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The Determinants Of Earnings Growth For Firms On The JSE – An Empirical Analysis

A research proposal submitted by

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Plagiarism declaration

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The Determinants Of Earnings Growth For Firms On The JSE – An Empirical Analysis

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ABSTRACT

This research aims to aid managers, analysts and private investors in their valuations of companies by identifying those factors which can greatly influence the future earnings growth of a firm. The researcher hypothesized that dividend pay-out, as well as real GDP, play a crucial role in determining the earnings growth rate for firms. The study used a multivariate panel regression model, which was adapted from the model first put forward by Zhou and Ruland (2006). Previous literature has focused on the sustainable growth model and whether the relationship between dividend pay-out ratio and earnings growth holds true (Arnott and Asness, 2003, Zhou and Ruland, 2006, Flint et al., 2010, Vermeulen and Smit, 2011). This has resulted in a one-dimensional focus on the factors which can influence the earnings growth. In addition, earnings growth is a key concern for any analyst when determining the value of a company. Prior literature shows there are many factors which can influence the growth and success of a firm and its earnings (Lewis and Churchill, 1983, Brown et al., 2005). This study aims to contribute to the prior literature in the form of an additional factor, such as real GDP, which could have an influence on the earnings growth of JSE and AltX listed firms. The findings reveal that the model still struggles to predict future earnings growth. There is no significant relationship between dividend pay-out and earnings growth, despite the contrasting results of previous studies. The findings also reveal real GDP does not significantly influence the earnings growth. The results indicate a tendency among investors to return to investing fundamentals in the short-term when there is a high level of uncertainty in the political, financial and economic sphere in South Africa.

Keywords: Earnings growth, multivariate panel regression, sustainable growth model, dividend pay-out, JSE, AltX

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1: Introduction

1.1 Context of the study

When constructing a discounted cash flow, an analyst is faced with the problem of predicting future growth (Das et al., 1998). The same can be said about other valuation methods, such as the dividend growth model which incorporates expectations about future growth (Jorgensen et al., 2011).

Ultimately, when performing a valuation, the analyst is concerned with the reasonability of the inputs into the model (Fernández, 2007).

The sustainable growth rate is one tool which analysts can use when determining the terminal value growth in a Gordon growth model valuation (Gordon and Shapiro, 1956). As with most theories and models, however, they are only as good as their inputs and underlying assumptions. The sustainable growth rate assumes the dividend pay-out ratio will remain constant and uses return on equity, an accounting ratio, to estimate growth in cash flow (Higgins, 1977). There is ample research which suggests the claims of the sustainable growth rate are false (Arnott and Asness, 2003, Flint et al., 2010, DeAngelo et al., 1996, Vermeulen and Smit, 2011, Zhou and Ruland, 2006) but there is limited research which investigates other variables and their effect on earnings growth.

The requirements for a discounted cash flow valuation include a discount rate, the future cash flows which are expected by the entity or shareholders and the rate at which those cash flows will grow. This paper examines factors that influence the growth rate of future cash flows. It expands on earlier research by Zhou and Ruland (2006) and Vermeulen and Smit (2011) and examines the relationship between dividend pay-out, real Gross Domestic Product (GDP) and historic earnings growth.

1.2 Research question

This research informs managers, analysts and private investors in their valuations of companies by identifying those factors which may influence the earnings growth of a firm. The following research question is addressed:

> **Is there a significant relationship between the dividend pay-out, real GDP and the variation in earnings growth?**

1.2.1 Assumptions

- The study assumes the companies in the sample will continue as going concerns into perpetuity. The Gordon Growth model relies on a higher cost of capital than the

growth rate of dividends (Gordon and Shapiro, 1956). This is a crucial assumption applied in the theoretical construct.

- For the sample period, it is assumed that the South African stock markets are weak-form efficient (Jefferis and Smith, 2005).[1]
- The net profit after tax measurement is assumed to approximate the free cash flows belonging to the equity holders (Dechow, 1994) (see section 3.4).

1.2.2 Limitations and delimitations

- This study used book values for the calculation of leverage because of data limitations. This was also done in a similar study by Vermeulen and Smit (2011). In addition, Bowman (1980) discovered there was limited variation between the book value and market value of debt.
- This study only considers firms which are listed on the JSE and AltX. This follows Vermeulen and Smit (2011).
- The study focuses on the effect differing variables can have on earnings. Earnings are, however, an accounting measure and can be affected by the accounting policies used by a firm, something which is not specifically controlled for in the final model (see section 3.4).
- One of the delimitations of this study is trying to discover the determinants of earnings growth when the sample being used is only for a twenty-one-year period. This was done due to the lack of quality data available.
- For the purpose of this research all stocks listed on the JSE and AltX were available for sample selection because these are the only companies in South Africa which are openly traded and which publish financials available to the public. This provided a robust model. The only firms to be excluded from the analysis, are firms in the financial services sector because of their large amounts of leverage (DeAngelo and Stulz, 2013).
- Firms which were delisted due to financial statement fraud were excluded from the analysis. This is to prevent the use of any figures which do not faithfully represent the financial condition of the companies.
- This study excludes over-the-counter securities because of the limited availability of data relating to these instruments.
- While this thesis is based on earlier research by Zhou and Ruland (2006) and Vermeulen and Smit (2011), there are some important differences. The American and previous South African study used a sample period of 53 and 36 years

[1] This means the analyst cannot predict future stock prices based on past information.

respectively (compared to the twenty-one-year period in this study). In this research, the total number of company years collected and processed amounted to 11 277. This included 6 426 company years relating to delisted firms and 4 851 related to currently listed companies as at 27 August 2019. This is very close to the 12 669 company years attained by Vermeulen and Smit (2011). The study performed in the USA had a considerably larger dataset. The biggest difference from the previous South African study conducted by Vermeulen and Smit (2011) is that this study attained all the data from the Iress database, whereas Vermeulen and Smit (2011) used a combination of data from the McGregor BFA database and the University of Stellenbosch Business School (USB) database. The use of a single database adds validity to the numbers as one measurement system has been consistently used and so reduces the risk of lost data.

1.3 Contribution

Previous literature has focused on the sustainable growth model and whether the relationship between dividend pay-out ratio and growth holds true (Arnott and Asness, 2003, Zhou and Ruland, 2006, Flint et al., 2010, Vermeulen and Smit, 2011). This has resulted in a one-dimensional focus on the factors which can influence the earnings growth. In addition, earnings growth is a key concern for any analyst when determining the value of a company. Prior literature shows there are a multitude of factors which can influence the growth and success of a firm and its earnings (Lewis and Churchill, 1983, Brown et al., 2005).

This study aims to contribute to the prior literature in several ways. First, it complements the international research on the relationship between dividend pay-out and earnings growth which is focused mainly on developed economies and very large capital markets. With the exception of Vermeulen and Smit (2011), South African-specific research is lacking. In addition, Vermeulen and Smit (2011) examine the relationship between dividend pay-out and earnings growth from 1973 to 2009 while this research deals with a different period under review.[2] Second, real GDP, which can have an influence on the earnings growth of JSE and AltX listed firms, is specifically addressed. Third, a series of sensitivity tests are performed which were not conducted by Vermeulen and Smit (2011). These include: the lag effect of dividends, the relevance of integrated reporting, inflation and the interaction between commonly-identified control variables for moderating the relationship between dividend pay-out and earnings growth.

[2] During the latter part of the period, 1996 to 2016, South Africa was faced with new economic and political uncertainties.

Ultimately, the research will be relevant for managers, analysts and private investors interested in generating superior returns. This research will also aid managers as it should help identify factors which can greatly influence the earnings growth of the firm, in line with the expectation of managers.

