INDICATORS OF CORPORATE FINANCIAL SUCCESS: SIMILAR STUDIES IN SOUTH AFRICA AND THE USA, DIFFERENT RESULTS

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Purpose: The aim of this study was to test whether findings by Johnson and Soenen (2003) regarding indicators of successful companies in the USA also apply to South African JSE-listed companies.

Problem investigated: To date, no South African study has tried to determine the indicators of the financial success of local companies specifically along the lines of Johnson and Soenen's (2003) study. Determining whether the indicators found to be most highly significant in the US study also apply in South Africa would constitute valuable information in the South African context.

Approach: The study tested the significance of the linear relationships between possible indicators of financial success and three measures of financial success for South African companies and compared them to the results of the US study.

Findings: The findings revealed that the relationships are far less significant for South African companies.

Value of research: The study highlighted the fact that indicators of financial success for US companies are not necessarily contributors to the success of South African listed companies and that models developed in different environments should therefore be used with caution when applied in South Africa.

Conclusion: Further studies need to be undertaken in order to identify the most significant South African indicators of corporate financial success.

Key words: Indicators of financial success; Sharpe ratio; Jensen's alpha; Economic Value Added (EVA); Market-to-book ratio; Sustainable growth rate.

INTRODUCTION

In their article titled 'Indicators of successful companies', Johnson and Soenen (2003) identified the characteristics of successful US companies using the monthly Compustat data of 478 US listed companies. They used three measures of financial success, namely the Sharpe ratio, Jensen's alpha and Economic Value Added (EVA). Johnson and Soenen (2003) identified ten possible indicators of financial success which they hypothesized might have an impact on measures of financial success. These possible indicators were

- Book-to-market;
- Company size;
- Sustainable growth rate;
- Profitability;
- Capital structure;
- Liquidity;
- The cash conversion cycle;
- Earnings volatility;
- Research and development expenditures; and
- Advertising expenditures.

The findings of Johnson and Soenen (2003) suggest that, based on strong linear relationships relative to all three measures of success, the most successful US companies are large, profitable companies with efficient working capital management and a degree of uniqueness.

This parallel study conducted on the annual data of South African listed companies has not found the same strong linear relationships. This leads to the inference that, based on the South African data available, the indicators that lead to financial success for US companies do not seem to have the same significant impact on the financial success of South African companies.
The remainder of the study is set out as follows:

- Measures of financial success;
- Possible indicators of financially successful companies;
- Aim of the study and hypotheses;
- Data and research method;
- Data analysis;
- Results of empirical study; and
- Conclusions.

MEASURES OF FINANCIAL SUCCESS

The Sharpe (1966, 1994) ratio and the Jensen (1969) measure (also called Jensen's alpha) are both based on the capital asset pricing model (CAPM) and represent financial performance from the perspective of a portfolio manager. EVA, which was popularised by Stewart (1991) and Stern (1993), is an internal measure of financial performance determined after the full cost of capital of a company has been taken into account. Each of these measures is discussed in more detail below.

The Sharpe measure

The Sharpe measure (S) is determined as follows by Sharpe (1966, 1994) and Sharpe (in Brown and Reilly, 2009:943):

$$S_i = (R_i – RFR) / \sigma_i$$

Where

R_i = the rate of return on a specific share *i*
RFR = the risk-free rate
σ_i = the standard deviation of returns for share *i*

The Sharpe measure therefore represents the returns earned above the risk-free rate (excess returns), per unit of total risk. It is evident from the equation that the effect of changes in the risk-free rate, which affects all returns, is eliminated. This measure also rewards the ability to diversify, since a decrease in the total risk, as expressed by the standard deviation in the denominator, would lead to an increase in S. Cardinali and Nason (2010:15) elaborate on the usefulness of the Sharpe ratio for comparative purposes, but point out that 'it is one very blunt tool in the investors' bag'.

Jensen's alpha

Jensen's alpha (Jensen, 1969) is a performance measure derived from a comparison between actual returns and the returns required to compensate for a certain level of systematic risk. In order to determine alpha (α), the following regression model, using excess returns, must be estimated:

$$R_{jt} - RFR = \alpha_i + \beta_j(R_{mt} – RFR) + e_{jt}$$

Where

α_i = y-intercept (Jensen's alpha)
β_j = the systematic risk (beta) of share or portfolio *j*
R_{mt} = the expected return on the market portfolio of risky assets

e_{jt} = a random error term

Body, Kane and Marcus (2009:826), using a slightly different notation, but the same terms, to express the direct calculation of Jensen's alpha as follows:

$$\alpha_p = r_p - [r_f + \beta_p(r_m - r_f)]$$

From the equation above, it can be deduced that investments in shares or portfolios that realize returns in line with the inherent systematic risk of the investment would have an alpha value of zero. Stated differently, in a linear regression run over time between the realized excess returns and the expected excess returns, the y-intercept (alpha) is expected to yield a nil value. A positive alpha indicates good performance (Indro, Jiang, Patuwo & Zhang, 1999), whereas a negative alpha signals inadequate performance. A significant positive alpha indicates consistent actual returns above the returns required according to the systematic risk of the share and therefore represents superior performance. Conversely, a significant negative alpha indicates poor performance.

Economic Value Added (EVA)

EVA is a measure of economic profit which was originally trade-marked by Bennett Stewart III (Stewart, 1991) and Joel Stern (Stern, 1993), who worked together at the consulting company Stern Stewart in the 1980s. The calculation of EVA is very similar to that of the well-known 'residual income' measure used as a benchmark for divisional performance for some time. The formula for EVA is as follows:

EVA = Performance spread x Invested Capital
= (ROIC – WACC) x IC

Where

ROIC = Return on invested capital
WACC = Weighted average cost of capital
IC = Invested Capital (at the beginning of the year)

EVA differs from normal accounting profits in two key respects. Firstly, a number of adjustments are required to reported financial statements in order for them to reflect 'an investor's point of view'. Secondly, the cost of owners' capital (equity), which is not deducted from profits in the normal Income Statement (currently referred to as Statement of Comprehensive Income), is also taken into account as an opportunity cost in order to determine EVA.

