59%

These results are shown graphically in Figure 2.

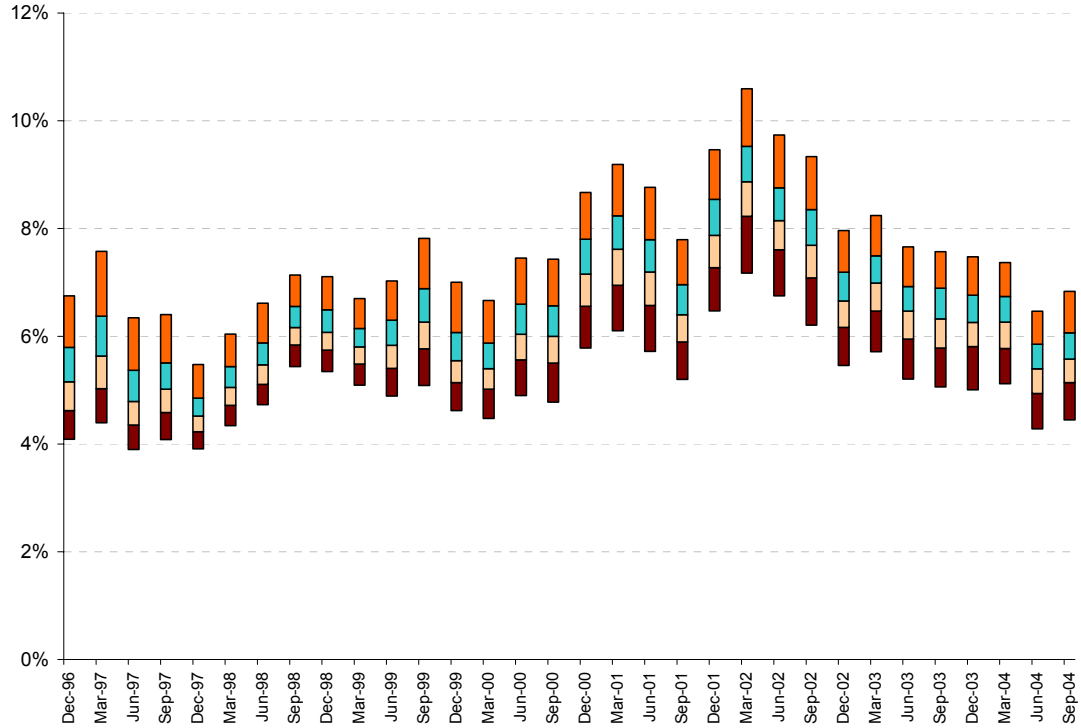
Figure 2: Annualized returns dispersion graph (1997 – 2004)



6.2 Annualised Tracking Errors

Figure 3 shows the range of annualized tracking errors, from the 5th percentile to the 95th percentile, highlighting the 5th percentile to 25th percentile; the 25th percentile to median; the median to 75th percentile; and the 75th percentile to 95th percentile of the tracking errors of the security selection simulation for each quarter. The tracking errors were calculated relative to the JSE All Share Index.

Figure 3: Tracking error relative to the JSE All Share Index (1997 – 2004)



