

EQUITY RISK SERVICE – Q2 2015

Estimating betas for JSE-listed companies and indices

The Equity Risk Service

The Equity Risk Service is aimed at bringing up-to-date the risk measures and associated statistics of the sector indices and the stocks listed on the Johannesburg Stock Exchange (JSE).

The Equity Risk Service is based not only on the American and the British experience but also on an ongoing research programme at the University of Cape Town (UCT). Our estimates are based on a price series database supplied by the Johannesburg Stock Exchange Ltd.

What makes our service unique?

Our service differs from others in that we refine our estimation procedure to improve the accuracy of our risk estimates. Firstly, we implement a Bayesian adjustment which takes account of prior information on betas. Our research has shown that this adjustment improves the predictability of betas by some 20%. Secondly, and more importantly, we implement a thin-trading correction procedure, known as the “trade-to-trade” procedure. Our research shows that this procedure removes all the bias in beta estimates caused by thin-trading.

About the different market proxies

The JSE is unique in the sense that it is composed of two distinctly different types of shares: resources shares and financial & industrial shares. Investors are often concerned with the behaviour of shares in these markets relative to an index which characterises these markets separately, rather than relative to an overall market index. For example, many investors prefer to measure the performance of an industrial share relative to an industrial market index and a gold share relative to a mining index. To accommodate these preferences for each listed share, we have included risk statistics relative to each share’s characteristic market index and also relative to the overall market index. Logical proxies for these characteristic markets would be the three secondary component indices of the All Share Index (J203), namely:

- The Financial and Industrial Index (J250),
- The Resource Index (J258),
- The Top-40 Index (J200).

Thus, the accompanying tables give risk statistics for all shares relative to the All Share Index, as well as relative to one of the above-mentioned secondary indices.

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Our research is available on Thomson One, Bloomberg, TheMarkets.com, Factset and on <http://eqresearch.bnpparibas.com/index>. Please contact your salesperson for authorisation. Please see the important notice on the back page.



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1. Introduction

We have come a long way and have learnt a great deal about the estimation of risk on the stock market over the last decade.

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The Equity Risk Service is based on the American and British experiences and is part of the on going research programme at the University of Cape Town (UCT). Our estimates are based on a price series database supplied by Johannesburg Stock Exchange Ltd.

What makes our service unique?

Our service differs from others in that we refine our estimation procedure to improve the accuracy of our risk estimates. Firstly, we implement a Bayesian adjustment, which takes account of prior information on betas. Our research has shown that this adjustment improves the predictability of betas by some 20%. Secondly, and more importantly, we implement a thin-trading correction procedure, known as the “trade-to-trade” procedure. Our research shows that this procedure removes all the bias in beta estimates caused by thin-trading.

We realise that due to the increased emphasis on professionalism, most investment managers no longer doubt the usefulness and the scientific merit of the tools of Modern Portfolio Theory. However, many investors have been daunted by the myths that the level of mathematics needed is unmanageable. We thus also include some explanatory material (in Section 2) showing that the crucial ideas are simple ones and are free from mathematical complexity.

In Section 3 we expand on these ideas and suggest how the Equity Risk Service may be used. In Section 4 the risk and associated statistics of listed stocks on the JSE are tabled. In Section 5 some pertinent questions are answered, in Section 6 we include a worked example and in Section 7 we refer to some literature on the subject of systematic risk measurement. We include references to some of our own publications in this area.

The Equity Risk Service is aimed at bringing up-to-date risk measures and associated statistics.

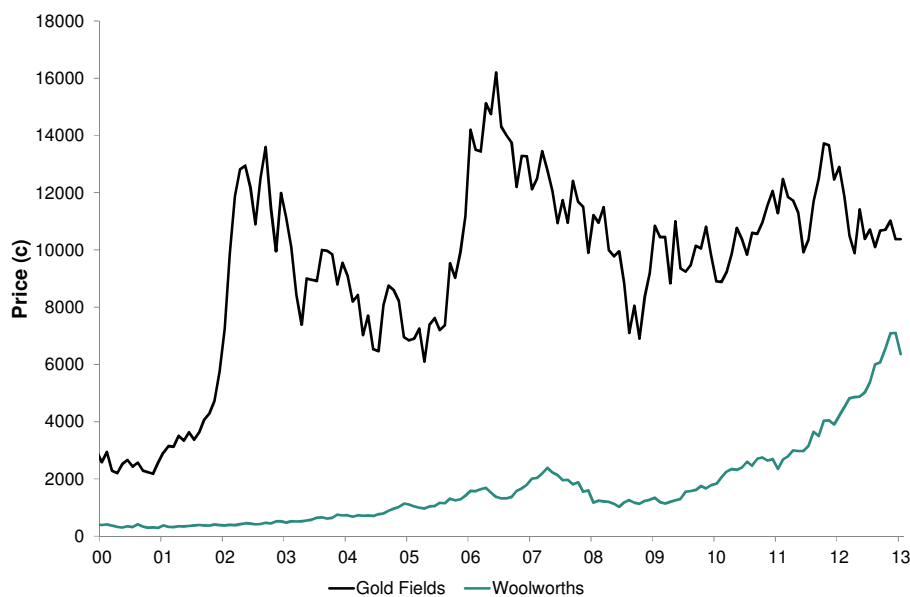
Our service differs from that of others as we implement a Bayesian adjustment and thin-trading correction.

2. The basics of risk management

The major challenge facing investors has always been the maximisation of their wealth in a world of uncertainty. In the finance world, the level of uncertainty, or risk, of a share has become associated with the degree to which the share price “bounces around” or fluctuates. The more variable the company’s share price, the more risky the share.

To get a better picture of the notion of risk, consider the chart at the end of this section (Exhibit 1) which demonstrates the variability of Gold Fields, a ‘high-risk’ gold share, and Woolworths, a ‘low-risk’ stores share. Exhibit 1 charts their monthly prices since 2000.

EXHIBIT 1: Prices (2000-2013)



Sources: I-Net Station; BNP Paribas Securities South Africa

We can also attach a quantitative measure of the risk of a share by measuring its variability. We do this by computing the standard deviation of the percentage price changes (percentage returns). The standard deviations are a widely accepted statistical measure of a share’s total risk. The higher the standard deviation, the riskier the share. (These measures are found in both the Index Statistics and the Security Statistics tables in Section 4.) We see, as expected, that Gold Fields had a standard deviation of 38.1% over this entire period, while Woolworths had a standard deviation of only 28.8% over the same period.

It is important to note that a company’s total risk can be split into two parts, namely, market risk and unique risk. Market/systematic risk reflects the fluctuations which are linked to factors which affect the market as a whole (e.g., political events and interest rate changes). Unique/non-systematic risk reflects the fluctuations which are linked to events which are unique to the company (e.g., bad management and worker strikes).

Market/systematic risk

All share prices are driven to some extent by market forces, some more than others. Beta measures the sensitivity of a share price to movements of the market as a whole.

A share with a beta of 1.5 will move, on average, 15% for each 10% move of the market. Generally, such a share would prove aggressive, performing well in bull markets and poorly in bear markets. On the other hand, a share with a beta of 0.5 will move, on average, only 5% for every 10% move of the market. Generally, such a share would prove to be defensive, underperforming the market index in bull markets, but doing well, relative to other shares, in bear markets. Finally, a share with a beta of 1 will, on average, move in line with the market. We can determine what proportion of a share’s total risk is attributable to market risk by using the R^2

The major challenge facing investors has always been the maximisation of their wealth in a world of uncertainty.

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Beta measures the sensitivity of a share price to movements of the market as a whole.

statistic. R^2 tells us the proportion of a share's total risk which is attributable to market movements.

Unique/unsystematic risk

Unexpected price movements (those which are not market driven) are a result of a share's unique risk. We can also determine the proportion of a share's total risk which is unique risk by using the R^2 statistic. Where R^2 tells us the proportion of a share's total risk which is attributable to market movements, $1 - R^2$ tells us the proportion of a share's total risk which is not attributable to market movements but rather to factors that are unique to the company.

Why the distinction?

Firstly, the Capital Asset Pricing Model (CAPM) advocates that investors should not expect to be compensated (expect more profit) for taking on unique risk, but they can expect to receive higher returns for taking on market risk.

This makes sense as most of us are concerned with holding a portfolio of investments rather than one individual share. The major reason for holding portfolios is an intuitive one – we don't want to put all our eggs in one basket. Put simply, if portfolios are diversified, the unique risks of individual shares tend to cancel each other out.

For example, while Gold Fields shares had periods of decline since 2000, Woolworths' shares increased in value over the same period. If we had been holding a portfolio of both shares, the bad news of Gold Fields would largely have been cancelled by the good news of Woolworths' success and so we would have diversified some of the unique risk of Gold Fields away.

This reduction in unique risk is precisely what diversification is all about. In fact, a portfolio consisting of an investment divided equally between almost any 10 listed companies will have eliminated over 80% of the unique risk of the portfolio.

And so our evidence is consistent with intuition – if we are not forced to take on unique risk (since it can be eliminated by diversification), then why should we be rewarded for it? However, no matter how much we diversify, we cannot eliminate market risk. We cannot escape the economy-wide perils that affect the entire market – each share in our portfolio will respond to the news affecting the economy as a whole.

The market risk of your portfolio can be determined by computing the weighted average of the betas of the component shares of your portfolio. This is precisely why beta is such an important tool to professional investment management. Unique risk can easily be diversified away; leaving the beta of a well-diversified portfolio to tell you all there is to know about the portfolio's risk.

The second reason why it is important to know the difference between market risk and unique risk concerns the way people approach investment analysis. Some investors are skilled at predicting which way the market will be moving, others attempt to identify which sectors they should be in, and perhaps analyse particular shares. Your skills in these areas are inextricably linked to the two components of total risk and have important implications for the composition of the portfolios you should hold. To capitalise on any skills you may have in forecasting the market, you will need to be concerned about shifting the beta of your portfolio – increasing it when you predict a market rise and vice versa. That is, you will be altering the market risk exposure of your portfolio. On the other hand, if you are skilled at selecting sectors and shares, or have some information that the rest of the market does not, you may need to take on some unique risk.

In summary, it is worth mentioning that, measured over long periods of time, high beta shares have given the highest returns. However, we emphasise “over long periods of time”: clearly, during bear markets, high beta shares are the worst performers. While many investors may be seeking high returns from high beta shares, there is absolutely no guarantee that they will be achieved. That is why beta is referred to as a measure of risk – high beta shares are genuinely more risky than low beta shares.

Unexpected share movements that are not market-driven are a result of a share's unique risk.

3. Use of the service

The ERS is not about advising you on what shares you should buy; its aim is to supply back-up information to the astute investor or portfolio manager so that they may make sound, professional investment decisions. Below we offer some ideas on how risk measures can be used. These ideas by no means cover all the uses as there exist a multitude of specific financial models which require these parameters.

Determining and monitoring your portfolio's risk level

The biggest concern of investment managers is that they get caught with a so-called balanced portfolio which “takes a dive” during a market recession, or a so-called growth fund which returns only 10% when the market goes up 20%. Whether you are a private investor or a professional portfolio manager, you need to know how much risk your portfolio is exposed to and how to monitor the risk over time.

Calculating your portfolio's risk

By now it should be clear that, for portfolios, beta is the most important component of risk (since market risk is the dominant risk component for diversified portfolios). The beta of a portfolio tells us how sensitive it is to market movements. Calculating a portfolio's beta is straightforward: simply look up the individual betas of the constituent shares and weight each one by the proportion of your funds which is invested in that share. The sum of these weighted values will yield your portfolio's beta (to calculate the actual amount of market risk your portfolio has, refer to our worked example in Section 6).

The portfolio's beta is calculated by looking up individual betas of the constituent shares and weighting each one by the proportion of your funds which is invested in that share.

The measurement of the unique risk of a portfolio is slightly more intricate. Naturally, if your portfolio is the market index or something very close to it, the unique risk of your portfolio will be virtually zero. However, if your portfolio is not diversified, you may need some data on the recent history of your portfolio's performance.

Alternatively, if your portfolio is reasonably diversified, we suggest instead that you calculate your portfolio's unique risk from the unique risk figures of the constituent shares and you follow our worked example in Section 6. If your portfolio is fairly well diversified, this approach gives a good estimate of its unique risk. However, if many of the shares in your portfolio are clustered in one industry, then the true unique risk will be slightly higher than calculated. Once you have measured the two risk components of your portfolio, you should compare them to your target levels. If either of the risk components is off target, the remedy is clear.

Traditionally, the approaches to portfolio management have included: restricting selection choices to an eligible list of large companies; specifying a minimum yield level; restricting the proportion in a single share or sector; and even authorising every deal that is made. This can impose unnecessary constraints that fail to control the risks. The modern way to manage portfolios is to measure beta and unique risk on an ongoing basis and to track actual levels to target levels.

Measuring your portfolio's performance

In the past, many managers have compared their funds on the basis of returns alone. Performance figures that are unadjusted for risk tell us how much money the portfolio has earned, but they tell us nothing about the risks that were taken on the way. Managers may argue that it is profit that clients are concerned with and find it difficult to convince clients that their portfolios yield lower returns than their competitors simply because they are exposed to lower risks. But managers who take on unnecessarily high-risk portfolios in an attempt to gain a competitive edge on return are foolish and will be managers no more when the market turns bearish. Your congratulations should always go to the managers who have achieved the highest risk-adjusted returns even if their unadjusted returns are lower.

It is important to examine risk-adjusted returns when examining your portfolio's performance.

Adjusting for risk

A lot has been written about adjusting for risk. Some measures have been designed to compare portfolios on a one-off basis, and others have been designed to continually monitor the risk-adjusted performance of a portfolio.

For example, to compare risk-adjusted performances of various portfolios at the year-end, you could simply divide the annual return on each portfolio by its beta (Treynor's measure). Clearly, the portfolio having the largest measure would be the best risk-adjusted performer. If however, the portfolios are not fully diversified, you should perhaps divide by their standard deviation (i.e., total risk) instead of beta and compare them on this basis (Sharpe's measure).

Alternatively, you may want to monitor how well you are doing for individual portfolios. In this case, you could compute the portfolio's abnormal return on an ongoing basis. The term abnormal return embodies the idea of having returns over and above (or below) what is expected, given the risk of a portfolio. The idea is to compute the return for your portfolio over and above the return you would expect for a portfolio having the same beta as yours.

For example, consider a portfolio having a beta of 1. Since this is the same beta as that of the market index, you would expect it to do just as well as the market. What about an investment with a beta of zero? Zero beta means zero market risk. If you were to invest all your money in a fixed interest instrument, you would receive the interest rate as a return but your beta would be zero. So the interest rate can be used as a benchmark return for a portfolio with a beta equal to zero.

Now suppose your portfolio has a beta of 0.7. This can be viewed as having the same beta as a portfolio with 70% invested in the market index and 30% invested at a fixed interest rate. So to compare like with like, the benchmark return on your portfolio can be computed as 0.7 multiplied by the return of the market index (over the same period) plus 0.3 multiplied by the interest rate. Having obtained this benchmark return, you subtract it from your portfolio's actual return realised over the same period. This is your portfolio's abnormal return. If your abnormal return is positive, you are doing well. If it is negative, you are underperforming the benchmark.

Selection and timing

We shift our emphasis away from portfolios and consider the two issues uppermost in any portfolio manager's mind. Firstly, which shares to choose (selection), and secondly when to trade (timing).

Considering selection, you should look for shares with high abnormal returns. By contrast, shares that consistently produce negative abnormal returns are the ones to sell. The abnormal return for a share can be calculated in the same way as that for a portfolio described above (see also Section 6 for a worked example). Abnormal returns can even be computed on a daily or weekly basis to closely monitor opportunities to trade in shares.

Calculating abnormal returns of shares is well and good, but there are hundreds of shares. Which shares should you look for? Obviously, you should focus your efforts on the sectors and shares which you know best. You may also want to focus on sectors where you hold much less than market proportions. But the shares which are most likely to yield significant abnormal returns are the ones having high unique risk. If a share had no unique risk, there would be no purpose in analysing its abnormal returns as its price movements would be determined entirely by its beta.

Considering market timing, this depends very much on your ability to forecast which way the market is moving. If you think the market is about to go up, you should move into high-beta shares. On the other hand, if you think the market is about to fall, you would do better to move into low-beta shares or into liquid assets. Of the two, going liquid is easier and may be less costly, but you may be constrained to remain invested in liquid (e.g., time deposits). Whichever way you choose, however, you will be best off selling the highest beta shares first.

Your confidence in your forecasts should also impact on the degree to which you shift your portfolio. Clearly, the less confident you are about your forecasts, the more moderate you should make the shift in the beta of your portfolio.

Selection and timing are two important issues to any portfolio manager.

Your ability to make accurate forecasts and your ability to pick winners are clearly going to influence your investment strategy. Assume you are a fairly good analyst and that you are right 6 times out of 10. Even with these moderate levels of forecasting skills you can produce useful profits. You may thus want to take on a slight amount of unique risk, although it would be wise to limit unique risk to a maximum of about 10% of your portfolio's total risk. If, however, you do not claim to be able to pick winners or if you have no particular forecasting prowess, you should hold as diversified a portfolio as possible.

4. The tables

About the different market proxies

The JSE is unique in the sense that it is composed of two distinctly different types of shares, i.e., resources shares and financial & industrial shares. Often investors are concerned with the behaviour of shares in these markets relative to an index which characterises these markets separately, rather than relative to an overall market index. For example, many investors prefer to measure the performance of an industrial share relative to an industrial market index and a gold share relative to a mining index. To accommodate these preferences for each listed share, we have included risk statistics relative to each share's characteristic market index and also relative to the overall market index. Logical proxies for these characteristic markets would be the three secondary component indices of the All Share Index (J203), namely:

- The Financial and Industrial Index (J250),
- The Resource Index (J258), and
- The Top-40 Index (J200).

Thus, the accompanying tables give risk statistics for all shares relative to the All Share Index, as well as relative to one of the above-mentioned secondary indices. Please note that we have switched to the new Free Float FTSE/JSE Africa Index Series.