1.4 Definition of terms

Table 1.1 – Definition of terms

Term	Description
Investment Opportunity Schedule (IOS)	Measure of growth opportunities available to the firm which can translate into higher profitability (Riahi-Belkaoui and Picur, 2001).
Sustainable Growth Rate (SGR)	Calculated by taking the return on equity (ROE) and multiplying it by the retention ratio. ROE is calculated using earnings attributable to shareholders for the year divided by the book value of equity at the beginning of the year. The average book value of the opening and closing balance for the year may also be used. The book value of equity will include share capital, treasury shares and retained income. The retention ratio is calculated by taking the remainder of earnings, less dividends paid, divided by earnings.
AltX	This is a smaller exchange, part of the JSE and was started in 2003 to accommodate small to medium sized firms which are growing (Scholtz and Smit, 2012).

2: Literature review

The background will provide a theoretical construct of the model to be used as well as explain the results of prior literature and the void that this paper seeks to fill.

2.1 Valuation models

In the following section the theoretical construct for the model used is examined. These are the dividend discount model (section 2.1.1) and the discounted cash flow model (section 2.1.2).

2.1.1 Dividend discount model

The sustainable growth rate (SGR) is conventionally used to calculate the maximum rate at which a company can grow its earnings without having to raise additional debt or equity (Higgins, 1977). The SGR has become a universally accepted part of valuation methodology (Fernández et al., 2002). The Gordon Growth Model relies on the SGR and its assumption that firms which retain more of their earnings will have a better growth outlook (Gordon and Shapiro, 1956).

The sustainable growth rate (SGR) is calculated as follows:

$$SGR = ROE \; x \; RR \qquad \textbf{Equation 1}$$

Higgins (1977)

where ROE is the return on equity and RR is the retention ratio.

ROE is calculated using the net profit after tax for the period divided by the book value of equity at the beginning of the period. The retention ratio is calculated by dividing the net profit after tax for the period less the dividends paid for the period by the net profit after tax for the period (Higgins, 1977).

Equation 1 is based on three assumptions. First, the company wants to maintain a target capital structure without raising any additional equity or debt. Secondly, the company will maintain a static retention ratio. Finally, the company will increase sales as fast as the market allows (Higgins, 1977).

Equation 1 can be expanded into the following:

$$SGR = \frac{Net\ profit}{Shareholders'\ equity\ at\ beginning\ of\ the\ year} \; x\ RR$$

but

$$Net\ profit\ = \frac{Net\ profit}{Revenue}\ x\ \frac{Revenue}{Total\ assets}\ x\ \frac{Total\ assets}{1}$$

Therefore,

Equation 2

$$SGR = \frac{Net\ profit}{Revenue}\ x\ \frac{Revenue}{Total\ assets}\ x\ \frac{Total\ assets}{Shareholders'\ equity\ at\ beginning\ of\ the\ year}\ x\ RR$$

Higgins (1977)

Equation 2 suggests that growth can only be influenced by the profit margin, asset turnover, equity multiplier and retention ratio (Higgins, 1977). These ratios are firm-specific and do not incorporate internal and external factors to which firms are exposed. Growth is also not linear and, in practical terms, cannot be a function of only a limited number of factors (Brown et al., 2005, Lewis and Churchill, 1983).

The Gordon Growth Model, otherwise known as the dividend discount model, can be used to value equity (Gordon and Shapiro, 1956). The SGR is used as the growth rate. The model is expressed as follows:

$$Market\ value\ of\ equity = \frac{D_{t0}(1+g)}{k_e - g}$$ ***Equation 3***

Gordon and Shapiro (1956)

where D_{t0} is the dividend paid at T_0, k_e is the cost of equity and g is the annual growth rate into perpetuity, which is calculated using the sustainable growth rate. The dividend paid at T_0, being the most recent dividend paid by the company, can be calculated by taking the dividend per ordinary share actually paid multiplied by the number of outstanding ordinary shares.

The cost of equity represents the return companies theoretically pay to their shareholders for the capital which was provided to the business. Equation 3 can be expanded into the following:

$$Market\ value\ of\ equity = \frac{NI\ x\ PR(1+g)}{k_e - g}$$ ***Equation 4***

where NI is the net income after tax and PR is the pay-out ratio. Similar to the SGR, equation 4 illustrates that the pay-out ratio can have a substantial influence on the value of equity.

The Gordon Growth model assumes that growth should not exceed the cost of equity. It also assumes that dividends will grow constantly into perpetuity, implying the earnings will grow constantly while the retention ratio remains the same. It assumes all free cash flow is paid as a dividend and the company's business model and financial leverage will remain steady (Gordon and Shapiro, 1956).

Equation 4 can be re-arranged into the following (see Appendix for the derivation):

$$g = \frac{k_e - \left[\frac{EPS_{t0}}{V_{t0}}\right]\left[\frac{DPS_{t0}}{EPS_{t0}}\right]}{1 + \left[\frac{EPS_{t0}}{V_{t0}}\right]\left[\frac{DPS_{t0}}{EPS_{t0}}\right]} = \frac{k_e - EYxPR}{1 + EYxPR}$$ ***Equation 5***

where *g* represents the SGR and k_e, the cost of equity. *EPS* represents the earnings per share attributable to ordinary shareholders for year T_0 and *V*, the market price per share at the beginning of year t. Together, *EPS* divided by *V* gives the earnings yield: *EY*. DPS_{t0} is the dividend paid per share attributable to the ordinary shareholders at the beginning of year t and, finally, DPS_{t0} divided by *EPS* gives the pay-out ratio, *PR*.

Equation 5 shows that company growth is dependent on the difference between the company-specific risk borne by shareholders, the cost of equity and the dividends received by the shareholders, the dividend yield. As the company increases the dividend paid-out to its shareholders, capital growth diminishes (Maio and Santa-Clara, 2015). According to the model, for a company to increase growth, it has to invest in riskier projects, reduce the pay-out ratio or capitalize on the leveraging effect of debt provided the cost of debt is less than the cost of equity. Earnings yield also has an effect on earnings growth according to the model, with a lower earnings yield driving a higher growth rate.

In equation 5, the k_e incorporates risk. The concept of risk was first introduced by Markowitz (1991) in his Modern Portfolio Theory. This theory sought to maximise the return per level of risk and was simplified by the Capital Asset Pricing Model (CAPM) (Sharpe, 1964). The inclusion of k_e in the Gordon growth model allows for the consideration of additional variables when suggesting other factors which can influence earnings growth. Any factor

which can be shown to influence shareholder returns has the ability to impact earnings growth. This paper attempts to fill a gap with focus on an additional factor such as real GDP.

The key variable in the CAPM formula is beta which measures the systematic market risk borne by the equity holder, which includes company specific leverage. The cost of equity according to the CAPM can however, be inaccurate (Fama and French, 2004, Merton, 1973, Nel, 2011, Reddy and Thomson, 2011). As a result, the cost of equity can also be determined using either the Fama-French three-factor model or the Arbitrage Pricing Theory (APT) (Fama and French, 2015, Ross, 2013).

Prior literature provides strong evidence for the efficiency of the Fama-French three-factor model and the APT model (Page, 1986, Gaunt, 2004). The Fama-French three-factor model and APT model do not consider only the systematic risk relevant to the market index but other factors such as firm size and market-to-book for the Fama-French three-factor model and other macro-economic systematic risk factors such as inflation, interest rate, GDP and many more in the case of the APT model (Kisman and Restiyanita, 2015). The APT model can also be modified to account for a number of systematic risk factors, using factor analysis.

The APT is based on the introduction of additional variables which influence shareholder returns. There is prior research, however, questioning the efficiency of the APT model. For example, it fails to explain the differences in average returns (Reinganum, 1981) and Taneja (2010) who questions the strong relation between the size and book-to-market coefficients in the case of the three-factor model.

The Fama-French three-factor model introduces firm size and market-to-book value risk. The market-to-book value and the size of the firms were included as control variables in this study as these have been proven to be indicators of future growth, however, not the drivers of earnings growth (Preinreich, 1932).