6.3 Proposition 2 – Dispersion of Annualised Active Risk

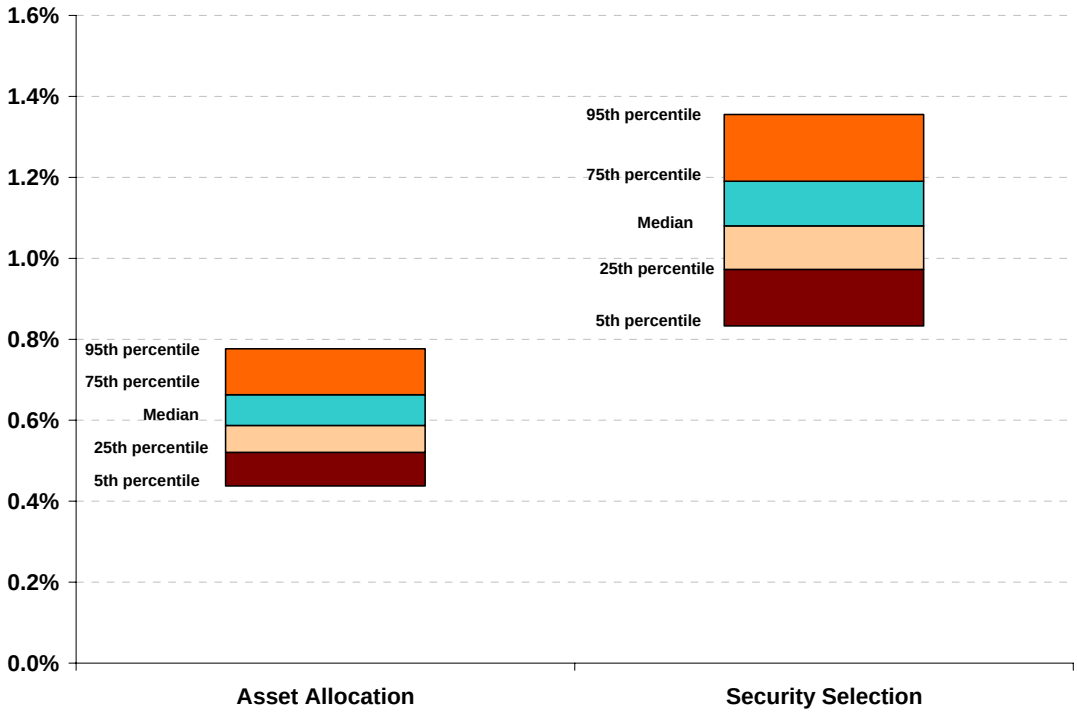
Table 2 summarizes the results of the annualized active risk dispersions for the asset allocation and the security selection simulations. It appears that the active risk was greater for the security selection simulation than for the asset allocation simulation, where the 5th percentile value of the security selection simulation was greater than the 95th percentile value of the asset allocation simulation.

Table 2: Active risk dispersion summary statistics

	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile
Asset Allocation	0.44%	0.52%	0.59%	0.66%	0.78%
Security Selection	0.83%	0.97%	1.08%	1.19%	1.36%

These results are shown graphically in Figure 4.

Figure 4: Annualized active risk dispersion graph (1997 – 2004)



6.4 Proposition 3 – Dispersion of annualised information ratio

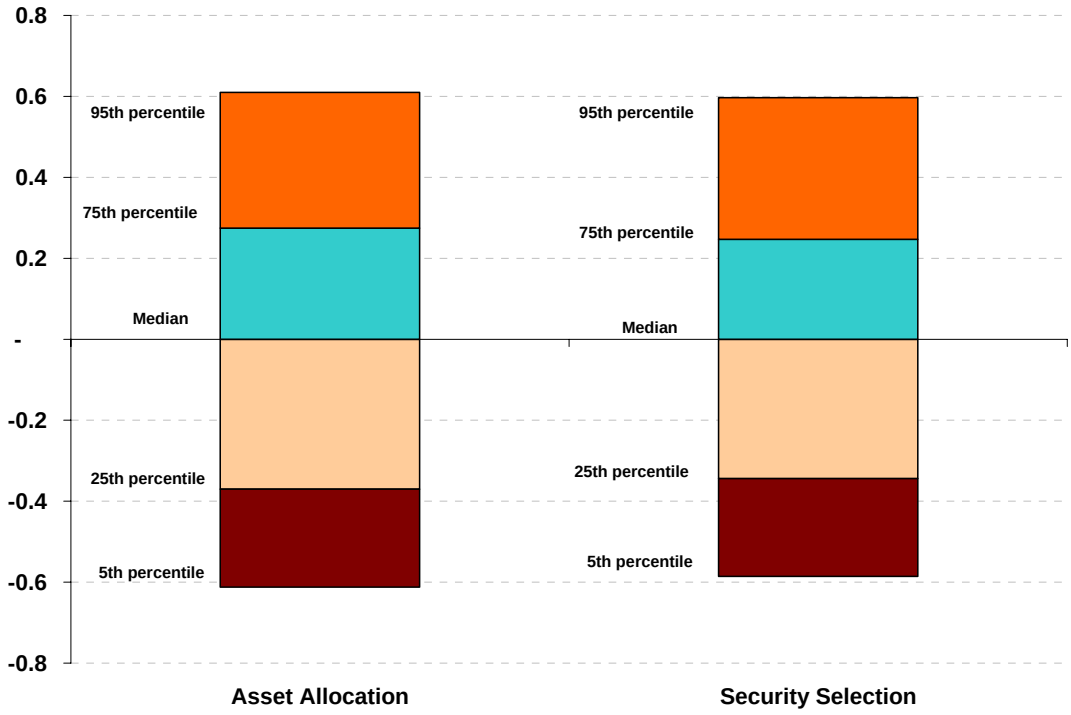
Table 3 summarizes the results of the annualized information ratio dispersions of the asset allocation and the security selection simulations. It appears as though their dispersions as similar.

