THE RELATIONSHIP BETWEEN CROSS-SECTIONAL VOLATILITY, TRACKING-ERROR AND ACTIVE POSITIONS: THE CASE FOR SOUTH AFRICA

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Abstract

International research suggests that tracking-error is influenced mainly by two components, namely market volatility and a portfolio manager's active positions. Of these components, market volatility cannot be controlled by a manager while active positions can be adjusted to maintain a desired or mandated level of tracking-error. Focusing on the South African market, this study found that a strong positive relationship exists between cross sectional volatility and the level of tracking-error, and that active managers respond to changes in cross sectional volatility by adjusting their active positions. Based on these findings, this study firstly suggests that in order to outperform the market during times of low cross sectional volatility whilst maintaining desired tracking-error levels, stock picking skills becomes more important than ever. Secondly this study suggests that being able to identify those factors leading to a decrease in cross sectional volatility may enable investors to proactively increase their exposure to more passively managed funds in order to decrease management fees, thereby shifting their focus to alternative sources of alpha.

Keywords: market volatility, investors, South Africa

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1. Background

Risk is one of the most important factors to consider when making investment decisions. The risk measure most often used and quoted is probably the tracking error, which is the standard deviation of the difference between a portfolio's returns and those of the benchmark over a specific period of time. A higher tracking error is an indication of higher risk, which is usually accompanied by a more aggressive approach towards portfolio management. Jackson (2005) has performed an empirical study in which he investigates equity tracking-error trends in the UK over a relatively short period (2001 – 2004). He argues that active managers change their active positions, which can be defined as their "portfolio equity positions" relative to the benchmark, to compensate for a decrease in the level of tracking error experienced during the period under review. Vardharaj *et al.* (2004) identify several factors that affect the level of tracking error of an equity portfolio. These factors include the number of stocks in the portfolio, market capitalisation and style deviation from the benchmark, sector deviation, portfolio beta and benchmark volatility. Of these factors, the first four can be controlled by the portfolio manager through active positions, while benchmark volatility cannot be controlled by a single manager. This study integrates the findings of Jackson (2005) and Vardharaj *et al.* (2004) to investigate the question of whether a change in market volatility, which cannot be controlled by a portfolio manager, leads to a change in active positions in order to maintain desired and mandated tracking-error levels, and to continue outperforming the market.

The present study is structured as follows: A literature study is performed on volatility, tracking-error and active positions, and is discussed in section 2. The primary and secondary objectives are discussed in section 3. A description of the methodology followed and the results are discussed in sections 4 and 5 respectively, followed by managerial implications (section 6) and recommended future research (section 7). Finally the study is summarised in section 8.

2. Literature Study

2.1 Performance and Tracking Error

Harry Markowitz (1952) is regarded by many investment specialists as the precursor regarding theories on how to combine assets to form efficiently diversified portfolios. He tested the rule that the investor does (or should) consider expected return a desirable thing, and variance of return (referred to as

the "risk" of a portfolio) an undesirable thing. He found that this rule is sound both as a maxim for, and hypothesis about, investment behaviour. Shortly after the publication of his findings, a number of authors have been investigating ways of optimally measuring investment performance (Sharpe, 1964; Treynor, 1965; Jensen, 1968; and 1969, Fama 1972) by trying to decompose performance in keeping with risk taken on by the manager. From these studies it is clear that higher expected return is accompanied by the willingness of taking on more risk, which has resulted in the well-known "risk-return" trade-off slogan in the investment world. Based on these studies it can be concluded that manager performance is a function of the action taken by the specific manager as well as market movements. Put differently, performance can be decomposed into a part that is controllable by the manager and a part over which the manager has no control. It can be argued from these studies that the manager therefore has control over a certain portion of the risk taken on, known as "asset-specific or unsystematic risk", and a portion which is dictated by the market, known as "systematic risk". Managers have control over unsystematic risk in the sense that this risk can be reduced to a great extent through diversification (e.g. Markowitz, 1952).

In an attempt to create superior performance, managers will deviate from a benchmark by taking active positions relative to the benchmark. According to the "risk-return" dogma, this implies that the more managers attempt to increase alpha (the difference between their portfolio return and that of the benchmark), the more aggressive the managers will be in terms of their active positions, resulting in higher risk as measured by the standard deviation.