Bathke Jr et al. (1989) studied the effect firm size can have on earnings. The study looked at the short-term predictive ability of firm size in relation to earnings. The study revealed firm size was a significant predictor for earnings for large- and medium-sized firms. Fama and French (1995) conducted a study, looking at the relationship between firm size and book-to-market value with earnings growth. The researchers found company size, measured by the market capitalization and book-to-market value had a strong correlation with shareholder returns and earnings growth.

2.1.2 Discounted cash flow

The discounted cash flow calculation follows two models which also rely heavily on the estimates of earnings growth. The first uses discounted free cash flows. The analyst calculates all the cash flows into the firm after accounting for reinvestment in capital assets and changes in working capital, the firm represented by the debt and equity holders.

The second model, named free cash flow to equity, calculates all the cash flows to equity holders after accounting for debt repayments and distributions relating to non-shareholders, in addition to capital expenditure and changes in working capital. The valuation using the cash flow to equity model can be estimated using the cash flow to the firm model after subtracting the value of any non-equity providers of finance.

The growth variable is accounted for in the determination of the terminal value of the free cash flow and estimates. The sustainable growth rate is also concerned with the growth in cash but is often used to determine earnings growth by practitioners (Friedl and Schwetzler, 2011). The terminal value will account for the majority of the valuation and can be explained by the following formulae:

$$Terminal\ Value\ for\ FCFF = \frac{FCFF_t(1+g)}{WACC - g} \qquad \textbf{Equation 6}$$

$$Terminal\ Value\ for\ FCFE = \frac{FCFE_t(1+g)}{k_e - g} \qquad \textbf{Equation 7}$$

where WACC is the weighted average cost of capital, FCFF is the free cash flow to the firm and FCFE is the free cash flow to equity in the final year of the forecast period in the valuation.

From equations 6 and 7, the growth variable is a key input which can significantly influence the valuation (Friedl and Schwetzler, 2011). Penman (1998) shows that the different methods listed above for calculating the value for equity all stem from the terminal value calculation used in the dividend discount model originally proposed by Gordon and Shapiro (1956). This is relevant as it shows that the theoretical construct used can be applied to dividend discount model valuations, as well as free cash flow valuations, provided the same assumptions are applicable.

2.2 Previous literature and hypothesis development

The literature on the relationship between dividend pay-out, GDP and earnings growth will now be discussed.

2.2.1 Dividend pay-out and earnings growth (H1)

There is a considerable body of work dealing with the relationship between the dividend pay-out and earnings growth (Arnott and Asness, 2003, Flint et al., 2010). The expected growth has been investigated using various methods. For example, researchers have attempted to calculate the implied growth rate of a firm where the residual income model was used to determine the implied growth rate for terminal value cash flows (Easton et al., 2002). In theory, a lower dividend pay-out ratio is meant to result in a higher growth rate according to the SGR model as there will be funds available which can be invested in new opportunities (Higgins, 1977).

The first criticism of the SGR theorem comes from Miller and Modigliani (1961). They show that a change in dividend policy has no effect on the value of a firm. The SGR theorem can be modified, however, to show that any positive change in the dividend policy will have a negative impact on the capital appreciation received by the investor and that in fact, the dividend policy does not influence the firm value. This was tested by Ibbotson and Chen (2003) who found the price-to-earnings ratio was not affected by the dividend policy.

Prior literature has also investigated the forces which influence the dividend policy decision. This was done by Rozeff (1982), who focused on investment needs and the impact it will have on dividend policy. The study concluded that companies with growth opportunities will first resort to retained income, as opposed to external finance, as a source of funds because of the lower cost. Consequently, it was concluded that firms with high growth expectations will have significantly lower dividend pay-out ratios.

La Porta et al. (2000) focused on the effect agents can have on the dividend policy. The study also shows firms which are fast growing will have smaller dividends (in line with Higgins (1977)).

The same conclusion was reached by Myers (1984) using the pecking order theory. This theory states that when firms require funds to finance expansion, they access funds which have the lowest risk first. As these are typically part of retained earnings, a lower dividend pay-out ratio results. It is also important to note the pecking order theory operates on the assumption there are no agency costs indicating that the managers act in the best interests of shareholders (Zoppa and McMahon, 2002, Frank and Goyal, 2008).

Damodaran (2008) argues that the amount a company has available to reinvest and the quality of those reinvestments are the best proxies for future growth. He also argues that when determining the growth, the valuator should focus on what the business has the

potential to pay as dividends after taxes, reinvestment needs and debt payments and not what the business has actually historically paid.

Arnott and Asness (2003) were the first to study the relationship between dividend pay-out ratios and earnings growth in the United States. The test used the weighted market indices as a proxy for earnings growth, which resulted in several large companies dominating the results. Arnott and Asness (2003) used a ten-year future earnings growth period from 1971-2001. This was a long-term test which aimed to provide useful information to investors with a long-term point of view in their valuations. The results of the test contradict theory by showing that there was a strong *inverse* relationship between the retention ratio and the earnings growth. Arnott and Asness (2003) cited Jensen (1986) when attempting to explain this phenomenon. According to the free cash flow theory, management invest in value destroying projects with additional cash on hand, resulting in lower earnings growth.[3]

Unlike Arnott and Asness (2003), who use market indices to gauge performance, Zhou and Ruland (2006) use firm-specific performance measures. Their study included multiple control variables such as leverage, return on assets, size of the firm, investment opportunity schedule, earnings yield, past earnings growth and asset growth. Zhou and Ruland (2006) found a significant *positive* relationship between dividend pay-out and earnings growth. All the control variables were also significant. They concluded that the relationship between dividend pay-out and earnings growth was due to the free cash flow theory.

DeAngelo et al. (1996) also investigated whether the dividend decision correlates with higher future earnings growth in the United States. This was done with a sample of 145 listed firms on the NYSE which had experienced 9 or more years of consecutive growth in earnings, after which there was a decline in earnings. The study revealed that dividends are not reliable proxies for future growth as managers have the tendency to exhibit behavioural bias when growth prospects dwindle. They do not pay a high dividend when earnings are higher as a precaution given that an increase in earnings may only be temporary.

Vermeulen and Smit (2011) replicated the study performed by Zhou and Ruland (2006) in South Africa and, once again, there was a strong *inverse* relationship between earnings growth and the retention ratio.

[3] This can be traced to work conducted by Ross (1973) and Mitnick (1975). The former focused on economic agency and Mitnick on institutional agency. The results of Arnott and Asness (2003) illustrate agency problems.

Flint et al. (2010) also concluded that there was a *positive* relationship between dividend pay-out ratios and future earnings growth in Australia. This research is in agreement with prior research by Parker (2005) which focused on Australia, North America and Canada.

Due to the relationship between dividend pay-out and earnings growth, researchers have attempted to find the drivers of dividend policy. Empirical research shows that one of the determinants of the dividend pay-out is the Investment Opportunity Schedule (IOS). The IOS can be measured using various ratios: market value of the firm to the book value of assets, market-to-book value of equity or the price earnings ratio. These ratios were initially used by Gaver and Gaver (1993) who confirmed that there was an inverse relationship (at the firm-level) between investment opportunities and debt to equity, as well as dividend yield. Gul (1999) also showed that investment opportunities are negatively associated with dividends.

Additional research performed in Europe (ap Gwilym et al., 2006), Taiwan (Huang et al., 2009), Singapore (Lee, 2010) and Malaysia (Al-Twaijry, 2007) was also conducted with the aim of determining the influence the pay-out ratio may have on earnings.

Based on the consensus from the international literature, it is expected that the dividend pay-out would be positively correlated with future earnings growth for South African listed firms.