Table 3: Information ratio summary statistics

	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile
Asset Allocation	-0.61	-0.24	0.02	0.27	0.61
Security Selection	-0.59	-0.24	0.01	0.25	0.60

These results are shown graphically in Figure 5.

Figure 5: Annualized information ratio dispersion graph (1997 – 2004)



7. INTERPRETATION OF RESULTS

7.1 Introduction

The objective of this research was to investigate the relative importance of the asset allocation decision versus the security selection decision in the investment process in South Africa.

With the inconclusiveness of the available research thus far, an innovative approach was suggested by Kritzman & Page (2002). For the purposes of this research report, this methodology was replicated in the South African environment.

7.2

Proposition 1 – Dispersion of Annualised Returns

Graphically, the dispersion of annualized returns was greater for the security selection simulation than for the asset allocation simulation. Kritzman & Page (2002) concluded that this proves their assertion that security selection was a more important source of return than asset allocation. In a world detached of risk, this may have been the case.

Various statistical tests were not carried out to analyze these outcomes, but the assertion that there is greater variability of outcomes in the security selection simulation, is proved by visual inspection of the outcomes graph.

7.3 Tracking Errors

The methodology followed for the security selection simulation led to, on average, equally-weighted share portfolios. Equally-weighted share portfolios have a smaller capitalization bias than a market-capitalization index. Therefore, the tracking errors calculated contained an element of a small cap bias. The tracking error due to the small cap bias varied through time, with market movements. It is reasonable to state that the median tracking error at each date was the tracking error caused by the small cap bias of an equally-weighted portfolio. This ranged from 4.5% in quarter 1, 1998 to 8.7% in quarter 2, 2002.

South African investment managers generally manage their equity portfolios to a tracking error range of between 4 percent and 6 percent to the JSE All Share Index, averaging 6.2 percent. A few investment managers, like Allan Gray, would manage to a larger tracking error. The main reasons why investment managers generally manage to such tracking error levels are: liquidity concerns of smaller cap shares; benchmark hugging; and fear of deviating too far from the peer group.

The larger tracking error ranges calculated in this research report, as compared to Kritzman & Page (2002), was due to the megacap bias that Anglo American plc and BHP Billiton plc introduce into our market. Other global developed markets are not as exposed to the megacap bias as the South African market. Regardless of this megacap bias, constituents of the JSE Alsi 40 Index are generally regarded to be liquid shares, which even the largest of investment managers are able to invest in meaningfully. Hence, these results showed that South African equity managers generally to do not invest in securities where their weightings deviate significantly from the JSE Alsi 40 Index.

7.4 Proposition 2 – Dispersion of Annualised Active Risk

Graphically, the realized annualized active risk for the security selection simulation was much greater than for the asset allocation simulation. Hence, there was additional volatility associated with the security selection simulation. The security selection simulation only varied the equity component of the portfolio. If the bond components and the cash components were also varied, then the active risk would possibly have been greater.

Various statistical tests were not carried out to analyze these outcomes, but the assertion that there was a difference in annualized active risk, was proved by visual inspection of the outcomes graph.

7.5 Proposition 3 – Dispersion of Annualised Information Ratio

Graphically, there was no difference in annualized information ratios between the asset allocation and the security selection decisions. The information ratio adjusted the returns achieved by the risk associated with achieving those returns, relative to the benchmark. The results showed that on a risk-adjusted basis, as defined by the information ratio, there was no preference between either decision.

Various statistical tests were not carried out to analyze these outcomes, but by visual inspection of the outcomes graphs, we can deduce that there wasn't a significant difference between the information ratios between either decision. Even by inspecting the various quartiles of both outcomes, they appeared fairly similar.

8. CONCLUSIONS

An innovative method for testing the relative importance of the asset allocation decision versus the security selection decision, using a bootstrap (simulation) technique, was tested for the South African market. It was shown that the returns dispersion from the security selection decision had greater variability than the returns dispersion from the asset allocation decision. From this observation, it was concluded that the security selection decision had greater importance as it generated a wider range of returns than the asset allocation decision. However, when the active risk associated with either decision was incorporated, to derive the information ratio, then neither decision had the dominant influence.

The tracking errors of the security selection simulation relative to the JSE All Share Index ranged from 3.3% to 12.0%, with a median tracking error of 6.1%. This median tracking error was the approximate tracking error of an equally-weighted portfolio of securities, chosen from the JSE Alsi 40 Index, relative to the JSE All Share Index. South African equity managers generally manage their portfolios in a range between 4% and 6%, relative to the JSE All Share Index. Therefore, the tracking errors achieved in the security selection simulation were at the top end of the range for South African equity managers. This provided the reservation that the simulated security selections may not be a realistic representation of the typical South African equity portfolio.