In keeping with the argument that managers have control over a portion of risk, using the standard deviation of portfolio returns as a standalone measure of portfolio risk may be misleading and even unfair to the manager, in that the standard deviation does not distinguish between the controllable and uncontrollable parts of risk. Therefore a better measure of risk and the level of aggressiveness would probably be the tracking error, which can be defined as the extent to which return fluctuations in the managed portfolio are not correlated with return fluctuations in the benchmark (Reilly and Brown, 2006). Mathematically, the tracking error is calculated as the standard deviation of the difference between the portfolio return and its benchmark. The higher the desired alpha, the more aggressive the manager will be in terms of his/her active positions, and the higher the tracking error will be. This is supported by Ammann *et al.* (2000) who illustrate that the tracking error can be decomposed into the two basic abilities of a manager, namely timing and selection, which are the exact two components of performance addressed by Fama (1972).

Vardharaj *et al.* (2004) take the decomposition of tracking error one step further in identifying several factors that affect the level of tracking error of an equity portfolio. These factors include the number of stocks in the portfolio, market capitalisation and style deviation from the benchmark, sector deviation, portfolio beta and benchmark volatility. Of these factors, the first four can be controlled by the portfolio manager through active positions, while benchmark volatility, as mentioned earlier, cannot be controlled by a single manager. In an unpublished, practical study, Jackson (2005) has shown that equity tracking errors in the UK follow a trend, and that this trend can be ascribed to active managers compensating for the change in market volatility (the uncontrollable factor) by adjusting their portfolio exposure to the market (the controllable factor). He shows that a decrease in the UK market volatility was experienced during the period under review (2001 until 2004), and argues that due to this lower level of market volatility the overall levels of tracking error decreased accordingly. Although Jackson bases his conclusion purely on graphical results, Vardharaj *et al*. (2004) show, by means of statistical methods, that lower volatility does indeed result in lower levels of tracking error. Jackson (2005) further argues that UK active managers attempt to offset this decline in volatility (and therefore tracking error) in order to continue their attempts to outperform the benchmark by focusing on those factors that are under their control, namely active positions, specifically decreased benchmark coverage and increased betas, which again is exactly in line with the study done by Vardharaj *et al*. (2004).

In trying to make sense of active manager behaviour in response to volatility and tracking-error changes, both non-controllable and controllable components, namely market volatility and active positions need to be addressed in more detail.

2.2 Uncontrollable Component: Volatility

The first question to be answered is whether stock market volatility does indeed change over time. Poterba *et al*. (1986) showed that shocks to stock market volatility do not persist for long periods, and that these shocks have half-lives of six months or less. Schwert (1989) found that although market volatility is fairly stable over the long term, stock markets are much more volatile during recessions, and that macro-economic, financial leverage and share trading volume help to explain this volatility. Of these factors, he argued that recessions are the biggest factor in explaining market volatility, but also argued that finding those sources that contribute to volatility is not an easy task.

Hamilton *et al*. (1996) reached the same conclusion as Schwert (1989) in that economic recessions are the single largest contributor to the variance in stock markets, and used this result to develop a time series model that can be used to predict stock market volatility and forecast economic turning points. Kupiec (1991) acknowledged the difficulty of finding reasons for stock market volatility as suggested by Schwert (1989), and instead

of trying to identify the reasons behind market volatility, investigated volatility trends in the OECD countries over a period of 30 years to assess the impact of the market volatility on the real economy. He found that stock market volatility had increased in many of these countries over the 30-year period, but also concluded that these high levels reverted back to lower, more normal levels. He also found that the correlation between the volatilities of these countries increased over time, a finding that was supported by Solnik *et al.* (1996), who further showed that volatility correlation between countries increases during times of high volatility.