Claims by Stern and Stewart touting EVA as the best driver of external shareholder value were followed by the implementation of EVA by top companies in the USA and in other countries worldwide. Wood (2000:9) found that, by the year 2000, more than 400 South African organizations had already implemented EVA. Numerous studies which supported EVA as having the closest link with market returns include ones by O'Byrne (1996:119), Uyemura, Kantor and Pettit (1996:98), Makelainen (1998:15) and Millman (2003:40). However, some studies also refute the claims about EVA, for example, ones by Biddle, Bowen and Wallace (1999:69), Copeland (2002) and Tsuji (2007).

Johnson and Soenen (2003:364) used the EVA amount divided by total assets in order to eliminate the size bias inherent in the EVA amount. More recently, Stewart (2009) came up with a variation of the initial EVA model, labelling it 'EVA Momentum' and claiming it to be 'the single best ratio of corporate performance' (Stewart, 2009:85). EVA Momentum is calculated by dividing the change in EVA from the previous year to the current year by last year's sales. For the purposes of the current study, preference is given to EVA divided by total assets in order to facilitate a comparison between South African and US companies.

POSSIBLE INDICATORS OF FINANCIALLY SUCCESSFUL COMPANIES

Johnson and Soenen (2003:365) used ten possible indicators of financial success. However, in South Africa, one of these indicators, namely advertising cost, is not required to be disclosed in companies' financial statements. Therefore only the remaining nine indicators are used for the purposes of the South African study. A brief discussion of each of the possible indicators of success is given below.

Market-to-Book (MB) Ratio

Fama and French (1992) found that the book-to-market ratios of individual shares have the ability to explain cross-sectional variations in share returns. In subsequent research, Fama and French (1998a,b) showed that companies with high book-to-market ratios (value shares) have higher returns than companies with low market-to-book ratios (growth shares).
In a more recent study, Fama and French (2006:514) concluded that their findings were again in line with existing evidence that 'book-to-market is a powerful variable describing the cross section of average stock returns'. In South Africa, the inverse of the book-to-market ratio, namely the market-to-book ratio (MB) is better known and based on past research, it is expected that companies with low MBs would have higher returns than companies with high MBs.

Size (TA)

Company size is measured by the number of total assets in the balance sheet. Fama and French (1992) found that share returns are negatively related to size and positively related to book-to-market ratios. In their study based on the Japanese Stock Exchange, it was found by Chan, Hamao and Lakonishok (1993:68) that there was a significant relationship between returns and four fundamental variables, namely earnings yield, size, book-to-market ratio and cash flow yield. Book-to-market was found to be statistically the most significant of the four. Based on these findings, it is not altogether clear whether company size can be expected to have a positive or negative effect on the measures of success.

Sustainable Growth Rate (SG)

A company's ability to grow consistently in future is determined by its profitability and financial policies. Higgens (1977) defined a company's sustainable growth rate (SGR) as the highest growth rate a company can maintain without changing its financial leverage. According to Correia, Flynn, Uliana and Wormald (2007:5-41), the SGR, developed by Zakon of the Boston consulting group, contains four input variables. These are the profitability, as measured by the return on assets after tax, the financial leverage (Debt/Equity), the profit retention ratio (after dividends) and the tax rate.
Raisch and Von Krogh (2007:65) indicate that in their study 'the sustainable growth rate was determined by equating annual capital requirements with capital generation potential'. Assuming a target capital structure, the SGR is the rate at which a company can grow using only retained profits as equity and combining them with an appropriate portion of long-term debt. Because the assumptions of the SGR formula seldom apply in practice, the average sales for the last five years are used as a proxy for sustainable growth in the data analysis of the listed companies in the current study.

Profitability (ROA)

According to Doyle (1994:124), profitability is the basis for defining 'success'. Profitability is therefore considered an important goal for most firms, as well as a versatile performance measurement tool that can be expressed in absolute terms. It can also be used as a ratio, such as ROA. Profitability also increases a company's ability to grow. Growth has commonly been measured by the rate at which a firm generates earnings relative to its assets at hand (Johnson & Soenen, 2003:365). According to Eriksen and Knudsen (2003:195), 'ROA is the most consistent measure of profitability'.

Capital Structure (CS)

Since the seminal work by Modigliani and Miller (1958), the effect that leverage has on firm value has been widely researched and debated. Rajan and Zingales (1995:1429) suggest that financial leverage may be represented by the capital structure ratio of debt to total assets. Borrowed funds invested at a higher rate of return than the fixed interest rate paid generate positive returns for shareholders because of the tax deductibility of interest expenses (Johnson & Soenen, 2003:365). This, in turn, is believed to increase the value of the firm. By contrast, Fama and French (1998a,b) conclude that there is a negative relationship between debt and firm value. Aggarwal and Zhao (2007:296) also found that leverage is 'unambiguously negatively associated with firm value'.

Liquidity (LIQ)

Financial ratios such as the current ratio and the quick ratio are commonly applied to measure liquidity and ultimately financial success. However, due to the static nature of financial ratios, Soenen (1993:53) argues that liquidity is affected more by the operating cash flow generated by a company's assets than by the liquidation value of those assets. Johnson and Soenen (2003:365) refer to financial slack as having sufficient funds available for good positive-NPV investment opportunities that may arise. Liquidity is measured by calculating the ratio of cash and bank balances as a fraction of total assets. Although this may be of great value to a firm in achieving financial success, Johnson and Soenen (2003:366) also warn against having too much cash on hand, as this may lead to poor cash management and low returns on cash funds, as well as high opportunity cost. To achieve financial success, an optimal balance therefore needs to be reached between the return that can be generated by a high LIQ-ratio and the risks involved. Raheman and Nasr (2007:280) argue that maintaining the liquidity of the firm is equally important to the goal of maximizing profits.