The asset allocation simulation required a decision to be made between three assets, i.e. between equities, bonds and cash. The security selection simulation required up to 44 decisions to be made, as there were up to 42 shares, and bonds and cash. This implied that more skillwais needed in getting the security selection decision correct than the asset allocation decision, as there were many more investment decisions to be made.

8.1 Suggestions for Further Research

To improve upon the conclusions reached in this research report, the following modifications could be considered for further research:

- The data used in this research covered the period 1997 to 2004. A different conclusion may be reached by using more data.
- Only securities from the JSE Alsi 40 Index were considered. The returns dispersion range for the security selection simulation should increase if constituents of the JSE Mid Cap and JSE Small Cap Indexes were also included. However, its impact on risk and the information ratio also needs to be ascertained.
- If constraints were introduced into the analysis, e.g. sector constraints and/or maximum deviation from individual security benchmark weightings, then the JSE Alsi 40 Index could be used instead of the equally-weighted JSE Alsi 40 Index. The analysis would then be more relevant to the South African environment, instead of a theoretical study undertaken herein.

- Alternative measures of risk could be used to test the results of this research report.
- Varying both the asset allocation and the security selection decisions simultaneously could be carried out and tested for its relative importance.
- A different conclusion may be reached if the security selection decision within the bond and cash components is varied.
- As per Kritzman & Page (2002), the relative importance of the sector allocation decision could also be assessed. This will show whether the sector allocation decision has a closer relationship to the asset allocation decision or to the security selection decision.

9.