About the index and share statistics tables

Each column of information is defined as follows:

Security:	The company's name
Code:	The ticker symbol which identifies the security on the JSE
Number of months:	The number of months during which the security traded. For example, a thinly-traded security may have been listed for 35 months but, if it hasn't traded at all for two of those months, only 33 traded months can be used in the estimation process.
Annualised Alpha:	The average return per annum on a share when the market on average does not move.
Beta:	This is the sensitivity of the share's price to changes in the market. A beta of 1 means that the share will, on average, move in line with the market (as measured by the relevant FTSE/JSE Index). A beta greater than 1 implies that the share will tend to move more in percentage terms than the market index and vice versa.
Se(β):	The standard error of beta is a statistical measure of the reliability of the estimate of beta. The lower this figure, the more reliable the estimate of beta. Statisticians set up a confidence interval for the estimate of beta by adding and subtracting $2 \times se(\beta)$ from the beta estimate. There is a 95% chance that the true beta lies in this interval.
Ann. Total Risk:	This is the standard deviation of returns which measures the share's total risk expressed in % per annum.
Ann. Unique Risk:	(or Non-Systematic Risk) reflects the fluctuations in the security's returns that are linked to events that are unique to the company (e.g., bad management, worker strikes etc.).

The secondary component indices of the All Share Index are used as market proxies.

- R²:** This can be interpreted as the proportion of the share's total risk accounted for by its market risk. Note that a high beta will not necessarily produce a high R². In statistical terms, R² is the coefficient of determination of the regression.
- % of days traded:** This quantity is the percentage of the business days over the period of analysis which the security traded. This provides an indication of the extent to which the security is thinly traded.

4.1 FTSE/JSE All Share Index (J203) as market proxy

EXHIBIT 2: FTSE/JSE Indices vs All Share Index

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Africa Headline Indices							
JSE All Share Index	J203	60	1.00	0.00	11.6	0.0	100
JSE Top 40 Index	J200	60	1.10	0.02	12.7	1.3	99
JSE Mid Cap Index	J201	60	0.54	0.08	9.4	6.9	44
JSE Small Cap Index	J202	60	0.39	0.07	7.6	6.1	35
JSE Fledgling Index	J204	60	0.26	0.08	7.8	7.1	15
Tradeable Indices							
JSE Resource 20 Index	J210	60	1.45	0.14	20.6	11.8	66
JSE Industrial 25 Index	J211	60	0.93	0.06	12.1	5.6	79
JSE Financial 15 Index	J212	60	0.86	0.10	13.0	8.3	58
JSE Financial and Industrial 30 Index	J213	60	0.92	0.06	11.8	5.1	81
Secondary Markets							
JSE Development Capital Index	J230	60	0.44	0.47	41.0	40.3	1
JSE Venture Capital Index	J231	60	0.04	0.99	85.5	84.8	0
JSE ALTX Index	J232	60	0.40	0.23	20.5	19.8	5
JSE ALTX 15 Index	J233	60	0.22	0.32	27.6	27.3	1
Specialist Indices							
JSE Socially Responsible Investment Index	J100	60	1.05	0.03	12.3	2.3	96
JSE SA Financials and Industrials Index	J250	60	0.82	0.06	10.6	4.7	80
JSE Preference Share Index	J251	60	0.08	0.08	6.8	6.7	2
JSE SA Listed Property Index	J253	60	0.11	0.15	13.2	13.1	1
JSE Capped Property Index	J254	60	0.21	0.12	10.7	10.4	5
JSE SA Industrials Index	J257	60	0.86	0.06	11.1	4.9	80
JSE SA Resources Index	J258	60	1.45	0.14	20.6	11.8	66
JSE Dividend+ Index	J259	60	0.77	0.08	11.4	7.1	60
JSE RAFI 40 Index	J260	60	1.08	0.03	12.7	2.6	96
Capped Indices							
JSE Capped Top 40 Index	J300	60	1.07	0.01	12.4	1.2	99
JSE Capped All Share Index	J303	60	0.99	0.00	11.4	0.2	100
Style Indices							
JSE Value Index	J330	60	0.91	0.06	11.6	4.7	83
JSE Growth Index	J331	60	1.05	0.03	12.4	2.9	95
Shareholder Weighted Indices							
JSE Shareholder Weighted Top 40 Index	J400	60	1.00	0.03	11.9	3.0	94
JSE Shareholder Weighted All Share Index	J403	60	0.88	0.03	10.6	2.9	93
Industry Indices							
JSE Oil & Gas Index	J500	60	0.59	0.54	48.2	47.3	2
JSE Basic Materials Index	J510	60	1.47	0.14	20.8	12.0	66
JSE Industrials Index	J520	60	0.68	0.10	11.5	8.3	47
JSE Consumer Goods Index	J530	60	0.93	0.12	14.8	10.1	53
JSE Health Care Index	J540	60	0.45	0.14	12.9	11.7	16
JSE Consumer Services Index	J550	60	0.97	0.14	16.3	11.8	47
JSE Telecommunication Index	J560	60	0.81	0.20	19.6	17.1	23
JSE Financials Index	J580	60	0.72	0.10	11.7	8.2	50
JSE Technology Index	J590	60	0.63	0.19	17.6	15.9	16

(continued on next page)

EXHIBIT 2: FTSE/JSE Indices vs All Share Index (cont'd)

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Sector Indices							
JSE Oil & Gas Producers Index	J055	60	0.59	0.54	48.2	47.3	2
JSE Chemicals Index	J135	60	0.64	0.16	15.4	13.4	23
JSE Forestry & Paper Index	J173	60	0.97	0.20	20.8	17.3	29
JSE Industrial Metals Index	J175	60	1.19	0.23	24.6	20.2	32
JSE Mining Index	J177	60	1.52	0.15	21.9	13.1	64
JSE Construction & Materials Index	J235	60	0.45	0.22	19.6	18.8	7
JSE General Industrials Index	J272	60	0.75	0.10	12.5	9.0	48
JSE Electronic & Electrical Equipment Index	J273	60	0.47	0.17	15.5	14.4	12
JSE Industrial Engineering Index	J275	60	0.44	0.20	17.8	16.9	8
JSE Industrial Transportation Index	J277	60	0.75	0.16	16.7	14.1	27
JSE Support Services Index	J279	60	0.48	0.18	16.2	15.1	12
JSE Automobiles & Parts Index	J335	60	0.41	0.28	25.0	24.4	4
JSE Beverages Index	J353	60	0.72	0.14	14.7	12.0	32
JSE Food Producers Index	J357	60	0.39	0.15	13.4	12.5	11
JSE Household Goods Index	J372	60	1.08	0.21	21.8	17.7	33
JSE Personal Goods Index	J376	60	1.47	0.25	27.6	21.5	39
JSE Health Care Equipment & Services Index	J453	60	0.42	0.15	13.5	12.5	13
JSE Pharmaceuticals & Biotechnology Index	J457	60	0.43	0.21	18.6	17.8	7
JSE Food & Drug Retailers Index	J533	60	0.46	0.23	20.4	19.5	7
JSE General Retailers Index	J537	60	0.95	0.19	19.5	16.0	32
JSE Media Index	J555	60	1.42	0.53	48.8	45.6	11
JSE Travel & Leisure Index	J575	60	0.45	0.15	14.3	13.2	13
JSE Fixed Line Telecommunications Index	J653	60	0.90	0.34	31.2	29.2	11
JSE Mobile Telecommunications Index	J657	60	0.80	0.21	20.1	17.7	21
JSE Banks Index	J835	60	0.83	0.15	16.3	13.0	35
JSE Nonlife Insurance Index	J853	60	0.30	0.20	17.9	17.4	3
JSE Life Insurance Index	J857	60	0.89	0.12	14.4	10.0	50
JSE General Financial Index	J877	60	0.80	0.12	13.6	9.9	46
JSE Equity Investment Instruments Index	J898	60	0.68	0.12	13.0	10.3	35
JSE Software & Computer Services Index	J953	60	0.63	0.19	17.7	16.0	17
Sub Sector Indices							
JSE Gold Mining Index	J150	60	0.80	0.42	37.3	35.8	6
JSE Coal Mining Index	J151	60	0.93	0.26	25.0	22.4	19
JSE Platinum Mining Index	J153	60	1.45	0.20	24.4	17.6	48
JSE General Mining Index	J154	60	1.71	0.17	24.5	14.3	65

Sources: JSE; BNP Paribas Securities South Africa

EXHIBIT 3: All Stocks vs All Share Index

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J200 Large Caps								
Banks								
Barclays Africa Group Limited	BGA	60	0.90	0.20	20.2	16.9	29	100
Capitec Bank Hldgs Ltd	CPI	60	0.17	0.34	29.4	29.2	0	100
Firststrand Limited	FSR	60	0.91	0.17	18.3	14.6	35	100
Nedbank Group.	NED	60	0.67	0.17	16.7	14.5	23	100
RMB Holdings	RMH	60	0.92	0.18	18.9	15.3	34	100
Standard Bank Group	SBK	60	0.77	0.18	17.9	15.2	27	100
Beverages								
SABMiller	SAB	60	0.71	0.14	14.8	12.1	32	100
Chemicals								
Sasol	SOL	60	1.11	0.19	21.3	16.5	39	100
Equity Investment Instruments								
Rand Merchant Insurance Holdings Ltd	RMI	51	0.73	0.23	19.1	17.0	18	100
Reinet Investments SCA	REI	60	0.74	0.17	16.8	14.3	26	100
Financial Services								
Brait SA	BAT	60	-0.03	0.32	27.7	27.5	0	100
Investec Ltd	INL	60	1.23	0.16	20.4	14.0	52	100
Investec PLC	INP	60	1.22	0.17	20.3	14.1	51	100
Food & Drug Retailers								
Shoprite	SHP	60	0.44	0.28	25.0	24.3	4	99
Food Producers								
Tiger Brands	TBS	60	0.60	0.24	21.7	20.3	11	100
Forestry & Paper								
Mondi Limited	MND	60	0.92	0.24	23.7	20.6	22	100
Mondi Plc	MNP	60	1.03	0.24	24.1	20.4	27	100
General Industrials								
Bidvest Group	BVT	60	0.71	0.15	15.1	12.4	31	100
Remgro	REM	60	0.86	0.14	15.5	11.7	43	100
General Retailers								
Mr Price Group	MPC	60	0.83	0.26	24.8	22.5	17	100
Woolworths Holdings	WHL	60	1.03	0.24	24.5	20.8	27	100
Health Care Equipment & Services								
Medi-Clinicrp	MDC	60	0.56	0.22	19.9	18.6	11	100
Netcare	NTC	60	0.64	0.17	16.8	14.9	20	100
Household Goods & Home Construction								
Steinhoff International Holdings	SHF	60	1.04	0.20	21.7	17.5	34	100
Industrial Metals & Mining								
Kumba Iron Ore	KIO	60	1.19	0.28	28.2	23.7	28	100
Life Insurance								
Discovery Holdings	DSY	60	0.46	0.19	16.7	15.8	9	100
MMI Holdings Ltd	MMI	60	0.78	0.19	19.1	16.5	24	100
Old Mutual Plc	OML	60	0.90	0.19	19.8	16.4	29	100
Sanlam	SLM	60	0.97	0.16	17.8	13.5	41	99
Media								
Naspers	NPN	60	1.29	0.24	26.5	21.0	37	100
Mining								
Anglo American	AGL	60	1.46	0.24	27.2	20.2	44	100
Anglo American Platinum	AMS	60	1.02	0.28	27.2	23.9	22	100
Anglogold Ashanti Ltd	ANG	60	0.78	0.47	41.9	40.2	6	100
BHP Billiton	BIL	60	1.77	0.16	25.3	13.6	70	100
Mobile Telecommunications								
MTN Group	MTN	60	0.77	0.22	21.4	19.1	19	100
Vodacom Group Ltd	VOD	60	0.85	0.21	20.9	18.1	24	100
Personal Goods								
Compagnie Financiere Richemont AG	CFR	60	1.37	0.25	27.6	21.5	39	100
Pharmaceuticals & Biotechnology								
Aspen Pharmacare Holdings Ltd	APN	60	0.42	0.24	21.6	20.9	5	100
Real Estate Investment & Services								
Capital & Countries Properties	CCO	60	0.17	0.22	19.1	18.9	1	100
Real Estate Investment Trusts								
Growthpoint Prop Ltd	GRT	60	0.27	0.20	17.7	17.3	3	100
Intu Properties Plc	ITU	60	0.81	0.18	17.9	15.0	29	98
Tobacco								
British American Tobacco PLC	BTI	60	0.44	0.16	14.8	13.8	11	100

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EXHIBIT 3: All Stocks vs All Share Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J201 Mid Caps								
Beverages								
Distell Group Limited	DST	60	0.45	0.23	20.0	19.2	6	98
Chemicals								
AECI	AFE	60	0.50	0.19	17.2	16.1	11	100
Omnia Holdings Ltd	OMN	60	0.50	0.19	17.7	16.5	11	100
Construction & Materials								
PPC Limited	PPC	60	0.30	0.31	26.4	26.0	1	100
Electronic & Electrical Equipment								
Reunert	RLO	60	0.37	0.21	18.4	17.8	5	100
Equity Investment Instruments								
Hosken Cons Invest	HCI	60	0.42	0.19	17.3	16.5	8	98
Financial Services								
Alexander Forbes Group Holdings	AFH	11	0.79	0.97	26.8	22.3	23	100
Coronation Fund Managers	CML	60	0.87	0.25	24.1	21.4	20	100
PSG Group	PSG	60	0.54	0.32	28.3	27.3	5	100
Zeder Investments	ZED	60	0.50	0.24	21.2	20.2	8	100
Fixed Line Telecommunications								
Telkom	TKG	60	0.81	0.34	31.2	29.2	11	100
Food & Drug Retailers								
Clicks Group Ltd	CLS	60	0.68	0.24	22.3	20.6	13	100
Pick N Pay Stores	PIK	60	0.55	0.25	22.2	21.0	9	100
The Spar Group	SPP	60	0.44	0.23	20.5	19.7	6	100
Food Producers								
AngloVaal Industries ORD	AVI	60	0.42	0.20	17.7	16.9	8	100
Illovo Sugar	ILV	60	0.51	0.21	19.4	18.3	10	100
Oceana Group	OCE	60	0.36	0.30	25.8	25.3	2	96
Pioneer Foods Group Ltd	PFG	60	0.35	0.23	20.0	19.5	4	100
RCL Foods Limited	RCL	60	0.09	0.22	19.4	19.2	0	96
Tongaat Hulett	TON	60	-0.06	0.25	21.6	21.4	0	100
Forestry & Paper								
Sappi	SAP	60	0.60	0.27	24.1	22.8	9	100
General Industrials								
Barloworld	BAW	60	0.64	0.28	25.2	23.8	9	100
KAP Industrial Holdings Ltd	KAP	60	0.49	0.29	24.6	23.8	5	85
Nampak	NPK	60	0.60	0.22	20.1	18.6	12	100
General Retailers								
Curro Holdings Limited	COH	48	0.43	0.64	46.6	45.9	1	100
Massmart Holdings Ltd	MSM	60	0.96	0.24	24.0	20.8	24	100
The Foschini Group Ltd	TFG	60	0.87	0.31	29.0	26.6	14	100
Truworths International	TRU	60	0.88	0.27	25.5	22.8	18	100
Health Care Equipment & Services								
Life Healthcare Group Holdings	LHC	60	0.07	0.23	19.8	19.6	0	100
Industrial Transportation								
Grindrod	GND	60	0.63	0.26	23.4	22.0	11	100
Imperial Holdings	IPL	60	0.85	0.22	21.8	19.1	22	99
Super Group Ltd	SPG	60	0.10	0.30	25.2	25.0	0	98
Trencor Ltd	TRE	60	0.19	0.24	22.0	21.7	1	93
Life Insurance								
Liberty Holdings Limited Ord	LBH	60	0.58	0.17	16.5	15.0	17	100
Mining								
African Rainbow Minerals Ltd	ARI	60	1.32	0.26	27.7	22.0	36	100
Assore Limited	ASR	60	1.40	0.35	35.5	29.9	28	99
Exxaro Resources	EXX	60	1.17	0.26	26.7	22.2	30	100
Gold Fields	GFI	60	0.44	0.45	39.1	38.4	2	100
Impala Platinum Hlds	IMP	60	1.40	0.25	28.1	21.8	39	100
Lonmin PLC	LON	60	1.66	0.36	38.7	31.2	35	100
Northam Platinum	NHM	60	1.40	0.33	33.5	27.7	30	100
Royal Bafokeng Platinum	RBP	55	0.93	0.27	23.1	20.3	22	100
Sibanye Gold Limited	SGL	28	1.30	1.02	63.6	53.4	27	100
Nonlife Insurance								
Santam	SNT	60	0.31	0.20	17.9	17.4	3	100
Pharmaceuticals & Biotechnology								
Adcock Ingram Holdings Ltd	AIP	60	0.64	0.22	20.2	18.5	14	100