$H1_0$: the dividend pay-out is positively correlated with earnings growth

For the purpose of this study the focus shall be on the research performed by Zhou and Ruland (2006) and Vermeulen and Smit (2011). This will be done because the previous American study formed the basis of the model used in this thesis. The results will also be compared to the previous South African study, Vermeulen and Smit (2011), because different time periods were used.

2.2.2 Gross domestic product and earnings growth (H2)

The relationship between earnings growth and GDP was first analysed by Bernstein and Arnott (2003). In the long-term it is impossible for firms to outgrow the GDP rate but nominal corporate earnings can track nominal GDP growth in the long run (see also Abarbanell and Bushee (1997)).

Bernstein and Arnott (2003) conducted a study analysing whether the earnings growth of companies is able to outperform GDP in the long-run. They found the earnings growth of the firms was two percent less than the macro-economic growth. This is because growth in existing enterprises drives only a portion of the GDP growth. GDP growth can also extend from new enterprises which has no effect on the earnings growth of old enterprises.

Analysing returns from 1900 to 2002, Ritter (2005) found there was a negative correlation between real shareholder returns and per capita GDP. This contradicts the notion that countries with increasing GDP should also report better returns for shareholders. The study found the effect of labour participation, technological change, increases in capital and high personal savings does not translate into an increase in earnings for corporations. Ibbotson and Chen (2003) also found that economic productivity can outgrow enterprise earnings and dividends received by the shareholders from 1926 to 2000.

Dimson et al. (2009) found that there was a weak relationship between real per capita GDP and earnings growth. When testing the relationship between real aggregate GDP growth and shareholder returns over the period 1900-2013 in 21 markets, a significant relationship was found (see also (Dimson et al., 2002)). This finding is inconsistent with Estrada (2012) and by L'Her et al. (2018), who found no relation between either real GDP or real per capita GDP and shareholder returns.

In general, it appears that an increasing GDP results in increased earnings but the prior literature has generated mixed results. It was uncertain what the relationship would be between real GDP and earnings growth. In theory, if GDP is increasing, more money is being spent by consumers and investors and this should translate into higher corporate earnings.

$H2_0$: the real GDP is positively correlated with earnings growth

2.3 Mechanisms in a South African context

The model to be used in this study was adapted from Zhou and Ruland (2006). The initial model was applied in the United States of America (USA) and has now been applied in South Africa. As earnings growth is the subject of the model it is important that underlying market mechanisms are closely aligned, in order to ensure that the model can be utilised in a South African context.

The first mechanism to be addressed is the age of the relevant economies. The USA has been industrialized for a much longer period than South Africa and there is considerable research which shows that developed countries have more stable earnings than developing ones (Jansen, 2004). Research has shown higher earnings volatility is mainly caused by the "openness" of the country to trade with other countries (Easterly and Kraay, 2000) and export concentration (Jansen, 2004). In this research, earnings volatility was reduced by selecting multiple companies from different industries over multiple time periods.

The next consideration is market efficiency. The model was initially used in the United States from 1950 to 2003 (Zhou and Ruland, 2006). The same model was then used in South Africa

form 1973 to the end of 2009 (Vermeulen and Smit, 2011). Weak-form efficiency means that it is possible to outperform the market just through the use of historical stock price movements, in this way supporting the random walk theory. The Johannesburg Stock Exchange, according to Jefferis and Smith (2005), was weak form efficient over an eleven-year period from January 1990 to June 2001. The United States stock market, according to Chan et al. (1997), was also weak form efficient over the period January 1961 to December 1992. This illustrates the comparability of both markets.

South Africa has been shown to have much lower trading volumes than the USA. This can be as a result of informational inefficiencies. Gursoy et al. (2008) find the South African stock market shows a strong inverse relationship between trading volume and stock price volatility when total trading volume is used as a substitute for the flow of information. When accounting for both expected and unexpected trading volume, Gursoy et al. (2008) find trading volume was unable to explain stock price movements. This indicates that the South African markets can be sensitive to information if total trading volume is an adequate proxy for informational efficiency.

At the end of 2016, the United States stock market had a capitalization of $27 trillion and South Africa had a capitalization of $951 billion. Despite this, the South African stock market is the largest and most sophisticated in Africa and can be compared to other developed markets such as Switzerland $1.4 trillion and Australia $1.3 trillion. South Africa closely resembles a developed market in size and information (Jefferis and Smith, 2005).

With regards to analyst coverage of companies and their earnings, Degeorge et al. (2013) show that South Africa and the United States are very similar. They find that earnings management activity is higher when there are small positive surprises, versus small negative surprises for both countries. This illustrates the pressure on management in both countries to outperform the general consensus, despite the fact that South Africa is classified as a medium level financial development country and the United States is classified at a high level. The study also reveals that the mean analyst coverage for firms and the percentage of firms followed by analysts for South Africa is 5.9 and 80% versus the United States' 5.4 and 72%. The relatively small difference indicates similar levels of informational efficiency, consequently making South Africa and the United States comparable (see section 1.2.1).

2.4 Synthesis

Table 2.1 provides an explanation of the control variables used in this research.

Table 2.1 – Independent and control variable inclusion explained	
Independent variable	**Description**
Dividend pay-out	Dividend pay-out ratio is a commonly used metric which has been associated with the growth rate in earnings (Higgins, 1977). In theory, the lower the pay-out the higher the future earnings growth. This is because firms which have more earnings to reinvest into valuing adding projects should result in higher future earnings. Empirical research, however, supports the relationship that a lower pay-out ratio results in lower future earnings growth. In addition, this is supported by the free cash flow theory.
Real GDP	Theoretically, if GDP is increasing, more money is being spent by consumers and investors and this should translate into higher corporate earnings.
Control variable	**Description**
Leverage	Leverage is a fundamental source of finance for any firm and has the potential to provide relevant information regarding the future growth of assets. Leverage can also help to explain the movement in earnings (Dimitrov and Jain, 2008). It is the expectation that firms which have leverage are able to use their debt to finance new growth and, as a result, there should be a relationship between earnings growth and leverage (Fama and French, 2002). Pecking order theory states firms with high leverage should have high investment growth opportunities, resulting in future earnings growth (Fama and French, 2002). Trade-off theory also states firms with future growth prospects will retain more earnings, resulting in an increase in the issuance of debt in order to maintain the target debt to equity ratio (Awan et al., 2010). However, empirical research has proven there is either a negative (Rajan and Zingales, 1995) or no relationship (Titman and Wessels, 1988) between leverage and growth opportunities.
Earnings yield	The market expects that firms with lower earnings yield ratios have greater expectations for future growth than firms with lower ratios. The earnings yield variable, therefore, has predictive power (Zhou and Ruland, 2006).
Size of the firm	It is much easier for smaller firms to grow relative to large firms. Firm size was also used as a control variable by Zhou and Ruland (2006) and Vermeulen and Smit (2011).
Return on assets (ROA)	The researcher controlled for return on assets because it is more difficult for firms with a high ROA to grow relative to a firm with a low ROA (Zhou and Ruland, 2006).
Asset growth (AG)	Larger future earnings growth would be accompanied by larger asset growth. Consequently, a positive relationship was expected (Zhou and Ruland, 2006).

In theory, a higher dividend should result in lower earnings growth but the literature suggests this is not the case. Does dividend pay-out affect earnings growth in South Africa and does real GDP also play a role?

3: Research methodology

The purpose of this study is to determine whether dividend pay-out or real GDP can influence earnings growth. The study used a multivariate panel regression model adapted from the model developed by Zhou and Ruland (2006) and Vermeulen and Smit (2011). The pay-out ratio and real GDP are the independent variables in the model. Additional control variables were also added, the substantiation of which is provided in the literature review (see section 2.4, table 2.1). Earnings growth over a one-, three- and five-year period was used as the dependent variable when the model was run as was done by Zhou and Ruland (2006) and Vermeulen and Smit (2011).