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APPENDIX 1: CONSTITUENTS OF THE JSE ALSI40 INDEX

Q1 1997	Q2 1997	Q3 1997	Q4 1997	Q1 1998	Q2 1998	Q3 1998	Q4 1998	Q1 1999	Q2 1999	Q3 1999	Q4 1999	Q1 2000	Q2 2000	Q3 2000	Q4 2000
Anglos	Anglos	Anglos	Anglos	Anglos	Anglos	Anglos	Anglos	Anglos	Anglos	Anglos plc	Anglos plc	Abil	Abil	Abil	Abil
Amcoal	Amcoal	Amgold	Amgold	Amgold	Amgold	Amgold	Amgold	Amgold	Amgold	Angloplat	Angloplat	Anglos plc	Anglos plc	Anglos plc	Anglos plc
Amgold	Amgold	Amic	Amic	Amic	Amic	Amic	Amic	Amic	Angloplat	Anglogold	Anglogold	Angloplat	Angloplat	Angloplat	Angloplat
Amic	Amic	Anglovaal - N	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Anglogold	ABSA	ABSA	Anglogold	Anglogold	Anglogold	Anglogold
Anglovaal - N	Anglovaal - N	ABSA	Anglovaal - N	ABSA	ABSA	ABSA	ABSA	Anglogold	ABSA	Barlows	Barlows	ABSA	ABSA	ABSA	ABSA
ABSA	ABSA	AVI	ABSA	Barlows	Barlows	Barlows	Barlows	ABSA	Barlows	BHP Billiton	BHP Billiton	Barlows	Barlows	Barlows	Barlows
AVI	AVI	Barlows	AVI	BHP Billiton	BHP Billiton	BHP Billiton	BHP Billiton	Barlows	BHP Billiton	BOE	BOE	BHP Billiton	BHP Billiton	BHP Billiton	BHP Billiton
Barlows	Barlows	CG Smith	Barlows	Bidvest	Bidvest	Bidvest	BOE	BHP Billiton	BOE	Bidvest	Bidvest	BOE	BOE	BOE	BOE
CG Smith	CG Smith	De Beers	BHP Billiton	CG Smith	CG Smith	CG Smith	Bidvest	BOE	Bidvest	CG Smith	CG Smith	Bidvest	Bidvest	Bidvest	Bidvest
De Beers	De Beers	Driefontein	CG Smith	Charter plc	Charter plc	Coronation - N	CG Smith	Bidvest	CG Smith	Comparex	Comparex	CG Smith	Comparex	Comparex	Comparex
Driefontein	Driefontein	FNB	De Beers	De Beers	De Beers	De Beers	Coronation - N	CG Smith	Comparex	Coronation - N	Coronation - N	Comparex	Coronation - N	Coronation - N	Coronation - N
Freegold	Freegold	GFSA	Driefontein	Didata	Didata	Didata	De Beers	Comparex	Coronation - N	De Beers	De Beers	Coronation - N	De Beers	De Beers	De Beers
FNB	FNB	Gencor	FNB	Driefontein	Driefontein	Driefontein	Didata	Coronation - N	De Beers	Didata	Didata	De Beers	Didata	Didata	Didata
GFSA	GFSA	Investec	GFSA	FNB	FNB	Firstrand	Driefontein	De Beers	Didata	Datatec	Datatec	Didata	Datatec	Datatec	Datatec
Gencor	Gencor	Imperial	Gencor	Gencor	Gencor	Gold Fields	Firstrand	Didata	Datatec	Fedsure	Fedsure	Datatec	Fedsure	Fedsure	Fedsure
Investec	Investec	Iscor	Investec	Gensec	Gensec	Gencor	Gold Fields	Driefontein	Fedsure	Firstrand	Firstrand	Fedsure	Firstrand	Firstrand	Firstrand
Imperial	Imperial	JCI	Imperial	Investec	Investec	Gensec	Gencor	Datatec	Firstrand	Gencor	Gold Fields	Firstrand	Gold Fields	Gold Fields	Gold Fields
Iscor	Iscor	Johnnic	Iscor	Imperial	Imperial	Investec	Gensec	Fedsure	Gold Fields	Gensec	Gencor	Gold Fields	Gensec	Gensec	Gensec
JCI	JCI	Libsil	JCI	Iscor	Iscor	Imperial	Investec	Firstrand	Gensec	Implats	Gensec	Gencor	Implats	Implats	Implats
Johnnic	Johnnic	Liberty	Johnnic	JCI	JCI	Iscor	Imperial	Gold Fields	Implats	Investec	Implats	Gensec	Investec	Investec	Investec