Cash Conversion Cycle (CCC)

Effective working capital management plays a crucial role in both the liquidity and profitability of a firm (Shin & Soenen, 1998:37). The cash cycle concept (CCC) was introduced by Gitman (1974) as a fundamental element in managing working capital effectively. Jose, Lancaster and Stevens (1996:34) define the CCC as 'a dynamic measure of ongoing liquidity' which represents the time between cash disbursements for resources and cash proceeds from product sales. It is described as dynamic, since it takes into account both balance sheet and income statement information. Raheman and Nasr (2007:280) state that the longer the CCC, the higher the sales and the higher the profits. Balancing risk and efficiency will ensure that an optimal level of working capital is achieved (Nazir & Afza, 2009:20). In their study of 204 Pakistani firms, Nazir and Afza (2009:27) concluded that an aggressive working capital management policy, where a low level of current assets or a high level of current liabilities is maintained, has a negative effect on profitability as well as on liquidity. However, substantial levels of current assets may have a similar negative effect.

Earnings volatility (SDEBIT)

The volatility of historical earnings has a direct bearing on the risk perceived by shareholders and therefore on the value and returns of a company. Volatility in earnings is caused by internal factors such as cost structures (operating leverage) and debt levels (financial leverage), as well as external factors such as economic conditions and competition. For the purposes of this study, earnings volatility is measured by the standard deviation of the annual differences in earnings before interest and tax (EBIT), divided by the five-year average in total assets.

Research and Development (R&D)

R&D investment is crucial for a firm to maintain its competitive advantage, especially in a highly technological environment (Johnson & Soenen, 2003:366). Where product cycles are shorter and competition is severe, firms in such industries have no option other than either to keep inventing new patents or to become more innovative by constantly introducing new products (Artz, Norman, Hatfield & Cardinal, 2010:725). According to Eriksen and Knudsen (2003:192), 'competitive advantages are derived from firm-specific, specialized factors that are difficult to imitate or substitute'. Hence the need for constant long-term investment in R&D. Apart from increasing the profitability that a firm hopes to achieve through continuous investment in R&D, the perception of the firm as a firm with increasing growth potential is also boosted. This is based on research by Chan, Martin and Kensinger (1990:268), who found that although R&D expenditure decreases earnings, the market responds favourably towards firms with an aggressive R&D strategy.

AIM OF THE STUDY AND HYPOTHESES

This study endeavoured to test the strength of linear relationships between the three measures of success for US companies and the indicators of successful companies used by Johnson and Soenen (2003), applied to South African companies, and comparing the results to those for the US companies in Johnson and Soenen's (2003) study.

The first hypothesis was that the findings of the two studies would be similar.

Hypothesis 1: The indicators that lead to the financial success of South African companies are similar to those that lead to the financial success of US companies.

In other words, there are also strong linear relationships between the three measures of success and the same possible indicators of success for both South African and US companies. Arguments backing this hypothesis would support the feasibility of comparing South African companies to US companies. These may include the fact that the South African JSE Securities Exchange is among the top twenty in the world (17^{th} in a JSE Survey, 2003) in terms of the market capitalisation of its equity market and that South Africa was recently placed first in a world-wide ranking (out of 139 countries) for the regulation of security exchanges (JSE Press Release Details, 2010).

The second hypothesis, which is a competing hypothesis relative to the first, was that there are no similarities between the behaviour of South African companies and that of US companies.

Hypothesis 2: The indicators that lead to the financial success of South African companies are different from those that lead to the financial success of US companies.

If Hypothesis 2 was true, this would be reflected in the fact that linear relationships for the South African companies would be weak and/or different from those of the US companies. This hypothesis might be backed by the argument that the South African economy is still a developing economy and therefore cannot be compared to the developed economy of the USA. In addition, because of much lower trading volumes and other factors alluded to in the concluding section, the data on South African listed companies may not be as reliable as that on the US companies.

DATA AND RESEARCH METHOD

The source of the information used in the study was the McGregor BFA, a major financial data provider in South Africa. The ten-year period from 1999 to 2008 was selected in order to meet the requirements for depth and recency of data. As a first step, it was decided to start with all the companies listed on the JSE when the study began in 2009, a total of 402.

Next, mining companies were eliminated on the grounds that they own diminishing assets, and therefore critical measures like EVA cannot be determined reliably for them. Financial companies were also eliminated on the basis of the different financial accounting requirements for these companies, which culminate in reported financial statements that are significantly different from those of the other companies in the database. Financial companies also have a tendency to create secret reserves, which makes them unsuitable for comparison with other types of companies. The industrial and other companies that remained totalled 274. After the further elimination of companies with incomplete data, the final sample in the database came to 66 listed companies.

The SPSS statistical software package as well as the E.Views package were used to run multiple linear regressions on each of the three measures of financial success (one at a time) and the nine possible indicators of financial success.

DATA ANALYSIS

Three different models are analysed, based on the three measures of success, namely the *Sharpe* measure, *Jensen's* Alpha and *EVA*. An initial test for poolability (whether the data should be combined into a single pool and analysed as a panel) – testing a pooled regression against running individual regressions – could not be conducted because the variable *R&D* was perfectly cointegrated with the constant. We suspect that this was due to the high prevalence of zeros for the variable *R&D*. Since the above test is only one of a number of poolability tests that are available, we conducted tests which looked at the choice between (i) a pooled model versus individual (cross-section) effects; (ii) a pooled model versus individual (time-series) effects; and (iii) a pooled model versus individual (cross-section and time-series) effects.

All three tests mentioned above worked along the same lines in that they compare a restricted model (a behavioural equation with the same parameters over time and companies) with an unrestricted model (the same behavioural equation with different parameters over time and companies) – in essence, an F-test (Baltagi, 2008:57). In each case, the null hypothesis (H_0) was that the cross-section or time-series or both parameters are all equal to zero. In our analysis, we looked at the F-values of each test and compared them to a critical F-value ($F_{critical}$) of 1.32669. Therefore, we rejected the null hypothesis for these tests for the situation where the F-value was greater than the critical F-value. The null hypotheses for tests (i) to (iii) could not be rejected, so we had a situation where different firms did not have any characteristic inherent in their structure that accounted for differences in their performance, and where the time periods did not account for any of the variation between the different firms. Therefore, we simply analysed individual regressions and abandoned a panel data approach altogether.