Combining the findings of Schwert (1989), Hamilton *et al*. (1996), Kupiec (1991) and Solnik *et al.* (1996) leads to the conclusion that during economic recessions, stock market volatility will be higher, while the correlation between stock market volatility of different countries will increase. This sounds like a reason for concern, as it is during recession times that diversification benefits are needed the most. Mankiw *et al.* (1991) argued that the efficient market hypothesis implies that stock markets do not exhibit excess volatility or predictable movements. They tested the hypothesis of market efficiency and found that although their data did not support market efficiency, they could also not reject the hypothesis with a high degree of confidence. Using time-series models, Dueker (1997) showed that expected market volatility reverts to near-normal levels quickly following a spike.

Malkiel *et al*. (1998) concurred with the idea that the volatility for the market as a whole is quite stable, but taking a disaggregated look at the volatility of stock prices led them to conclude that on an individual share level, volatility has increased considerably. In follow-up studies, Campbell *et al.* (2001), Xu *et al*. (2003) and Wei *et al*. (2006) confirm these findings and present more detailed explanations of the reasons and implications of the increased volatility on an individual share level.

Eichengreen *et al.* (2003) argue that stock market volatility is not constant, but instead follows a u-shaped pattern which can be explained by monetary volatility and financial internationalisation. Using econometric models, Belratti *et al.* (2006) show that the interest rate and money growth volatilities, which are a function of monetary policy, account for structural breaks in stock-market volatility. On a long-term basis, they found that there is a relationship between money growth, inflation, the Federal funds rate, output growth and stock-market volatility.

It is generally accepted that emerging markets like South Africa follow market trends experienced by developed markets, on which most of the above studies are based. However, it was found by Bekaert *et al*. (1997) that volatility differs between emerging markets, which suggests that the volatility of emerging markets is more dependent on local factors. Another important difference is that emerging markets also experience higher levels of market volatility compared to developed markets (Du Plessis, 1979, Roll, 1992, Bekaert *et al*., 1995, Bekaert *et al.* 1997, Aggarwal *et al*., 1999 and Bradfield *et al*., 2004).

In contrast to volatility that measures changes in total market returns over time, cross-sectional volatility measures the variability in a market's stock returns at a point in time (Ankrim *et al.*, 2002). A simple, yet very important implication of cross-sectional volatility proposed by Ankrim *et al*. (2002) is that the lower (higher) the cross sectional volatility, the less (more) opportunities active managers have to create active returns (alpha). The reasoning behind this statement requires a more in-depth discussion of cross sectional volatility.

Using the formula suggested by Ankrim *et al*. (2002) and adjusting it for individual securities, cross-sectional volatility can be measured as follows:

$$X_t^2 = \sum_{i=1}^{n} w_{it-1}(r_{it} - r_t)^2 \quad (1)$$

Where

X^2_t = the square of cross-sectional volatility at time t, for a market with n securities

r_t = market return from t -1 to t

r_{it} = return for security i (where i = 1,2, ..., n)

w_{it-1} = capitalisation weight for security i at the end of t – 1

From formula (1) it can be argued that if all the securities in the market have the same return for a specific period (e.g. a month), irrespective of the weights assigned to the different securities, the cross-sectional volatility will be zero, implying that the opportunity to create alpha is theoretically zero. The implication is that tracking-error is therefore a function of the aggressiveness of portfolio bets (or active positions) as well as the cross-sectional volatility of the securities in the market, supporting the propositions in the first part of the literature study. Active managers might be more concerned with cross-sectional volatility than market volatility as it provides a better indication of opportunities to generate active returns than what can be obtained by studying only market volatility. Therefore the present study will focus on cross-sectional volatility rather than on market volatility.

The above section demonstrates that stock-market volatility has been studied for over 20 years. Some authors have found that market volatility is quite stable over time while others have found that there is a definite trend. Most of the research, however, has one thing in common, namely that stock market volatility changes over the short term. For the purposes of the present study, the focus will therefore be placed on short-term movements in the South African stock-market volatility, and more specifically, movements in cross-sectional volatility. The results will ultimately be used to better understand active manager behaviour related to these movements.