3.1 Population

The entire population of firms taken from the JSE and AltX from 1 January 1996 to the 31 December 2016 was used in the test. The entire population was also used by Zhou and Ruland (2006) and Vermeulen and Smit (2011). This population included shares newly listed or delisted during the study period to ensure there is limited survivorship bias (Carpenter and Lynch, 1999).[4] This resulted in an unbalanced panel but is consistent with the approach followed by Vermeulen and Smit (2011) when looking at the relation between pay-out ratio and earnings growth and controls for survivorship bias (Brown et al., 1992).

Several of the firms were removed because they were outliers. Once the outliers from the population were removed, the model was run. Significant outliers were excluded, using a case-wise analysis and 3 standard deviations as a cut-off (see appendix – table 1.1 and 1.2 for the result of the case-wise analysis).[5]

This study focused on the period after 1980's as it is difficult to find reliable data for companies listed on the JSE dating back to later periods. This study continued up to and including 2016 as this makes this study currently applicable.

This study looked at the short- to medium-term impact dividend pay-out and real GDP have on earnings growth, as a long-term impact requires data for many years, resulting in the exclusion of firms, which may increase survivorship bias. The listing period for many South African companies is also relatively short compared to other countries (Vermeulen and Smit, 2011).

3.2 Data source, collection and management

All of the data used in this study are collected from secondary sources and are managed in Excel. Company specific indicators were obtained from the Iress database

[4] This was done to ensure delisted firms are also considered.

[5] Real GDP and inflation growth were not adjusted to the company's financial year.

(www.iress.co.za).[6] Data relating to the South African economy, such as real GDP and inflation, were obtained from Stats SA and the World Bank.

3.3 Data analysis

To test the relationship between earnings growth and two independent variables (dividend pay-out and real GDP), three models are considered. Refer to table 3.2:

Table 3.2 – Model versions	
Model	**Description**
Model 1	One-year earnings growth
Model 2	Three-year cumulative earnings growth
Model 3	Five-year cumulative earnings growth

Models 1-3 were tested using a two-stage hierarchical pooled and panel regression. To ensure validity and reliability, the model proposed by Zhou and Ruland (2006) and Vermeulen and Smit (2011) is used first. Refer to equation 3.1:

Base *(stage 1 of hierarchical regression)*

Equation 3.1

$$EG_{it} = \alpha + \beta 1\ DP_{i\,t-1} + \beta 2\ L_{i\,t-1} + \beta 3\ EY_{i\,t-1} + \beta 4\ S_{i\,t-1} + \beta 5\ ROA_{i\,t-1} + \beta 6\ AG_{i\,t-1,t} + \varepsilon_{it}$$

In the second stage, real GDP is added to equation 3.1 to yield the final regression model shown by equation 3.2:

Real GDP *(stage 2 of hierarchical regression)*

Equation 3.2

$$EG_{it} = \alpha + \beta 1\ DP_{i\,t-1} + \beta 2\ GDP_{i\,t} + \beta 3\ L_{i\,t-1} + \beta 4\ EY_{i\,t-1} + \beta 5\ S_{i\,t-1} + \beta 6\ ROA_{i\,t-1} + \beta 7\ AG_{i\,t-1,t} + \varepsilon_{it}$$

- where i denotes the cross sections, for different companies, and t denotes the different time periods where t = 1…21 for each year from 1996-2016;
- ε_{it} is the normal error term; and
- α is the constant.

[6] Iress is an Australian software company which focuses on the financial markets.

The multivariate regression captured the relationship between the determinants and the earnings growth. The measurement of dependent and independent variables is outlined in table 3.3:

Table 3.3 – Measurement of variables

Label	Variable	Measurement	Precedent
EG	Nominal earnings growth	Growth in profit attributable to ordinary shareholders less preference dividends for Year t. Growth was calculated for one-, three- and five-year periods.	Vermeulen and Smit (2011), Zhou and Ruland (2006)
DP	Pay-out	Total ordinary dividends paid for Year t-1 divided by net profit after tax for Year t-1.	Vermeulen and Smit (2011), Zhou and Ruland (2006), Arnott and Asness (2003), Flint et al. (2010)
GDP	Real GDP	Growth in real GDP at 1996 market prices for Year t. Growth was calculated for one-, three- and five-year periods.	Ross (2013), Kisman and Restiyanita (2015), Chen et al. (1986)
L	Leverage	Total liabilities as a percentage of total assets, with all measurements being the book values at the beginning of Year t.	Vermeulen and Smit (2011), Zhou and Ruland (2006), Fama and French (2002)
EY	Earnings yield	Profit attributable to ordinary shareholders less preference dividends at beginning of Year t, divided by the market value of equity, calculated by multiplying the number of ordinary equity shares in issue at the beginning of Year t by the share price at the beginning of Year t.	Vermeulen and Smit (2011), Zhou and Ruland (2006), Gordon and Porter (2009)
S	Size of the firm	Natural logarithm of market value of equity, calculated by multiplying the number of ordinary equity shares in issue at the beginning of Year t by the share price at the beginning of Year t.	Fama and French (2015), Vermeulen and Smit (2011), Zhou and Ruland (2006)
ROA	Return on assets	Measured as net profit after tax at the beginning of Year t divided by total assets at the beginning of Year t.	Vermeulen and Smit (2011), Zhou and Ruland (2006)
AG	Asset growth	Annual growth in total assets from the beginning of Year t to the end of Year t.	Vermeulen and Smit (2011), Zhou and Ruland (2006)

3.4 Why earnings growth and not cash flows?

This research is using a period spanning twenty-one-years to gather data. Cash flow statements were not required by companies prior to 2001. This late adoption of the cash flow standard resulted in many South African companies not reporting these figures until the mid-2000's.

According to the theoretical breakdown, the SGR does require a cash flow figure to be used but an important assumption of this research is that the net profit after tax measurement is assumed to approximate the free cash flows belonging to the equity holders. This is a fair assumption considering non-cash items, such as depreciation, can approximate reinvestment in capital assets (Balmann and Mußhoff, 2002). Equation 3.1 was initially utilised using earnings growth, the accounting measure, as the dependent variable by Zhou and Ruland (2006). The researcher acknowledges that there has been a change over time, affecting how earnings are reported and derived, but the fact remains that using a cash flow figure which resembles free cash flow to the equity holder will have to involve some type of apportionment for maintenance and expansion capital expenditure which may not be disclosed by the company under review. Furthermore, there is research by Barth et al. (2001) and Dechow (1994) which shows the predictive ability of accrual earnings is better than that of cash flows.[7]

All these factors influenced the researcher to utilize net profit after tax attributable to the shareholders as the dependent variable.

3.5 Validity and reliability

The researcher consulted with a statistician to ensure the process followed to analyse data is correct and the results are valid.

This study used a twenty-one-year period in order to identify the relationship. This contrasts with previous research by Arnott and Asness (2003) (55 years), Zhou and Ruland (2006) (53 years) and Vermeulen and Smit (2011) (36 years). A shorter period was chosen because there was a lack of consistent, quality data in prior periods (see section 1.2.2).

[7] This was primarily attributed to the more prominent mismatching problems faced by cash flow measures as opposed to accrual measures.

The researcher paid particular attention to the assumptions of multivariate regression. These include the following:

(1) there is an approximately linear relationship between the dependent and independent variable
(2) variables are not perfectly correlated (multi-collinearity)
(3) variances of residual terms are approximately constant (homoscedasticity)
(4) error terms have an approximately normal distribution and
(5) residual terms are uncorrelated (auto-correlation).