If it was found that the null hypotheses for tests (i) to (iii) could not be rejected, we would have a situation where different firms do not have any characteristic inherent in their structure that accounts for differences in their performance, and where the time periods do not account for any of the variation between the different firms. Therefore, we could simply analyse individual regressions and abandon a panel data approach altogether.

Secondly, we looked at the endogeneity (or misspecification) of each pooled model. Endogeneity refers to a correlation between the error term and one or more of the independent variables. In other words, there are individual or time effects which are correlated with the independent variables. For this we used the Hausman test. Under the Hausman test, the H_0 is

$E(u_{it} / X_{it}) = 0$

In other words, the error term and independent variables are uncorrelated. In terms of data analysis and modelling, the presence of endogeneity was our greatest concern. If endogeneity was found to be present in any of the models, this would call for the use of an instrumental variable (IV) approach. Under IV methodology, one needs to find a variable which is correlated with the endogenous explanatory variables but does not itself belong in the explanatory equation, that is, it is completely uncorrelated with any of the independent variables. As a first option, a one-period lag of the endogenous variable is often used as the IV. If this fails to improve the results under the Hausman test, other IVs can also be considered. As a last resort, one would have to find a new variable that is not correlated to the independent variables at all. This is normally not an easy task – and in a South African context, near impossible – and, therefore, we would naturally want to avoid such an approach.

Thirdly, we looked at serial correlation. Serial correlation (SC) refers to a situation where a variable is correlated with its own lags or the lags of other dependent variables in the model. We tested for this using the Durbin-Watson (DW) test for panel data, by using the methodology and critical value prescribed by Bhargava, Franzini and Narendranathan (1982). This methodology allowed us to identify a decision rule to which the test statistic could then be compared. Since there were ten time periods (T), the critical values were derived from Table II in the paper by Bhargava *et al.* (1982) with the following additional criteria: number of cross-sections (H) approximated to 50 and the number of independent repressors set to 9. The critical values were therefore, d_{PL} = 1.8164 and d_{PU} = 1.8945. The decision rule for serial correlation was based on the following:

|--- +SC ---|--- Inconclusive ---|---No SC ---|---No SC ---|-- Inconclusive ---|--- – SC ---|

0	d_{PL}	d_{PU}	2	$4 - d_{PU}$	$4 - d_{PL}$	4
0	1.8164	1.8945	2	2.1055	2.1836	4

To correct for serial correlation, one can employ the Prais-Winston transformation, where the error term is corrected using a relevant transformation. The transformed model is then run and tested for serial correlation. If serial correlation is again found, the transformed (or updated) model is transformed once again. The procedure is repeated iteratively until serial correlation is no longer present.

Fourthly, we considered heteroskedasticity, which refers to non-constant variances related to the error term in the model. Heteroskedacity is a problem because it implies that there is great variability in the model; in other words, parameter estimates do not converge to their actual values. Again, as with the poolability test, we could not conduct the test for heteroskedasticity on the data, because of the high prevalence of the zeros under the R&D variable. Therefore, we corrected for potential heteroskedasticity using White's cross-section coefficient variance method. This weighting system corrects for heteroskedasticity. The correct weight to use depends on the structure of the panel. One looks at the number of cross-sections (*N*) and the number of time-periods (*T*). In this case, we had a situation where $N > T$, which prompted the use of period weights. In our analysis, we adjusted for heteroskedasticity, even though we were unable to test for it. If there was heteroskedasticity, this would then correct for it. If no heteroskedasticity was present, the corrections would alter the structure and features of the data only minimally (Gujarati, 1995).

Lastly, stationarity tests were done on the data. A non-stationary process has a variable variance and a mean that does not return to a long-run mean over time, whereas a stationary process reverts to a constant long-term mean and has a constant variance, independent of time. Non-stationary behaviour can be related to trends, cycles, random walks or combinations of the three. Using non-stationary time series data in financial models produces unreliable and spurious results (i.e. may indicate a relationship between two variables where one does not exist) and leads to poor understanding and forecasting. The solution is to transform the data so that it becomes stationary. This can be done by either differencing (if the process is a random walk with or without a drift), or by de-trending (if the data exhibits a deterministic trend). The disadvantage of differencing is that the process loses one observation each time the difference is taken.

The panel approach (O'Connell, 2007; De Jager, 2008) also helps, though the panel unit root tests have been criticized because they assume cross-sectional independence. Non-stationary panel data models came about in response to the low power of tests (failing to reject the null hypothesis when the null hypothesis is in fact false) and unavailability of data or degrees of freedom. When testing for stationarity, the null hypothesis (H_0) for all the tests used in the analysis is non-stationarity (Baltagi 2008:137-168). Unit root tests on variables were done at a 'level with individual intercept and trend'. The Levin, Lin and Chu (LLC) test and the Breitung t-stat assume a common unit process for all cross-sections, whereas the Ima, Pesaran and Shin (IPS), ADF Fisher and PP Fisher tests assume individual unit root process for cross-sections. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The results for the above tests are summarised below. Note that the stationarity tests are summarised in Table 1, after the individual results for each of the dependent variables.

Sharpe

The results for the model using the *Sharpe* measure as a dependent variable can be summarised as follows:

Poolability

(i) Pooled model versus individual (cross-section) effects
$F\text{-stat} = 1.0838 < F_{critical} = 1.32669$

The H_0 that all cross-section parameters are zero is thus not rejected. It is therefore concluded that cross-sections are homogenous and that the model does not require the introduction of individual cross-section effects in the fixed effects specification.

(ii) Pooled model versus individual (time-series) effects
$F\text{-stat} = 24.2363 > F_{critical} = 1.32669$

The H_0 that all time-series parameters are zero is therefore rejected. Hence, it is concluded that time periods have unique differences which are not accounted for in the model – dynamic adjustments occur in the panel. Time-series effects are thus included in the fixed effects model.