Kllof	Kllof	Lonrho	Libsil	Johnnic	Johnnic	Johnnic	Iscor	GFSA	Investec	Imperial	Investec	Implats	Imperial	Imperial	Imperial
Libsil	Libsil	Malbak	Liberty	Libsil	Libsil	Liberty	Johnnic	Gensec	Imperial	Johnnic	Imperial	Investec	Iscor	Johnnic	Johnnic
Liberty	Liberty	Minorco	Lonrho	Liberty	Liberty	Metropolitan	Liberty	Investec	Johnnic	Liberty Int	Johnnic	Imperial	Johnnic	Liberty Int	Liberty Int
Lonrho	Lonrho	NBS	Malbak	Metropolitan	Metropolitan	Minorco	Metropolitan	Imperial	Liberty	Liberty	Liberty Int	Johnnic	Liberty Int	Liberty	Liberty
Malbak	Malbak	Nedcor	Minorco	Minorco	Minorco	NBS Boland	Minorco	Johnnic	Metropolitan	Metropolitan	Liberty	Liberty Int	Liberty	M Cell	M Cell
Minorco	Minorco	Nampak	NBS	Nedcor	Nedcor	Nedcor	Nedcor	Liberty	Minorco	Metcash	Nail - N	Liberty	M Cell	Metcash	MIHH
Murray & Roberts	Murray & Roberts	Persetel	Nedcor	Nampak	Nampak	Nampak	Nampak	Metropolitan	Nail - N	Nail - N	Nedcor	M Cell	Metcash	Nedcor	Metcash
Nedcor	Nedcor	Richemont	Nampak	Orion Selections	Orion Selections	Naspers - N	Naspers - N	Minorco	Nedcor	Nedcor	Nampak	Metcash	Nedcor	Nampak	Nedcor
Nampak	Nampak	Rembrandt	Persetel	PQ Holdings	PQ Holdings	Orion Selections	Pepkor	Nail - N	Nampak	Nampak	Old Mutual	Nail - N	Nampak	Naspers - N	Nampak
Richemont	Richemont	Rusplats	Richemont	Richemont	Richemont	Pepkor	PQ Holdings	Nedcor	Pepkor	Pepkor	Pepkor	Nedcor	Naspers - N	Old Mutual	Naspers - N
Rembrandt	Rembrandt	SAB Miller	Rembrandt	RMBH	RMBH	PQ Holdings	Richemont	Richemont	Richemont	Richemont	Richemont	Nampak	Old Mutual	Profurn	Old Mutual
Rusplats	Rusplats	Sappi	SAB Miller	Rembrandt	Rembrandt	Richemont	RMBH	RMBH	RMBH	RMBH	RMBH	Old Mutual	Profurn	Richemont	Richemont
SAB Miller	SAB Miller	Stanbic	Sappi	SAB Miller	SAB Miller	RMBH	Rembrandt	Rembrandt	Rembrandt	Rembrandt	Rembrandt	Richemont	Richemont	RMBH	Remgro
Sappi	Sappi	Safren	Stanbic	Sappi	Sappi	Rembrandt	SAB Miller	SAB Miller	SAB Miller	SAB Miller	SAB Miller	Rembrandt	Rembrandt	Rembrandt	RMBH
Stanbic	Stanbic	Sasol	Safren	Stanbic	Stanbic	SAB Miller	Sappi	Sappi	Sappi	Sappi	Sappi	SAB Miller	SAB Miller	SAB Miller	SAB Miller
Safren	Safren	Southern	Sasol	Safren	Safren	Sappi	Stanbic	Stanbic	Stanbic	Stanbic	Stanbic	Sappi	Sappi	Sappi	Sappi
Sasol	Sasol	Tiger Oats	Southern	Sasol	Sasol	Stanbic	Sasol	Sanlam	Sanlam	Sanlam	Sanlam	Stanbic	Stanbic	Stanbic	Stanbic
Tongaat	Tongaat	Tongaat	Tiger Oats	Southern	Southern	Sasol	Tiger Oats	Sasol	Sasol	Sasol	Sasol	Sanlam	Sanlam	Sanlam	Sanlam
Vaal Reefs	Vaal Reefs	Vaal Reefs	Tongaat	Tiger Oats	Tiger Oats	Tiger Oats	Tongaat	Theta	Theta	Theta	Theta	Sasol	Sasol	Sasol	Sasol
Western Areas	Western Areas	Western Areas	Vaal Reefs	Tongaat	Tongaat	Tongaat	#N/A	Tiger Oats	Tiger Oats	Tiger Oats	Tiger Oats	Tiger Oats	Tiger Brands	Tiger Brands	Tiger Brands
			Western Areas							Tongaat					Venfin