2.3 Controllable component: Active positions

The change in active positions held by a manager in reaction to changes in tracking-error trends is a topic that has not been explored by many researchers. Studies carried out by Treynor (1965), Sharpe (1966), Jensen (1968, 1969) and Fama (1972) addressed this topic to a certain extent, but the focus was more on performance measurement than on active positions in response to market changes. The work done by Vardharaj *et al*. (2004), however, has addressed the relationship between volatility, tracking-error and active positions. Although their focus is different compared to the present study, their results are relevant. They find that an increase (decrease) in benchmark volatility results in an increase (decrease) in tracking error, and that a change in active positions (where active positions include the number of stocks held, average market capitalisation, sector allocation and beta) leads to a change in tracking error. Therefore the relationship proposed by Vardharaj *et al.* (2004) can be seen as two independent relationships: firstly between tracking-error and benchmark volatility and, secondly, between tracking-error and active positions. These two independent relationships have been integrated, probably unknowingly, by Jackson (2005) when studying tracking-error trends in the UK market. Although his results have not been statistically confirmed, it can be summarised in the following statement: Volatility is positively related to tracking error, and active managers will react to this relationship by adjusting their active positions.

In summary, according to the literature study, tracking error is influenced by an uncontrollable component, market (or cross-sectional) volatility, and a controllable component, active positions. As these two components change, tracking error will change. By integrating the results from the literature, the following relationship (which was presented coincidentally by Jackson, 2005) is formally suggested for this study: Cross-sectional volatility has a positive relationship with tracking error, and active managers will respond to a change in cross-sectional volatility (and by implication tracking error) by adjusting their active positions to maintain their desired (or mandated) level of tracking error, and ultimately continue creating alpha.

3. Objectives

The primary objective of this study is to investigate the relationship between cross-sectional volatility, tracking-error and active positions of active managers in South Africa. The secondary objective is to use these results to better understand active manager behaviour during market conditions characterised by increasing or decreasing levels of cross-sectional volatility, and ultimately know what to expect regarding manager behaviour during similar conditions in future.

4. Methodology

The first step will be to test the relationship between cross-sectional volatility, tracking-error and active positions focusing on the total market whilst ignoring manager-imposed style tilts. A second step would be to investigate specialised funds to test the same relationship. Therefore South African General Equity Unit Trust (GEUT) funds is deemed an appropriate sample representing all actively managed, style-neutral portfolios in South Africa. Furthermore, because of the extremely high level of market concentration experienced in South Africa (see for example Van Heerden *et al*., 2008), it was decided to use the FTSE/JSE All Share Top 40 Index (ALSI 40) as a proxy for the South African market. The ALSI 40 represents approximately 85% to 90% of the FTSE/JSE All Share Index (ALSI), which is generally used as the South African market portfolio. Using the ALSI 40 is therefore seen as appropriate for analysis purposes, while it will reduce the complexity of the analysis process significantly.

In keeping with the results of Sénéchal (2004) and Jackson (2005), combined with the general belief that the South African market follows developed market trends, the period of 2001 to 2004 should be a period during which a decrease in cross-sectional volatility was experienced. Therefore, the period before 2001 should, by implication, represent a period of relatively higher cross-sectional volatility. Subsequently data for the South African GEUT funds was collected from Micropol over a period of 7 years (1998 to 2004). This relatively short period is also in line with the results obtained from the literature study, in that volatility changes over short periods of time but reverts to a more normal level over longer periods.

The following steps were performed to analyse the relationship between cross-sectional volatility, tracking-error and active positions for the South African market.

i. Cross-sectional volatility

Using the ALSI top 40 as a proxy for the market and applying formula (1), cross-sectional volatility was calculated on a monthly basis for the period 1998 to 2004. To test whether cross-sectional volatility had indeed decreased since 2001, the average cross-sectional volatility from 1998 to 2000 (hereinafter referred to as "period one") was compared to that from 2001 to 2004 (hereinafter referred to as "period two"). Using a test of differences between means, the following hypothesis was tested:

H_0: $\mu_d = 0$ vs. H_1: $\mu_d > 0$ (a)

where μ_d is the difference between the mean cross-sectional volatility for period one and period two.

ii. Tracking error

Rolling 12-month tracking errors were calculated for two periods: January 1998 to December 2000 and from January 2002 to December 2004. The twelve

months from January 2001 to December 2001 were used as the first value for the rolling 12-month tracking error for period two. The rationale behind this approach was to avoid any overlap between the two periods. Next the correlation between the rolling tracking errors and the cross-sectional volatility for each period was calculated. To test for the significance of the relationship, the following hypothesis was formulated and tested:

H_0: r = 0 vs. H_1: r ≠ 0 (b)

where r is the correlation coefficient.