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EXHIBIT 3: All Stocks vs All Share Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Real Estate Investment & Services								
Attacq Limited	ATT	20	0.00	0.48	17.1	16.6	1	100
New Europe Property Investments Plc	NEP	60	0.20	0.16	13.8	13.5	2	86
Rockcastle Global Reals Estatico Co Ltd	ROC	35	0.39	0.40	22.6	22.0	2	93
Real Estate Investment Trusts								
Capital Property Fund	CPF	60	0.14	0.18	15.7	15.5	1	88
Fortress Inc Fund Ltd A	FFA	60	0.11	0.14	12.0	11.9	1	96
Fortress Inc Fund Ltd B	FFB	60	-0.02	0.39	31.6	31.3	0	76
Fountainhead Property Trust	FPT	60	0.17	0.17	15.0	14.8	2	100
Hyprop Investments Ltd	HYP	60	-0.16	0.19	16.4	16.1	2	100
Redefine International PLC	RPL	20	0.57	0.68	24.8	23.5	7	100
Redefine Properties Ltd	RDF	60	0.11	0.17	14.9	14.7	0	100
Resilient Prop Inc Fund	RES	60	-0.06	0.21	18.1	17.9	0	100
Vukile Property Fund	VKE	60	0.09	0.19	16.1	15.9	0	100
Software & Computer Services								
Datatec	DTC	60	0.80	0.24	22.5	20.2	18	100
EOH Holdings Ltd.	EOH	60	0.43	0.28	24.4	23.7	3	99
Travel & Leisure								
Sun International Ltd	SUI	60	0.44	0.22	19.4	18.6	7	100
Tsogo Sun Holdings Ltd	TSH	60	0.23	0.19	16.7	16.4	2	99
J202 Small Caps								
Automobiles & Parts								
Metair Investments Ord	MTA	60	0.41	0.28	25.0	24.4	4	93
Beverages								
Capevin Holdings Ltd	CVH	34	0.38	0.33	19.1	18.4	4	99
Chemicals								
African Oxygen Ltd	AFX	60	0.59	0.24	21.6	20.2	11	100
Construction & Materials								
Afrimat Ltd	AFT	60	0.19	0.26	22.4	22.2	1	98
Aveng	AEG	60	0.77	0.35	32.1	30.4	9	100
Group Five/South Africa	GRF	60	0.68	0.32	28.2	26.7	9	100
Murray & Roberts	MUR	60	0.38	0.32	27.6	27.0	2	97
Raubex Group	RBX	60	0.70	0.31	28.3	26.8	9	100
Wilson Bayly Holmes-Ovcon	WBO	60	0.51	0.23	20.7	19.7	8	100
Electronic & Electrical Equipment								
Allied Electronics Corp	AEL	60	0.46	0.27	23.5	22.7	5	98
Allied Electronics Corp N	AEN	60	0.69	0.24	22.3	20.5	14	100
Consolidated Infrastructure Group Ltd	CIL	57	0.70	0.28	23.3	21.7	11	89
Equity Investment Instruments								
Brimstone Investment Corp N	BRN	60	-0.06	0.23	19.3	19.1	0	78
Niveus Investments Ltd	NIV	33	0.53	0.70	39.5	38.4	2	70
Pallinghurst Resources Guernsey Ltd	PGL	60	0.21	0.33	28.2	27.9	0	100
Financial Services								
Grande Parade	GPL	60	0.08	0.27	23.6	23.4	0	96
JSE	JSE	60	0.65	0.21	20.1	18.5	15	100
Peregrine Holdings	PGR	60	0.63	0.21	18.6	17.0	14	85
PSG Kinsult Limited	KST	12	-0.30	0.69	19.6	16.8	21	100
Transaction Capital Ltd	TCP	36	-0.03	0.33	19.1	18.8	0	99
Trustco Group Holdings Limited	TTO	60	1.63	0.78	74.2	65.3	21	83
Food Producers								
Astral Foods Ltd	ARL	60	0.10	0.28	23.7	23.5	0	100
Clover Industries Ltd	CLR	54	0.56	0.29	22.6	21.6	7	100
Rhodes	RFG	8	0.31	2.02	41.6	38.4	3	100
General Industrials								
Mpact Ltd	MPT	47	0.17	0.26	18.5	18.2	0	100
General Retailers								
Advtech	ADH	60	0.20	0.23	19.5	19.2	1	78
Cashbuild Ltd	CSB	60	0.10	0.33	28.1	27.9	0	99
Holdsport Ltd	HSP	47	0.47	0.30	22.4	21.6	5	99
Lewis Group	LEW	60	0.79	0.29	26.5	24.4	13	100
Health Care Equipment & Services								
Afrocentric Investment Corp Ltd	ACT	60	0.18	0.38	32.4	32.1	0	92
Industrial Engineering								
Howden Africa Holdings	HWN	60	0.32	0.26	22.3	21.8	3	73
Hudaco Industries	HDC	60	0.60	0.25	22.8	21.5	10	99
Invicta Holdings	IVT	60	0.18	0.26	22.3	22.1	0	97

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EXHIBIT 3: All Stocks vs All Share Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Industrial Metals & Mining								
Arcelor Mittal South Africa Ltd	ACL	60	1.15	0.40	38.3	34.6	17	100
Hulamin	HLM	60	-0.02	0.42	36.3	36.0	0	100
Life Insurance								
Clientele	CLI	60	0.01	0.19	15.7	15.6	0	73
Media								
Caxton & CTP	CAT	60	0.25	0.28	24.2	23.9	1	88
Mining								
Aquarius Platinum Ltd	AQP	60	1.05	0.51	46.3	43.3	11	99
Harmony	HAR	60	0.71	0.56	49.2	47.7	4	100
Merafe Resources	MRF	60	0.76	0.34	31.2	29.4	10	100
Pan African Resources Plc	PAN	60	0.94	0.38	35.0	32.4	13	100
Mobile Telecommunications								
Blue Label Telecoms Ltd.	BLU	60	0.73	0.33	30.0	28.3	9	100
Pharmaceuticals & Biotechnology								
Ascendis Health Ltd	ASC	19	0.48	0.94	32.5	31.3	2	99
Real Estate Investment & Services								
The Pivotal Fund Ltd	PIV	6	0.67	2.14	49.3	34.0	44	99
Real Estate Investment Trusts								
Accelerate Prop Fund Ltd	APF	18	-0.20	0.66	23.3	21.7	9	89
Arrowhead Properties Ltd	AWA	42	0.20	0.22	13.6	13.3	2	100
Ascension Properties Ltd	AIB	36	0.51	0.30	17.0	16.0	8	72
Ascension Properties Ltd-A units	AIA	36	0.02	0.24	13.9	13.7	0	75
Delta Property Fund Ltd	DLT	31	0.43	0.26	15.3	14.3	9	97
Dipula Income Fund Ltd A	DIB	45	-0.31	0.45	29.0	28.1	5	57
Emira Property Fund Ltd	EMI	60	0.19	0.17	14.9	14.7	2	100
Hospitality Property A	HPA	60	0.11	0.25	20.9	20.8	0	86
Investec Australia Property	IAP	20	0.23	0.41	14.1	13.7	1	98
Investec Property Fund Limited	IPF	50	-0.14	0.27	20.3	19.9	1	99
Octodec Invest Ltd	OCT	60	-0.19	0.28	24.0	23.6	2	92
Rebosis Property Fund Lt	REB	49	0.15	0.21	15.8	15.5	1	95
SA Corp Real Estate Fund	SAC	60	0.13	0.18	15.2	15.0	0	100
Software & Computer Services								
Business Connexion Group Ltd	BCX	60	0.35	0.19	16.9	16.3	5	99
Support Services								
Adcorp Holdings Ltd	ADR	60	0.29	0.20	17.2	16.7	4	99
Mix Telematics Ltd	MIX	60	0.27	0.47	41.2	40.8	0	86
Net 1 Ueps Technologies Inc	NT1	60	0.39	0.62	54.3	53.7	1	65
Travel & Leisure								
City Lodge Hotels Ltd	CLH	60	0.49	0.22	19.7	18.7	8	100
Famous Brands	FBR	60	0.62	0.24	21.8	20.4	11	100
Spur Corp	SUR	60	0.38	0.29	25.0	24.4	3	98
J204 Fledging								
Banks								
Finbond Group Ltd	FGL	60	0.47	1.14	96.1	95.1	0	67
Chemicals								
Delta EMD Ltd	DTA	60	0.14	0.41	35.2	34.9	0	74
Rolfes Technology Hldgs	RLF	60	0.41	0.44	38.2	37.6	1	81
Spanjaard	SPA	60	-0.70	0.44	36.2	33.9	10	18
Construction & Materials								
Basil Read Holdings	BSR	60	0.20	0.47	41.0	40.7	0	100
Calgro M3 Holdings	CGR	60	0.45	0.70	60.1	59.4	1	76
Distribution and Warehousing Network	DAW	60	0.20	0.38	32.3	32.0	0	91
ESOR Limited	ESR	60	0.40	0.53	45.8	45.2	1	99
Masonite Africa	MAS	60	0.08	0.36	36.3	36.0	0	23
Mazor Group	MZR	60	0.60	0.35	29.6	28.5	6	60
Sephaku Holdings Ltd	SEP	60	0.47	0.52	44.5	43.8	2	80
Stefanutti Stocks Hld Ltd	SSK	60	0.17	0.35	30.1	29.9	0	100
Electronic & Electrical Equipment								
Amalgamated Electronics Corp	AER	60	0.13	0.34	30.7	30.4	0	70
ARB Holdings Ltd	ARH	60	0.42	0.27	24.5	23.8	3	88
Digicore Holdings	DGC	60	0.47	0.45	40.3	39.6	2	92
Ellies Holdings Ltd	ELI	60	0.90	0.51	46.0	43.7	8	98
Jasco Electronics Holdings	JSC	60	0.39	0.49	42.9	42.4	1	92
South Ocean Holdings	SOH	60	1.03	0.47	41.6	38.8	11	75

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EXHIBIT 3: All Stocks vs All Share Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Equity Investment Instruments								
Sabvest	SBV	56	-0.10	0.52	48.7	47.8	0	14
Sabvest Lmt N	SVN	60	0.41	0.49	44.4	43.7	3	16
Stellar Cap Partners Ltd	SCP	60	-0.23	0.67	55.9	54.8	3	52
Trematon Capital Investments	TMT	60	0.25	0.27	23.4	23.0	3	35
Financial Services								
African Equity Emp Inv Ltd	AEE	60	0.38	0.87	75.9	75.1	1	53
Cadiz Holdings	CDZ	60	0.21	0.28	23.7	23.4	1	91
London Finance and Investment Group	LNF	60	-0.15	0.38	38.2	37.6	0	9
Prescient Limited	PCT	34	-0.08	0.49	27.6	27.0	1	93
Purple Group Ltd	PPE	60	0.44	0.63	54.0	53.3	1	79
Sasfin Holdings	SFN	60	0.33	0.24	20.7	20.1	3	90
Food Producers								
Crookes Brothers	CKS	60	0.17	0.30	25.7	25.5	0	42
Quantum Foods Holdings Ltd	QFH	8	0.48	1.72	35.9	32.9	4	100
Sovereign Food Investments	SOV	60	0.40	0.33	28.4	27.9	2	82
Forestry & Paper								
York Timber Holdings Ltd	YRK	60	0.25	0.33	29.2	28.8	1	85
General Industrials								
Argent Industrial Ltd	ART	60	0.05	0.28	23.6	23.4	0	97
Astrapak Limited	APK	60	0.33	0.32	27.9	27.5	2	82
Bowler Metcalf	BCF	60	0.26	0.21	18.3	17.9	3	86
Eqstra Holdings	EQS	60	0.21	0.40	34.5	34.2	0	100
Transpaco	TPC	60	0.12	0.18	15.3	15.1	0	67
General Retailers								
Combined Motor Hldgs Ltd	CMH	60	0.30	0.25	22.4	22.0	2	78
Iliad Africa	ILA	60	0.58	0.45	38.9	37.9	4	95
Nictus	NCS	60	0.07	0.62	56.5	56.0	0	25
REX Trueform Clothing Sco	RTN	56	0.17	1.73	74.3	71.5	0	12
Verimark Holdings	VMK	60	-0.14	0.50	41.9	41.3	1	76
Industrial Engineering								
Bell Equipment Co	BEL	60	0.19	0.37	32.5	32.2	0	93
ENX Group Limited	ENX	60	-0.13	0.38	31.3	30.9	1	72
Master Drilling Group Ltd	MDI	30	-0.16	0.39	21.5	20.8	3	86
Industrial Metals & Mining								
Insimbi Ref & Alloy	ISB	60	0.96	0.42	38.6	36.0	12	54
Metmar	MML	60	0.67	0.46	40.4	39.1	5	94
ZCI Ltd	ZCI	60	-0.24	0.97	99.5	96.8	4	17
Industrial Transportation								
Cargo Carriers	CRG	60	0.26	0.31	28.8	28.4	1	22
OneLogix Group Ltd	OLG	60	0.30	0.41	35.1	34.6	1	93
Santova Limited	SNV	60	0.58	0.63	55.4	54.4	2	78
Value Group	VLE	60	0.43	0.28	23.9	23.3	4	84
Leisure Goods								
Nu-World Holdings	NWL	60	0.51	0.35	34.7	33.8	4	49
Media								
African Media Entertainment Ltd	AME	60	0.45	0.19	14.3	13.5	5	25
Mining								
Atlatsa Resources Corp	ATL	60	0.68	0.63	56.8	55.4	3	82
Bauba Platinum Ltd	BAU	59	0.75	0.67	64.7	63.1	4	54
BuildMax Limited	BDM	60	0.32	0.51	45.5	45.0	0	86
Coal of Africa Ltd	CZA	60	0.52	1.00	85.6	84.5	1	100
DRD Gold	DRD	60	0.76	0.54	47.9	46.2	5	100
Goliath Gold Mining Limited	GGM	60	-0.37	0.45	41.1	39.9	4	46
Keaton Energy Holdings Ltd	KEH	60	0.59	0.46	40.8	39.7	3	95
Petmin Ltd.	PET	60	0.49	0.37	32.6	31.8	3	100
Randgold & Exploration Company Ltd	RNG	60	0.67	0.70	58.3	57.0	3	76
Sable Metals and Min Ltd	SMM	30	0.06	0.98	63.7	62.2	4	51
Sentula Mining	SNU	60	0.08	0.54	46.4	46.0	0	98
Trans HEX Group	TSX	60	-0.30	0.38	32.9	32.1	3	98
Wescoal Holdings Limited	WSL	60	0.24	0.47	40.4	40.0	0	99
Wesizwe Platinum	WEZ	60	0.66	0.70	61.3	60.0	3	100
Nonlife Insurance								
Conduit Capital	CND	60	0.13	0.38	32.9	32.6	0	73
Oil & Gas Producers								
Sacoil Holdings Ltd	SCL	60	0.63	1.04	91.7	90.0	2	88

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EXHIBIT 3: All Stocks vs All Share Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Real Estate Investment & Services								
Adrenna Prop Group Ltd	ANA	60	-0.30	0.78	79.8	77.6	3	29
Freedom Prop Fund Ltd	FDP	12	0.47	2.67	63.8	60.6	3	94
Ingenuity Property Inv L	ING	60	0.23	0.26	26.3	25.9	2	38
Putprop Ltd	PPR	60	-0.14	0.21	20.1	19.8	2	39
Real Estate Investment Trusts								
Equities Prop Fund Ltd	EQU	12	0.65	0.96	23.9	21.4	12	63
Fairvest Property Hldgs	FVT	60	0.35	0.31	24.4	24.0	3	42
Safari Investments Ras Ltd	SAR	14	0.52	0.60	17.6	16.2	9	80
Synergy Income Fund Ltd	SGA	42	0.18	0.25	15.4	15.1	1	44
Texton Property Fund Ltd	TEX	46	0.24	0.27	19.7	19.4	1	71
Tower Property Fund Ltd	TWR	23	0.31	0.44	17.8	17.3	2	73
Software & Computer Services								
Adaptit Holdings Ltd	ADI	60	0.79	0.57	50.3	48.4	5	70
Cognition Holdings Ltd	CGN	60	0.34	0.37	35.3	34.8	1	75
Compu Clearing Outs Ltd	CCL	60	0.29	0.39	37.8	37.4	0	34
Datacentrix Holdings	DCT	60	0.12	0.35	29.6	29.4	0	96
Support Services								
ELB Group	ELR	60	0.69	0.30	24.7	23.2	10	67
Interwaste Holdings Ltd	IWE	60	0.91	0.41	36.8	34.4	11	78
Marshall Monteagle PLC	MMP	52	-0.33	0.39	32.5	31.5	3	37
Metrofile Holdings	MFL	60	-0.09	0.25	22.0	21.8	0	96
Morvest Bus Group Ltd	MOR	51	-0.03	0.55	39.9	39.4	1	94
Primeserv Group	PMV	60	-0.65	0.75	63.6	59.9	9	30
Torre Industries Limited	TOR	31	-0.61	0.65	38.9	35.1	15	95
Winhold Limited	WNH	60	0.38	0.43	37.4	36.9	1	77
Technology Hardware & Equipment								
Mustek	MST	60	0.48	0.28	24.3	23.4	5	93
Pinnacle Holdings Limited	PNC	60	0.63	0.35	32.7	31.5	6	95
Travel & Leisure								
Comair	COM	60	0.16	0.39	33.9	33.6	0	89
Phumelela Gaming & Leisure	PHM	60	0.31	0.34	29.9	29.4	1	84
Taste Holdings	TAS	60	0.61	0.52	45.0	43.9	3	93
Wilderness Holdings Ltd	WIL	57	0.62	0.64	49.5	48.2	3	20
J232 AItx								
Construction & Materials								
Accentuate Limited	ACE	60	0.69	0.50	46.2	44.8	4	51
W G Wearne	WEA	60	0.79	1.26	112.5	109.5	4	75
Electricity								
IPSA Group PLC	IPS	60	0.48	1.03	100.8	99.7	1	46
Electronic & Electrical Equipment								
Ansys	ANS	60	1.32	0.72	67.4	62.0	14	88
Financial Services								
African Dawn Capital Ltd	ADW	60	0.38	1.11	95.4	94.5	0	96
Anchor Group Limited	ACG	9	0.60	2.72	64.1	54.8	18	100
Global Asset Management Ltd	GAM	26	-0.47	0.85	55.7	50.4	16	13
Vunani Capital Holdings	VUN	60	0.89	0.66	58.6	56.3	6	47
Health Care Equipment & Services								
Advanced Health Limited	AVL	14	0.38	2.56	69.6	67.0	0	100
Household Goods & Home Construction								
Rba Holdings Ltd	RBA	60	0.65	1.19	96.6	94.9	2	83
Industrial Engineering								
Mine Restoration Investments Ltd	MRI	41	-0.17	0.90	61.6	59.7	4	45
PSV Holdings Ltd.	PSV	60	0.38	1.01	86.5	85.7	0	64
Industrial Metals & Mining								
BSI Steel Ltd	BSS	60	0.23	0.44	40.6	40.2	0	80
Media								
MoneyWeb Holdings	MNY	60	0.83	0.73	63.4	61.4	5	23
Mining								
Chrometco	CMO	60	0.41	1.05	91.5	90.6	0	66
Jubilee Platinum PLC	JBL	60	0.46	0.60	52.0	51.2	1	99
Personal Goods								
Beige Holdings	BEG	60	0.58	0.68	61.1	60.1	2	82
Imbalie Beauty Limited	ILE	60	0.40	0.74	68.9	68.2	1	45
Pharmaceuticals & Biotechnology								
Nutritional Holdings Limited	NUT	60	0.93	2.01	179.8	170.4	8	68