Osborne and Waters (2002) and Gujarati (2009)

The Doornik-Hansen test for normality was used to test error term distributions. Multiple plots depicting the relationship between the dependent and independent variables were examined to ensure a linear relationship is present. Pearson correlation was used to test that variables are not perfectly correlated (Benesty et al., 2009). In addition, a Variance Inflation Factor was used (Thompson et al., 2017). A Breusch-Pagan/Cook-Weisberg test was used to test for heteroscedasticity (Gujarati, 2009). These results were corroborated with the White test. The results of these validity checks are included as part of the regression tables presented in section 4.3.

Omitted variable tests were also performed. Omitted variable bias was reduced by performing the Ramsey Regression Equation Specification Error Test (RESET). In addition, the model used included controls for mean reversion in earnings growth as previous research by Lipe and Kormendi (1994) concluded there is significant mean reversion in the stock market. Omitted variable bias was further reduced through the inclusion of additional control variables. The control variables stem from the model initially used by Zhou and Ruland (2006). The control variables consist of earnings yield, return on assets, previous earnings growth and asset growth. As an additional safeguard, the results from models 1-3 (see table 4.3) are subject to several sensitivity tests which are explained in more detail in section 4.4.

Finally, a Breusch and Pagan Lagrangian multiplier test confirmed the appropriateness of using a panel model to complement the results of a pooled regression. A Hausman test was conducted in order to determine whether the random effects or fixed effects estimation model should be used when panel regression results are generated. Random effects assumes the covariance between the unknown variables and the independent variables is zero. This contrasts with the fixed effects model which assumes the residual error is a

random error (Clark and Linzer, 2015). In the interest of brevity, these results are un-tabulated.

The above methodology was considered reliable for statistical analysis.

4: Results

Section 4.1 reports the descriptive statistics. Section 4.2 deals with the univariate analysis, focusing specifically on the relationship between earnings growth and dividend pay-out. Section 4.3 presents the findings from the multivariate regression analysis which examined dividend pay-out and real GDP.

4.1 Descriptive statistics

Table 4.1 provides the descriptive statistics. The results show that the median earnings growth for firms on the Johannesburg Stock Exchange was 21% for one-year earnings growth. This is similar to the mean of 21.9% for Vermeulen and Smit (2011) and 21.5% for Zhou and Ruland (2006). Vermeulen and Smit (2011) conducted their study from 1973 to 2009, compared to this study which was conducted from 1996 to 2016. The mean indicates the South African commercial arena is still producing similar returns for their shareholders.

Table 4.1 – Descriptive statistics

Variable	Mean	Std. Deviation (%)
Earnings growth (1-year %)	20.6504	40.09410
Earnings growth (3-year %)	4.1161	35.88864
Earnings growth (5-year %)	2.2011	40.24132
Debt/Assets	0.4693	0.20340
Earnings yield	10.8521	4.17606
Size	28.6712	1.90827
Dividend pay-out	34.2319	26.90278
Return on assets	15.3331	6.58795
Asset growth	13.4992	14.81748
PEG 1	21.4602	41.39450
PEG 3	3.7615	46.21021
PEG 5	0.4443	48.60950

The earnings growth standard deviation of 40% is much less than the 133.9% reported by Vermeulen and Smit (2011). The decrease in standard deviation suggests that the South African economy is more developed than it was.[8]

The mean dividend pay-out decreases from 43.3% in Vermeulen and Smit (2011) to 34.2% in this study. The dividend pay-out standard deviation (26.9%) is slightly lower compared to Zhou and Ruland (2006) in the United States (31.4%) and Vermeulen and Smit (2011) in South Africa (39.8%).

[8] Difference also due to the different time periods.

The leverage ratio has remained relatively unchanged. In this study the mean leverage ratio was 46.9% compared to the prior study of 47.4% reported by Vermeulen and Smit (2011). This contrasts with the United States which reports a mean leverage ratio of 46.5% (Zhou and Ruland, 2006). Despite the differing interest rate levels, the South African and United States leverage is similar. This may be evidence of a benchmark target capital structure which firms seek to reach (Barclay and Smith, 2005).

Vermeulen and Smit (2011) recorded a mean earnings yield of 18.8% compared to 10.9% from table 4.1. This could have been due to the maturing nature of the economy. Mature economies generally have lower earnings yields than developing economies have (Olsson, 2002). The standard deviation for the earnings yield of 5.18% is also less than the prior study of 6.8%. The lower earnings yield can largely be attributed to the increase in market prices. As the earnings growth for Vermeulen and Smit (2011) and this study were similar (21.9% and 21%), it means that the market prices have increased. This could be a reflection of investors' appetites for riskier investments. Emerging economies do bear increased risk, which provides the potential for higher returns (Olsson, 2002). Alternatively, it could be a result of less profitable operations as a result of increasing costs (Olawale and Garwe, 2010).

The mean return on assets for the population was 15.3%. This is higher than the 9.5% recorded by Vermeulen and Smit (2011). The USA has a lower return on assets of 7.4% which is expected in a much more competitive economy (Smith and Thanassoulis, 2015). The increase in return on assets compared to the prior South African study may be explained by the efficient dismantling of unprofitable divisions within enterprises caused by potential fears within the country.[9] The higher return on assets could also be explained by the lower mean asset growth. The total mean asset growth of 13.5% dwindles in comparison to the 20% first recorded in South Africa. This indicates that companies' assets have not being growing as fast as prior levels. This suggests companies are not investing as heavily in the assets of the business.

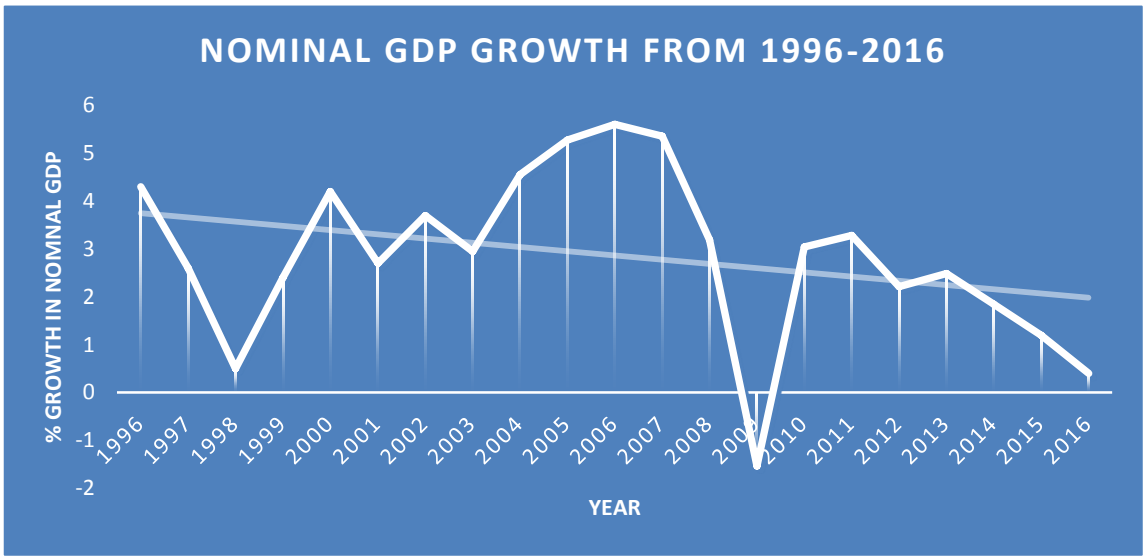
Compared to Vermeulen and Smit (2011), the lower dividend pay-out, higher return on assets and lower asset growth, may be an indication of the high level of economic uncertainty present in the South African economy. In the context of uncertainty, companies

[9] In 2007, Eskom embarked on the construction of the Medupi and Kusile power plants. The construction of these was made more complicated with corruption, excessive debt, delays and additional strain on the electricity supplier. This has introduced much uncertainty for many investors as no power supply could potentially drastically harm corporate margins. As a result, managements' could be engaged in large sell-offs of divisions and the withdrawal of capital in order to reduce their exposure to this risk.

retain their earnings rather than pay them out as dividends (Bradley et al., 1998). Because of the political and economic uncertainty which has plagued the economy for a pro-longed period of time (Hlatshwayo and Saxegaard, 2016, Redl, 2018), many managers have arguably lost hope and are now more risk averse than they once were. Political uncertainty was examined by Bleaney (1994), who found a strong negative relationship between private fixed investment and political uncertainty. The economic uncertainty stems from the future growth prospects, as can be evidenced from the decreasing GDP trend line from graph 1.