According to the literature (section 2) it can be expected that a strong positive relationship would be evident between cross-sectional volatility and tracking error. As discussed, volatility cannot be controlled by the manager. To determine whether a manager will respond to changes in volatility (and, by implication, tracking error) the component that can be controlled, active positions, needs to be analysed.

iii. Active positions

Active positions include the number of stocks held, average market capitalisation, sector allocation and beta (Vardharaj *et al*., 2004). From this point onwards the first three types of active positions will collectively be referred to as "market coverage". To test whether a change was experienced in market coverage over the two periods under review, 12-month rolling regression analyses were performed on the ALSI 40 (dependent variable) and the returns of the GEUT funds (independent variable), using the r-squared as an indication of benchmark coverage. The reasoning behind the use of the r-squared as an indication of benchmark coverage can be explained as follows: If all the GEUT funds fully replicated the market, the differences between the return of the market and that of the fund would theoretically be zero, i.e. the variation in the ALSI 40 return would be explained completely by the variation in the GEUT funds, resulting in an r-squared of 1. The more the fund deviates from the market (i.e. the lower the market coverage), the lower the r-squared should be. In keeping with the literature, it can be expected that periods of relatively lower (higher) cross-sectional volatility should be accompanied by lower (higher) market coverage, resulting in lower (higher) r-squared values. The following hypothesis was used to test for differences between means:

H_0: $\mu_d = 0$ vs. H_1: $\mu_d > 0$ (c)

where μ_d is the difference between the mean 12-month rolling r-squared for period one and period two.

A portfolio's beta is an indication of how volatile the portfolio is, relative to the market (see for example Reilly and Brown, 2006). A beta of 1 indicates that the portfolio will move with the market, while a beta of more (less) than 1 is an indication that the portfolio is more (less) volatile than the market. In keeping with the benchmark coverage explained above, it therefore makes sense to expect that during times of lower cross-sectional volatility (less opportunity to outperform), portfolio managers will try to identify undervalued securities with higher volatility relative to the market (i.e. higher beta) in order to continue outperforming the market. The following hypothesis was formulated and tested:

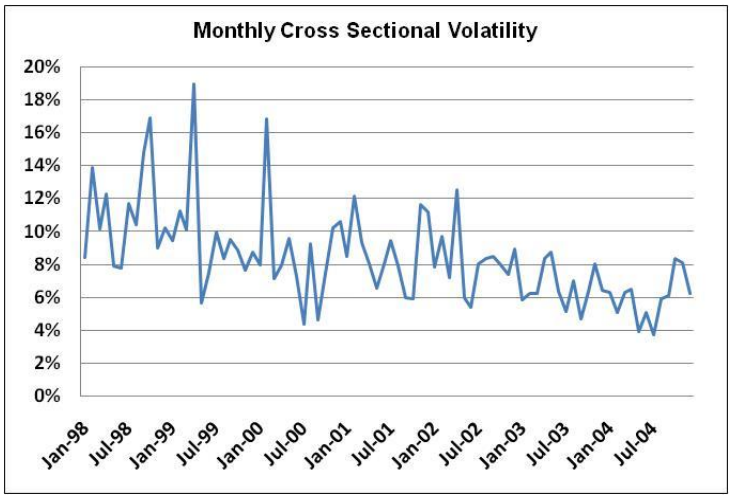
H_0: $\mu_d = 0$ vs. H_1: $\mu_d < 0$ (d)

where μ_d is the difference between the mean rolling 12-month beta for period one and period two. Rolling 12-month betas are obtained from the same regression analysis discussed above, as the coefficient of the regression represents the beta value.

5. Results

Figure 1 shows the monthly cross-sectional volatility from 1998 to 2004.