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EXHIBIT 3: All Stocks vs All Share Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Real Estate Investment & Services								
Sirius Real Estate Limited	SRE	6	0.47	1.42	25.4	22.2	7	100
Real Estate Investment Trusts								
Oasis Crescent Property Fund	OAS	60	-0.04	0.10	8.0	7.9	1	22
Software & Computer Services								
ISA Holdings	ISA	60	0.16	0.37	32.1	31.8	0	82
Silverbridge Holdings	SVB	60	0.24	1.18	119.3	118.2	0	27
Support Services								
CSG Holdings Ltd	CSG	60	0.00	0.75	61.1	60.4	1	70
Technology Hardware & Equipment								
Alaris Holdings Ltd	ALH	60	0.49	1.48	156.9	155.4	2	47
Huge Group Ltd	HUG	60	0.43	0.89	80.7	79.9	1	59
Travel & Leisure								
Gooderson Leisure Corp	GDN	60	0.50	0.42	39.1	38.3	3	36
Other								
Construction & Materials								
Kaydav Group Ltd	KDV	60	0.94	0.59	51.2	48.5	7	22
Equity Investment Instruments								
Brimstone Investment Corporation Ltd	BRT	60	0.11	0.24	19.7	19.5	0	46
Tiso Blackstar Group SE	TBG	44	1.02	0.72	55.5	51.4	11	68
Financial Services								
Efficient Group Ltd	EFG	45	0.11	1.18	65.5	64.5	1	23
Fixed Line Telecommunications								
Telemasters Holdings Limited	TLM	60	0.42	0.83	81.5	80.7	1	34
Food & Drug Retailers								
Pick N Pay Holdings Limited	PWK	60	0.52	0.23	20.6	19.5	9	100
Food Producers								
AH-Vest Limited	AHL	60	0.97	1.48	121.0	114.3	7	14
General Retailers								
African and Overseas Enterprises Limited	AOVP	29	0.25	0.84	39.5	38.8	0	3
African and Overseas Enterprises Ltd	AON	58	0.08	0.49	50.5	50.0	0	9
Italtile Ltd	ITE	60	0.29	0.26	23.4	22.9	2	72
JD Group Limited	JDG	60	0.48	0.62	54.1	53.3	1	100
Mining								
Eastern Platinum Ltd	EPS	60	0.73	0.88	78.0	76.2	3	95
Infrasors Holdings	IRA	60	0.41	0.43	37.2	36.6	1	68
Rockwell Diamonds Incor	RDI	60	0.04	1.01	80.7	79.7	1	35
Tawana Resources NL	TAW	60	0.47	1.49	127.0	125.7	0	34
Nonlife Insurance								
Zurich Insurance Co SA	ZSA	60	-0.08	0.15	14.2	14.0	1	19
Oil & Gas Producers								
Oando Plc	OAQ	60	0.68	1.00	83.4	81.8	2	73
Personal Goods								
Sear del Investment Corp	SER	60	0.69	0.62	51.7	50.4	4	50
Sear del Investment Corp N	SRN	60	0.44	0.65	60.2	59.4	0	35
Real Estate Investment & Services								
Mas Real Estate Inc.	MSP	60	-0.33	0.43	31.5	30.7	3	40
Orion Real Estate Ltd	ORE	60	1.06	0.81	70.1	66.3	7	26
Stenprop Limited	STP	6	0.56	1.25	24.1	19.7	21	24
Tradehold Limited	TDH	60	0.07	0.35	32.3	32.1	0	63
Visual International Hld	VIS	13	0.27	1.75	44.0	41.9	1	70
Real Estate Investment Trusts								
Hospitality Property B	HPB	60	0.81	0.52	45.9	44.0	6	88
Sycom Property Fund	SYC	60	0.56	0.30	27.8	26.7	6	92
Synergy Income Fund Ltd	SGA	42	0.18	0.25	15.4	15.1	1	44
Support Services								
MICROmega Holdings	MMG	60	0.72	1.10	93.2	91.5	4	52
Rare Holdings Ltd	RAR	60	0.12	0.86	79.0	78.2	0	53
Workforce Limited	WKF	52	0.25	0.73	59.1	58.5	0	10
Travel & Leisure								
Cullinan Holdings	CUL	60	0.47	0.67	58.7	57.9	0	35

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4.2 FTSE/JSE Financial & Industrial (J250) as market proxy

EXHIBIT 4: FTSE/JSE Indices vs Financial & Industrial Index

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Africa Headline Indices							
JSE All Share Index	J203	60	0.98	0.07	11.6	5.1	80
JSE Top 40 Index	J200	60	1.04	0.08	12.7	6.3	75
JSE Mid Cap Index	J201	60	0.67	0.08	9.4	6.1	57
JSE Small Cap Index	J202	60	0.48	0.07	7.6	5.6	44
JSE Fledgling Index	J204	60	0.27	0.09	7.8	7.2	13
Tradeable Indices							
JSE Resource 20 Index	J210	60	0.95	0.23	20.6	17.8	24
JSE Industrial 25 Index	J211	60	1.11	0.04	12.1	3.2	93
JSE Financial 15 Index	J212	60	1.08	0.08	13.0	6.1	77
JSE Financial and Industrial 30 Index	J213	60	1.11	0.02	11.8	1.6	98
Secondary Markets							
JSE Development Capital Index	J230	60	0.37	0.52	41.0	40.4	1
JSE Venture Capital Index	J231	60	-0.20	1.08	85.5	84.8	0
JSE ALTX Index	J232	60	0.32	0.26	20.5	20.1	3
JSE ALTX 15 Index	J233	60	0.07	0.35	27.6	27.4	0
Specialist Indices							
JSE Socially Responsible Investment Index	J100	60	0.97	0.09	12.3	6.7	69
JSE SA Financials and Industrials Index							
JSE Preference Share Index	J251	60	0.09	0.09	6.8	6.7	2
JSE SA Listed Property Index	J253	60	0.46	0.16	13.2	12.2	14
JSE Capped Property Index	J254	60	0.49	0.12	10.7	9.3	23
JSE SA Industrials Index	J257	60	1.03	0.03	11.1	2.5	95
JSE SA Resources Index	J258	60	0.94	0.23	20.6	17.8	23
JSE Dividend+ Index	J259	60	0.89	0.08	11.4	6.4	68
JSE RAFI 40 Index	J260	60	1.01	0.09	12.7	6.8	71
Capped Indices							
JSE Capped Top 40 Index	J300	60	1.03	0.07	12.4	5.8	78
JSE Capped All Share Index	J303	60	0.97	0.06	11.4	5.0	81
Style Indices							
JSE Value Index	J330	60	0.92	0.08	11.6	6.2	70
JSE Growth Index	J331	60	1.01	0.08	12.4	6.3	74
Shareholder Weighted Indices							
JSE Shareholder Weighted Top 40 Index	J400	60	1.04	0.06	11.9	4.6	85
JSE Shareholder Weighted All Share Index	J403	60	0.95	0.04	10.6	3.5	89
Industry Indices							
JSE Oil & Gas Index	J500	60	0.30	0.60	48.2	47.7	1
JSE Basic Materials Index	J510	60	0.96	0.23	20.8	18.1	24
JSE Industrials Index	J520	60	0.84	0.09	11.5	7.3	60
JSE Consumer Goods Index	J530	60	1.05	0.12	14.8	9.7	56
JSE Health Care Index	J540	60	0.70	0.13	12.9	10.5	33
JSE Consumer Services Index	J550	60	1.17	0.13	16.3	10.6	58
JSE Telecommunication Index	J560	60	1.08	0.20	19.6	15.8	34
JSE Financials Index	J580	60	0.95	0.08	11.7	6.0	73
JSE Technology Index	J590	60	0.77	0.20	17.6	15.5	21

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EXHIBIT 4: FTSE/JSE Indices vs Financial & Industrial Index (cont'd)

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Sector Indices							
JSE Oil & Gas Producers Index	J055	60	0.30	0.60	48.2	47.7	1
JSE Chemicals Index	J135	60	0.68	0.17	15.4	13.5	21
JSE Forestry & Paper Index	J173	60	0.95	0.23	20.8	18.0	23
JSE Industrial Metals Index	J175	60	0.82	0.29	24.6	22.8	13
JSE Mining Index	J177	60	0.96	0.25	21.9	19.3	22
JSE Construction & Materials Index	J235	60	0.52	0.24	19.6	18.7	8
JSE General Industrials Index	J272	60	0.90	0.10	12.5	8.1	58
JSE Electronic & Electrical Equipment Index	J273	60	0.46	0.19	15.5	14.6	10
JSE Industrial Engineering Index	J275	60	0.30	0.22	17.8	17.4	3
JSE Industrial Transportation Index	J277	60	1.03	0.16	16.7	12.5	43
JSE Support Services Index	J279	60	0.54	0.19	16.2	15.0	13
JSE Automobiles & Parts Index	J335	60	0.51	0.31	25.0	24.2	5
JSE Beverages Index	J353	60	0.85	0.15	14.7	11.6	37
JSE Food Producers Index	J357	60	0.56	0.15	13.4	11.9	19
JSE Household Goods Index	J372	60	1.02	0.24	21.8	18.7	25
JSE Personal Goods Index	J376	60	1.59	0.28	27.6	21.7	37
JSE Health Care Equipment & Services Index	J453	60	0.61	0.15	13.5	11.7	23
JSE Pharmaceuticals & Biotechnology Index	J457	60	0.76	0.21	18.6	16.6	19
JSE Food & Drug Retailers Index	J533	60	0.76	0.24	20.4	18.6	15
JSE General Retailers Index	J537	60	1.27	0.18	19.5	14.1	48
JSE Media Index	J555	60	1.00	0.60	48.8	47.2	5
JSE Travel & Leisure Index	J575	60	0.52	0.17	14.3	13.1	15
JSE Fixed Line Telecommunications Index	J653	60	0.75	0.39	31.2	30.0	6
JSE Mobile Telecommunications Index	J657	60	1.09	0.21	20.1	16.3	33
JSE Banks Index	J835	60	1.11	0.14	16.3	11.2	53
JSE Nonlife Insurance Index	J853	60	0.41	0.22	17.9	17.2	5
JSE Life Insurance Index	J857	60	1.09	0.11	14.4	8.6	63
JSE General Financial Index	J877	60	0.91	0.12	13.6	9.6	49
JSE Equity Investment Instruments Index	J898	60	0.80	0.13	13.0	9.8	41
JSE Software & Computer Services Index	J953	60	0.77	0.20	17.7	15.6	21
Sub Sector Indices							
JSE Gold Mining Index	J150	60	0.13	0.47	37.3	36.9	0
JSE Coal Mining Index	J151	60	0.43	0.31	25.0	24.4	3
JSE Platinum Mining Index	J153	60	1.06	0.27	24.4	21.5	21
JSE General Mining Index	J154	60	1.15	0.27	24.5	21.1	25

Sources: JSE; BNP Paribas Securities South Africa

EXHIBIT 5: FINDI Stocks vs Financial & Industrial Index

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J200 Large Caps								
Banks								
Barclays Africa Group Limited	BGA	60	1.08	0.20	20.2	16.0	36	100
Capitec Bank Hldgs Ltd	CPI	60	0.46	0.37	29.4	28.8	3	100
Firststrand Limited	FSR	60	1.16	0.16	18.3	12.9	49	100
Nedbank Group.	NED	60	0.94	0.17	16.7	12.9	39	100
RMB Holdings	RMH	60	1.18	0.17	18.9	13.5	48	100
Standard Bank Group	SBK	60	1.03	0.17	17.9	13.7	41	100
Beverages								
SABMiller	SAB	60	0.82	0.15	14.8	11.7	37	100
Chemicals								
Sasol	SOL	60	0.82	0.24	21.3	19.0	19	100
Equity Investment Instruments								
Rand Merchant Insurance Holdings Ltd	RMI	51	1.02	0.24	19.1	15.7	31	100
Reinet Investments SCA	REI	60	0.83	0.18	16.8	14.1	28	100
Financial Services								
Brait SA	BAT	60	0.03	0.35	27.7	27.5	0	100
Investec Ltd	INL	60	1.29	0.18	20.4	14.2	50	100
Investec PLC	INP	60	1.26	0.19	20.3	14.6	48	100
Food & Drug Retailers								
Shoprite	SHP	60	0.73	0.30	25.0	23.4	11	99
Food Producers								
Tiger Brands	TBS	60	0.79	0.25	21.7	19.6	17	100
Forestry & Paper								
Mondi Limited	MND	60	0.88	0.27	23.7	21.2	18	100
Mondi Plc	MNP	60	0.95	0.27	24.1	21.2	21	100
General Industrials								
Bidvest Group	BVT	60	0.87	0.15	15.1	11.6	40	100
Remgro	REM	60	1.08	0.13	15.5	10.1	57	100
General Retailers								
Mr Price Group	MPC	60	1.13	0.27	24.8	20.8	28	100
Woolworths Holdings	WHL	60	1.29	0.24	24.5	19.1	38	100
Health Care Equipment & Services								
Medi-Clinicrp	MDC	60	0.68	0.23	19.9	18.3	14	100
Netcare	NTC	60	0.81	0.18	16.8	14.2	28	100
Household Goods & Home Construction								
Steinhoff International Holdings	SHF	60	0.96	0.24	21.7	18.6	26	100
Industrial Metals & Mining								
Kumba Iron Ore	KIO	60	0.83	0.33	28.2	26.1	13	100
Life Insurance								
Discovery Holdings	DSY	60	0.72	0.19	16.7	14.6	21	100
MMI Holdings Ltd	MMI	60	0.92	0.20	19.1	15.9	29	100
Old Mutual Plc	OML	60	1.01	0.21	19.8	16.1	32	100
Sanlam	SLM	60	1.25	0.15	17.8	11.4	58	99
Media								
Naspers	NPN	60	1.31	0.27	26.5	21.2	35	100
Mobile Telecommunications								
MTN Group	MTN	60	1.02	0.23	21.4	17.8	30	100
Vodacom Group Ltd	VOD	60	1.04	0.22	20.9	17.2	32	100
Personal Goods								
Compagnie Financiere Richemont AG	CFR	60	1.40	0.28	27.6	21.7	37	100
Pharmaceuticals & Biotechnology								
Aspen Pharmacare Holdings Ltd	APN	60	0.78	0.25	21.6	19.6	16	100
Real Estate Investment & Services								
Capital & Countries Properties	CCO	60	0.09	0.24	19.1	18.9	0	100
Real Estate Investment Trusts								
Growthpoint Prop Ltd	GRT	60	0.66	0.21	17.7	16.1	17	100
Intu Properties Plc	ITU	60	0.80	0.20	17.9	15.4	24	98
Tobacco								
British American Tobacco PLC	BTI	60	0.57	0.17	14.8	13.4	16	100

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EXHIBIT 5: FINDI Stocks vs Financial & Industrial Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J201 Mid Caps								
Beverages								
Distell Group Limited	DST	60	0.58	0.24	20.0	18.8	10	98
Chemicals								
AECI	AFE	60	0.56	0.21	17.2	16.0	12	100
Omnia Holdings Ltd	OMN	60	0.44	0.22	17.7	16.9	6	100
Construction & Materials								
PPC Limited	PPC	60	0.32	0.34	26.4	26.1	1	100
Electronic & Electrical Equipment								
Reunert	RLO	60	0.45	0.22	18.4	17.6	7	100
Equity Investment Instruments								
Hosken Cons Invest	HCI	60	0.29	0.22	17.3	16.9	3	98
Financial Services								
Alexander Forbes Group Holdings	AFH	11	0.82	1.00	26.8	20.9	32	100
Coronation Fund Managers	CML	60	1.02	0.26	24.1	20.7	25	100
PSG Group	PSG	60	0.78	0.34	28.3	26.5	11	100
Zeder Investments	ZED	60	0.57	0.26	21.2	20.0	9	100
Fixed Line Telecommunications								
Telkom	TKG	60	0.67	0.39	31.2	30.0	6	100
Food & Drug Retailers								
Clicks Group Ltd	CLS	60	0.96	0.25	22.3	19.2	25	100
Pick N Pay Stores	PIK	60	0.56	0.27	22.2	21.2	8	100
The Spar Group	SPP	60	0.64	0.25	20.5	19.1	12	100
Food Producers								
AngloVaal Industries ORD	AVI	60	0.69	0.20	17.7	15.8	19	100
Illovo Sugar	ILV	60	0.46	0.24	19.4	18.6	6	100
Oceana Group	OCE	60	0.45	0.32	25.8	25.1	3	96
Pioneer Foods Group Ltd	PFG	60	0.47	0.25	20.0	19.2	6	100
RCL Foods Limited	RCL	60	0.22	0.25	19.4	19.1	1	96
Tongaat Hulett	TON	60	0.00	0.27	21.6	21.4	0	100
Forestry & Paper								
Sappi	SAP	60	0.63	0.29	24.1	22.8	9	100
General Industrials								
Barloworld	BAW	60	0.50	0.31	25.2	24.4	5	100
KAP Industrial Holdings Ltd	KAP	60	0.48	0.31	24.6	23.9	4	85
Nampak	NPK	60	0.69	0.24	20.1	18.4	14	100
General Retailers								
Curro Holdings Limited	COH	48	0.60	0.72	46.6	45.5	3	100
Massmart Holdings Ltd	MSM	60	1.06	0.26	24.0	20.4	27	100
The Foschini Group Ltd	TFG	60	1.15	0.32	29.0	25.1	24	100
Truworths International	TRU	60	1.09	0.28	25.5	21.8	26	100
Health Care Equipment & Services								
Life Healthcare Group Holdings	LHC	60	0.29	0.25	19.8	19.4	2	100
Industrial Transportation								
Grindrod	GND	60	0.81	0.27	23.4	21.3	16	100
Imperial Holdings	IPL	60	1.15	0.22	21.8	17.3	36	99
Super Group Ltd	SPG	60	0.23	0.32	25.2	24.9	0	98
Trencor Ltd	TRE	60	0.28	0.27	22.0	21.7	2	93
Life Insurance								
Liberty Holdings Limited Ord	LBH	60	0.66	0.19	16.5	14.8	19	100
Nonlife Insurance								
Santam	SNT	60	0.41	0.22	17.9	17.2	5	100
Pharmaceuticals & Biotechnology								
Adcock Ingram Holdings Ltd	AIP	60	0.57	0.25	20.2	19.0	9	100
Real Estate Investment & Services								
Attacq Limited	ATT	20	0.22	0.45	17.1	16.6	1	100
New Europe Property Investments Plc	NEP	60	0.24	0.18	13.8	13.5	3	86
Rockcastle Global Reals Estated Co Ltd	ROC	35	0.48	0.43	22.6	21.9	4	93

