AN INVESTIGATION INTO SOUTH AFRICAN GENERAL EQUITY UNIT TRUST PERFORMANCE DURING DIFFERENT ECONOMIC PERIODS

By DE Bertolis and M Hayes

ABSTRACT

This paper investigates the performance of South African general equity unit trusts relative to the FTSE/JSE All Share Index during the period January 1994 to December 2012. The period under investigation was split into six further sub-periods each having a specific economic cycle: a downturn, average growth or robust growth. Unit trusts are shown to have underperformed in economic downturns and outperformed in periods of robust growth, while no conclusions can be made about unit trust performance during periods of average growth. Overall, unit trusts showed slight outperformance, but this was not found to be persistent.

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1.   INTRODUCTION

1.1   South Africa's first unit trust, Sage Fund, was established in June 1965 with approximately R600 000 under management, R41 million at December 2012 price levels. Since then there has been huge growth in the unit trust industry in South Africa: as at the end of 2012, there were 704 South African domestic unit trust funds available, with a market value of R1 160 billion.[1] Equities dominate South African unit trusts, but the relative popularity of general equity funds has been on a decline since the 1970s (Meyer-Pretorius & Wolmarans, 2006).

1.2   The Efficient Market Hypothesis states that, on a risk-adjusted basis, it is impossible to outperform the market other than by luck or by accepting greater systematic risk (Clarke, Tomas & Mandelker, 2001). As the price of the investment fully reflects all known information at the time of purchase, investment managers cannot gain an advantage through gathering additional information. There are three versions of the Efficient Market Hypothesis (Malkiel & Fama, 1970):
– weak form: prices reflect all past information that is publicly available;
– semi-strong form: prices reflect all publicly-available past information and will instantaneously adjust to any new public information; and
– strong-form: prices reflect all available information, even if this information is not publicly available.

1.3   The Efficient Market Hypothesis, in particular the semi-strong form, has implications for the performance of unit trusts. If the hypothesis holds, it would be expected that active fund managers of unit trusts would be unable to outperform the market consistently unless through access to information that is not publicly available or accepting greater systematic risk. It is assumed that private information is not available to stock managers due to regulations that aim to eliminate insider trading (Malkiel, 2003).

1.4   There has been a fair amount of research on the performance and growth in unit trusts since the mid to late 1960s. Seminal papers by Treynor,[2] Sharpe (1966) and Jensen (1968) created a framework for risk-adjusted unit trust performance analysis. Since then, manager skill has been a controversial topic because of conflicting conclusions on the performance and persistence, as defined in ¶2.2, of unit trusts (Carhart, 1997).

1.5   As unit trusts are popular investment vehicles for the retail market, the Actuarial Society of South Africa's Investments Committee has explicitly expressed interest in research on the performances of unit trusts and their underlying asset managers. This paper is a partial response to this broad research question.

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1 ASISA. Local Fund Statistics (2012). Available: www.asisa.org.za. [18 February 2013]
2 J Treynor (unpublished). Market value, time, and risk. Unpublished manuscript (1961: 95–209)

2. DEFINITIONS

2.1   All South African unit trusts are governed by the Collective Investment Schemes Control Act 45 of 2002 (CISCA). This act aims "to regulate and control the establishment and administration of collective investment schemes" (Republic of South Africa, 2002).

2.2   'Persistent underperformance' or 'persistent outperformance' is defined as being underperformance or outperformance that is statistically significant over a defined time period.

2.3   A 'South African general equity unit trust' is defined by the Association of Savings and Investment South Africa (ASISA) as a collective investment portfolio comprising of 80% or more equities listed on the Johannesburg Stock Exchange (JSE).[3] These unit trusts invest "across all economic groups and industry sectors of the JSE Securities Exchange South Africa as well as across the range of large, mid and smaller cap shares".[4] In this paper, the performance of retail unit trusts only was investigated as institutional unit trusts mirror the holdings of retail unit trusts, but with different cost structures.

2.4   The benchmark chosen to assess the ability of unit trust asset managers should be a reasonable reflection of the investable equity universe, as alpha is measured relative to a passive holding of the investable equity universe. Various single- and multi-factor models have been used to assess unit trust performance in the United States of America (Fletcher & Forbes, 2002). In this paper, the performance of unit trusts is rated against a single benchmark, the FTSE/JSE ALL Share Index, chosen to represent most appropriately the overall South African domestic equity market. A single benchmark has been chosen to create consistency in assessing performance across all funds. It is important to note that the FTSE/JSE All Share Index was not the actual benchmark for all of the general equity unit trusts investigated. This benchmark is, however, highly correlated with the performance of all South African general equity unit trusts, as the portfolio of stocks in each South African general equity unit trust is a sizable subset of the FTSE/JSE All Share Index. We do not therefore believe that the distortion caused by using a more encompassing benchmark is significant.

2.5   'Relative performance' refers to performance of unit trusts in comparison with the benchmark, as defined above in ¶2.3.

2.6   For the purpose of this paper, mutual funds can be assumed to be directly comparable with unit trusts. This is realistic in practice, as they are both a preferred investment vehicle for retail clients despite subtle differences that may exist in the structure of these collective investment vehicles.

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3   ASISA. Classification of South African regulated collective investment portfolios (2012). Available: www.asisa.org.za [18 February 2013].

4   supra

2.7   'Alpha', in this paper, refers specifically to Jensen's alpha, which is a risk-adjusted measure of performance in excess of the market. This is defined formally in ¶8.4.

2.8   The 'beta' of a unit trust, in this paper, refers to the sensitivity of a unit trust relative to the market. This acts as a proxy for the market risk exhibited by unit trust investment managers. This is defined more fully in ¶8.4.

2.9   The determination of economic market cycles is discussed in section 5.

3.   AIMS OF THE STUDY

3.1   The primary aim of this paper is to investigate the performance of general equity unit trust investment managers relative to the market over different economic periods. The three periods of interest are those characterised by:
–   economic downturn;
–   stable or average economic growth; and
–   above-average economic growth.

3.2   This paper also investigates whether unit trust investment managers outperform the market on average over the entire investigation period.

3.3   Given the findings of the above research questions and assuming that investors can correctly predict the economic cycles, the paper then investigates whether there might be optimal investment strategies using South African general equity unit trusts during different economics periods.

4.   PREVIOUS RESEARCH

4.1   GLOBAL
    4.1.1   One of the earliest empirical investigations into the performance of unit trusts was completed by Friend et al. (1962) on the performance of unit trusts in the United States of America (USA). This led to further research by Treynor & Mazuy (1966) who analysed the performance of American unit trusts with consideration of the volatility of returns, thus using a risk-adjusted approach to adjust investment performance. This analysis was largely possible due to the then early developments of the Capital Asset Pricing Model (CAPM) by Treynor[5] and Sharpe (1964). Treynor & Mazuy (op. cit.) concluded that, on a risk-adjusted basis, there was no statistical evidence that any of the unit trusts investigated were able to beat the market. Two years later, Jensen (op. cit.) came to the same conclusion, stating that "115 [unit trusts] were unable to outperform the market buy-and-hold strategy" (p. 415) and those funds that outperformed may have done so by chance as opposed to skilful stock selection by fund managers. This is consistent with the semi-strong form of the Efficient Market Hypothesis, as defined in ¶1.3.

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5   Treynor, supra

4.1.2   An investigation by Malkiel (1995) into the performance of equity unit trusts from the USA from 1971 to 1991 found that, on average, unit trusts underperformed the Standard & Poor 500 Index even before the deduction of expenses. Malkiel did not provide any reasons for the observed underperformance. The author also noted that the performance persistency reflected "the hot hand phenomenon" (Malkiel, 1995), which is the tendency of successful fund managers to continue to be successful in the future. This was evident in the 1970s, but appeared to break down in the 1980s. Malkiel (1995) concluded that performance persistency was not conclusive and that most conclusive studies showing persistency, such as Grinblatt & Titman (1992), Hendricks, Patel & Zeckhauser (1993) and Goetzmann & Ibbotson (1994), had not taken into account the considerable effects of survivorship bias.[6] Hendricks, Patel & Zeckhauser (op. cit.) found that, even before expense deduction, unit trust investment managers underperformed the market after adjustment for survivorship bias. They did not appear to investigate the reasons for the observed underperformance, however.