Figure 1 shows historic growth in nominal GDP. From 1973-2009 the average nominal GDP growth was 2.52% versus 2.87% from 1996-2016. It appears that there may be some relationship between earnings growth and GDP. There is a decreasing trend in nominal GDP from 1996 to 2016.

Graph 4.1 – Nominal GDP growth



4.2 Univariate analysis

Univariate correlations are reported in table 4.2 for the base model, per equation 3.1. Un-tabulated normality tests showed that not all of the variables are normally distributed. As a result, a non-parametric Spearman Rho was used to calculate paired correlations.

Table 4.2 – Spearman's correlation

	1-year earnings growth	3-year earnings growth	5-year earnings growth	Debt/Assets	Earnings Yield	Size	Dividend pay-out	Return On Assets	Asset growth
1-year earnings growth	1.000	.187**	.014	.064	-.076	-.084*	-.056	-.168**	.335**
3-year earnings growth	.187**	1.000	.180**	.030	.016	-.014	-.140**	.167**	.269**
5-year earnings growth	.014	.180**	1.000	.041	-.048	-.023	-.006	-.034	.051
Debt/Assets	.064	.030	.041	1.000	.029	.053	-.153**	-.281**	.071
Earnings yield	-.076	.016	-.048	.029	1.000	-.439**	-.162**	.016	-.045
Size	-.084*	-.014	-.023	.053	-.439**	1.000	.142**	.058	-.065
Dividend pay-out	-.056	-.140**	-.006	-.153**	-.162**	.142**	1.000	.021	-.185**
Return on assets	-.168**	.167**	-.034	-.281**	.016	.058	.021	1.000	.082*
Asset growth	.335**	.269**	.051	.071	-.045	-.065	-.185**	.082*	1.000

** - Correlation is significant at the 0.01 level (2-tailed).

* - Correlation is significant at the 0.05 level (2-tailed).

Non-normality[10]

[10] A Spearman's correlation was performed because not all of the variables were normally distributed.

Table 4.2 shows that size (r_s = -0.084, p<0.05), return on assets (r_s = -0.168, p<0.01) and asset growth (r_s = 0.335, p<0.01) have significant relationships with attributable earnings growth for the one-year period. The significance, however, of these correlations does not hold across the earnings growth period.

All variables besides debt-to-assets and asset growth have a negative correlation with one-year earnings growth. Earnings yield and return on assets produce differing correlations, depending on the earnings growth period.

The change in the relationship between earnings growth and dividend pay-out is interesting. Prior research shows that these two variables are positively related for one-, three- and five-year earnings growth periods (Zhou and Ruland, 2006, Vermeulen and Smit, 2011) but table 4.2 shows a negative relationship between the one-year earnings growth and the dividend pay-out (r_x = -0.056, p>0.10). Zhou and Ruland (2006) and Vermeulen and Smit (2011) both attained correlations of 0.248 and 0.190 for the one-year growth in earnings which were significant at the 1% level. This is much greater than the correlation present in this study (r_x = -0.056, p>0.10). The correlation between earnings growth and dividend pay-out is negative and significant only at the 1% level for the three-year earnings growth model but, compared to prior literature, the dividend pay-out was significant at the 1% level across all models. This provides some evidence that the dividend pay-out works inversely in relation to earnings growth.

4.3 Multivariate analysis

Table 4.3 contains the multivariate panel regression results for the base model.

Table 4.3 – Standardized coefficients[11]

Independent and control variables	Model 1 DV=Earnings growth 1-year		Model 2 DV=Earnings growth 3-year		Model 3 DV=Earnings growth 5-year	
	Standardized Beta	t-statistic	Standardized Beta	t-statistic	Standardized beta	t-statistic
Dividend pay-out	0,033	0.833	-0.030	-0.745	0.044	1.038
Debt/Assets	-0.012	-0.305	0.027	0.657	0.030	0.701
Earnings yield	-0.107	-2.484**	0.002	0.035	-0.018	-0.388
Size	-0,075	-1.762*	-0.017	-0.388	-0.028	-0.617
Return on assets	-0.232	-5.889***	0.128	3.172***	-0.001	-0.023
Asset growth	0.265	6.815***	0.227	5.677***	0.032	0.771
Model Summary						
R^2	0.127		0.076		0.004	
Adjusted R^2	0.119		0.067		0.006	
F-statistic	14.769		8.366		0.392	
Fixed year-effect	√					
Fixed firm-effect	√					

Model 1 is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

Per an un-tabulated ANOVA, for Model 1 (F=14.769, p<0.01), Model 2 (F=8.366, p<0.01) and Model 3 (F=0.392, p<0.01), the null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

[11] An un-tabulated Breusch-Pagan L test confirmed the appropriateness of using a panel regression to complement any pooled regression findings. The Hausman test for Model 1 (X_2=18.1, p<0.01) confirmed the appropriateness of using a fixed effects model for the panel regression while a random effects model is used for Model 2 (X_2=6.96, p>0.1) and Model 3 (X_2=7.24, p>0.1).

In order to avoid repetition and address mean reversion, the results of the base model, per table 4.3, shall be discussed together with the results of the base model including past earnings growth, as per table 4.4.

Measured as the growth in profit attributable to ordinary shareholders less preference dividends from the beginning of the year before Year t to the beginning of Year t, Past earnings growth was included as a control variable for one-, three- and five-year periods in order to account for the effect of mean reversion in earnings growth (Zhou and Ruland, 2006, Vermeulen and Smit, 2011)).

Table 4.4 – Standardized coefficients including past earnings growth

Independent and control variables	Model 1 DV=Earnings growth 1-year		Model 2 DV=Earnings growth 3-year		Model 3 DV=Earnings growth 5-year	
	Standardized Beta	t-statistic	Standardized Beta	t-statistic	Standardized beta	t-statistic
Dividend pay-out	0.023	0.585	-0.029	-0.704	0.040	0.952
Debt/Assets	-0.001	-0.025	0.025	0.615	0.033	0.768
Earnings yield	-0.095	-2.197**	0.001	0.020	-0.023	-0.496
Size	-0.073	-1.711*	-0.017	-0.389	-0.027	-0.594
Return on assets	-0.212	-5.287***	0.124	3.034***	-0.001	-0.025
Asset growth	0.276	7.081***	0.227	5.664***	0.034	0.822
Past earnings growth	-0.100	-2.507**	0.025	0.618	-0.056	-1.366
Model Summary						
R^2	0.136		0.077		0.007	
Adjusted R^2	0.126		0.066		-0.005	
F-statistic	13.668		7.218		0.603	
Fixed year-effect	√					
Fixed firm-effect	√					

Model 1 is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

Per an un-tabulated ANOVA, for Model 1 (F=13.668, p<0.01), Model 2 (F=7.218, p<0.01) and Model 3 (F=0.603, p>0.1), the null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

Zhou and Ruland (2006) and Vermeulen and Smit (2011) had an adjusted r² of 19.96% and 14.10% respectively for the one-year earnings growth period, compared with the adjusted R^2 of 11.9% and 12.6% per table 4.3 & 4.4.

The robustness of the model decreases as the earnings growth period increases. This suggests that the dividend pay-out has a short-term effect on the earnings growth. This pattern was first observed by Vermeulen and Smit (2011). The adjusted r^2 in South Africa weakens as there is an increase in the earnings growth period from one-year to three-year and from three-year to five-year. A similar result is shown in table 4.3 & 4.4 but the effect is more pronounced.