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EXHIBIT 5: FINDI Stocks vs Financial & Industrial Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Real Estate Investment Trusts								
Capital Property Fund	CPF	60	0.46	0.19	15.7	14.8	10	88
Fortress Inc Fund Ltd A	FFA	60	0.27	0.15	12.0	11.6	6	96
Fortress Inc Fund Ltd B	FFB	60	-0.07	0.44	31.6	31.1	1	76
Fountainhead Property Trust	FPT	60	0.45	0.18	15.0	14.1	10	100
Hyprop Investments Ltd	HYP	60	0.20	0.21	16.4	16.2	1	100
Redefine International PLC	RPL	20	0.67	0.61	24.8	22.8	12	100
Redefine Properties Ltd	RDF	60	0.47	0.18	14.9	13.9	11	100
Resilient Prop Inc Fund	RES	60	0.34	0.23	18.1	17.6	3	100
Vukile Property Fund	VKE	60	0.46	0.19	16.1	15.2	9	100
Software & Computer Services								
Datatec	DTC	60	0.89	0.26	22.5	19.9	21	100
EOH Holdings Ltd.	EOH	60	0.54	0.30	24.4	23.4	5	99
Travel & Leisure								
Sun International Ltd	SUI	60	0.43	0.24	19.4	18.7	5	100
Tsogo Sun Holdings Ltd	TSH	60	0.38	0.21	16.7	16.1	5	99
J202 Small Caps								
Automobiles & Parts								
Metair Investments Ord	MTA	60	0.50	0.31	25.0	24.2	5	93
Beverages								
Capevin Holdings Ltd	CVH	34	0.57	0.36	19.1	17.9	9	99
Chemicals								
African Oxygen Ltd	AFX	60	0.71	0.25	21.6	19.9	14	100
Construction & Materials								
Afrimat Ltd	AFT	60	0.09	0.28	22.4	22.2	0	98
Aveng	AEV	60	0.78	0.39	32.1	30.4	9	100
Group Five/South Africa	GRF	60	0.75	0.34	28.2	26.5	10	100
Murray & Roberts	MUR	60	0.58	0.34	27.6	26.6	6	97
Raubex Group	RBX	60	0.63	0.35	28.3	27.1	7	100
Wilson Bayly Holmes-Ovcon	WBO	60	0.60	0.25	20.7	19.5	10	100
Electronic & Electrical Equipment								
Allied Electronics Corp	AEL	60	0.42	0.29	23.5	22.9	3	98
Allied Electronics Corp N	AEN	60	0.51	0.27	22.3	21.4	6	100
Consolidated Infrastructure Group Ltd	CIL	57	0.74	0.32	23.3	21.8	10	89
Equity Investment Instruments								
Brimstone Investment Corp N	BRN	60	0.12	0.25	19.3	19.1	0	78
Niveus Investments Ltd	NIV	33	0.47	0.79	39.5	38.6	1	70
Pallinghurst Resources Guernsey Ltd	PGL	60	0.19	0.36	28.2	27.9	0	100
Financial Services								
Grande Parade	GPL	60	0.18	0.30	23.6	23.4	0	96
JSE	JSE	60	0.73	0.23	20.1	18.3	17	100
Peregrine Holdings	PGR	60	0.65	0.23	18.6	17.1	14	85
PSG Kinsult Limited	KST	12	-0.36	0.67	19.6	15.3	34	100
Transaction Capital Ltd	TCP	36	0.25	0.36	19.1	18.7	0	99
Trustco Group Holdings Limited	TTO	60	1.27	0.87	74.2	67.1	17	83
Food Producers								
Astral Foods Ltd	ARL	60	0.31	0.30	23.7	23.3	1	100
Clover Industries Ltd	CLR	54	0.66	0.32	22.6	21.4	9	100
Rhodes	RFV	8	0.45	2.41	41.6	38.9	0	100
General Industrials								
Mpact Ltd	MPT	47	0.43	0.29	18.5	17.8	4	100
General Retailers								
Advtech	ADH	60	0.22	0.26	19.5	19.2	0	78
Cashbuild Ltd	CSB	60	0.30	0.36	28.1	27.7	1	99
Holdsport Ltd	HSP	47	0.78	0.33	22.4	20.6	14	99
Lewis Group	LEW	60	1.05	0.30	26.5	23.1	22	100
Health Care Equipment & Services								
Afrocentric Investment Corp Ltd	ACT	60	0.14	0.41	32.4	32.1	0	92
Industrial Engineering								
Howden Africa Holdings	HWN	60	0.40	0.28	22.3	21.7	4	73
Hudaco Industries	HDC	60	0.44	0.28	22.8	22.1	4	99
Invicta Holdings	IVT	60	0.12	0.28	22.3	22.1	0	97
Industrial Metals & Mining								
Arcelor Mittal South Africa Ltd	ACL	60	0.76	0.47	38.3	36.7	7	100
Hulamin	HLM	60	-0.08	0.46	36.3	35.8	1	100

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EXHIBIT 5: FINDI Stocks vs Financial & Industrial Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Life Insurance								
Clientele	CLI	60	0.00	0.20	15.7	15.6	0	73
Media								
Caxton & CTP	CAT	60	0.18	0.31	24.2	24.0	0	88
Mobile Telecommunications								
Blue Label Telecoms Ltd.	BLU	60	0.79	0.36	30.0	28.1	10	100
Pharmaceuticals & Biotechnology								
Ascendis Health Ltd	ASC	19	0.43	0.88	32.5	31.5	1	99
Real Estate Investment & Services								
The Pivotal Fund Ltd	PIV	6	0.62	2.46	49.3	33.1	47	99
Real Estate Investment Trusts								
Accelerate Prop Fund Ltd	APF	18	0.18	0.63	23.3	22.6	1	89
Arrowhead Properties Ltd	AWA	42	0.59	0.22	13.6	12.3	16	100
Ascension Properties Ltd	AIB	36	0.56	0.32	17.0	15.9	9	72
Ascension Properties Ltd-A units	AIA	36	0.19	0.28	13.9	13.7	0	75
Delta Property Fund Ltd	DLT	31	0.77	0.26	15.3	12.9	27	97
Dipula Income Fund Ltd A	DIB	45	-0.03	0.48	29.0	28.5	2	57
Emira Property Fund Ltd	EMI	60	0.48	0.18	14.9	13.9	11	100
Hospitality Property A	HPA	60	0.22	0.26	20.9	20.7	1	86
Investec Australia Property	IAP	20	0.24	0.38	14.1	13.7	1	98
Investec Property Fund Limited	IPF	50	0.22	0.31	20.3	20.0	1	99
Octodec Invest Ltd	OCT	60	0.25	0.31	24.0	23.7	1	92
Rebosis Property Fund Lt	REB	49	0.47	0.23	15.8	14.9	8	95
SA Corp Real Estate Fund	SAC	60	0.35	0.19	15.2	14.6	5	100
Software & Computer Services								
Business Connexion Group Ltd	BCX	60	0.36	0.21	16.9	16.4	5	99
Support Services								
Adcorp Holdings Ltd	ADR	60	0.25	0.22	17.2	16.9	2	99
Mix Telematics Ltd	MIX	60	0.18	0.51	41.2	40.8	0	86
Net 1 Ueps Technologies Inc	NT1	60	0.36	0.66	54.3	53.8	0	65
Travel & Leisure								
City Lodge Hotels Ltd	CLH	60	0.66	0.23	19.7	18.1	14	100
Famous Brands	FBR	60	0.81	0.25	21.8	19.6	17	100
Spur Corp	SUR	60	0.34	0.32	25.0	24.6	2	98
J204 Fledging								
Banks								
Finbond Group Ltd	FGL	60	0.50	1.27	96.1	95.1	0	67
Construction & Materials								
Basil Read Holdings	BSR	60	0.22	0.52	41.0	40.7	0	100
Calgro M3 Holdings	CGR	60	0.38	0.77	60.1	59.6	1	76
Distribution and Warehousing Network	DAW	60	0.24	0.41	32.3	32.0	0	91
ESOR Limited	ESR	60	0.47	0.58	45.8	45.1	1	99
Masonite Africa	MAS	60	0.10	0.42	36.3	36.0	0	23
Mazor Group	MZR	60	0.63	0.37	29.6	28.4	6	60
Sephaku Holdings Ltd	SEP	60	0.66	0.57	44.5	43.3	4	80
Stefanutti Stocks Hld Ltd	SSK	60	0.12	0.38	30.1	29.9	0	100
Electronic & Electrical Equipment								
Amalgamated Electronics Corp	AER	60	0.15	0.37	30.7	30.5	0	70
ARB Holdings Ltd	ARH	60	0.50	0.30	24.5	23.6	4	88
Digicore Holdings	DGC	60	0.50	0.49	40.3	39.6	2	92
Ellies Holdings Ltd	ELI	60	0.86	0.56	46.0	43.8	8	98
Jasco Electronics Holdings	JSC	60	0.42	0.55	42.9	42.4	1	92
South Ocean Holdings	SOH	60	0.86	0.54	41.6	39.6	8	75
Equity Investment Instruments								
Sabvest	SBV	56	0.02	0.54	48.7	47.9	0	14
Sabvest Lmt N	SVN	60	0.34	0.54	44.4	43.9	3	16
Stellar Cap Partners Ltd	SCP	60	0.07	0.72	55.9	55.3	1	52
Trematon Capital Investments	TMT	60	0.09	0.30	23.4	23.2	1	35
Financial Services								
African Equity Emp Inv Ltd	AEE	60	0.49	0.95	75.9	75.0	1	53
Cadiz Holdings	CDZ	60	0.31	0.31	23.7	23.3	2	91
London Finance and Investment Group	LNF	60	-0.07	0.41	38.2	37.6	0	9
Prescient Limited	PCT	34	-0.02	0.55	27.6	27.0	2	93
Purple Group Ltd	PPE	60	0.43	0.69	54.0	53.4	0	79
Sasfin Holdings	SFN	60	0.22	0.26	20.7	20.4	0	90

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EXHIBIT 5: FINDI Stocks vs Financial & Industrial Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Food Producers								
Crookes Brothers	CKS	60	0.22	0.34	25.7	25.5	0	42
Quantum Foods Holdings Ltd	QFH	8	0.55	1.93	35.9	31.5	13	100
Sovereign Food Investments	SOV	60	0.34	0.36	28.4	28.0	1	82
General Industrials								
Argent Industrial Ltd	ART	60	0.21	0.30	23.6	23.3	1	97
Astrapak Limited	APK	60	0.37	0.35	27.9	27.5	2	82
Bowler Metcalf	BCF	60	0.18	0.23	18.3	18.1	1	86
Eqstra Holdings	EQS	60	0.24	0.43	34.5	34.2	0	100
Transpaco	TPC	60	0.07	0.20	15.3	15.2	0	67
General Retailers								
Combined Motor Hldgs Ltd	CMH	60	0.38	0.27	22.4	21.9	3	78
Iliad Africa	ILA	60	0.70	0.48	38.9	37.5	5	95
Nictus	NCS	60	0.19	0.63	56.5	56.1	0	25
REX Trueform Clothing Sco	RTN	56	0.33	1.87	74.3	72.8	0	12
Verimark Holdings	VMK	60	0.07	0.56	41.9	41.5	0	76
Industrial Engineering								
Bell Equipment Co	BEL	60	0.12	0.41	32.5	32.2	0	93
ENX Group Limited	ENX	60	-0.13	0.42	31.3	30.8	1	72
Master Drilling Group Ltd	MDI	30	-0.14	0.42	21.5	20.7	4	86
Industrial Transportation								
Cargo Carriers	CRG	60	0.19	0.37	28.8	28.5	0	22
OneLogix Group Ltd	OLG	60	0.40	0.44	35.1	34.5	1	93
Santova Limited	SNV	60	0.37	0.69	55.4	54.9	0	78
Value Group	VLE	60	0.44	0.31	23.9	23.3	3	84
Leisure Goods								
Nu-World Holdings	NWL	60	0.55	0.39	34.7	33.8	4	49
Media								
African Media Entertainment Ltd	AME	60	0.38	0.21	14.3	13.7	1	25
Nonlife Insurance								
Conduit Capital	CND	60	0.39	0.42	32.9	32.4	1	73
Real Estate Investment & Services								
Adrenna Prop Group Ltd	ANA	60	0.01	0.88	79.8	78.4	1	29
Freedom Prop Fund Ltd	FDP	12	0.52	2.70	63.8	59.3	7	94
Ingenuity Property Inv L	ING	60	0.24	0.28	26.3	26.0	2	38
Putprop Ltd	PPR	60	-0.06	0.21	20.1	19.9	1	39
Real Estate Investment Trusts								
Equities Prop Fund Ltd	EQU	12	0.62	1.02	23.9	21.4	13	63
Fairvest Property Hldgs	FVT	60	0.34	0.33	24.4	24.0	2	42
Safari Investments Ras Ltd	SAR	14	0.46	0.69	17.6	16.6	5	80
Synergy Income Fund Ltd	SGA	42	0.27	0.28	15.4	15.0	2	44
Texton Property Fund Ltd	TEX	46	0.50	0.30	19.7	18.9	6	71
Tower Property Fund Ltd	TWR	23	0.23	0.42	17.8	17.4	0	73
Software & Computer Services								
Adaptit Holdings Ltd	ADI	60	0.67	0.63	50.3	48.9	3	70
Cognition Holdings Ltd	CGN	60	0.33	0.41	35.3	34.9	1	75
Compu Clearing Outs Ltd	CCL	60	0.49	0.45	37.8	37.1	1	34
Datacentrix Holdings	DCT	60	0.15	0.38	29.6	29.4	0	96
Support Services								
ELB Group	ELR	60	0.62	0.33	24.7	23.6	7	67
Interwaste Holdings Ltd	IWE	60	0.83	0.45	36.8	34.9	9	78
Marshall Monteagle PLC	MMP	52	-0.30	0.41	32.5	31.4	4	37
Metrofile Holdings	MFL	60	-0.08	0.28	22.0	21.7	1	96
MORVEST Bus Group Ltd	MOR	51	-0.25	0.61	39.9	38.5	5	94
Primeserv Group	PMV	60	-0.24	0.85	63.6	61.0	6	30
Torre Industries Limited	TOR	31	-0.22	0.76	38.9	36.4	9	95
Winhold Limited	WNH	60	0.32	0.48	37.4	37.0	0	77
Technology Hardware & Equipment								
Mustek	MST	60	0.38	0.31	24.3	23.8	2	93
Pinnacle Holdings Limited	PNC	60	0.62	0.39	32.7	31.6	5	95
Travel & Leisure								
Comair	COM	60	0.16	0.43	33.9	33.7	0	89
Phumelela Gaming & Leisure	PHM	60	0.09	0.37	29.9	29.6	0	84
Taste Holdings	TAS	60	0.59	0.56	45.0	44.0	3	93
Wilderness Holdings Ltd	WIL	57	0.37	0.67	49.5	48.9	1	20

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EXHIBIT 5: FINDI Stocks vs Financial & Industrial Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Other								
Construction & Materials								
Kaydav Group Ltd	KDV	60	0.89	0.63	51.2	48.6	6	22
Equity Investment Instruments								
Brimstone Investment Corporation Ltd	BRT	60	0.08	0.26	19.7	19.5	0	46
Financial Services								
Efficient Group Ltd	EFG	45	0.34	1.41	65.5	64.8	0	23
Food & Drug Retailers								
Pick N Pay Holdings Limited	PWK	60	0.52	0.25	20.6	19.7	7	100
General Retailers								
African and Overseas Enterprises Limited	AOVP	29	-0.09	0.95	39.5	31.9	8	3
African and Overseas Enterprises Ltd	AON	58	0.21	0.54	50.5	50.0	0	9
Italtile Ltd	ITE	60	0.51	0.28	23.4	22.5	6	72
JD Group Limited	JDG	60	0.49	0.68	54.1	53.4	1	100
Nonlife Insurance								
Zurich Insurance Co SA	ZSA	60	0.00	0.17	14.2	14.1	0	19
Personal Goods								
Sardel Investment Corp	SER	60	0.69	0.67	51.7	50.3	4	50
Sardel Investment Corp N	SRN	60	0.66	0.69	60.2	58.7	3	35
Real Estate Investment & Services								
Mas Real Estate Inc.	MSP	60	-0.07	0.42	31.5	31.1	1	40
Orion Real Estate Ltd	ORE	60	0.84	0.94	70.1	67.2	5	26
Tradehold Limited	TDH	60	0.26	0.38	32.3	32.0	0	63
Real Estate Investment Trusts								
Hospitality Property B	HPB	60	0.72	0.58	45.9	44.4	5	88
Sycom Property Fund	SYC	60	0.82	0.32	27.8	25.7	13	92
Synergy Income Fund Ltd	SGA	42	0.27	0.28	15.4	15.0	2	44
Support Services								
MICROmega Holdings	MMG	60	0.67	1.14	93.2	91.5	4	52
Travel & Leisure								
Cullinan Holdings	CUL	60	0.27	0.71	58.7	58.2	0	35