4.1.3.   Quigley & Sinquefield (2000) reviewed the performance of equity unit trusts from the United Kingdom (UK) from 1978 to 1997 and came to similar conclusions, that fund managers were unable to outperform the market on a risk-adjusted basis and that they showed no evidence of persistent outperformance, but rather of persistent underperformance. No reasons were ventured for this evidence.

4.1.4   Fletcher & Forbes (op. cit.) analysed equity unit trust data from the UK from 1982 to 1996 using five different benchmarks. Two main conclusions were drawn:
– the choice of benchmark affects the observed relative outperformance by unit trust investment managers; and
– despite this bias, on average the unit trusts failed to significantly outperform any of the benchmarks. In fact, more evidence of underperformance was found.

4.1.5   Similarly, Kosowski (2006) investigated the performance of US equity mutual funds between 1962 and 2005 using three different benchmarks, but a different approach to the analysis. He analysed the performance during periods of market expansion and contraction separately, finding that relative unit trust performance was significantly different in these two periods. During market expansions, the unit trusts underperformed all three benchmarks on average, but, during contractions, outperformed all three benchmarks on average. He concluded that "negative return performance of [American] domestic mutual funds is attributable to expansion and not recession periods". No reason was ventured for this phenomenon.

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6 Survivorship bias distorts apparent results by including only funds that have survived to certain points and neglecting the fact that some underperforming funds may have been discontinued. This skews results positively because funds are discontinued usually on the basis of poor performance.

4.2   SOUTH AFRICA

4.2.1   The findings of analysis of the South African unit trust industry are inconclusive. The earliest research undertaken on South African unit trusts was that of Du Plessis (1974) and Kerbel (1974). At this time, the South African unit trust industry was still in its infancy, so the authors were limited by data quantity and availability (Strebel, 1977). Du Plessis (op. cit.) only analysed two unit trusts and benchmarked them against each other, noting that the absolute returns had a positive relationship with the systematic risks accepted. Kerbel (op. cit.) investigated 10 unit trusts and concluded that all 10 unit trusts underperformed the benchmark—the JSE Actuaries All Share index—on a non-risk adjusted basis. He noted as well that the unit trusts were less volatile on average, and that adjusting the returns for risk may have resulted in different conclusions. He did not, however, investigate the performance on a risk-adjusted basis. Kerbel (op. cit.) did not propose any reasons for the underperformance of unit trust investment managers.

4.2.2   Gilbertson[7] and Taylor[8] analysed unit trust performance for the period 1970 to 1977 using the JSE Actuaries All Share index as a benchmark. Results were strongly in agreement. Looking at the risk-adjusted performance of 11 unit trusts, Gilbertson concluded that only two of the 11 exhibited better performance than the market, and that this outperformance was statistically insignificant. Taylor showed similar results and reported that, on average, the 10 unit trusts investigated returned 2,4% per annum less than the market although this was also not a statistically significant underperformance. No reasons were given for the observed underperformance.

4.2.3   In 1982, a more thorough investigation was carried out by Gilbertson & Vermaak (1982) who investigated 11 South African unit trusts over the period 1974 to 1981. They concluded that, on average, the performance of the unit trusts underperformed three different stock market indices, the JSE Actuaries All Share, Industrial and RDM-100 indices, in absolute terms. On a risk-adjusted basis, however, using the Treynor, Sharpe and Jenson measures of risk-adjusted returns, the unit trusts generally outperformed all three indices. The investigation also found one unit trust with persistent outperformance compared with the three market indices and compared with the other unit trusts.

4.2.4   From 1982, there was little research on unit trust performance until Knight & Firer (1989) published a paper measuring the performance of 10 South African unit trusts over the period January 1977 to December 1986. On average, the 10 unit trusts returned 2% per annum less than the JSE Actuaries All Share index, but this did not take into account any adjustments for risk. Once risk-adjusted returns, based on the CAPM, were taken into consideration, it was found that five unit trusts exhibited significant outperformance relative to the market. It was noted that these results give much stronger

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7 BP Gilbertson (unpublished). The performance of South African mutual funds: 1974–1981 Unpublished report, Johannesburg Consolidated Investment Company, Johannesburg, 1976. Available: www.iassa.co.za/articles/020_nov1982_05.pdf

8 CJ Taylor (unpublished). The performance of South African investment trusts and mutual funds. Unpublished MBA research report, School of Business Administration, University of the Witwatersrand, Johannesburg, 1977

evidence of outperformance than any other previous studies, such as Gilbertson & Vermaak (op. cit.), and that this might suggest that the South African market was not strong-form efficient at that time. It was also noted how outperformance might have been overstated, as upfront fees, which can be up to 5% of the investment amount, had not been taken into account. Meyer-Pretorius & Wolmarans (op. cit.), in contrast, took into account the effect of costs on unit trust performance between the years 1965 and 2005. They concluded that costs play a substantial role in the performance of unit trusts and erode all outperformance. Without costs, unit trusts outperformed the market by an average of 1,49% per annum on a non-risk-adjusted basis. After costs, unit trusts underperformed the market on average by 5,6% per annum, on a non-risk-adjusted basis. Meyer-Pretorius & Wolmarans (op. cit.) did not investigate unit trust performance on a risk-adjusted basis

5. ECONOMIC PERIODS

5.1   This paper investigates the period January 1994 to December 2012. This is further split into sub-periods, based on the economic cycle. Division of the research period into economic sub-periods is considered in the discussion that follows.

5.2   The starting year of 1994 was chosen based on research by Reddy & Thomson (2011). The year 1994 was shown to be the year in which the beta of the FTSE/All Share index was closest to the previous four quarters. This was one of the few periods investigated by Reddy & Thomson (op. cit.) where the systematic risk remained relatively unchanged. It was a period of relative stability in the market, making it a reasonable neutral starting point for the investigation.

5.3   Venter (2009; 2011) determined downward phases of the business cycle by analysing Business Cycle Indicators (BCIs) provided by the Reserve Bank of South Africa, as well as historical and current diffusion indices based on the BCIs. This approach is consistent with that of Kosowski (op. cit.).

5.4   The primary purpose of the BCIs is for the Reserve Bank of South Africa to determine turning points of the economic cycle. A variety of economic time series data is used for this purpose. There are three different BCIs, all of which are trend-adjusted (Venter, 2009):
– Leading BCI:[9] A forward-looking indicator which looks six to 12 months in the future and changes direction six to 12 months before a turning point in the business cycle.
– Coincident BCI:[10] The indicator coincides with the current business cycle and therefore changes direction at a similar time to the turning point of a business cycle.

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9   JC Venter & WS Pretorius. Note on the revision of composite leading and coincident business cycle indicators (2004). Available: http://bit.ly/NBdX5W. [30 May 2013]
10 The Conference Board. Business Cycle Indicators Handbook (2001). Available: www.conference-board.org/pdf_free/economics/bci/BCI-Handbook.pdf. [14 May 2013]

– Lagging BCI:[11] A backward-looking indicator which changes direction after the business cycle reached a turning point.

5.5   A diffusion index measures the extent of a change in a BCI. It assesses the proportion of an indicator's underlying components that are moving in the same direction as the indicator as a whole. The greater the number of components in agreement, the greater the probability of a change in economic cycle. This is reflected by a change in the diffusion index.[12] There are two diffusion indices (Venter & Prestorius, 2001):

– The current diffusion index: The deviation of the current diffusion index from its long-term trend is a quantitative indication of the cyclical movement in general economic activity. A diffusion index value of 100 is used as an indication of the long-term trend. An index value below 100 indicates that the economy is in a downward phase of the business cycle. An index value above 100 indicates that the economy is in an upward phase.