Q1 2001	Q2 2001	Q3 2001	Q4 2001	Q1 2002	Q2 2002	Q3 2002	Q4 2002	Q1 2003	Q2 2003	Q3 2003	Q4 2003	Q1 2004	Q2 2004	Q3 2004	Q4 2004
Abil	Abil	Abil	Abil	Abil	Abil	ABI	ABI	ABI	ABI	ABI	ABI	ABI	ABI	ABI	ABI
Anglos plc	Alex Forbes	Alex Forbes	Alex Forbes	Alex Forbes	Alex Forbes	Alex Forbes	Alex Forbes	Alex Forbes	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc
Angloplat	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Anglos plc	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat
Anglogold	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Angloplat	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold
ABSA	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold	Anglogold	ARM	ARM	ABSA	ABSA	ABSA	ABSA	ABSA
Barloworld	ABSA	ABSA	ABSA	ABSA	ABSA	ABSA	ABSA	ARM	ABSA	ABSA	Avgold	Avgold	Avgold	Barloworld	Barloworld
BHP Billiton	Barloworld	Barloworld	Barloworld	Barloworld	Barloworld	Barloworld	Barloworld	ABSA	Avgold	Avgold	Barloworld	Barloworld	Barloworld	BHP Billiton	BHP Billiton
BOE	BHP Billiton	BHP Billiton	BHP Billiton	BHP Billiton	BHP Billiton	BHP Billiton	BHP Billiton	Avgold	Barloworld	Barloworld	BHP Billiton	BHP Billiton	BHP Billiton	Bidvest	Bidvest
Bidvest	BOE	BOE	BOE	BOE	BOE	BOE	Bidvest	Barloworld	BHP Billiton	BHP Billiton	Bidvest	Bidvest	Bidvest	Discovery	Edcon
Comparex	Bidvest	Bidvest	Bidvest	Bidvest	Bidvest	Bidvest	Coronation	BHP Billiton	Bidvest	Bidvest	Firstrand	Firstrand	Firstrand	Firstrand	Firstrand
Coronation - N	Coronation - N	Coronation - N	Coronation - N	Coronation - N	Didata	Coronation	Coronation - N	Bidvest	Durban Deep	Firstrand	Gold Fields	Gold Fields	Gold Fields	Gold Fields	Gold Fields
De Beers	De Beers	Didata	Didata	Didata	Firstrand	Coronation - N	Didata	Didata	Firstrand	Gold Fields	Harmony	Harmony	Harmony	Harmony	Harmony
Didata	Didata	Datatec	Firstrand	Firstrand	Gold Fields	Didata	Durban Deep	Durban Deep	Gold Fields	Harmony	Implats	Implats	Implats	Implats	Ispat Iscor
Datatec	Datatec	Firstrand	Gold Fields	Gold Fields	Harmony	Durban Deep	Firstrand	Firstrand	Harmony	Implats	Investec Ltd	Investec Ltd	Investec Ltd	Investec Ltd	Implats
Fedsure	Fedsure	Gold Fields	Implats	Harmony	Implats	Firstrand	Gold Fields	Gold Fields	Implats	Investec Ltd	Investec plc	Investec plc	Investec plc	Investec plc	Investec Ltd
Firstrand	Firstrand	Implats	Investec	Implats	Investec	Gold Fields	Harmony	Harmony	Investec Ltd	Investec plc	Imperial	Imperial	Imperial	Imperial	Investec plc
Gold Fields	Gold Fields	Investec	Imperial	Investec	Imperial	Harmony	Implats	Implats	Investec plc	Imperial	Iscor	Iscor	Iscor	Iscor	Imperial
Implats	Implats	Imperial	Iscor	Imperial	Iscor	Implats	Investec Ltd	Investec Ltd	Imperial	Iscor	Kumba	Kumba	Kumba	Kumba	Kumba
Investec	Investec	JD Group	JD Group	Iscor	JD Group	Investec	Investec plc	Investec plc	Iscor	Kumba	Liberty Int	Liberty Int	Liberty Int	Liberty Int	Liberty Int
Imperial	Imperial	Johnnic	Johnnic	Johnnic	Johnnic	Imperial	Imperial	Imperial	Johnnic	Liberty Int	Liberty	Liberty	Liberty	Liberty	Liberty
Johnnic	JD Group	Liberty Int	Liberty Int	Kumba	Kumba	Iscor	Iscor	Iscor	Kumba	Liberty	MTN	MTN	MTN	MTN	MTN
Liberty Int	Johnnic	Liberty	Liberty	Liberty Int	Liberty Int	Johnnic	Johnnic	Johnnic	Liberty Int	MTN	Nedcor	Nedcor	Nedcor	Nedcor	Nedcor
Liberty	Liberty Int	M Cell	M Cell	Liberty	Liberty	Kumba	Kumba	Kumba	Liberty	Nedcor	Nampak	Nampak	Nampak	Nampak	Nampak
M Cell	Liberty	Metropolitan	NAC	M Cell	M Cell	Liberty Int	Liberty Int	Liberty Int	MTN	Nampak	Naspers - N	Naspers - N	Naspers - N	Naspers - N	Naspers - N
MIHH	M Cell	MIHH	Nedcor	NAC	NAC	Liberty	Liberty	Liberty	Nedcor	Naspers - N	Netcare	Netcare	Netcare	Netcare	Netcare
Metcash	MIHH	Metcash	Nampak	Nedcor	Nedcor	M Cell	M Cell	MTN	Nampak	Netcare	Old Mutual	Old Mutual	Old Mutual	Old Mutual	Old Mutual
Nedcor	Nedcor	Nedcor	Naspers - N	Nampak	Nampak	Nedcor	Nedcor	Nedcor	Naspers - N	Old Mutual	Pick 'n Pay	Pick 'n Pay	Pick 'n Pay	Pick 'n Pay	Pick 'n Pay
Nampak	Nampak	Nampak	Old Mutual	Old Mutual	Old Mutual	Nampak	NIB	Nampak	Old Mutual	Pick 'n Pay	PPC	PPC	PPC	PPC	PPC
Naspers - N	Naspers - N	Naspers - N	Pick 'n Pay	Pick 'n Pay	Pick 'n Pay	Old Mutual	Nampak	Old Mutual	Pick 'n Pay	Richemont	Richemont	Richemont	Richemont	Richemont	Richemont
Old Mutual	Old Mutual	Old Mutual	Richemont	Richemont	Richemont	Pick 'n Pay	Old Mutual	Pick 'n Pay	Richemont	Remgro	Remgro	Remgro	Remgro	Remgro	Remgro
Richemont	Richemont	Richemont	Remgro	Remgro	Remgro	Richemont	Pick 'n Pay	Richemont	Remgro	RMBH	RMBH	RMBH	RMBH	RMBH	RMBH
Remgro	Remgro	Remgro	RMBH	RMBH	RMBH	Remgro	Richemont	Remgro	RMBH	SAB Miller	SAB Miller	SAB Miller	SAB Miller	SAB Miller	SAB Miller
RMBH	RMBH	RMBH	SAB Miller	SAB Miller	SAB Miller	RMBH	Remgro	RMBH	SAB Miller	Sappi	Sappi	Sappi	Sappi	Sappi	Sappi
SAB Miller	SAB Miller	SAB Miller	Sappi	Sappi	Sappi	SAB Miller	RMBH	SAB Miller	Sappi	Standard Bank	Standard Bank	Standard Bank	Standard Bank	Standard Bank	Standard Bank
Sappi	Sappi	Sappi	Stanbic	Stanbic	Stanbic	Sappi	SAB Miller	Sappi	Standard Bank	Steinhoff	Steinhoff	Steinhoff	Steinhoff	Steinhoff	Steinhoff
Stanbic	Stanbic	Stanbic	Steinhoff	Steinhoff	Steinhoff	Standard Bank	Sappi	Standard Bank	Steinhoff	Sanlam	Sanlam	Sanlam	Sanlam	Sanlam	Sanlam
Sanlam	Sanlam	Sanlam	Sanlam	Sanlam	Sanlam	Steinhoff	Standard Bank	Steinhoff	Sanlam	Sasol	Sasol	Sasol	Sasol	Sasol	Sasol
Sasol	Sasol	Sasol	Sasol	Sasol	Sasol	Sanlam	Steinhoff	Sanlam	Sasol	Tiger Brands	Tiger Brands	Tiger Brands	Tiger Brands	Tiger Brands	Tiger Brands
Tiger Brands	Tiger Brands	Tiger Brands	Tiger Brands	Tiger Brands	Tiger Brands	Sasol	Sanlam	Sasol	Tiger Brands	Telkom	Telkom	Telkom	Telkom	Telkom	Telkom
Venfin	Venfin	Venfin	Venfin	Venfin	Venfin	Tiger Brands	Sasol	Tiger Brands	Telkom	Venfin	Venfin	Venfin	Venfin	Venfin	Venfin
						Venfin	Tiger Brands	Venfin	Venfin	Woolies	Woolies	Woolies	Woolies	Woolies	Woolies
							Venfin								