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4.3 FTSE/JSE Resource Index (J258) as market proxy

EXHIBIT 6: FTSE/JSE Indices vs Resources Index

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Africa Headline Indices							
JSE All Share Index	J203	60	0.46	0.04	11.6	6.7	66
JSE Top 40 Index	J200	60	0.52	0.05	12.7	6.9	70
JSE Mid Cap Index	J201	60	0.16	0.06	9.4	8.7	12
JSE Small Cap Index	J202	60	0.13	0.05	7.6	7.1	11
JSE Fledgling Index	J204	60	0.13	0.05	7.8	7.2	12
Tradeable Indices							
JSE Resource 20 Index	J210	60	1.00	0.01	20.6	0.7	100
JSE Industrial 25 Index	J211	60	0.30	0.07	12.1	10.3	27
JSE Financial 15 Index	J212	60	0.24	0.08	13.0	11.9	14
JSE Financial and Industrial 30 Index	J213	60	0.29	0.07	11.8	10.1	26
Secondary Markets							
JSE Development Capital Index	J230	60	0.24	0.27	41.0	40.4	1
JSE Venture Capital Index	J231	60	0.13	0.56	85.5	84.8	0
JSE ALTX Index	J232	60	0.25	0.13	20.5	19.7	6
JSE ALTX 15 Index	J233	60	0.26	0.18	27.6	26.9	4
Specialist Indices							
JSE Socially Responsible Investment Index	J100	60	0.52	0.04	12.3	6.2	74
JSE SA Financials and Industrials Index	J250	60	0.25	0.06	10.6	9.2	23
JSE Preference Share Index	J251	60	0.04	0.04	6.8	6.7	1
JSE SA Listed Property Index	J253	60	-0.18	0.08	13.2	12.6	7
JSE Capped Property Index	J254	60	-0.09	0.07	10.7	10.5	3
JSE SA Industrials Index	J257	60	0.28	0.06	11.1	9.4	27
JSE SA Resources Index	J258	60	1.00	0.00	20.6	0.0	100
JSE Dividend+ Index	J259	60	0.27	0.07	11.4	9.9	23
JSE RAFI 40 Index	J260	60	0.53	0.04	12.7	6.5	73
Capped Indices							
JSE Capped Top 40 Index	J300	60	0.49	0.05	12.4	7.0	68
JSE Capped All Share Index	J303	60	0.45	0.04	11.4	6.7	65
Style Indices							
JSE Value Index	J330	60	0.41	0.05	11.6	7.8	54
JSE Growth Index	J331	60	0.48	0.05	12.4	7.6	62
Shareholder Weighted Indices							
JSE Shareholder Weighted Top 40 Index	J400	60	0.41	0.05	11.9	8.4	50
JSE Shareholder Weighted All Share Index	J403	60	0.35	0.05	10.6	7.8	46
Industry Indices							
JSE Oil & Gas Index	J500	60	0.31	0.31	48.2	47.4	2
JSE Basic Materials Index	J510	60	1.00	0.02	20.8	2.9	98
JSE Industrials Index	J520	60	0.20	0.07	11.5	10.7	13
JSE Consumer Goods Index	J530	60	0.35	0.08	14.8	12.8	24
JSE Health Care Index	J540	60	0.03	0.08	12.9	12.8	0
JSE Consumer Services Index	J550	60	0.26	0.10	16.3	15.3	11
JSE Telecommunication Index	J560	60	0.21	0.12	19.6	19.0	5
JSE Financials Index	J580	60	0.17	0.07	11.7	11.1	9
JSE Technology Index	J590	60	0.20	0.11	17.6	17.0	5

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EXHIBIT 6: FTSE/JSE Indices vs Resources Index (cont'd)

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Sector Indices							
JSE Oil & Gas Producers Index	J055	60	0.31	0.31	48.2	47.4	2
JSE Chemicals Index	J135	60	0.30	0.09	15.4	14.0	16
JSE Forestry & Paper Index	J173	60	0.46	0.12	20.8	18.3	21
JSE Industrial Metals Index	J175	60	0.83	0.11	24.6	17.6	49
JSE Mining Index	J177	60	1.06	0.02	21.9	2.7	98
JSE Construction & Materials Index	J235	60	0.21	0.13	19.6	19.0	5
JSE General Industrials Index	J272	60	0.22	0.08	12.5	11.6	13
JSE Electronic & Electrical Equipment Index	J273	60	0.24	0.10	15.5	14.5	11
JSE Industrial Engineering Index	J275	60	0.29	0.11	17.8	16.6	11
JSE Industrial Transportation Index	J277	60	0.17	0.11	16.7	16.1	5
JSE Support Services Index	J279	60	0.14	0.10	16.2	15.8	3
JSE Automobiles & Parts Index	J335	60	0.20	0.16	25.0	24.5	3
JSE Beverages Index	J353	60	0.25	0.09	14.7	13.7	13
JSE Food Producers Index	J357	60	0.06	0.09	13.4	13.2	1
JSE Household Goods Index	J372	60	0.48	0.13	21.8	19.3	20
JSE Personal Goods Index	J376	60	0.61	0.16	27.6	24.4	21
JSE Health Care Equipment & Services Index	J453	60	0.07	0.09	13.5	13.3	1
JSE Pharmaceuticals & Biotechnology Index	J457	60	-0.02	0.12	18.6	18.4	0
JSE Food & Drug Retailers Index	J533	60	-0.02	0.13	20.4	20.2	0
JSE General Retailers Index	J537	60	0.21	0.12	19.5	18.9	5
JSE Media Index	J555	60	0.96	0.29	48.8	44.3	16
JSE Travel & Leisure Index	J575	60	0.17	0.09	14.3	13.8	6
JSE Fixed Line Telecommunications Index	J653	60	0.51	0.19	31.2	29.2	11
JSE Mobile Telecommunications Index	J657	60	0.21	0.13	20.1	19.5	5
JSE Banks Index	J835	60	0.17	0.10	16.3	15.7	5
JSE Nonlife Insurance Index	J853	60	0.08	0.12	17.9	17.7	0
JSE Life Insurance Index	J857	60	0.29	0.09	14.4	13.0	16
JSE General Financial Index	J877	60	0.28	0.08	13.6	12.2	18
JSE Equity Investment Instruments Index	J898	60	0.24	0.08	13.0	11.9	13
JSE Software & Computer Services Index	J953	60	0.20	0.11	17.7	17.1	5
Sub Sector Indices							
JSE Gold Mining Index	J150	60	0.81	0.22	37.3	33.0	20
JSE Coal Mining Index	J151	60	0.75	0.13	25.0	19.4	39
JSE Platinum Mining Index	J153	60	0.93	0.10	24.4	15.0	63
JSE General Mining Index	J154	60	1.15	0.04	24.5	6.4	93

Sources: JSE; BNP Paribas Securities South Africa

EXHIBIT 7: Resource Stocks vs Resource Index

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J200 Large Caps								
Chemicals								
Sasol	SOL	60	0.71	0.10	21.3	15.4	47	100
Forestry & Paper								
Mondi Limited	MND	60	0.48	0.14	23.7	21.4	17	100
Mondi Plc	MNP	60	0.54	0.14	24.1	21.3	20	100
Industrial Metals & Mining								
Kumba Iron Ore	KIO	60	0.85	0.14	28.2	21.7	40	100
Mining								
Anglo American	AGL	60	1.18	0.08	27.2	12.0	80	100
Anglo American Platinum	AMS	60	0.83	0.14	27.2	20.9	41	100
Anglogold Ashanti Ltd	ANG	60	0.96	0.24	41.9	36.2	24	100
BHP Billiton	BIL	60	1.14	0.06	25.3	9.1	87	100
J201 Mid Caps								
Chemicals								
AECI	AFE	60	0.20	0.11	17.2	16.6	5	100
Omnia Holdings Ltd	OMN	60	0.31	0.11	17.7	16.3	13	100
Forestry & Paper								
Sappi	SAP	60	0.26	0.15	24.1	23.3	5	100
Mining								
African Rainbow Minerals Ltd	ARI	60	1.05	0.11	27.7	16.8	63	100
Assore Limited	ASR	60	1.05	0.18	35.5	27.4	40	99
Exxaro Resources	EXX	60	0.87	0.13	26.7	19.5	46	100
Gold Fields	GFI	60	0.48	0.25	39.1	37.5	6	100
Impala Platinum Hlds	IMP	60	0.87	0.14	28.1	21.2	42	100
Lonmin PLC	LON	60	1.25	0.18	38.7	27.9	48	100
Northam Platinum	NHM	60	0.96	0.17	33.5	26.4	37	100
Royal Bafokeng Platinum	RBP	55	0.64	0.13	23.1	18.9	32	100
Sibanye Gold Limited	SGL	28	1.30	0.46	63.6	50.5	34	100
J202 Small Caps								
Chemicals								
African Oxygen Ltd	AFX	60	0.20	0.14	21.6	21.0	3	100
Industrial Metals & Mining								
Arcelor Mittal South Africa Ltd	ACL	60	0.94	0.21	38.3	32.3	28	100
Hulamin	HLM	60	0.10	0.24	36.3	36.0	0	100
Mining								
Aquarius Platinum Ltd	AQP	60	0.92	0.27	46.3	41.4	19	99
Harmony	HAR	60	0.81	0.30	49.2	45.5	13	100
Merafe Resources	MRF	60	0.55	0.19	31.2	28.8	14	100
Pan African Resources Plc	PAN	60	0.77	0.20	35.0	30.7	22	100

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EXHIBIT 7: Resource Stocks vs Resource Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J204 Fledging								
Chemicals								
Delta EMD Ltd	DTA	60	0.14	0.23	35.2	34.8	0	74
Rolfes Technology Hldgs	RLF	60	0.25	0.25	38.2	37.6	1	81
Spanjaard	SPA	60	-0.28	0.25	36.2	35.2	4	18
Forestry & Paper								
York Timber Holdings Ltd	YRK	60	0.16	0.19	29.2	28.8	1	85
Industrial Metals & Mining								
Insimbi Ref & Alloy	ISB	60	0.24	0.25	38.6	38.0	2	54
Metmar	MML	60	0.38	0.26	40.4	39.3	4	94
ZCI Ltd	ZCI	60	-0.78	0.59	99.5	93.5	11	17
Mining								
Atlatsa Resources Corp	ATL	60	0.75	0.35	56.8	53.9	9	82
Bauba Platinum Ltd	BAU	59	0.52	0.38	64.7	63.3	3	54
BuildMax Limited	BDM	60	0.43	0.29	45.5	44.3	4	86
Coal of Africa Ltd	CZA	60	0.56	0.56	85.6	83.9	2	100
DRD Gold	DRD	60	0.82	0.29	47.9	44.0	14	100
Goliath Gold Mining Limited	GGM	60	-0.33	0.27	41.1	39.9	4	46
Keaton Energy Holdings Ltd	KEH	60	0.37	0.26	40.8	39.7	3	95
Petmin Ltd.	PET	60	0.43	0.20	32.6	31.1	7	100
Randgold & Exploray Company Ltd	RNG	60	0.53	0.42	58.3	56.9	3	76
Sable Metals and Min Ltd	SMM	30	-0.29	0.53	63.7	60.9	7	51
Sentula Mining	SNU	60	-0.04	0.30	46.4	46.0	0	98
Trans HEX Group	TSX	60	-0.24	0.21	32.9	32.1	3	98
Wescoal Holdings Limited	WSL	60	0.03	0.26	40.4	40.0	0	99
Wesizwe Platinum	WEZ	60	0.93	0.38	61.3	57.0	12	100
Oil & Gas Producers								
Sacoil Holdings Ltd	SCL	60	0.92	0.61	91.7	87.8	6	88
Other								
Mining								
Eastern Platinum Ltd	EPS	60	0.48	0.49	78.0	76.7	2	95
Infrasors Holdings	IRA	60	0.23	0.23	37.2	36.6	1	68
Rockwell Diamonds Incor	RDI	60	0.01	0.61	80.7	79.9	1	35
Tawana Resources NL	TAW	60	0.61	0.85	127.0	124.9	1	34
Oil & Gas Producers								
Oando Plc	OAQ	60	0.84	0.54	83.4	80.1	6	73

Note: The table is sorted according to size classification and sector classification.
Sources: JSE; BNP Paribas Securities South Africa

4.4 FTSE/JSE Top40 (J200) as market proxy

EXHIBIT 8: FTSE/JSE Indices vs Top 40 Index

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Africa Headline Indices							
JSE All Share Index	J203	60	0.90	0.01	11.6	1.2	99
JSE Top 40 Index	J200	60	1.00	0.00	12.7	0.0	100
JSE Mid Cap Index	J201	60	0.43	0.08	9.4	7.5	34
JSE Small Cap Index	J202	60	0.32	0.07	7.6	6.4	29
JSE Fledgling Index	J204	60	0.21	0.08	7.8	7.2	12
Tradeable Indices							
JSE Resource 20 Index	J210	60	1.36	0.12	20.6	11.1	70
JSE Industrial 25 Index	J211	60	0.84	0.06	12.1	5.8	77
JSE Financial 15 Index	J212	60	0.73	0.10	13.0	8.9	51
JSE Financial and Industrial 30 Index	J213	60	0.82	0.06	11.8	5.4	79
Secondary Markets							
JSE Development Capital Index	J230	60	0.39	0.43	41.0	40.3	1
JSE Venture Capital Index	J231	60	0.13	0.90	85.5	84.8	0
JSE ALTX Index	J232	60	0.36	0.21	20.5	19.9	5
JSE ALTX 15 Index	J233	60	0.18	0.29	27.6	27.3	1
Specialist Indices							
JSE Socially Responsible Investment Index	J100	60	0.95	0.03	12.3	2.5	95
JSE SA Financials and Industrials Index	J250	60	0.72	0.06	10.6	5.2	75
JSE Preference Share Index	J251	60	0.07	0.07	6.8	6.7	2
JSE SA Listed Property Index	J253	60	0.03	0.14	13.2	13.1	0
JSE Capped Property Index	J254	60	0.14	0.11	10.7	10.5	3
JSE SA Industrials Index	J257	60	0.77	0.06	11.1	5.2	78
JSE SA Resources Index	J258	60	1.35	0.12	20.6	11.1	70
JSE Dividend+ Index	J259	60	0.64	0.08	11.4	7.8	52
JSE RAFI 40 Index	J260	60	0.97	0.03	12.7	2.9	94
Capped Indices							
JSE Capped Top 40 Index	J300	60	0.97	0.01	12.4	0.6	100
JSE Capped All Share Index	J303	60	0.89	0.01	11.4	1.2	99
Style Indices							
JSE Value Index	J330	60	0.81	0.06	11.6	5.3	79
JSE Growth Index	J331	60	0.95	0.03	12.4	2.7	95
Shareholder Weighted Indices							
JSE Shareholder Weighted Top 40 Index	J400	60	0.90	0.03	11.9	3.3	92
JSE Shareholder Weighted All Share Index	J403	60	0.79	0.04	10.6	3.5	89
Industry Indices							
JSE Oil & Gas Index	J500	60	0.69	0.49	48.2	47.0	4
JSE Basic Materials Index	J510	60	1.37	0.12	20.8	11.4	69
JSE Industrials Index	J520	60	0.58	0.09	11.5	8.8	41
JSE Consumer Goods Index	J530	60	0.85	0.11	14.8	10.0	53
JSE Health Care Index	J540	60	0.35	0.13	12.9	12.0	12
JSE Consumer Services Index	J550	60	0.85	0.13	16.3	12.1	44
JSE Telecommunication Index	J560	60	0.73	0.18	19.6	17.2	22
JSE Financials Index	J580	60	0.60	0.09	11.7	8.8	43
JSE Technology Index	J590	60	0.55	0.17	17.6	16.0	16

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EXHIBIT 8: FTSE/JSE Indices vs Top 40 Index (cont'd)