Figure 1



From the above graph it seems that a continuous decrease in cross sectional volatility was experienced from 1998. To determine whether the average cross-sectional volatility was lower during period two than period one, hypothesis (a) was tested. At a 95% level of confidence, it was found that the mean cross-

sectional volatility decreased significantly (t = 5.604; p = 0.000) from period one to period two. To determine whether this significant decrease in cross-sectional volatility and therefore opportunities to outperform the market had an effect on the level of tracking error, hypothesis (b) was tested for both periods. A statistically significant correlation for period one (r = 0.317; p = 0.02) and period two (r = 0.536; p = 0.00) were obtained, indicating that there was a strong positive correlation between cross-sectional volatility and tracking error. This finding is in line with those reported by Vardharaj *et al.* (2004) and Jackson (2005). The following two graphs illustrate this positive relationship between cross-sectional volatility and tracking error for the two periods:

Figure 2

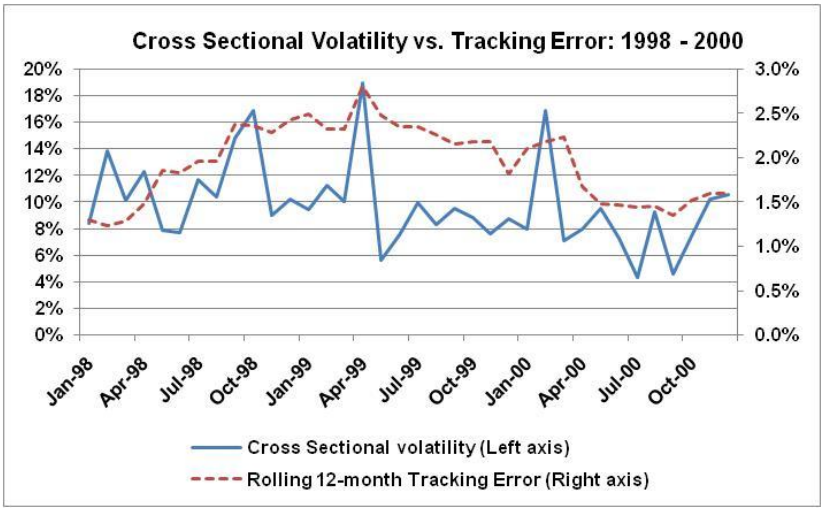
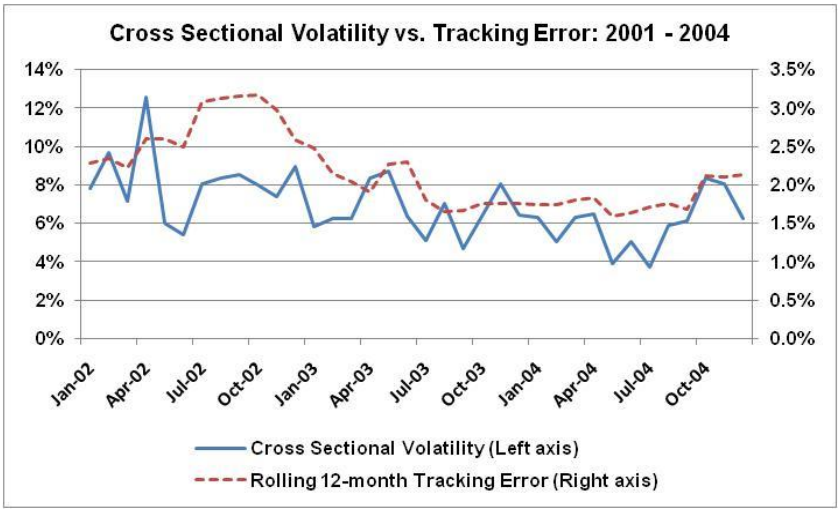