(iii) Pooled model versus individual (cross-section and time-series) effects
F-stat = 4.1224 > $F_{critical}$ = 1.32669

The H_0 that all cross-section and time-series parameters are zero is therefore rejected. Cross-sections are heterogeneous, and dynamic adjustments occur in the panel. It is concluded that both cross-section and time-series effects should be included in the fixed effects model.

Endogeneity

p-value = 0.0349 < α = 0.05

Therefore, the H_0 has to be rejected and it has to be concluded that endogeneity is present; in other words, the model is misspecified. The use of an IV is required in this regression.

Serial correlation

The DW test statistic (d_p = 1.7020) falls between 0 and 1.8164, indicating the existence of positive serial correlation.

Jensen's alpha

The results for the model using the *Jensen*'s Alpha measure as a dependent variable can be summarised as follows:

(i) Pooled model versus individual (cross-section) effects
F-stat = 0.9621 < $F_{critical}$ = 1.32669

The H_0 that all cross-section parameters are zero was thus not rejected. Therefore, it is concluded that cross-sections are homogenous and that the model does not require the introduction of individual cross-section effects in the fixed effects specification.

(ii) Pooled model versus individual (time-series) effects
F-stat = 7.6466 > $F_{critical}$ = 1.32669

The H_0 that all time-series parameters are zero was therefore rejected. Hence, it is concluded that time periods display unique differences which are not accounted for in the model; in other words, dynamic adjustments take place in the panel. Time-series effects are thus included in the fixed effects model.

(iii) Pooled model versus individual (cross-section and time-series) effects
F-stat = 1.8371 > $F_{critical}$ = 1.32669

The H_0 that all cross-section and time-series parameters are zero was therefore rejected. Cross-sections are heterogeneous, and dynamic adjustments take place in the panel. It is concluded that both cross-section and time-series effects should be included in the fixed effects model.

Endogeneity

p-value = 0.4658 > α = 0.05

Therefore, the H_0 was not rejected and no endogeneity is present. The model is correctly specified.

Serial correlation

The DW test statistic (d_p = 1.9302) falls between 1.8945 and 2, indicating that no serial correlation was present.

Economic Value Added (EVA)

The results for the model using the Economic Value Added (*EVA*) measure as a dependent variable can be summarised as follows:

(i) Pooled model versus individual (cross-section) effects
F-stat = 36.2590 > $F_{critical}$ = 1.32669

The H_0 that all cross-section parameters are zero was therefore rejected. Thus it is concluded that cross-sections are heterogeneous, which calls for the introduction of individual cross-section effects in the fixed effects specification.

(ii) Pooled model versus individual (time-series) effects
F-stat = 1.3383 > $F_{critical}$ = 1.32669
The H_0 that all time-series parameters are zero was therefore rejected. Hence, it is concluded that time periods have unique differences which are not accounted for in the model, namely dynamic adjustments take place in the panel. Time-series effects are therefore included in the fixed effects model.

(iii) Pooled model versus individual (cross-section and time-series) effects
F-stat = 32.0324 > $F_{critical}$ = 1.32669
The H_0 that all cross-section and time-series parameters are zero was therefore rejected. Cross-sections are heterogeneous, and dynamic adjustments take place in the panel. It is concluded that both cross-section and time-series effects should be included in the fixed effects model.

Endogeneity
p-value = 0.0690 > α = 0.05
Therefore, the H_0 was not rejected and no endogeneity was present. The model is correctly specified.

Serial correlation
The DW test statistic (d_p = 1.0899) falls between 0 and 1.8164, indicating the existence of positive serial correlation.

Stationarity

The stationarity results for all variables are summarised below.

Table 1: Stationarity results

VARIABLE	LLC	BREITUNG T-STAT	IPS	ADF FISHER	PP FISHER	CONCLUSION
SHARPE	-16.3312***	-3.34524***	-2.51302***	212.190***	349.608***	*Reject H_0 and conclude panel is stationary*
JENSEN	-24.0708***	-0.82380 {-3.10233***}	-5.16060***	302.026***	421.956***	*Reject H_0 and conclude panel is stationary, except for Breitung t-stat which becomes stationary after differencing.*
EVA	-18.6710***	4.38920 {-9.34742***}	-2.09215**	231.408***	280.646***	*Reject H_0 and conclude panel is stationary, except for Breitung t-stat which becomes stationary after differencing.*
MTB	-11.9848***	5.00345	-0.83423 (1.48701***)	209.345***	251.793***	*Reject H_0 and conclude panel is stationary, except for IPS which becomes stationary after differencing. Breitung t-stat remains with a unit*

						root even after differencing twice.
RD	-13.8894***	-1.58065*	-2.21739**	105.340***	145.738***	*Reject H_0 and conclude panel is stationary*
ROA	-6.63468***	5.36859 {-6.34415***}	0.64057 (3.73042***)	142.541 (288.501***)	179.471***	*Panel only becomes stationary after differencing for three of the tests, therefore fail to reject H_0 for stationarity.*
CCC	-15.9417***	0.13996 (-1.92109***)	-1.62787*	196.863***	233.913***	*Reject H_0 and conclude panel is stationary, except for Breitung t-stat which becomes stationary after differencing.*
CS	-14.5403***	5.28873 (-1.86044***)	-1.96995***	212.863***	245.489***	*Reject H_0 and conclude panel is stationary, except for Breitung t-stat which becomes stationary after differencing.*
SG	-17.4144***	3.27905 {-5.87908***}	-0.99528 (4.53441***)	186.184***	276.303***	*Reject H_0 and conclude panel is stationary, except Breitung & IPS tests which become stationary after differencing.*
SDEBIT	-6.33507***	5.00444 {-3.78534***}	1.36798 (2.98525***)	104.950 (229.119***)	140.514 (346.395***)	*Panel only becomes stationary after differencing for four of the tests, therefore fail to reject H_0 for stationarity.*
LIQ	-13.0164***	1.22074 (-3.20349***)	-1.16809 (4.77337***)	179.567***	200.176***	*Reject H_0 and conclude panel is stationary, except Breitung & IPS tests which become stationary after differencing.*
TA	-112.320***	10.3458	-6.05620***	149.341 (254.599***)	109.641 (330.777***)	*Panel only becomes stationary after differencing for three of the tests, therefore fail to reject H_0 for stationarity.*