Index	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)
Sector Indices							
JSE Oil & Gas Producers Index	J055	60	0.69	0.49	48.2	47.0	4
JSE Chemicals Index	J135	60	0.58	0.14	15.4	13.4	23
JSE Forestry & Paper Index	J173	60	0.90	0.18	20.8	17.2	30
JSE Industrial Metals Index	J175	60	1.10	0.21	24.6	20.0	33
JSE Mining Index	J177	60	1.41	0.13	21.9	12.5	67
JSE Construction & Materials Index	J235	60	0.36	0.20	19.6	18.9	6
JSE General Industrials Index	J272	60	0.65	0.10	12.5	9.4	43
JSE Electronic & Electrical Equipment Index	J273	60	0.40	0.15	15.5	14.5	11
JSE Industrial Engineering Index	J275	60	0.37	0.18	17.8	17.0	7
JSE Industrial Transportation Index	J277	60	0.63	0.15	16.7	14.5	23
JSE Support Services Index	J279	60	0.44	0.16	16.2	15.1	12
JSE Automobiles & Parts Index	J335	60	0.35	0.26	25.0	24.4	3
JSE Beverages Index	J353	60	0.65	0.13	14.7	12.0	32
JSE Food Producers Index	J357	60	0.30	0.14	13.4	12.7	8
JSE Household Goods Index	J372	60	0.99	0.19	21.8	17.6	34
JSE Personal Goods Index	J376	60	1.37	0.22	27.6	21.1	40
JSE Health Care Equipment & Services Index	J453	60	0.33	0.13	13.5	12.7	10
JSE Pharmaceuticals & Biotechnology Index	J457	60	0.33	0.19	18.6	18.0	5
JSE Food & Drug Retailers Index	J533	60	0.33	0.21	20.4	19.8	4
JSE General Retailers Index	J537	60	0.78	0.18	19.5	16.7	26
JSE Media Index	J555	60	1.35	0.48	48.8	45.3	13
JSE Travel & Leisure Index	J575	60	0.37	0.14	14.3	13.4	11
JSE Fixed Line Telecommunications Index	J653	60	0.81	0.31	31.2	29.2	11
JSE Mobile Telecommunications Index	J657	60	0.72	0.19	20.1	17.7	21
JSE Banks Index	J835	60	0.69	0.14	16.3	13.5	30
JSE Nonlife Insurance Index	J853	60	0.21	0.19	17.9	17.5	2
JSE Life Insurance Index	J857	60	0.77	0.11	14.4	10.4	46
JSE General Financial Index	J877	60	0.68	0.11	13.6	10.4	41
JSE Equity Investment Instruments Index	J898	60	0.61	0.11	13.0	10.4	34
JSE Software & Computer Services Index	J953	60	0.56	0.17	17.7	16.1	16
Sub Sector Indices							
JSE Gold Mining Index	J150	60	0.72	0.38	37.3	35.8	6
JSE Coal Mining Index	J151	60	0.88	0.23	25.0	22.2	20
JSE Platinum Mining Index	J153	60	1.30	0.19	24.4	17.8	47
JSE General Mining Index	J154	60	1.59	0.14	24.5	13.6	69

Sources: JSE; BNP Paribas Securities South Africa

EXHIBIT 9: ALSI Stocks vs Top 40 Index

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J200 Large Caps								
Banks								
Barclays Africa Group Limited	BGA	60	0.76	0.18	20.2	17.4	25	100
Capitec Bank Hldgs Ltd	CPI	60	0.11	0.31	29.4	29.2	0	100
Firststrand Limited	FSR	60	0.76	0.16	18.3	15.2	30	100
Nedbank Group.	NED	60	0.56	0.16	16.7	14.9	19	100
RMB Holdings	RMH	60	0.78	0.17	18.9	15.7	30	100
Standard Bank Group	SBK	60	0.65	0.17	17.9	15.6	23	100
Beverages								
SABMiller	SAB	60	0.65	0.13	14.8	12.1	32	100
Chemicals								
Sasol	SOL	60	1.05	0.17	21.3	15.9	43	100
Equity Investment Instruments								
Rand Merchant Insurance Holdings Ltd	RMI	51	0.61	0.21	19.1	17.3	16	100
Reinet Investments SCA	REI	60	0.67	0.15	16.8	14.3	26	100
Financial Services								
Brait SA	BAT	60	0.00	0.29	27.7	27.4	0	100
Investec Ltd	INL	60	1.10	0.15	20.4	14.1	51	100
Investec PLC	INP	60	1.09	0.15	20.3	14.2	51	100
Food & Drug Retailers								
Shoprite	SHP	60	0.34	0.26	25.0	24.5	2	99
Food Producers								
Tiger Brands	TBS	60	0.50	0.22	21.7	20.6	9	100
Forestry & Paper								
Mondi Limited	MND	60	0.86	0.22	23.7	20.4	24	100
Mondi Plc	MNP	60	0.95	0.22	24.1	20.1	29	100
General Industrials								
Bidvest Group	BVT	60	0.62	0.13	15.1	12.6	28	100
Remgro	REM	60	0.74	0.13	15.5	12.1	39	100
General Retailers								
Mr Price Group	MPC	60	0.67	0.24	24.8	23.0	13	100
Woolworths Holdings	WHL	60	0.88	0.22	24.5	21.1	24	100
Health Care Equipment & Services								
Medi-Clinicrp	MDC	60	0.49	0.20	19.9	18.8	10	100
Netcare	NTC	60	0.55	0.16	16.8	15.1	18	100
Household Goods & Home Construction								
Steinhoff International Holdings	SHF	60	0.94	0.19	21.7	17.5	34	100
Industrial Metals & Mining								
Kumba Iron Ore	KIO	60	1.08	0.25	28.2	23.5	30	100
Life Insurance								
Discovery Holdings	DSY	60	0.37	0.17	16.7	16.0	7	100
MMI Holdings Ltd	MMI	60	0.66	0.18	19.1	16.9	20	100
Old Mutual Plc	OML	60	0.81	0.18	19.8	16.5	29	100
Sanlam	SLM	60	0.82	0.15	17.8	14.1	36	99
Media								
Naspers	NPN	60	1.17	0.22	26.5	20.6	39	100
Mining								
Anglo American	AGL	60	1.33	0.21	27.2	19.7	47	100
Anglo American Platinum	AMS	60	0.90	0.25	27.2	23.9	22	100
Anglogold Ashanti Ltd	ANG	60	0.72	0.43	41.9	40.1	7	100
BHP Billiton	BIL	60	1.63	0.14	25.3	12.8	74	100
Mobile Telecommunications								
MTN Group	MTN	60	0.69	0.20	21.4	19.1	19	100
Vodacom Group Ltd	VOD	60	0.76	0.19	20.9	18.2	24	100
Personal Goods								
Compagnie Financiere Richemont AG	CFR	60	1.24	0.22	27.6	21.2	41	100
Pharmaceuticals & Biotechnology								
Aspen Pharmacare Holdings Ltd	APN	60	0.34	0.22	21.6	21.1	3	100
Real Estate Investment & Services								
Capital & Countries Properties	CCO	60	0.21	0.20	19.1	18.8	1	100
Real Estate Investment Trusts								
Growthpoint Prop Ltd	GRT	60	0.18	0.19	17.7	17.5	1	100
Intu Properties Plc	ITU	60	0.73	0.16	17.9	15.0	28	98
Tobacco								
British American Tobacco PLC	BTI	60	0.42	0.15	14.8	13.7	12	100

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EXHIBIT 9: ALSI Stocks vs Top 40 Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
J201 Mid Caps								
Beverages								
Distell Group Limited	DST	60	0.40	0.21	20.0	19.2	6	98
Chemicals								
AECI	AFE	60	0.44	0.17	17.2	16.2	10	100
Omnia Holdings Ltd	OMN	60	0.48	0.18	17.7	16.4	11	100
Construction & Materials								
PPC Limited	PPC	60	0.28	0.28	26.4	26.1	1	100
Electronic & Electrical Equipment								
Reunert	RLO	60	0.30	0.19	18.4	17.9	4	100
Equity Investment Instruments								
Hosken Cons Invest	HCI	60	0.39	0.17	17.3	16.4	8	98
Financial Services								
Alexander Forbes Group Holdings	AFH	11	0.66	0.96	26.8	23.1	18	100
Coronation Fund Managers	CML	60	0.74	0.23	24.1	21.7	17	100
PSG Group	PSG	60	0.45	0.29	28.3	27.5	4	100
Zeder Investments	ZED	60	0.43	0.22	21.2	20.3	7	100
Fixed Line Telecommunications								
Telkom	TKG	60	0.73	0.31	31.2	29.2	11	100
Food & Drug Retailers								
Clicks Group Ltd	CLS	60	0.56	0.22	22.3	20.9	11	100
Pick N Pay Stores	PIK	60	0.45	0.23	22.2	21.3	6	100
The Spar Group	SPP	60	0.33	0.21	20.5	20.0	3	100
Food Producers								
AngloVaal Industries ORD	AVI	60	0.33	0.18	17.7	17.1	5	100
Illovo Sugar	ILV	60	0.45	0.19	19.4	18.4	8	100
Oceana Group	OCE	60	0.32	0.27	25.8	25.3	2	96
Pioneer Foods Group Ltd	PFG	60	0.30	0.21	20.0	19.6	3	100
RCL Foods Limited	RCL	60	0.09	0.20	19.4	19.2	0	96
Tongaat Hulett	TON	60	-0.06	0.23	21.6	21.3	1	100
Forestry & Paper								
Sappi	SAP	60	0.52	0.24	24.1	22.9	8	100
General Industrials								
Barloworld	BAW	60	0.54	0.25	25.2	24.0	8	100
KAP Industrial Holdings Ltd	KAP	60	0.41	0.26	24.6	23.9	4	85
Nampak	NPK	60	0.51	0.20	20.1	18.8	10	100
General Retailers								
Curro Holdings Limited	COH	48	0.43	0.57	46.6	45.9	1	100
Massmart Holdings Ltd	MSM	60	0.80	0.23	24.0	21.3	20	100
The Foschini Group Ltd	TFG	60	0.67	0.29	29.0	27.3	10	100
Truworths International	TRU	60	0.71	0.25	25.5	23.4	14	100
Health Care Equipment & Services								
Life Healthcare Group Holdings	LHC	60	0.02	0.21	19.8	19.6	0	100
Industrial Transportation								
Grindrod	GND	60	0.57	0.23	23.4	22.0	10	100
Imperial Holdings	IPL	60	0.69	0.21	21.8	19.6	18	99
Super Group Ltd	SPG	60	0.09	0.27	25.2	25.0	0	98
Trencor Ltd	TRE	60	0.20	0.22	22.0	21.7	1	93
Life Insurance								
Liberty Holdings Limited Ord	LBH	60	0.50	0.16	16.5	15.1	15	100
Mining								
African Rainbow Minerals Ltd	ARI	60	1.19	0.23	27.7	21.9	37	100
Assore Limited	ASR	60	1.26	0.31	35.5	29.5	30	99
Exxaro Resources	EXX	60	1.06	0.23	26.7	22.0	31	100
Gold Fields	GFI	60	0.41	0.41	39.1	38.5	1	100
Impala Platinum Hlds	IMP	60	1.20	0.24	28.1	22.3	37	100
Lonmin PLC	LON	60	1.48	0.32	38.7	30.7	37	100
Northam Platinum	NHM	60	1.23	0.30	33.5	27.7	30	100
Royal Bafokeng Platinum	RBP	55	0.82	0.24	23.1	20.4	21	100
Sibanye Gold Limited	SGL	28	1.02	0.93	63.6	54.2	25	100
Nonlife Insurance								
Santam	SNT	60	0.24	0.19	17.9	17.5	2	100
Pharmaceuticals & Biotechnology								
Adcock Ingram Holdings Ltd	AIP	60	0.58	0.20	20.2	18.5	14	100

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EXHIBIT 9: ALSI Stocks vs Top 40 Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Real Estate Investment & Services								
Attacq Limited	ATT	20	0.04	0.45	17.1	16.5	3	100
New Europe Property Investments Plc	NEP	60	0.18	0.15	13.8	13.5	2	86
Rockcastle Global Reals Estatico Co Ltd	ROC	35	0.32	0.36	22.6	22.2	1	93
Real Estate Investment Trusts								
Capital Property Fund	CPF	60	0.08	0.17	15.7	15.5	0	88
Fortress Inc Fund Ltd A	FFA	60	0.07	0.13	12.0	11.9	0	96
Fortress Inc Fund Ltd B	FFB	60	0.04	0.35	31.6	31.3	0	76
Fountainhead Property Trust	FPT	60	0.10	0.16	15.0	14.9	0	100
Hyprop Investments Ltd	HYP	60	-0.19	0.17	16.4	15.9	4	100
Redefine International PLC	RPL	20	0.55	0.65	24.8	23.5	6	100
Redefine Properties Ltd	RDF	60	0.05	0.16	14.9	14.7	0	100
Resilient Prop Inc Fund	RES	60	-0.11	0.19	18.1	17.8	1	100
Vukile Property Fund	VKE	60	0.03	0.17	16.1	16.0	0	100
Software & Computer Services								
Datatec	DTC	60	0.72	0.22	22.5	20.2	18	100
EOH Holdings Ltd.	EOH	60	0.37	0.26	24.4	23.8	2	99
Travel & Leisure								
Sun International Ltd	SUI	60	0.37	0.20	19.4	18.7	6	100
Tsogo Sun Holdings Ltd	TSH	60	0.18	0.18	16.7	16.5	1	99
J202 Small Caps								
Automobiles & Parts								
Metair Investments Ord	MTA	60	0.38	0.26	25.0	24.4	3	93
Beverages								
Capevin Holdings Ltd	CVH	34	0.35	0.29	19.1	18.5	3	99
Chemicals								
African Oxygen Ltd	AFX	60	0.54	0.21	21.6	20.2	11	100
Construction & Materials								
Afrimat Ltd	AFT	60	0.19	0.23	22.4	22.2	1	98
Aveng	AEG	60	0.62	0.32	32.1	30.7	7	100
Group Five/South Africa	GRF	60	0.62	0.29	28.2	26.7	9	100
Murray & Roberts	MUR	60	0.32	0.29	27.6	27.1	1	97
Raubex Group	RBX	60	0.63	0.28	28.3	26.8	9	100
Wilson Bayly Holmes-Ovcon	WBO	60	0.41	0.21	20.7	19.9	6	100
Electronic & Electrical Equipment								
Allied Electronics Corp	AEL	60	0.43	0.24	23.5	22.7	5	98
Allied Electronics Corp N	AEN	60	0.63	0.22	22.3	20.5	14	100
Consolidated Infrastructure Group Ltd	CIL	57	0.61	0.26	23.3	21.8	10	89
Equity Investment Instruments								
Brimstone Investment Corp N	BRN	60	-0.07	0.21	19.3	19.0	0	78
Niveus Investments Ltd	NIV	33	0.54	0.62	39.5	38.3	3	70
Pallinghurst Resources Guernsey Ltd	PGL	60	0.27	0.30	28.2	27.8	1	100
Financial Services								
Grande Parade	GPL	60	0.10	0.25	23.6	23.4	0	96
JSE	JSE	60	0.55	0.20	20.1	18.7	13	100
Peregrine Holdings	PGR	60	0.54	0.19	18.6	17.2	12	85
PSG Kinsult Limited	KST	12	0.02	0.69	19.6	17.5	14	100
Transaction Capital Ltd	TCP	36	-0.03	0.30	19.1	18.7	1	99
Trustco Group Holdings Limited	TTO	60	1.30	0.71	74.2	65.5	20	83
Food Producers								
Astral Foods Ltd	ARL	60	0.06	0.25	23.7	23.5	0	100
Clover Industries Ltd	CLR	54	0.47	0.26	22.6	21.7	6	100
Rhodes	RFG	8	0.38	1.89	41.6	37.7	6	100
General Industrials								
Mpact Ltd	MPT	47	0.14	0.23	18.5	18.3	0	100
General Retailers								
Advtech	ADH	60	0.19	0.21	19.5	19.2	0	78
Cashbuild Ltd	CSB	60	0.09	0.30	28.1	27.9	0	99
Holdsport Ltd	HSP	47	0.39	0.27	22.4	21.8	4	99
Lewis Group	LEW	60	0.65	0.26	26.5	24.8	11	100
Health Care Equipment & Services								
Afrocentric Investment Corp Ltd	ACT	60	0.21	0.34	32.4	32.1	0	92
Industrial Engineering								
Howden Africa Holdings	HWN	60	0.29	0.24	22.3	21.9	3	73
Hudaco Industries	HDC	60	0.54	0.23	22.8	21.6	9	99
Invicta Holdings	IVT	60	0.17	0.23	22.3	22.1	0	97

(continued on next page)

EXHIBIT 9: ALSI Stocks vs Top 40 Index (cont'd)

Security	Code	No. of Months	Beta	Std Error (β)	Total risk (Ann %)	Unique Risk (Ann %)	R ² (%)	% Days Traded
Industrial Metals & Mining								
Arcelor Mittal South Africa Ltd	ACL	60	1.00	0.37	38.3	34.6	17	100
Hulamin	HLM	60	0.04	0.38	36.3	36.0	0	100
Life Insurance								
Clientele	CLI	60	0.04	0.17	15.7	15.6	0	73
Media								
Caxton & CTP	CAT	60	0.24	0.25	24.2	23.9	1	88
Mining								
Aquarius Platinum Ltd	AQP	60	0.95	0.46	46.3	43.1	12	99
Harmony	HAR	60	0.62	0.51	49.2	47.9	4	100
Merafe Resources	MRF	60	0.65	0.31	31.2	29.6	9	100
Pan African Resources Plc	PAN	60	0.86	0.34	35.0	32.3	13	100
Mobile Telecommunications								
Blue Label Telecoms Ltd.	BLU	60	0.64	0.30	30.0	28.4	8	100
Pharmaceuticals & Biotechnology								
Ascendis Health Ltd	ASC	19	0.49	0.90	32.5	31.4	2	99
Real Estate Investment & Services								
The Pivotal Fund Ltd	PIV	6	0.62	2.11	49.3	34.7	42	99
Real Estate Investment Trusts								
Accelerate Prop Fund Ltd	APF	18	-0.03	0.63	23.3	21.6	10	89
Arrowhead Properties Ltd	AWA	42	0.12	0.20	13.6	13.4	0	100
Ascension Properties Ltd	AIB	36	0.43	0.27	17.0	16.2	6	72
Ascension Properties Ltd-A units	AIA	36	0.05	0.21	13.9	13.7	0	75
Delta Property Fund Ltd	DLT	31	0.33	0.24	15.3	14.6	6	97
Dipula Income Fund Ltd A	DIB	45	-0.24	0.39	29.0	27.8	7	57
Emira Property Fund Ltd	EMI	60	0.12	0.16	14.9	14.8	1	100
Hospitality Property A	HPA	60	0.08	0.22	20.9	20.8	0	86
Investec Australia Property	IAP	20	0.29	0.38	14.1	13.6	1	98
Investec Property Fund Limited	IPF	50	-0.16	0.24	20.3	19.8	3	99
Octodec Invest Ltd	OCT	60	-0.21	0.25	24.0	23.4	4	92
Rebosis Property Fund Lt	REB	49	0.10	0.19	15.8	15.6	0	95
SA Corp Real Estate Fund	SAC	60	0.07	0.16	15.2	15.0	0	100
Software & Computer Services								
Business Connexion Group Ltd	BCX	60	0.32	0.17	16.9	16.3	5	99
Support Services								
Adcorp Holdings Ltd	ADR	60	0.29	0.18	17.2	16.7	4	99
Mix Telematics Ltd	MIX	60	0.32	0.43	41.2	40.7	1	86
Net 1 Ueps Technologies Inc	NT1	60	0.45	0.56	54.3	53.6	1	65
Travel & Leisure								
City Lodge Hotels Ltd	CLH	60	0.40	0.20	19.7	18.9	6	100
Famous Brands	FBR	60	0.52	0.22	21.8	20.6	9	100
Spur Corp	SUR	60	0.35	0.26	25.0	24.4	3	98

Note: The table is sorted according to size classification and sector classification.