– The historical diffusion index: The historical diffusion index value for a particular month is obtained by expressing the number of increasing time series as a percentage of the total number of time series considered. An index value below 50 therefore indicates that the economy is in a downward phase of the business cycle. An index value above 50 indicates that the economy is in an upward phase.

5.6   We look at diffusion indices to determine the economic periods through the years 1994 to 2012. Figures 1 and 2 show the downturn periods as determined by Venter (2011) under the two methods described in ¶5.5.

5.7   Venter (2011) identified two periods of economic downturn over the period covered by this paper: January 1997 to August 1999, and December 2007 to August 2009.

5.8   The remaining periods (the growth periods) were split into a further two phases:
– periods of economic growth that are in line with the long-term trend, termed 'stable growth'; and
– periods of above-average economic growth where the growth is significantly higher than the long term average, termed 'above-average growth'.

5.9   From the beginning of 1994 to the end of 1996, the historical diffusion index was consistently higher than 50%, indicating a prolonged period of consistent economic growth. Since 1994, the historic diffusion index has increased rapidly, eventually reaching a point above the long-term trend by the end of 1996. Both these indicators suggest that the period from January 1994 to December 1996 was a period of above-average growth.

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11 JC Venter. Note on the revision and significance of the composite lagging business cycle indicator (2004). Available: http://bit.ly/1ntdvkx. [30 May 2013]
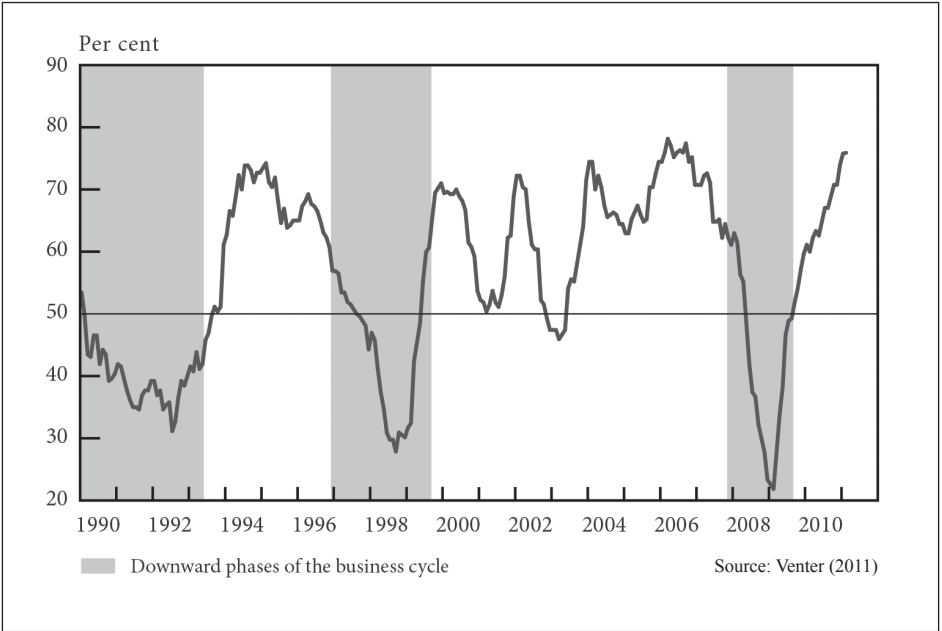12 The Conference Board, supra

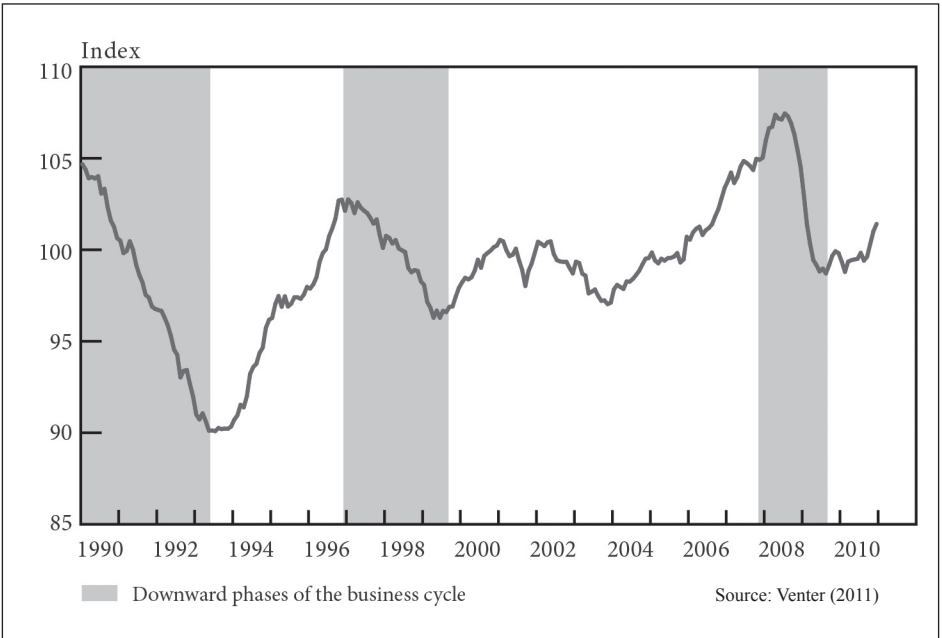Figure 1. Historical diffusion index

Figure 2. Current diffusion index (deviation from long-term trend)

5.10   The South African economy experienced a large expansion from September 1999 to November 2007. This expansion consisted of two distinctive periods (Venter, 2009).
– The period September 1999 to December 2003 had a "fairly moderate expansion" (Venter, 2009: 65). We define this period as stable.
– The period from January 2004 to November 2007 was a period of rapid growth. We define it as an above-average economic expansion.

5.11   The period after 2009 was not investigated by Venter (2009). The BCI indicators that he used show that September 2009 to December 2012 was a period of average economic growth. All three BCI indicators stayed flat, or increased marginally. Refer to Figure 3.

5.12   Table 1 below summarises the different economic periods, as used in this paper.

Table 1. Summary of periods and economic cycle

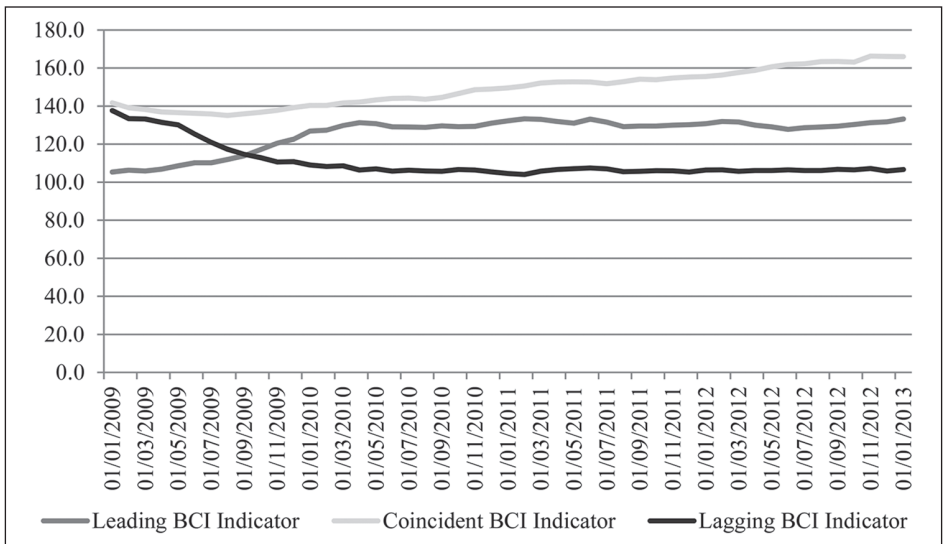| Period		Economic Cycle
Start	End	
January 1994	December 1996	Up
January 1997	August 1999	Down
September 1999	December 2003	Stable
January 2004	November 2007	Up
December 2007	August 2009	Down
September 2009	December 2012	Stable

Figure 3. Various Business Confidence Index (BCI) Indicators

6. GROWTH IN THE UNIT TRUST INDUSTRY

6.1 Warther (1995) showed that there is a positive correlation between unexpected cash-flows into the US equity mutual fund industry and equity market returns. As such, one may infer in the South African context that the increased cash-flows would encourage additional competition and thus that the number of unit trusts would increase in line with the general equity market. Figure 4 shows how the number of general equity unit trusts has increased over the investigation period January 1994 to December 2012.