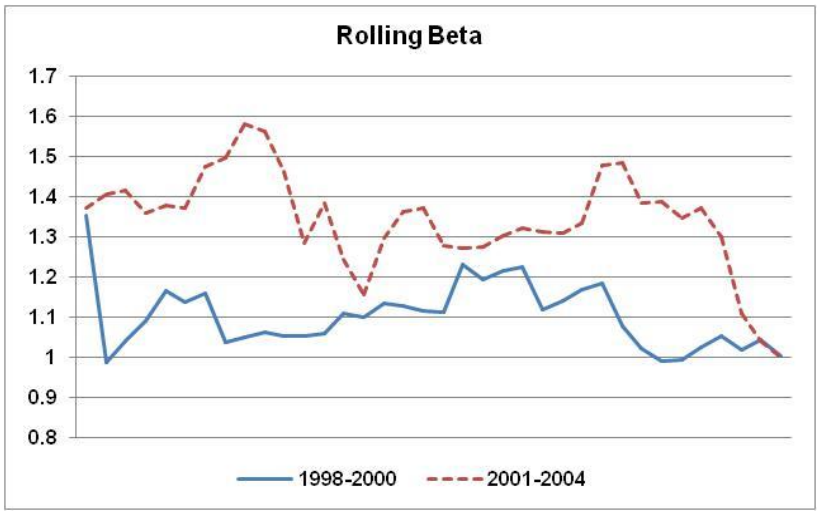
Figure 3



The implication of such a strong positive relationship is that if cross-sectional volatility (which cannot be controlled by managers) decreases, active managers will experience a decrease in their desired (or mandated) level of tracking error, indicating that the decrease in outperformance opportunities as depicted in lower cross-sectional volatility, is also reflected in the level of tracking error. In an attempt to maintain the specific level of tracking error and to continue outperforming the market, it is expected that active managers will react to this decrease in cross-sectional volatility by adjusting the component of tracking error over which they do have control, namely active positions. To determine whether this is indeed the case, hypotheses (c) and (d) were tested. The null hypothesis of no change in market coverage from period one to period two (i.e. hypothesis (c)) could not be rejected (t = 1.085; p = 0.285), indicating that there is not sufficient evidence to conclude that active managers react to a decrease in cross-sectional volatility by decreasing their market exposure in order to maintain their desired level of tracking error. The extremely high level of concentration of the South African market should, however, be kept in mind when making this conclusion, as only a few shares represent a significant percentage of the total market (e.g. the top five shares if defined by market capitalisation have represented between 40% and 55% of the ALSI during the last 10 years). Therefore in order to make an accurate conclusion about whether

there was an increase or decrease in market coverage during the two periods under review, an analysis should be done on a share-holding level instead of following a return-based analysis approach, as was done in this study. The second component of active positions, beta, was tested by means of hypothesis (d). The null hypothesis of no change in the average beta from period one to period two was rejected (t = -9.789; p = 0.00), indicating that during period two, active managers selected stocks that showed a statistically significant higher beta compared to stocks selected during period one. This is also indicated by Figure 4.

Figure 4



Once again these findings support those proposed by Jackson (2005) suggesting that active managers will revert to stocks with higher volatility compared to that of the market, in order to maintain their desired tracking-error levels, and continue attempts to outperform the market during times when such opportunities have decreased, as indicated by lower cross-sectional volatility.

Against the background of the empirical results the following can be concluded: Cross-sectional volatility has decreased significantly during the period 2001 to 2004 compared to the period 1998 to 2000. Owing to a strong positive relationship between cross-sectional volatility and tracking error, a decrease in tracking-error levels can be expected during the period 2001 to 2004. In order to maintain the desired (or mandated) tracking-error levels, however, it can be expected that active managers will respond by adjusting their active positions.

6. Managerial implications

Outperformance should more than offset the fees paid for actively managed portfolios. The fact that this does not always happen has led to the age-old debate of whether active management is indeed better than passive management, an argument that enjoys a lot of attention with no concrete conclusion as yet.

A better understanding of active manager behaviour might therefore assist in approaching this argument a bit differently, in that the question can be stated as follows: Under which circumstances will active management be a better approach than passive management? Understanding active manager behaviour might also assist in the selection process of managers, as such an understanding could be used to create a set of criteria against which the different managers can be measured. If it is possible, for example, to understand what an active manager will typically do under specific conditions, the criteria could be used to identify those managers that will perform the best under the specific conditions.

In terms of the argument proposed in this study that active managers will adjust active positions in response to a change in cross-sectional volatility, stock selection can be used as an important criterion for manager selection. The reasoning is as follows: During times of less opportunity (lower cross-sectional volatility) to create alpha, it becomes so much more difficult to identify those stocks that could outperform the market. Therefore adjusting active positions by means of picking the right stocks that also meet specific requirements (e.g. higher betas) becomes vitally important. From a South African perspective, understanding active manager behaviour and linking this behaviour to skill is even more important.