Differencing results in parenthesis: () = 1st difference; {} = 2nd difference

*** Significant at a 1% level

** Significant at a 5% level

* Significant at a 10% level

Table 2: Summary of results

	Sharpe	Jensen's Alpha	Economic Value Added (EVA)
Poolability			
(i) Individual (cross-section) effects	Do not include	Do not include	Include
(ii) Individual (time-series) effects	Include	Include	Include
(iii) Individual (cross-section and time-series) effects	Include	Include	Include
Endogeneity			
(i) Hausman Test	Misspecified	Correctly specified	Correctly specified
Serial correlation			
(i) Durbin-Watson	Positive SC	No SC	Positive SC
Heteroskedasticity			
Test for heteroskedasticity	-	-	-
Stationarity			
Levin, Lin and Chu (LLC) test	Stationary	Stationary	Stationary
Breitung T-stat test	Stationary	Non-stationary	Non-stationary
Im, Pesaran and Shin (IPS) test	Stationary	Stationary	Stationary
ADF Fisher test	Stationary	Stationary	Stationary
PP Fisher test	Stationary	Stationary	Stationary
Adjusted R^2			
Uncorrected model	0.004543	-0.001994	0.193624
Corrected model	0.296630	0.085490	0.764296

Corrections and conclusions of data analysis

Removing the zeros in *R&D* may allow for poolability and heteroskedasticity tests to be run, but this may fundamentally alter the structure of the data. If the zeros in that variable simply represent a lack of data, then this should not be a problem. However, if the zeros are significant (showing that the firm does not spend any money on research and development), then changing the data points will change the 'information' contained in the variable *R&D*.

Heteroskedasticity has been corrected for as described above.

Serial correlation

After correcting for serial correlation, the results show the following:

- **Sharpe**
  Corrections were made for serial correlation and the model was run again. The Durbin Watson test was inconclusive, but an alternative test, the fixed effects LM test, indicated no first order serial correlation:
  LM = -0.335648 < 1.65 [N(0,1) critical value]
  D_P = 1.848783 (falls between 1.8164 and 1.8945)
- **EVA**
  Corrections were made for serial correlation and the model was run again. Both the Durbin Watson and fixed effects LM test still showed a significant presence of serial correlation. We

could continue the iterative method till serial correlation disappeared, but with the small number of time values, there was a danger of differencing the model away:
LM = 4.924914 > 1.65 (critical value)
D_P = 1.302865 (falls between 0 and 1.8164)

- **Stationarity**
  Stationarity was corrected for by taking the appropriate action, as mentioned above.
- **Corrected Versus Uncorrected Model**
  From the adjusted R^2 value, one can deduce that data adjustments have a significant effect on the explanatory power of the models. However, based on this analysis, the Sharpe ratio cannot be used as a dependent variable, because of the existence of endogeneity. A marked improvement was seen in the explanatory power of the EVA model after the data adjustments.

RESULTS OF THE EMPIRICAL STUDY

The results of the regressions based on data on South African listed companies are presented in Table 3.

Table 3: Regression results of South African companies

Variable	Jensen's α		EVA / TA		Sharpe	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	.000	.822	-.063	.000	.540	.000
MTB	-5.425E-5	.908	.006 **	.020	-.025	.133
TA	-3.376E-11	.822	-4.232E-10	.611	-5.147E-9	.337
SG	.002	.799	.215 ***	.000	-.233	.416
ROA	-.014	.169	.376 ***	.000	.553	.119
CS	-.008	.348	-.259 ***	.000	-.285	.365
LIQ	.001	.911	-.092	.168	-.228	.597
CCC	1.932E-5	.439	-7.345E-5	.595	-.002 *	.056
SDEBIT	.022 *	.055	-.107 *	.094	-.567	.169
RD	.099	.823	-2.208	.370	8.947	.573

** Significance at a 10% level;*
*** Significance at a 5% level; and*
**** Significance at a 1% level.*
The independent variables are defined as follows:
C = constant;
MTB = market to book;
TA = Total assets, a proxy for company size;
SG = Sales growth measured as the 5 year compound growth rate;
ROA = Return on assets, measured as (5-year average operating income)/(5-year average total assets);
CS = Capital structure, measured as (long-term debt)/total assets;
LIQ = Liquidity is measured as (cash + marketable securities)/total assets;
CCC = Cash Conversion Cycle, measured as (inventories + amounts receivable – amounts payable) x 360 / sales;
SDEBIT = (standard deviation of earnings before interest and tax over 5 years)/(5-year average of total assets);
RD = (R&D expenses)/sales.

In general, the results based on the South African companies are not very encouraging as there seem to be significant relationships between some possible indicators of financial success, but only with one of the three chosen measures of success, namely EVA/TA. The indicators which proved to be significant relative to EVA/TA at a 1% level were sales growth, return on assets and capital structure.

The economic plausibility of these relationships appears to be justified. Sales growth and profitability both have positive coefficients, which indicate that increases in these indicators would lead to increases in EVA/TA. The negative coefficient of capital structure indicates that increases in debt relative to assets would have a negative impact on EVA/TA, which also makes economic sense if the companies in the final data base have high levels of financial gearing. The indicators were not found to show a highly significant relationship with the other measures of success, Jensen's alpha and the Sharpe ratio. The descriptive statistics of the regressions of the indicators of financial success and each of the measures of financial success are included as Appendix A.
The results of Johnson and Soenen's (2003) study, based on US companies, are set out in Table 4.