6.2 During the period of above-average growth, from January 2004 to November 2007 (47 months), the number of unit trusts grew from 53 to 93, an increase of 40 (75%).

6.3 During the 47 months prior to the above-average economic growth, a period of stable growth, the number of unit trusts had increased from 37 to 53, an increase of 16 (43%).

6.4 During the 47 months after the above-average growth, a period of economic downturn and stable growth, the number of unit trusts had increased from 93 to 116, an increase of 23 (25%).

6.5 The number of general equity unit trusts added during a period of robust growth was almost triple the amount for the period prior (stable growth) and almost double the period after (downturn and stable growth). One would further expect this supply increase to be a response to greater demand from retail unit trust investors.
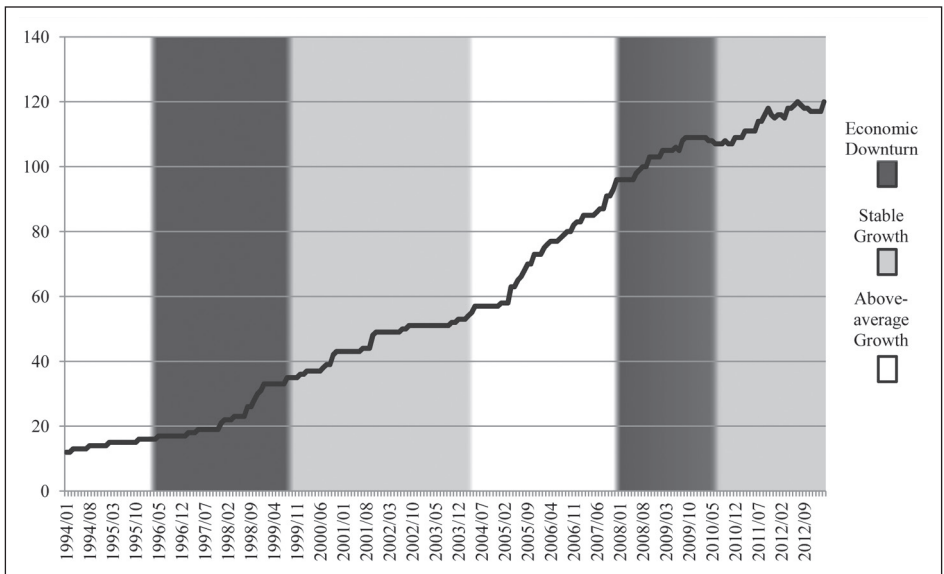

Figure 4. Growth in the unit trust industry

6.6   We might ask, however, whether the alpha generating capabilities of unit trust investment managers dampens or enhances this cyclical demand from retail unit trust investors. For example, if relative performance is strongly negative during economic upturns, this might dampen the demand for unit trusts during growth phases. The results from the investigation in this paper, as discussed in section 9, therefore need to be considered within this industry environment.

7.   DATA

7.1   Data was obtained from I-Net Bridge and Morningstar. All returns and interest rates are compounded continuously, unless otherwise stated. The unit trust data include all unit trusts over the period of the investigation and do not suffer from survivorship bias, which is raised as a concern in ¶4.1.2.

7.2   Monthly effective performances of South African general equity unit trusts were obtained from Morningstar. Performance figures are inclusive of re-invested dividends. The numbers obtained were converted into forces of interest to ensure technically accurate manipulation. All performance figures are quoted as a force of interest and calculated as follows:

$$R_{ij} = \ln(1 + h_{ij}).$$

where,

R_{ij} is the monthly force of interest for unit trust i in month j, inclusive of re-invested dividends.

h_{ij} is the monthly effective return of unit trust i in month j, inclusive of re-invested dividends.

7.3   Total monthly returns for the FTSE/JSE All Share Index were obtained from July 1995 to December 2012. Prior to July 1995, monthly returns from the JSE/Actuaries All Share Index were obtained from I-Net Bridge as the FTSE/JSE All Share was only created in July 1995.

7.4   Equities are acknowledged as being long-term investments. In order to determine a reasonable risk-free rate, therefore, the authors considered the most liquid long-term RSA Government Bond.[13] National Treasury, in their 2012/13 Debt Management Report, state that the R186 with redemption dates 2025, 2026 and 2027 is the most liquid long-term bond over the review period.[14] The Discounted Mean Term of this bond was approximately eight and half years, calculated at February 2013. We have used the

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13 The calculation of Jensen's alpha requires the use of a risk-free rate appropriate to the calculation at every point in time covered by the study.

14 National Treasury Republic of South Africa. Debt Management Report 2012/13. Available www.treasury.gov.za/publications/other/Debt%20Report%202012-13.pdf [12 February 2014]

monthly force of interest yields for 10-year zero-coupon South African Government bonds as the appropriate risk-free rate for domestic equities. The monthly yield used was a mid-point of the monthly opening and closing prices.

7.5   Transaction costs, in particular initial expenses related to buying unit trusts, were not included. The ongoing costs of running the unit trust as well as the performance fees are incorporated in the returns of unit trusts, as they are deducted from the unit trusts' net asset value. Ignoring these initial costs overstates the performance of unit trusts relative to the market. The extent to which it would overstate performance is difficult to quantify as each fund has different initial cost structures but may be significant, as indicated by our summary of research into this area in section 4. This may be an area for useful further research.

8.   THEORETICAL FRAMEWORK

8.1   The relative performance of South African general equity unit trusts was determined using the single-index model of Jensen's alpha. This reflects the relative performance of a unit trust with the theoretical risk-adjusted performance according to the CAPM. For the remainder of this paper, all references to 'alpha' refer specifically to Jensen's alpha as a measure of risk-adjusted performance.

8.2   The CAPM predicts returns to be linearly related to the amount of systematic risk taken, denoted by beta, which reflects the sensitivity of a unit trust relative to the market.

8.3   All interest rates and returns used are monthly continuously compounded rates and an alpha is calculated for every month under observation.

8.4   For a particular month, j, Jensen's alpha is calculated as follows:

$$\alpha_{ij} = R_{ij} - \left[R_{fj} + \beta_{iM} \left(R_{Mj} - R_{fj} \right) \right]$$

where:
   α_{ij} is Jensen's alpha for unit trust i at month j,
   R_{ij} is the return on unit trust i at month j,
   R_{fj} is the risk-free rate of return at month j, which is the yield on a 10-year zero-coupon South African government bond,
   R_{Mj} is the return on the market at month j, which uses the FTSE/JSE All Share Index as a proxy, and
   β_{iM} is the sensitivity of the unit trust i relative to the market throughout the period under investigation, expressed mathematically as

$$\beta_{iM} = \frac{Cov\left(R_i, R_m \right)}{Var\left(R_m \right)}$$

where the covariance and variance statistics are calculated historically for the period under investigation.

8.5   Relative performance during a specific period is tested using the two-tailed Student's *t*-test.[15] The Student's *t*-test should give reasonable results as Fama & French (2010) found that unit trust alphas are symmetrically distributed around zero. The Student's *t*-test is the most commonly used test for significance for performance measures such as Jensen's alpha.[16]

8.6   Formally stated, this paper tests the following hypothesis:
– Null hypothesis H_0: The relative performance is not significantly different from 0.
– Alternate hypothesis H_1: The relative performance differs significantly from 0.