APPENDIX 2: QUARTERLY RETURNS OF MARKET INDEXES

	JSE All-Share Index	JSE Alsi40 Index	Equally-weighted JSE Alsi40 Index	All Bond Index	Alexander Forbes Money Market Index
Q1 1997	6.80%	6.27%	4.33%	8.39%	4.25%
Q2 1997	5.47%	4.82%	2.62%	7.82%	4.14%
Q3 1997	-4.02%	-5.94%	-5.07%	5.59%	3.98%
Q4 1997	-13.90%	-14.84%	-14.87%	4.76%	3.83%
Q1 1998	24.14%	23.48%	23.72%	6.70%	3.75%
Q2 1998	-10.11%	-12.79%	-12.43%	-6.13%	3.44%
Q3 1998	-21.44%	-19.96%	-20.84%	-5.70%	4.31%
Q4 1998	7.33%	7.22%	9.91%	11.04%	5.22%
Q1 1999	20.26%	19.42%	19.58%	9.73%	4.61%
Q2 1999	12.84%	16.48%	15.14%	2.76%	3.87%
Q3 1999	-0.70%	2.09%	-5.21%	4.60%	3.42%
Q4 1999	26.77%	26.18%	31.97%	9.68%	2.98%
Q1 2000	-6.62%	-7.02%	-4.24%	1.61%	2.76%
Q2 2000	-1.76%	-0.38%	-4.84%	2.97%	2.54%
Q3 2000	8.70%	10.05%	5.48%	6.53%	2.60%
Q4 2000	0.64%	1.39%	-1.17%	7.03%	2.62%
Q1 2001	0.39%	0.42%	-3.92%	5.13%	2.64%
Q2 2001	12.87%	12.78%	16.55%	9.38%	2.64%
Q3 2001	-10.87%	-12.31%	-14.91%	3.87%	2.57%
Q4 2001	31.31%	34.15%	23.40%	-1.38%	2.35%
Q1 2002	6.25%	7.40%	3.19%	-4.56%	2.37%
Q2 2002	-2.68%	-4.38%	7.06%	8.93%	2.67%
Q3 2002	-10.11%	-11.07%	-9.41%	3.70%	2.86%
Q4 2002	-1.35%	-2.85%	3.91%	7.55%	3.17%
Q1 2003	-16.27%	-17.35%	-18.67%	4.77%	3.36%
Q2 2003	9.68%	9.16%	13.87%	6.73%	3.39%
Q3 2003	7.93%	7.39%	6.61%	2.67%	2.96%
Q4 2003	17.12%	16.93%	19.45%	2.82%	2.37%
Q1 2004	3.68%	3.63%	3.60%	-0.31%	2.00%
Q2 2004	-4.72%	-5.15%	-2.39%	0.45%	1.94%
Q3 2004	17.43%	18.23%	15.86%	6.90%	1.95%
Q4 2004	8.14%	6.25%	15.77%	7.66%	1.87%