Table 4: Regression results of US companies

Variable	Jensen's α		EVA / TA		Sharpe	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	-.076	.00	-.102	.00	-.001	.94
BM	.013 ***	.00	.009 *	.08	-.024 ***	.01
TA	3.65E-7 ***	.00	-5.79E-7 ***	.00	9.5E-7 ***	.00
SG	.015 ***	.01	.023 ***	.00	.040 ***	.00
ROA	.129 ***	.00	.631 ***	.00	.663 ***	.00
CS	.004	.75	.025 *	.06	.007	.76
LIQ	-.002	.87	-.023	.17	-.030	.32
CCC	-4.3E-5 ***	.01	-5.8E-5 ***	.00	-.000 ***	.00
SDEBIT	-.000 **	.04	-.000 *	.21	-.000	.21
RD	-.038	.33	-.157 ***	.00	-.009	.91
AD	.075 **	.02	.104 ***	.01	.379 ***	.00

Source: Adapted from Johnson and Soenen (2003:367)

The independent variables are defined as the same as those in Table 1, with the exception of the following:

- BM = Book to market, instead of market to book as used in Table 1; and
- AD = (advertising expenses)/(sales), as a proxy for company uniqueness.

It is apparent from Table 2 that there are significant relationships between the possible indicators of success and all three of the measures of success. The possible indicators that stand out as those with the most significant relationships are total assets (size), return on assets (profitability), cash conversion cycle (working capital management) and advertising cost (company uniqueness).
A comparison of the two sets of results indicates that the indicators of success that have the most significant impact on US companies do not have the same impact on South African companies, based on the data available.

CONCLUSIONS

The study by Johnson and Soenen (2003) covered a period of 17 years and incorporated 478 companies listed in the USA. Monthly data were used in the analysis and this constitutes a very comprehensive database. The results of the US study showed that the strongest indicators of successful companies were company size, profitability, working capital management and a degree of company uniqueness. The current study, based on South African listed companies, has yielded less convincing results. Only one indicator of success, namely EVA/TA, was found to exhibit significant statistical relationships with some of the possible drivers of success. These drivers were sales growth, return on assets, capital structure and the market-to-book ratio. Based on the findings one has to conclude that the indicators that proved to contribute significantly to financial success in the US study do not have the same significance in the South African study. Consequently, Hypothesis 1 is rejected and Hypothesis 2 is accepted.

Possible reasons for the differences between the results between the two studies are the following:

- The sizes of the databases differ significantly (66 companies versus 478);
- The time span of the data is also not the same (South Africa 10 years, USA 17 years);
- The reporting periods are dissimilar (annual in South Africa versus monthly in the USA);
- The unavailability of data for some South African listed companies (a preceding 5-year period was required to calculate the standard deviation of EBIT, resulting in 15 years of complete data required to determine the values for the 10-year period used. Many local companies have not been listed that long);
- The unreliability of certain parameters (i.e. the calculation of the beta-factor required to determine EVA could be questionable because of low trading volumes for some South African companies); and
- The difference in the efficiency of the two share markets.

Some alternatives that could be explored in further studies include using

- other measures of financial success (for instance, instead of the Sharpe ratio, the Treynor ratio can be used, or instead of using EVA/TA, EVA Momentum could be used);
- other possible indicators of financial success or leaving out some of the ones used in this study; and
- a larger sample size of useful data of more companies – even monthly data could probably be assembled with more success at a later stage.

Finally, it is hoped that the results of this study will be useful in future efforts to find the real indicators of financial success for South African companies.

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APPENDIX A: DESCRIPTIVE STATISTICS

Descriptive Statistics

	Mean	Std. Deviation	N
SHARPE	.376747	1.0501094	660
MTB	2.316481	2.7259265	660
TA	4.927817E6	8.1457271E6	660
SG	.121133	.1533275	660
ROA	.174530	.1302156	660
CS	.124579	.1475949	660
LIQ	.121231	.1059315	660
CCC	26.007858	50.0344758	660
SDEBIT	.088799	.1111010	660
RD/S's	.001141	.0026956	660

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA[a]	.	Enter

a. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.133[a]	.018	.004	1.0479223

a. Predictors: (Constant), RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.907	9	1.434	1.306	.230[a]
	Residual	713.792	650	1.098		
	Total	726.699	659			

a. Predictors: (Constant), RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA
b. Dependent variable: SHARPE

Correlations

		SHARPE	MTB	TA	SG	ROA	CS	LIQ	CCC	SDEBIT	RD/S's
Pearson Correlation	SHARPE	1.000	-.037	-.042	-.023	.017	-.057	-.005	-.064	-.066	.008
	MTB	-.037	1.000	.053	.188	.314	-.032	.231	-.196	-.028	.112
	TA	-.042	.053	1.000	.108	.086	.191	-.174	.096	-.104	.172
	SG	-.023	.188	.108	1.000	.267	-.047	.035	.035	-.192	-.006
	ROA	.017	.314	.086	.267	1.000	.134	.080	.149	.035	.120
	CS	-.057	-.032	.191	-.047	.134	1.000	-.211	.093	.313	-.042
	LIQ	-.005	.231	-.174	.035	.080	-.211	1.000	-.260	.103	-.076
	CCC	-.064	-.196	.096	.035	.149	.093	-.260	1.000	.096	.114
	SDEBIT	-.066	-.028	-.104	-.192	.035	.313	.103	.096	1.000	.062
	RD/S's	.008	.112	.172	-.006	.120	-.042	-.076	.114	.062	1.000
Sig. (1-tailed)	SHARPE	.	.174	.139	.280	.333	.071	.445	.050	.044	.422
	MTB	.174	.	.088	.000	.000	.204	.000	.000	.239	.002
	TA	.139	.088	.	.003	.013	.000	.000	.007	.004	.000
	SG	.280	.000	.003	.	.000	.113	.187	.187	.000	.440
	ROA	.333	.000	.013	.000	.	.000	.020	.000	.188	.001
	CS	.071	.204	.000	.113	.000	.	.000	.008	.000	.139
	LIQ	.445	.000	.000	.187	.020	.000	.	.000	.004	.025
	CCC	.050	.000	.007	.187	.000	.008	.000	.	.007	.002
	SDEBIT	.044	.239	.004	.000	.188	.000	.004	.007	.	.055
	RD/S's	.422	.002	.000	.440	.001	.139	.025	.002	.055	.