– Test statistic: $t = \dfrac{\bar{\alpha}}{s / \sqrt{n}}$ distributed as a Student's *t*-distribution with $n-1$ degrees of freedom.

Where
  $\bar{\alpha}$ is the mean of the mean monthly Jensen's alpha for each unit trust for the period under investigation,[17]
  s is the sample standard deviation of the mean unit trust alphas, and
  n is the number of mean alphas, in other words the number of unit trusts in the sample.

8.7   All tests were performed at a five percent significance level.

8.8   A rejection of H_0, or equivalently a significant alpha value, indicates persistent under- or over-performance of unit trusts relative to the market, where the market is deemed to be appropriately represented by the FTSE/JSE All Share Index.

8.9   The Student's *t*-test may be applied in a variety of ways. For a scenario where there are *n* unit trusts and *m* monthly periods for the period under investigation, the Student's *t*-test may be applied to consider each economic sub-period, the primary focus of this paper, as expressed in the formula stated in ¶8.6. Practically, this was calculated as follows:
– betas were calculated across all months *m* for each unit trust *i*;
– Jensen's alpha was calculated individually for each unit trust *i* and each month *j*, using the beta discussed immediately above;
– a mean was calculated for each unit trust *i* across all *m* periods; and
– the mean and standard deviation for the Student's *t*-test were calculated on the mean discussed immediately above.

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15 The test is two-tailed because one cannot commit up-front to underperformance or out-performance during different economic cycles, as this is a primary aim of the research.
16 V le Sourd. Performance measurement for traditional investment. (2007). Edhec Risk and Asset Management Research Centre. Available from: http://bit.ly/1g6j87H . [01 August 2013]
17 A mean across both *i* and *j* for each economic sub-period investigated.

8.10   The Student's *t*-test also may be applied to the entire period under investigation with all relevant unit trusts included to determine whether, on average, unit trusts outperformed or underperformed the market over the whole observation period.[18] The same test may be applied to the values of the unit trusts' betas, where a significant difference from one would indicate whether unit trusts are more or less sensitive to the market.[19]

9.   RESULTS
9.1   PERIOD 1: JANUARY 1994 TO DECEMBER 1996 (ABOVE-AVERAGE GROWTH)

9.1.1   This covers a 36-month period. A total of 12 general equity unit trusts were investigated.

9.1.2   During this period, on a non-risk-adjusted basis, the FTSE/JSE All Share Index increased by 40.6% (force of interest, δ, 11.36% per annum). On average, unit trust values increased by 64% (δ = 16.49% per annum) during this period.

9.1.3   Using Jensen's alpha, nine unit trust funds outperformed and three underperformed. Of the nine, only three exhibited significant outperformance. None of the three underperformers showed significant underperformance during the period.

9.1.4   It is important to note up-front that this paper does not aim to test the appropriateness of Jensen's alpha as a measure of risk-adjusted performance. Nevertheless, the results of this paper could be distorted if Jensen's alpha were not an appropriate measure of risk-adjusted performance. The CAPM that underpins Jensen's alpha, as described in ¶8.1–8.4, assumes returns to be linearly related to the amount of systematic risk taken, denoted by beta. As such, once the systematic risk is removed from the returns, one would expect that the risk-adjusted return, Jensen's alpha, would be unaffected by the beta. A simple plot for each period is used to check visually for evidence of random dispersion around the betas. If linearity or grouping occurs, this could be an indication that other risk factors are affecting the returns and that CAPM is insufficient to produce genuine risk-adjusted returns. This is therefore an area for further research.

9.1.5   Figure 5 shows moderate dispersion of alphas, as expected.

9.1.6   On average, on a risk-adjusted basis, the unit trusts during this period showed outperformance of 0.29% per month (δ, 3.47% per annum). This was found to fall marginally outside the five percent significance level (*p*-value, 0.0259), therefore, on average, unit trust performance was not significantly different from the market during this period. Given that the *p*-value is marginally outside the 2.5% band we note that this result, although insignificant, may be an indication that unit trust performance in this period does differ from that of the market.

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18 For this purpose, the alphas of interest are the mean alphas for each month across all unit trusts in that month.

19 For this test, $\overline{x}$ would be replaced by $\overline{\beta}$, the average of beta values for the unit trusts during a specific period, *s* would be the sample variance of betas and *n* would be the number of unit trusts investigated during the period.
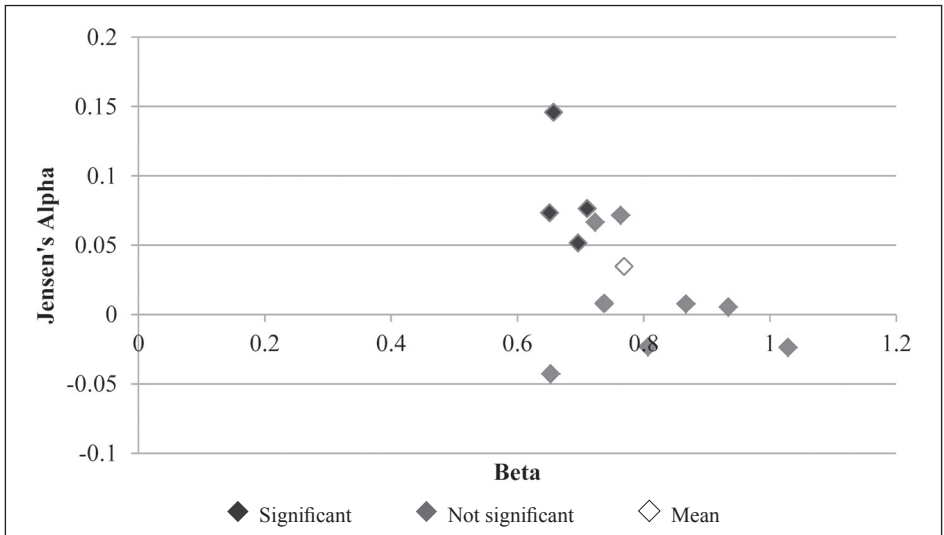
Figure 5. Plot of annualised alphas for period one

9.1.7 The average beta of the unit trusts during this time period was 0.7688 with a standard deviation of 0.1196. This result is significantly less than one at the five percent significance level (*p*-value less than 0.0001). We conclude that unit trusts during this period exhibited significantly lower systematic risk than the market as a whole.

9.2 PERIOD 2: JANUARY 1997 TO AUGUST 1999 (ECONOMIC DOWNTURN)

9.2.1 This covers a 32-month period. The performance of 17 general equity unit trusts was investigated.

9.2.2 During this period, in absolute terms, the market increased by 18.21% (δ, 6.27% per annum) and, on average, unit trusts increased by 11.00% during this period (δ, 3.91% per annum).

9.2.3 Using Jensen's alpha, five unit trusts outperformed, none with statistical significance and 12 underperformed, three of them significantly.

9.2.4 Figure 6 shows that the alphas appear to exhibit a broad negative relationship to the corresponding betas. Jensen's alpha may not therefore be wholly appropriate as a measure of outperformance, and the results must be considered with a degree of caution.

9.2.5 On average, on a risk-adjusted basis, the unit trusts during this period showed underperformance of –0.25% per month (δ, –3.02% per annum), significant at the five percent significance level (*p*-value, 0.0051). We conclude that, on average, unit trusts significantly underperformed the market during this period.