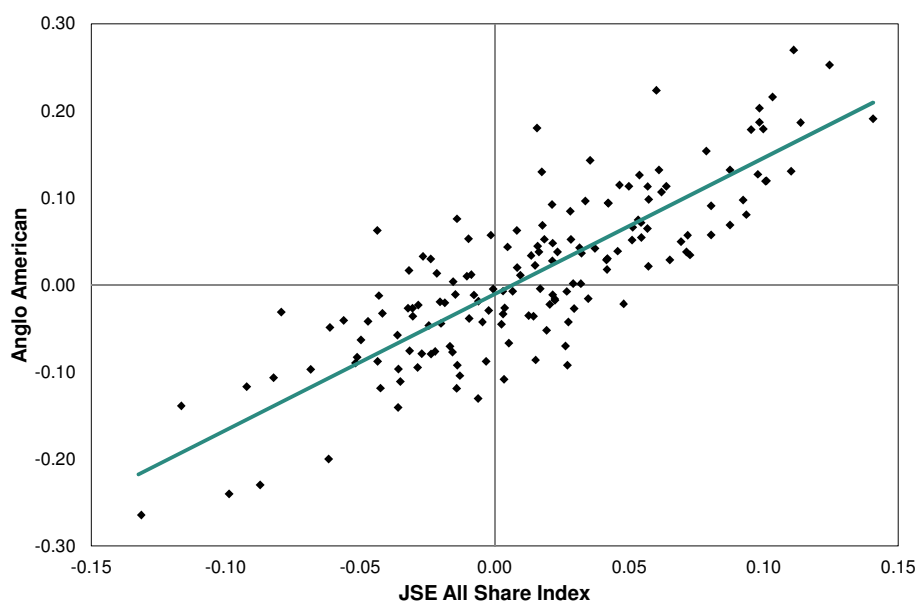
Sources: JSE; BNP Paribas Securities South Africa

5. Questions and answers

How do you compute beta?

We compute monthly returns for each share and the corresponding returns on the JSE/FTSE All Share Index. If, however, a share has not been traded at the month-end, we go back to the last day of trade and match the index to it in our return computation. If you were to plot these points with the index's returns on the horizontal axis and the share's returns on the vertical axis (as shown below), beta would be the slope of the line that best fits these points. We have illustrated this in Exhibit 10 using Anglo American.

EXHIBIT 10: Anglo American beta



Sources: I-Net Bridge; BNP Paribas Securities South Africa

Could I estimate beta on my own?

There is no reason why not. You would, however, need a time series of both the share returns as well as the market index returns. Be careful though, as there are some tricks which can make all the difference between good and bad estimates. We have implemented techniques that will improve beta estimation, especially for thinly-traded shares. We want you to use our service and therefore it is important to us that you have confidence in our estimates.

What estimation periods do you use?

We use the last five years of monthly returns, which is the last 60 data points. Research has shown that the trade-off between the desire to include more data points and concerns about the stationarity of beta point to five years of data as being most suitable. We also know that using daily or even weekly prices to maximise the number of data points is futile as it introduces considerable noise (error) that can bias our estimates.

In our sector listing, you will find some of the new companies which have less than 60 data points used in the estimation procedure. We advise you to use the betas of these companies with caution, especially if there are less than about 40 data points indicated in the column headed 'No. of months'. We only include betas of shares and sectors which have been listed for at least five months.

Are betas stable, or do they change?

Betas do change! The major causes for the changes in a company's beta are linked to a shift in the debt-to-equity ratio of a company or a shift in the risk of the projects that the company takes on.

Do betas differ in bull and bear markets?

It would be nice if they did, unfortunately our research suggests that they don't. However, we would be interested to know if you find a company with a beta that does!

I knew of a share with a high beta, but it declined while the market was rising

We could probably find many shares that did likewise. This occurrence is simply due to the fact that such shares have high unique risk. Consequently, these shares would have exhibited a large negative abnormal return over the particular period. Recall that for any single share only a part of the variability (total risk) is due to market movements. By combining shares into portfolios, their unique risks are diversified away, and it is unlikely that such declines would have been significant in the portfolio context.

I want to purchase more shares in a particular company but how will they influence the risk of my existing portfolio?

Assuming your existing portfolio is diversified, the beta of your portfolio is the only measure that determines the risk of your portfolio. Consequently, only the beta of the company you are considering can influence the risk of your portfolio. You can easily determine the effect of the additional share on your portfolio's risk by remembering that the beta of your portfolio is simply the weighted average of its constituent betas.

But beta only tells us part of the story on risk, so why the emphasis on beta?

Most individuals attempt to hold diversified portfolios to reduce unique risk. However, they know that their shares are tied together by a web of co-movements that determine the limit of the diversification benefits. This limit is determined by the market risk of their portfolio, and its beta precisely determines the sensitivity of the portfolio to market movements.

What exactly are R^2 and $1 - R^2$?

Technically the R^2 tells us how well the "best fitting" line "fits" the data points. Interpreting this in a more useful way, it tells us what proportion of the share's movement is due to market movements, i.e., the proportion of market risk relative to total risk. Clearly then, $1 - R^2$ tells us what proportion of the share's movement is due to unique factors, i.e., the $1 - R^2$ measures the proportion of unique risk relative to total risk.

The standard deviation, of a share in the tables is 48.5% per annum. How can I calculate its variability in monthly terms?

Our standard deviations in the tables are calculated on a monthly basis, and then annualised. Hence, the standard deviation of this share is interpreted as 48.5% per annum. To convert this into monthly terms, simply divide the published figure by the square root of 12, i.e., $48.5\% \div \sqrt{12} = 14\%$ per month.

6. A worked example

In this worked example¹, assume that you have a portfolio consisting of only the four companies listed in the table below that are held in the given investment proportions.

EXHIBIT 11: Portfolio summary

Share	Sector	Proportion	R ² (%)	Beta	Annualised Standard Deviation (%)
ANGLO AMERICAN	Mining	0.4	70.43	1.72	38.02
WOOLWORTHS HOLDINGS	General Retailers	0.1	20.84	0.67	27.06
ASPEN PHARMACARE HOLDINGS	Pharmaceuticals & Biotechnology	0.2	7.07	0.44	30.23
LIBERTY HOLDINGS	Life Insurance	0.3	7.75	0.29	19.19

Source: BNP Paribas Securities South Africa

In order to conduct a risk analysis on this portfolio, we will want to calculate its beta, unique risk and total risk.

Calculate your portfolio's market risk

Recall that the beta of a portfolio is simply the weighted average of the component betas and can be calculated as follows:

EXHIBIT 12: Portfolio beta

Share	Proportion	Beta	Proportion x Beta
ANGLO AMERICAN	0.4	1.72	0.690
WOOLWORTHS HOLDINGS	0.1	0.67	0.067
ASPEN PHARMACARE HOLDINGS	0.2	0.44	0.087
LIBERTY HOLDINGS	0.3	0.29	0.087
		Portfolio beta	0.931

Source: BNP Paribas Securities South Africa

Hence, we can on average expect this portfolio to move 9.31% for every 10% move of the market index.

We can also compute the magnitude of market risk of the portfolio. To do this, we need the standard deviation of the market index. In the very first entry of the Sector Statistics Table (EXHIBIT 2) we find the statistics of the JSE-Overall index. We may find that the standard deviation (total risk) of the market index is 18.44% per annum.

The market risk of our portfolio = beta x market risk of the index

$$= 0.931 \times 18.44$$

$$= 17.17\% \text{ per annum}$$

Calculate your portfolio's unique risk

Calculating the magnitude of your portfolio's unique risk is a little trickier than calculating the unique risk of an individual share. Let's begin by calculating the unique risk of the constituent shares in our portfolio.

There is a special relationship that links the different kinds of risk:

$$(\text{Total Risk})^2 = (\text{Market Risk})^2 + (\text{Unique Risk})^2$$

¹ Note that the statistics used here are from December 2012 issue.

It is important to realise that we can add the square of the standard deviations (i.e., the variances) but we cannot add the standard deviations and still obtain a meaningful interpretation.

Now since R^2 is the proportion of market risk relative to total risk and $1 - R^2$ is the proportion of unique risk relative to total risk, we can express the above relationship as:

$$(\text{Total Risk})^2 = R^2 \times (\text{Total Risk})^2 + (1 - R^2) \times (\text{Total Risk})^2$$

It is easy to see that the components of risk can be obtained by comparison of the above expressions:

$$\text{Unique Risk}^2 = (1 - R^2) \times (\text{Total Risk})^2$$

Similarly,

$$\text{Market Risk}^2 = R^2 \times (\text{Total Risk})^2$$

Note that we do not have information concerning the R^2 and the total risk of the portfolio as a whole, so we cannot directly compute these risk components for our portfolio using the above expressions. We do, however, have all the necessary information to compute these two risk components for individual shares.

Recall that the standard deviation of an individual share is the measure of total risk for the share. We can thus calculate the magnitude of the two components of risk for individual shares using the above expressions as follows:

EXHIBIT 13: Market risk and unique risk of individual shares

Shares	Market Risk R^2 (%)	Unique Risk $1 - R^2$ (%)	Annualised Standard Deviation (%)	Annualised Market Risk (%)	Annualised Unique Risk (%)
ANGLO AMERICAN	70.43	29.57	38.02	31.91	20.67
WOOLWORTHS HOLDINGS	20.84	79.16	27.06	12.35	24.07
ASPEN PHARMACARE HOLDINGS	7.07	92.93	30.23	8.04	29.15
LIBERTY HOLDINGS	7.75	92.25	19.19	5.34	18.43

Source: BNP Paribas Securities South Africa

We could also have obtained the Market Risk for each share by simply multiplying the beta values by the market risk as we did when we calculated the magnitude of portfolio market risk.

The calculation of the unique risk of our portfolio is shown below. Here we multiply the investment proportion by the unique risk, square and then sum across the constituent shares. Finally, we take the square root of the result to yield the portfolio's unique risk.

EXHIBIT 14: Portfolio's unique risk

Share	Proportion	Annualised Unique Risk (%)	[Proportion x Ann Unique Risk] ²
ANGLO AMERICAN	0.4	20.67	68.38
WOOLWORTHS HOLDINGS	0.1	24.07	5.79
ASPEN PHARMACARE HOLDINGS	0.2	29.15	33.98
LIBERTY HOLDINGS	0.3	18.43	30.58
TOTAL			138.74

Portfolio Unique Risk = $\sqrt{138.74}$ = 11.78% per annum

Source: BNP Paribas Securities South Africa

Notice how effective we have been in reducing unique risk. By diversifying amongst the above shares, we find that the unique risk of the portfolio is substantially less than the unique risk of most of the individual shares. Our calculations assume that the constituent shares are not all lumped in one industry. If all constituent shares are lumped in one industry, then the actual unique risk may be slightly higher than that calculated using the above method.

Calculate your portfolio's total risk

Recall that:

$$(\text{Total Risk})^2 = (\text{Market Risk})^2 + (\text{Unique Risk})^2$$

This relationship is true both for individual shares as well as portfolios, hence:

$$\begin{aligned} (\text{Portfolio's Total Risk})^2 &= (17.17)^2 + (11.78)^2 \\ &= 433.46 \end{aligned}$$

so

$$\text{Portfolio's Total Risk} = \sqrt{433.46} = 20.82\% \text{ per annum}$$

We are now able to compute our portfolio's proportion of market risk and its proportion of unique risk. Statistically, our portfolio has:

$$R^2 = (17.17)^2 / 433.46 = 0.68 \text{ and } (1 - R^2) = 0.32$$

That is, the movements of the market index can explain 68% of our portfolio's movements while only 32% of our portfolio's movements can be explained by unique factors. There is clearly scope to improve the diversification benefits (i.e., reduce the risk) of our portfolio. A well-diversified portfolio would have a unique risk component which accounts for 5% or less of the portfolio's total risk.

Calculate your portfolio's abnormal return

The abnormal return is equal to the difference between the actual return of our portfolio and the return offered from a benchmark portfolio with precisely the same market risk as our own portfolio.

Since our portfolio has a beta of 0.93, this implies that our portfolio has the same market risk as a portfolio which has 93% of our initial funds invested in the market index with the remaining 7% invested in the risk-free interest rate. Now suppose that the market index shows an annual return of 25% and the interest rate is 18%. Then, over the same period:

$$\begin{aligned} \text{Benchmark Return} &= \text{Beta} \times \text{Market Index Return} + (1 - \text{Beta}) \times \text{Interest Rate} \\ &= 0.93 \times 25\% + 0.07 \times 18\% \\ &= 24.51\% \end{aligned}$$

To calculate the actual return on our portfolio, we simply sum the returns over a particular period of the constituent securities, weighted by their investment proportions. In the calculation of abnormal return that follows, the time periods for the benchmark returns and the actual returns must clearly match one another.

Assume your calculation of actual portfolio return yielded 30% per annum. Then:

$$\begin{aligned} \text{Abnormal Return} &= \text{Actual Return} - \text{Benchmark Return} \\ &= 30\% - 24.51\% \\ &= 5.49\% \text{ per annum} \end{aligned}$$

(You can calculate the abnormal return for an individual security in precisely the same way, again using the notion of benchmark portfolio return.)

Although the market risk of our portfolio is identical to that of the benchmark portfolio, our portfolio has a unique risk of 11.78% per annum while the benchmark portfolio has none. Our previous discussion reminds us that there is no automatic reward for taking on unique risk. So unless you had special knowledge about your shares, an abnormal return of 5.49% per annum is more likely to occur, on average, two out of every five years. (We elaborate on the interpretation of risk in the following section.)

We can also use the notion of a benchmark return to give us some idea of how our portfolio is expected to perform in the future. For example, assume we are interested in our portfolio's expected performance in the forthcoming year. This of course depends on the performance of the market to a large extent. You may have some prediction of your own of the market's performance. If not, you can use past experience as a guide. Based on the last 30 years' track record on the JSE, a return on the market index of 9% over and above the risk-free interest rate seems a reasonable expectation. Adding an interest rate of 8% to this figure suggests an expected return on the market of 9% + 8% or 17% per annum. Hence, the expected return on our portfolio is:

$$\begin{aligned}\text{Expected Return} &= \text{Beta} \times \text{Expected Market Return} + (1 - \text{Beta}) \times \text{Interest Rate} \\ &= 0.93 (17\%) + 0.07 (8\%) \\ &= 16.37\%\end{aligned}$$

Interpreting the risk of your portfolio

Investors who are concerned with the notion of risk are clearly concerned about the potential of a share's return to drop unexpectedly. Yet, the standard deviation incorporates both downside risk and upside potential. We have already discussed the various components of risk and have mentioned that unique risk is the component of total risk that is not explained by market movements. Therefore, when we computed the abnormal return it was evident that a portfolio having zero unique risk would have an abnormal return of zero. Any non-zero abnormal returns consequently reflect the unique risk of a portfolio.

In the context of the expected portfolio return computed above, we are concerned about the variability of our market index forecast as well as factors unique to our portfolio. That is, our expected return forecast should be interpreted within the framework of the total risk of a portfolio.

There is a special relationship between the standard deviation and the number of times we expect returns to exceed the standard deviation. For example, assume your portfolio has an expected return of 16.37% with a total risk of 5% per month. How do we interpret this? Simply, there is approximately a one in six chance that the actual return will be below expectation by the standard deviation. Similarly, however, there is an approximately one in six chance of the actual return being above expectation by the standard deviation. A one in six chance can also be interpreted as one year in every six years. Furthermore, we can say that the actual portfolio return has approximately a one in three chance of being below expectation by at least half a standard deviation and approximately a one in forty chance of being below expectation by more than two standard deviations.

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8. Glossary

Abnormal Return is the return for your portfolio over and above the return you would expect for a benchmark portfolio having the same beta as your portfolio.

Beta measures the sensitivity of a share price to movements of the market as a whole.

The **CAPM**: the Capital Asset Pricing Model.

Market Risk (or Systematic Risk) reflects the fluctuations that are linked to factors that affect the market as a whole (e.g., political events, interest rate changes, etc.).

Non-Systematic Risk (or Unique Risk) reflects the fluctuations that are linked to events that are unique to the company (e.g., bad management, worker strikes, etc.).

R-squared (R^2) tells us the proportion of a share's total risk that is attributable to market movements.

Systematic Risk (or Market Risk) reflects the fluctuations that are linked to factors that affect the market as a whole (e.g., political events, interest rate changes etc.).

Unique Risk (or Non-Systematic Risk) reflects the fluctuations that are linked to events that are unique to the company (e.g., bad management, worker strikes etc.).

Acknowledgements

Since the inception of the risk service in 1989, several people have contributed significantly to the improvement and upkeep of the service.

We would like to thank the following contributors in this regard:

- Dr David Bowie, Ph.D. (UCT). David is now head of research of the World Markets Co., Edinburgh.
- Prof Dave Bradfield, Ph.D. (UCT).
- Cally Ardington, M.Sc. (UCT).
- Warren McLeod, M.Com. (UCT). Warren is now an analyst with Old Mutual Asset Management.
- Heidi Raubenheimer, B.Sc. (Hons) (UCT).
- Yashin Gopi, B.Sc. (Hons) (UKZN).
- Brian Munro, B.Sc. (Hons) (UCT).
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