Descriptive Statistics

	Mean	Std. Deviation	N
JENSEN	-.001345	.0293534	660
MTB	2.316481	2.7259265	660
TA	4.927817E6	8.1457271E6	660
SG	.121133	.1533275	660
ROA	.174530	.1302156	660
CS	.124579	.1475949	660
LIQ	.121231	.1059315	660
CCC	26.007858	50.0344758	660
SDEBIT	.088799	.1111010	660
RD/S's	.001141	.0026956	660

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA[a]	.	Enter

a. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.108[a]	.012	-.002	.0293826

a. Predictors: (Constant), RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	9	.001	.854	.566[a]
	Residual	.561	650	.001		
	Total	.568	659			

a. Predictors: (Constant), RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA

b. Dependent variable: JENSEN

Correlations

		JENSEN	MTB	TA	SG	ROA	CS	LIQ	CCC	SDEBIT	RD/S's
Pearson Correlation	JENSEN	1.000	-.028	-.026	-.020	-.056	-.024	.009	.028	.072	.010
	MTB	-.028	1.000	.053	.188	.314	-.032	.231	-.196	-.028	.112
	TA	-.026	.053	1.000	.108	.086	.191	-.174	.096	-.104	.172
	SG	-.020	.188	.108	1.000	.267	-.047	.035	.035	-.192	-.006
	ROA	-.056	.314	.086	.267	1.000	.134	.080	.149	.035	.120
	CS	-.024	-.032	.191	-.047	.134	1.000	-.211	.093	.313	-.042
	LIQ	.009	.231	-.174	.035	.080	-.211	1.000	-.260	.103	-.076
	CCC	.028	-.196	.096	.035	.149	.093	-.260	1.000	.096	.114
	SDEBIT	.072	-.028	-.104	-.192	.035	.313	.103	.096	1.000	.062
	RD/S's	.010	.112	.172	-.006	.120	-.042	-.076	.114	.062	1.000
Sig. (1-tailed)	JENSEN	.	.238	.248	.301	.074	.269	.409	.234	.032	.399
	MTB	.238	.	.088	.000	.000	.204	.000	.000	.239	.002
	TA	.248	.088	.	.003	.013	.000	.000	.007	.004	.000
	SG	.301	.000	.003	.	.000	.113	.187	.187	.000	.440
	ROA	.074	.000	.013	.000	.	.000	.020	.000	.188	.001
	CS	.269	.204	.000	.113	.000	.	.000	.008	.000	.139
	LIQ	.409	.000	.000	.187	.020	.000	.	.000	.004	.025
	CCC	.234	.000	.007	.187	.000	.008	.000	.	.007	.002
	SDEBIT	.032	.239	.004	.000	.188	.000	.004	.007	.	.055
	RD/S's	.399	.002	.000	.440	.001	.139	.025	.002	.055	.

Descriptive Statistics

	Mean	Std. Deviation	N
?EVA/TA	-.016861	.1810393	660
MTB	2.316481	2.7259265	660
TA	4.927817E6	8.1457271E6	660
SG	.121133	.1533275	660
ROA	.174530	.1302156	660
CS	.124579	.1475949	660
LIQ	.121231	.1059315	660
CCC	26.007858	50.0344758	660
SDEBIT	.088799	.1111010	660
RD/S's	.001141	.0026956	660

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA[a]	.	Enter

a. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.452[a]	.205	.194	.1625704

a. Predictors: (Constant), RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.420	9	.491	18.582	.000[a]
	Residual	17.179	650	.026		
	Total	21.599	659			

a. Predictors: (Constant), RD/S's, SG, CS, CCC, TA, MTB, LIQ, SDEBIT, ROA

b. Dependent variable: EVA/TA

Correlations

		?EVA/TA	MTB	TA	SG	ROA	CS	LIQ	CCC	SDEBIT	RD/S's
Pearson Correlation	?EVA/TA	1.000	.206	-.003	.289	.304	-.200	.044	-.009	-.167	.012
	MTB	.206	1.000	.053	.188	.314	-.032	.231	-.196	-.028	.112
	TA	-.003	.053	1.000	.108	.086	.191	-.174	.096	-.104	.172
	SG	.289	.188	.108	1.000	.267	-.047	.035	.035	-.192	-.006
	ROA	.304	.314	.086	.267	1.000	.134	.080	.149	.035	.120
	CS	-.200	-.032	.191	-.047	.134	1.000	-.211	.093	.313	-.042
	LIQ	.044	.231	-.174	.035	.080	-.211	1.000	-.260	.103	-.076
	CCC	-.009	-.196	.096	.035	.149	.093	-.260	1.000	.096	.114
	SDEBIT	-.167	-.028	-.104	-.192	.035	.313	.103	.096	1.000	.062
	RD/S's	.012	.112	.172	-.006	.120	-.042	-.076	.114	.062	1.000
Sig. (1-tailed)	?EVA/TA	.	.000	.470	.000	.000	.000	.130	.408	.000	.377
	MTB	.000	.	.088	.000	.000	.204	.000	.000	.239	.002
	TA	.470	.088	.	.003	.013	.000	.000	.007	.004	.000
	SG	.000	.000	.003	.	.000	.113	.187	.187	.000	.440
	ROA	.000	.000	.013	.000	.	.000	.020	.000	.188	.001
	CS	.000	.204	.000	.113	.000	.	.000	.008	.000	.139
	LIQ	.130	.000	.000	.187	.020	.000	.	.000	.004	.025
	CCC	.408	.000	.007	.187	.000	.008	.000	.	.007	.002
	SDEBIT	.000	.239	.004	.000	.188	.000	.004	.007	.	.055
	RD/S's	.377	.002	.000	.440	.001	.139	.025	.002	.055	.