9.2.6 The average beta for this period was 0.9113 with a standard deviation of 0.1124, significantly less than 1 at the five percent significance level (*p*-value= 0.0025).
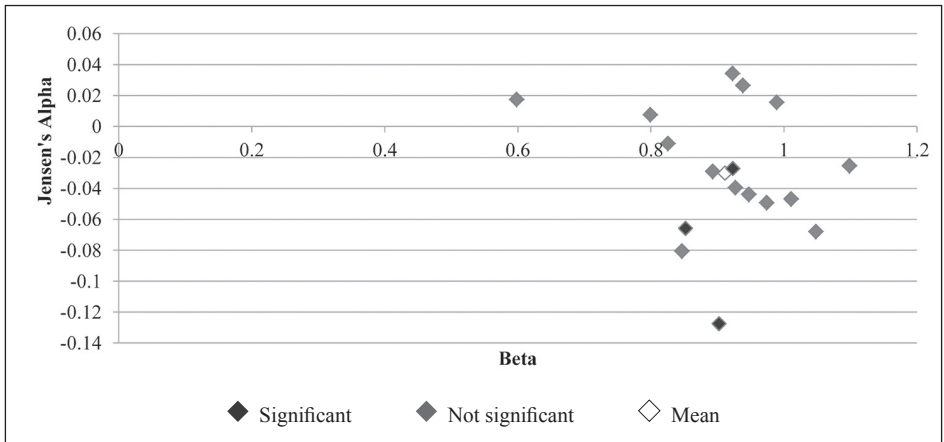
Figure 6. Plot of annualised alphas for period two

9.3 PERIOD 3: SEPTEMBER 1999 TO DECEMBER 2003 (STABLE GROWTH)

9.3.1 This covers a 52-month period. Some 35 general equity unit trusts were investigated.

9.3.2 During this period, in absolute terms, the market increased by 79.29% (δ, 13.47% annualised) and, on average, unit trusts increased by 80.45% (δ, 13.62% annualised).

9.3.3 Using Jensen's alpha as measure of relative performance, 17 unit trusts outperformed and 18 underperformed. Five funds exhibited significant outperformance and five significant underperformance.

9.3.4 Figure 7 shows that there are two distinct clusters of alpha returns over this period, those associated with a beta of great than 0.6, which seem to be evenly dispersed around zero and those associated with a beta of less than 0.6, which seem to have outperformed significantly. A beta around one is more likely to correspond with an alpha of zero as the portfolio is more aligned with the market portfolio. As the beta deviates from one, the portfolio is more dissimilar to the market and hence the corresponding alphas are more likely to be further away from zero.

9.3.5 The average value for Jensen's alpha of all unit trusts through this period was 0.06% per month (δ, 0.74% per annum). This was not found to be statistically different from an alpha of zero at the five percent significance level (*p*-value, 0.2458).

9.3.6 The average beta during the period was 0.7401 with a standard deviation of 0.1107, significantly less than 1 at the five percent significance level (*p*-value less than 0.0001).

9.4 PERIOD 4: JANUARY 2004 TO NOVEMBER 2007 (ABOVE-AVERAGE GROWTH)

9.4.1 This covers a 47-month period and includes the performance of 53 general equity unit trusts.

9.4.2   During this period, in absolute terms, the market increased by 225.10% (δ, 20.72% per annum) and, on average, unit trust values increased by 211.40% (δ, 19.11% per annum).

9.4.3   Using Jensen's alpha, all but one of the 53 unit trusts outperformed. Of the 52 that beat the market, 13 showed significant outperformance.

9.4.4   Figure 8 shows that the alphas appear to exhibit a much stronger negative relationship with the betas of the unit trusts, as compared with the previous periods investigated. Jensen's alpha may not therefore be wholly appropriate as an assessment of relative outperformance, and the results should be considered with a degree of caution.
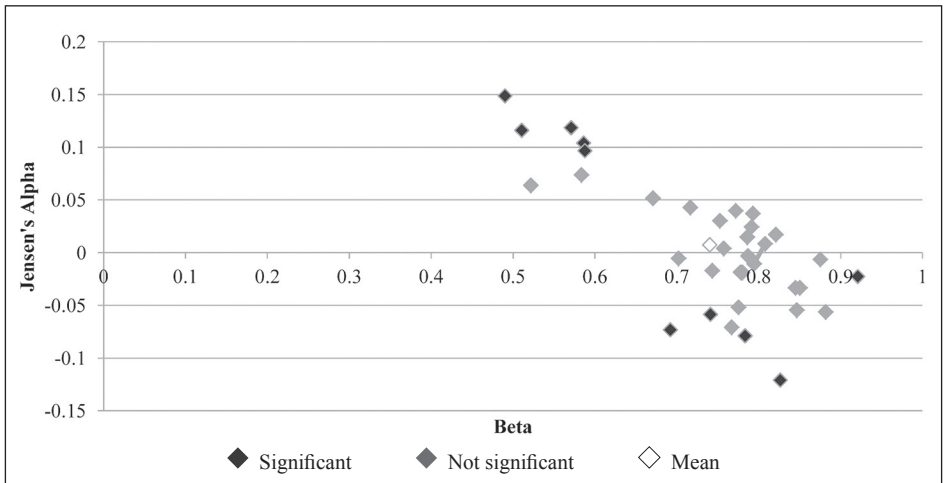

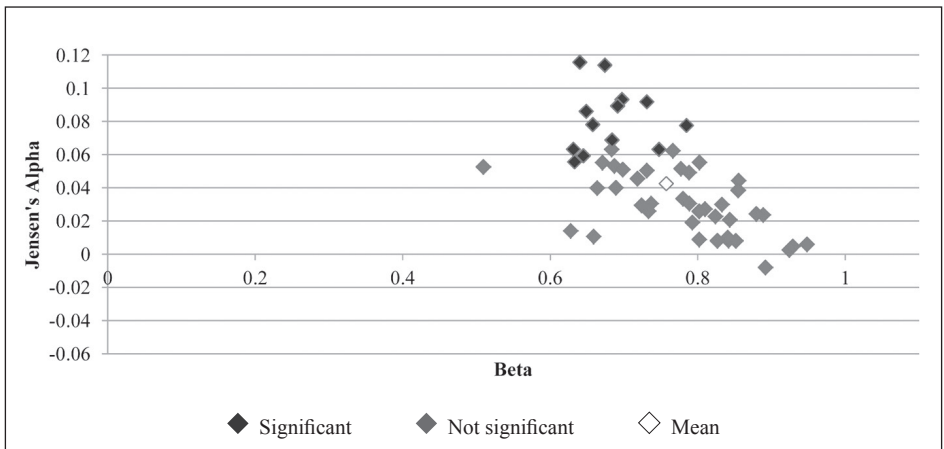Figure 7. Plot of annualised alphas for period three

Figure 8. Plot of annualised alphas for period four

9.4.5   The average calculated value of Jensen's alpha during the period was 0.35% per month (δ, 4.25% per annum), extremely significant at the five percent significance level (*p*-value less than 0.0001). We conclude therefore that, on average, unit trusts significantly outperformed the market during this period.

9.4.6   The average beta during this period was 0.7573 with a standard deviation of 0.0932. The average beta for this period was shown to be significantly less than 1 at the five percent significance level (*p*-value less than 0.0001). It is interesting to note that the period of greatest outperformance coincides with the period of greatest beta clustering, shown by the smallest observed standard deviation of 0.0932. Whilst this may be a statistical coincidence, it could also indicate that asset managers held similar portfolios with similar outperforming shares. This may speak to herd mentality, as considered in ¶10.1.6.3.

9.5   PERIOD 5: DECEMBER 2007 TO AUGUST 2009 (ECONOMIC DOWNTURN)

9.5.1   This covers a 21-month period. Some 92 general equity unit trusts were investigated during this period.

9.5.2   The market decreased in absolute terms over this period by 6.96% (δ, –3.85% per annum) and, on average, unit trusts decreased by 12.28% during this period (δ, –0.66% per annum).

9.5.3   Using Jensen's alpha, 28 unit trusts outperformed, none significantly, and 64 underperformed, six with statistical significance.

9.5.4   Figure 9 shows that the alphas were relatively evenly dispersed around zero, with the exception of a few outliers. In this period, the negative relationship between alpha and beta observed in earlier periods is less apparent.