The ALSI consists of 160-odd shares with an extremely high level of concentration, which in itself limits the opportunity set available to active managers if the objective is to outperform the market (ALSI). Conditions characterised by lower cross-sectional volatility will narrow the opportunity set even more, emphasising the importance of understanding the managers' behaviour and being able to measure their skills, specifically with regard to stock picking.

7. Future research

Three possible areas of future research in terms of this study are recommended.

Firstly, it was noted that the results obtained regarding market coverage should be interpreted with caution because of the high level of market concentration in South Africa. A more accurate approach could be to investigate the different components grouped under the term "market coverage" in this study separately, namely market capitalisation and style deviation from the benchmark, sector deviation and the number of stocks held. Furthermore, performing the analysis on a holdings-based approach instead of a returns-based approach as was performed here could result in more valid conclusions.

Secondly, the focus of this study was on general equity only. This narrow focus leaves unanswered the question of style-specific active-manager behaviour during times characterised by high or low cross-sectional volatility. Executing a similar study focusing on specialised (in terms of style preference) active managers might make it possible to generalise the findings reported in this study.

Finally, knowing that cross-sectional volatility has decreased over time (at least over the short term) and that managers will react to this decrease by adjusting their active positions, is a starting point in trying to understand active manager behaviour. However, more value could be added if this behaviour could be predicted. Therefore another possible area worth investigating is to understand *why* cross-sectional volatility changes over time. Research on the reasons for change in market volatility has been discussed in the literature study (see section 2), but still needs to be conducted on cross-sectional volatility level and specifically for the South African market. Being able to identify the conditions leading to a change in cross-sectional volatility might enable an investor to be proactive in terms of selecting managers that show the most skill during the specific market conditions and align their portfolio(s) accordingly. Alternatively, if an investor believes that it might be too difficult during such market conditions for any active manager to add significant value, the investor can increase his or her exposure towards passive funds while decreasing exposure towards active funds in order to reduce management fees, thereby shifting the focus to an alternative source of alpha.

8. Conclusion

Tracking error can be defined as the standard deviation of the difference between the portfolio return and its benchmark (i.e. alpha). A higher tracking error is normally associated with a more aggressive investment approach in an attempt to outperform the market or benchmark. It is argued in this study that tracking error is influenced by two components, namely active positions (which include the number of stocks in the portfolio, market capitalisation and style deviation from the market, sector deviation and portfolio beta) and market volatility. Of these factors, volatility cannot be controlled by the manager, while active positions can be adjusted to influence the level of tracking error. According to the literature, volatility changes over the short term, resulting in changes in tracking-error levels. This study shows that volatility, specifically cross-sectional volatility, decreased significantly during the period 2001 to 2004 compared to the period 1998 to 2000. It is further shown that a significant positive correlation exists between cross-sectional volatility and tracking error, implying that because of the decrease in cross-sectional volatility, a decrease in the level of tracking error can be expected as well. In an attempt to continue outperforming the market and maintaining their desired (or mandated) level of tracking error, active managers will respond to this decrease in cross-sectional volatility by adjusting their active positions. Although this study could not confirm that managers decrease their market coverage, the study does show that managers focus more on high beta stocks during times of lower cross-sectional volatility. Although a change in active positions might help in maintaining a specific level of tracking error, it would not necessarily assist in outperforming the market. In fact, it could have the completely opposite effect if the wrong stocks were selected. Therefore during times of low cross-sectional volatility, managers' stock-picking skills become more important than ever. The relationship between cross-sectional volatility, tracking-error and active positions could serve as a starting point for understanding active manager behaviour during different market conditions. In terms of this study, understanding this relationship could, for example, assist in creating a set of criteria to identify managers that showed exceptional stock-picking skill, especially during times of low cross-sectional volatility, which is characterised by a smaller opportunity set. Alternatively, being able to identify those factors leading to a decrease in cross-sectional volatility (and therefore increase the level of difficulty to outperform) may serve as a timely indication to investors to increase exposure to passive funds in order to decrease management fees and thereby shift their focus to an alternative source of alpha.

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