9.5.5   Using Jensen's alpha, the average underperformance of unit trusts during this period was –0.25% per month (δ, –3.03% per annum), statistically significant
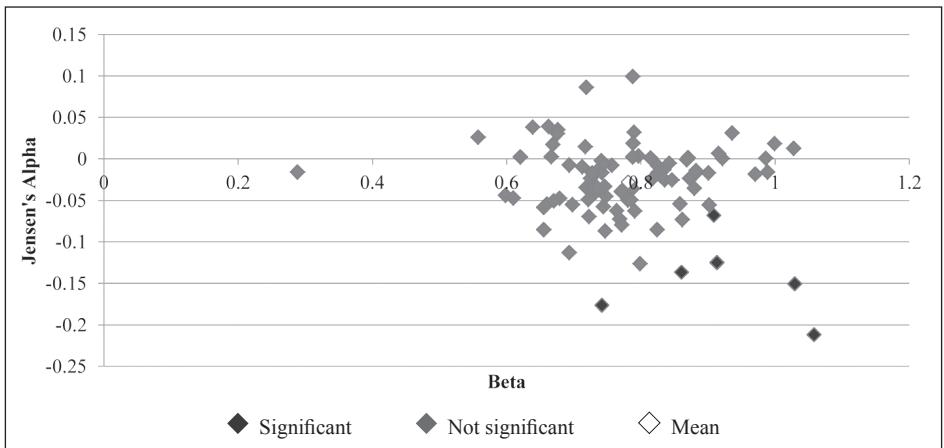

Figure 9. Plot of annualised alphas for period five

at the five percent level (p-value less than 0.0001). We conclude that, on average, unit trusts significantly underperformed the market during this period.

9.5.6   The average beta for this period was 0.7819 with a standard deviation of 0.1151. The average beta for this period was shown to be significantly less than 1 at the five percent level (p-value less than 0.0001).

9.6   PERIOD 6: SEPTEMBER 2009 TO DECEMBER 2012 (STABLE GROWTH)

9.6.1   This covers a 40-month period. We analysed the performance of 92 general equity unit trusts.

9.6.2   During this period, in absolute terms, the market increased by 72.72% (δ, 16.40% per annum) and, on average, unit trusts increased by 59.85% during this period (δ, 14.07% per annum).

9.6.3   Using Jensen's alpha, 40 unit trusts beat the market and 52 underperformed. Of the 40 that beat the market, eight showed significant outperformance while 11 of the 52 underperformers exhibited significant underperformance.

9.6.4   Figure 10 shows that the alphas were relatively evenly dispersed around zero.

9.6.5   Using Jensen's alpha, the average performance of unit trusts during this period was –0.03% per month (δ, –0.31% per annum). This was not found to be significantly different from the market performance at the five percent significance level (p-value, 0.1308).

9.6.6   The average beta for this period was 0.7642 with a standard deviation of 0.1259. The average beta for this period was found to be less than 1 with statistical significance at the five percent significance level (p-value less than 0.0001).
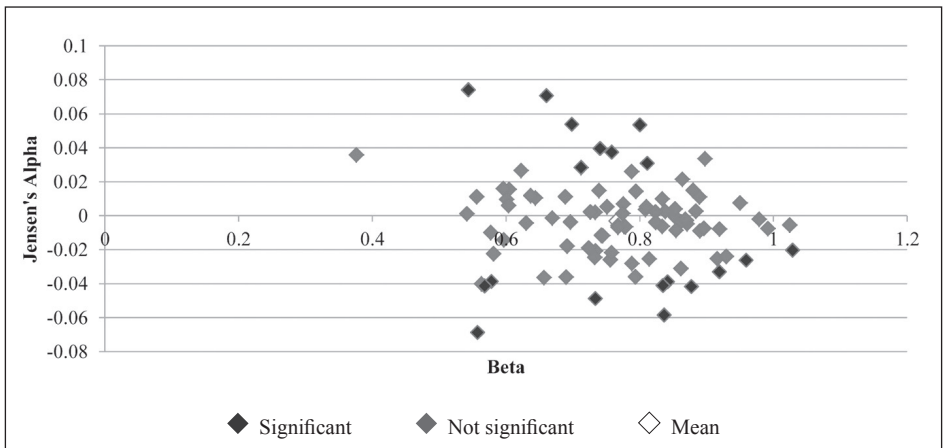

Figure 10. Plot of annualised alphas for period six

9.7   OVERALL PERIOD: JANUARY 1994 TO DECEMBER 2012

9.7.1   During the entire period of 228 months, the market increased by 1456% (δ, 14.44% per annum) and, on average, unit trusts increased by 1334% during this period (δ, 14.01% per annum).

9.7.2   On a risk-adjusted basis, unit trusts showed slight outperformance relative to the market with an average alpha of 0.99% per annum (*p*-value, 0.2095). This is mainly attributable to the performance of the fourth period, characterised by robust economic growth, in which unit trusts outperformed their benchmarks significantly. The outperformance is not statistically significant at the five percent level, however, and therefore the null hypothesis cannot be rejected.

9.7.3   Another factor leading to the outperformance is the length of the different economic periods. Average and above-average growth periods tend to be longer than periods of economic downturn, so even though unit trusts underperformed during downturns, the relative weighting of these in the whole period is quite small. This is a common characteristic of market cycles in a growing economy.

9.7.4   The inclusion of initial unit trust charges (if any) would reduce the relative outperformance, although the impact of this charge would diminish with increasing unit trust holding periods. Since equity investment is usually seen with a long-term time horizon, it would ordinarily be reasonable to state that the effect of initial charges would become marginal over time. One, however, needs to consider the effect of customer switching in the unit trust industry practically implying a shorter investment horizon.

10.   ANALYSIS

10.1   This section provides an analysis of results as presented in section 9.

10.2   RELATIVE PERFORMANCE (JENSEN'S ALPHA)

10.2.1   A summary of the results from section 9 are displayed in Table 2 below.

Table 2. Test results summary for Jensen's alpha

Period	Economic Period	Average Alpha (per annum)	Significance at 5% confidence
1	Up	3.47%	Marginal
2	Down	−3.02%	Significant
3	Stable	0.74%	Not significant
4	Up	4.25%	Significant
5	Down	−3.03%	Significant
6	Stable	−0.31%	Not significant

10.2.2   There were two periods of stable economic growth: a 36-month period starting from January 1994 and a 52-month period starting from September 1999. One period has a slight underperformance and the other had slight outperformance. The risk-adjusted performances of unit trusts in both periods, however, were not significantly

different from the corresponding performances of the market. The performance of unit trusts compared to the market during periods of stable economic growth is inconclusive. One cannot therefore reliably distinguish, in the overall performance characteristics of unit trust investment managers, between skill and luck during stable economic conditions.

10.2.3   There were two periods of economic downturn: a 32-month period starting from January 1997 and a 21-month period starting from December 2007. During both these periods, unit trust investment managers significantly underperformed relative to the market on a risk-adjusted basis. We have statistical support for the position that unit trust investment managers generate negative alpha during economic downturns.

10.2.4   There were two periods of robust growth: a 36-month period from January 1994 and a 47-month period from January 2004. During these periods, on a risk-adjusted basis, significant and persistent outperformance of the market was exhibited by unit trust investment managers on average. We have statistical support for the thesis that unit trust investment managers generate positive alpha during economic expansion.

10.2.5   A possible explanation for the persistent outperformance during periods of robust growth is that fund managers select their stocks based on a momentum strategy under which recent past winners are purchased or retained (Grinblatt, Titman & Wermers, 1996). This strategy creates further forward momentum in stock prices, resulting ultimately in outperformance relative to the market (Brown, Wei & Wermers, 2007).[20]

10.2.6   Behavioural finance provides a number of suggestions on the momentum effect (Fama, 1998).

10.2.6.1   Confirmation bias and overreaction: Investors tend to look for information that agrees with their original opinions or thoughts and then to overact to this information. During periods of robust economic growth, investors overlook negative information (if any) on their stock selections and focus mainly on positive news of their stock selections. Not only do they ignore or downplay the negatives, but they overreact to the positives, thinking the news is better than it actually is.

10.2.6.2   Overconfidence: As a unit trust investment manager's selected stocks start increasing in price, they tend to grow overconfident in their stock picking abilities or overconfident in their choice of stocks, which results in further purchases of those stocks, resulting in increased prices.

10.2.6.3   Herd mentality: Investment managers tend to invest in a similar portfolio of stocks. Brown, Wei & Wermers (op. cit.) attribute this to their inclination to invest in line with analyst stock recommendations. The managers rely on fund inflows for fees. Fund flows in turn are mainly dependent on their performance relative to other unit trusts. The top performers in a year usually receive the most inflows in the following year (Malkiel, 1995). Considering this, they are disposed towards holding similar stocks to competitors to mitigate the risk of significantly underperforming their peers.

10.2.7   The persistent underperformance during economic downturns imme-diately after the above-average growth periods could also be attributed to the momentum

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20 The momentum effect is observed only if there are more buyers of 'momentum' stocks than there are sellers.

investing argument, working in reverse. Behavioural finance theories such as those considered earlier contribute to market bubbles, as they result in the unrealistic increase in stock prices (Shiller, 2003), in turn causing stocks to become overvalued. Once the economy cools down, the market correction causes the possibly overvalued, previously outperforming stocks to drop in price by more than the relative drop in the market. This may have caused the significant underperformance of unit trusts during that period.

10.2.8   The above reasoning should be confirmed through a beta analysis, discussed below.

10.3   SYSTEMATIC RISK (BETAS)
10.3.1   A summary of the beta values of the economic periods are summarised in Table 3 below.

Table 3. Test results summary for beta

Period	Economic Period	Average Beta	Significantly different from 1 at 5%?
1	Up	0.7688	Yes
2	Down	0.9113	Yes
3	Stable	0.7401	Yes
4	Up	0.7573	Yes
5	Down	0.7819	Yes
6	Stable	0.7642	Yes

10.3.2   All betas were found to be significantly less than one. Unit trusts, in other words, during each observed period exhibited lower systematic risk than the market as a whole.

10.3.3   Falkenstein (1996) provides a possible explanation for this. He concluded that fund managers generally select stocks that have lower transaction costs than the market average, are more liquid and exhibit lower volatility. We are not convinced that this is the primary explanation, however, and consider this in ¶10.2.5.

10.3.4   An interesting conundrum is created when one considers the alpha generation discussed in ¶10.2 within the ambit of the betas for each observed period. One would expect that the periods of momentum investing would coincide with periods of betas significantly greater than one, i.e. unit trust investment managers taking on greater systematic risk. This has not been the case. The lower systematic risk of these unit trusts has not historically harmed the alpha generation during economic growth phases.

10.3.5   Ferson & Schadt (1996) provide a compelling explanation for the observation of low betas in unit trusts. Periods of strong market performance induce net new money into the unit trust industry. Unit trust asset managers are then left with cash balances – natural beta dampeners – which they need to invest prudently, so as not to unduly influence underlying equity share prices. A key point here is that residual cash balances exist as a result of unexpected cash flows. If cash flows can be correctly anticipated then the asset manager can set up an asset trading schedule to deal with these

cash flows and cash balances would not be needed. We find this the most compelling explanation for the low beta values observed in up markets, as shown in Table 3.

10.3.6   The betas experienced in down markets also need to be examined, however. Using the argument in ¶10.3.5, above, one would expect cash outflows during periods of poor market performance. This potentially explains the highest betas that are observed during economic downturns. The betas during down markets are still less than one, though. We suggest that this is a result of the residual cash balances held by unit trusts to aid their liquidity management.

10.3.7   The unexpected cash flows distort analysis regarding the abilities of asset managers to take greater systematic risk during up markets and reducing systematic risk during the corresponding down periods. This observation is consistent with Ferson & Schadt's (op. cit.) conclusions. It becomes difficult to ascertain whether momentum investing is the primary cause of the alpha patterns, as discussed in ¶10.2, even if the strategy may have an impact.

10.3.8   The implication of the lower observed betas for investors seeking a lower risk strategy is discussed in ¶11.5.

10.4   COMPARISON WITH PREVIOUS RESEARCH

10.4.1   Considering the whole investigation period, the research findings of this paper are consistent with previous research done. There is no statistical support to indicate that the alpha generating capabilities of unit trust managers are significantly different from zero over long periods of assessment.

10.4.2   The research findings of this paper do differ from previous research with regard to the alpha generation during different economic periods. In ¶4.1.5 we explain that the research from the US indicated that investment managers outperform during economic downturns and underperform during economic growth phases. This paper has shown the opposite for South Africa. The authors have suggested that momentum investing, as discussed in ¶10.1.7, could be a principal reason for this result and may be more pertinent in the South African market due to a less efficient market and/or less saturation by asset managers. This is an area for further, deeper research.

11.   UNIT TRUST INVESTMENT STRATEGY

11.1   Looking at the entire period under investigation, a risk-adjusted outperformance of 0.99% by unit trusts is not sufficient to conclude that unit trusts are a better or worse investment than a passive investment strategy.

11.2   The results of this investigation suggest that an effective investment strategy using South African general equity unit trusts, based on the observed market characteristics, would be to buy unit trusts at the start of a period of robust growth and sell before an economic downturn.

11.3   The challenge with this strategy is determining the start and end of different economic periods in advance. This has historically been extremely difficult to gauge, although

there are tools such as the Leading BCI to give an indication. One could also argue that if one has the ability to accurately judge economic cycles in advance, then there is potentially greater investment return available from tactical asset allocation with asset classes.

11.4   Another important consideration is that the alpha generation of individual unit trusts varies. It is important therefore to have a portfolio of unit trusts to diversify the specific risk of unit trust investment managers. Funds of funds unit trusts do offer these diversification benefits, but at the cost of an additional layer of fees. An investor looking for an investment displaying lower systematic risk may consider investing in a diversified basket of South African general equity unit trusts

12.   CONCLUSIONS

12.1   A number of conclusions, which link to our initial research questions, can be drawn from the analysis of results.

12.2   RESEARCH QUESTIONS

12.2.1   Over the entire investigation period, January 1994 to December 2012, the risk-adjusted outperformance of South African general equity unit trust investment managers of 0.99% was not statistically significant at the five percent level. This outperformance is statistically indistinguishable from luck.

12.2.2   The risk-adjusted performances of unit trust investment managers during periods of stable economic growth were also statistically indistinguishable from the performances of the market.

12.2.3   During periods of economic downturn, however, unit trust investment managers significantly underperformed relative to the market, on a risk-adjusted basis.

12.2.4   In contrast, during periods of robust economic growth, significant risk-adjusted outperformance of the market was exhibited by unit trust investment managers on average.

12.2.5   The alpha generation pattern may be explained through argument of a momentum investment strategy. The betas of the unit trusts, however, were significantly less than one over all sub-periods, which is not consistent with a momentum argument. We suggest that the effect of cash holdings distorts the observed beta values.

12.2.6   Based on the data gathered, an effective investment strategy using South African general equity unit trusts would be to buy unit trusts at the start of a period of robust growth and sell before an economic downturn. The problem with this strategy is determining the start and end of different economic periods in advance.

12.3   ADDITIONAL RESEARCH

12.3.1   Investigate the appropriateness of a market benchmark for South African general equity unit trusts. In particular, what the implications are of unit trust benchmarks being different to the market benchmark?

12.3.2   Apply more complex risk-adjusted models to the performance data, such as Carhart's (op. cit.) four-factor model.

12.3.3   Adjust the models to allow for the effect of the cash holdings, which are required to deal with unexpected cash flows.

12.3.4   Investigate the alpha generation capabilities of investment managers for other asset classes.

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