South Africa had a vastly different political, labour and economic landscape in the latter half of this study which is not included in the period under review by Vermeulen and Smit (2011) and provides one explanation for the material decrease in the adjusted R^2 from Model 1 to Model 3 (Beckman et al., 2010, Hlatshwayo and Saxegaard, 2016, Redl, 2018, Thomas, 2012).

There was a positive relationship between future earnings growth and the dividend pay-out for all models except for the three-year earnings growth model, which was slightly negative. This contrasts with prior research which shows a much stronger positive relationship between future earnings growth and the dividend pay-out in both the USA (Zhou and Ruland, 2006) and SA markets (Vermeulen and Smit, 2011). These results also differ from Arnott and Asness (2003), Zhou and Ruland (2006) and Vermeulen and Smit (2011) because dividend pay-out is insignificant at the 1%, 5% and 10% level.

Earnings yield, size, return on assets and asset growth, on the other hand, are all significant for Model 1. These variables decrease in significance as the period increases. This reaffirms the short-term relevance of the model.

One would expect firms with increases in earnings growth to be faced with increased competition in their line of business. This would thus drive the earnings growth downward. Consequently, a negative relationship with earnings growth was expected.

Table 4.4 provides little evidence of mean reversion as there is a negative and significant relationship between earnings growth and past earnings growth for the one-year model ($B=-0.1$, $p<0.05$). In addition, dividend pay-out remains statistically insignificant. Similarly, earnings yield, size, return on assets and asset growth were significant in the primary analysis (see table 4.3) and remain significant after controlling for past earnings growth. This implies that the earnings growth is not tending to the historical mean of earnings growth.[12]

[12] The finding also indicates that when companies achieve superior earnings growth, it is difficult for their competitors to capture a piece of the growth. A more detailed review on the relevance of market/industry features, including competition, is beyond the scope of this research.

This is in line with Vermeulen and Smit (2011) who did not find strong evidence for mean reversion.

Table 4.5 contains the results from the inclusion of real GDP in the base model.

Table 4.5 – Standardized coefficients for real GDP

Independent and control variables	Model 1 DV=Earnings growth 1-year		Model 2 DV=Earnings growth 3-year		Model 3 DV=Earnings growth 5-year	
	Standardized Beta	t-statistic	Standardized Beta	t-statistic	Standardized beta	t-statistic
Dividend pay-out	0.030	0.751	-0.033	-0.798	0.042	0.986
Debt/Assets	-0.009	-0.233	0.029	0.705	0.032	0.743
Earnings yield	-0.122	-2.738***	-0.009	-0.200	-0.028	-0.583
Size	-0.081	-1.890*	-0.021	-0.479	-0.032	-0.698
Return on assets	-0.229	-5.811***	0.130	3.215***	0.001	0.021
Asset growth	0.269	6.901***	0.230	5.729***	0.035	0.833
Real GDP	-0.051	-1.288	-0.036	-0.881	-0.033	-0.791
Model Summary						
R^2	0.130		0.078		0.005	
Adjusted R^2	0.120		0.067		-0.007	
F-statistic	12.910		7.279		0.425	
Fixed year-effect	√					
Fixed firm-effect	√					

Model 1 is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

Per an un-tabulated ANOVA, for Model 1 ($F=12.910$, $p<0.01$), Model 2 ($F=7.279$, $p<0.01$) and Model 3 ($F=0.425$, $p>0.1$), the null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

The inclusion of the additional variable, real GDP, in the regression model has an insignificant effect (ΔR^2=0.003, F=12.910, p>0.1) for the one-, three- (ΔR^2=0.002, F=7.729, p>0.1) and five-year earnings growth period (ΔR^2=0.001, F=0.425, p>0.1). This finding is consistent with Ritter (2005) and Ibbotson and Chen (2003). Improvements in the real economy do not translate to higher shareholder returns.

Collectively, the findings per tables 4.3, 4.4 and 4.5 suggest that the dividend pay-out is not a good predictor of earnings growth. Market expectations, which are not being included explicitly in the model, may be a better indicator of future growth. The negative significance of the earnings yield ratio for one-year earnings growth (B = -0.107, p<0.05) indicates that market expectations of the future are relatively accurate at determining firms which will increase their earnings growth in the short-term. Size (B = -0.075, p<0.1) and return on assets (B = -0.232, p<0.01) are significant and in line with expectations. The results do, however, show a negative relationship between leverage and earnings growth (B = -0.012, p>0.1). This contrasts with the positive but weak significant relationship identified by Vermeulen and Smit (2011). The negative relationship between leverage and earnings growth evident in this study, although different to economic theory, correlates with the results of Abor (2007) who found that South African businesses that take on long-term debt actually decrease the performance of the company. A positive and significant relationship between asset growth and earnings growth exists (B = 0.265, p<0.01). This indicates that the assets invested in are being utilized to generate greater returns.

Economic growth can stem from two origins, increased productivity and more input (Ogburn, 1951, Krugman, 1994). Technology primarily brings increased productivity. The beneficiaries of this increased productivity are not necessarily the shareholder but rather an organisation's customer. The customer is afforded a higher standard of living as a result of a change in technology (Ogburn, 1951, Ogburn, 1955). More input into the economy also does not translate into higher returns for the shareholder. Krugman (1994) and Young (1995) find that GDP increases are a result of increased participation rates, higher educational and health standards, transfer of the labour force from the agriculture sector to the industrial sector and higher personal savings rates. All of these forces do not directly translate into higher returns for shareholders.

Table 4.6 provides a summary of results from this study, Zhou and Ruland (2006) and Vermeulen and Smit (2011).

Table 4.6 – Expected relationships with independent variables for 1-year earnings growth

Independent	Expected relationship with earnings growth	Actual relationship with earnings growth per table 4.4 (1996-2016)	USA Zhou and Ruland (2006) (1950-2003)	Previous SA study Vermeulen and Smit (2011) (1973-2009)
Dividend pay-out	Positive	1Y – Positive 3Y – Negative 5Y – Positive	1Y – Positive*** 3Y – Positive*** 5Y – Positive***	1Y – Positive*** 3Y – Positive*** 5Y – Positive**
Real GDP	Positive	1Y – Negative 3Y – Negative 5Y – Negative	Not covered	Not covered
Debt/Assets	Positive	1Y – Negative 3Y – Positive 5Y – Positive	1Y – Positive** 3Y – Positive*** 5Y – Positive***	1Y – Positive* 3Y – Positive* 5Y – Positive
Earnings yield	Negative	1Y – Negative*** 3Y – Positive 5Y – Negative	1Y – Negative*** 3Y – Negative*** 5Y – Negative***	1Y – Negative*** 3Y – Negative*** 5Y – Negative
Size	Negative	1Y – Negative*** 3Y – Negative 5Y – Negative	1Y – Negative*** 3Y – Negative*** 5Y – Negative***	1Y – Negative 3Y – Positive 5Y – Positive*
Return on assets	Negative	1Y – Negative*** 3Y – Positive*** 5Y – Negative	1Y – Negative*** 3Y – Negative*** 5Y – Negative***	1Y – Negative*** 3Y – Negative*** 5Y – Negative***
Asset growth	Positive	1Y – Positive*** 3Y – Positive*** 5Y – Positive	1Y – Positive*** 3Y – Positive*** 5Y – Positive***	1Y – Positive*** 3Y – Positive*** 5Y – Positive***
Past earnings growth	Negative	1Y – Negative** 3Y – Positive 5Y – Negative	1Y – Positive 3Y – Negative*** 5Y – Negative***	1Y – Positive 3Y – Negative*** 5Y – Negative***

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

4.4 Sensitivity analysis

Due to the unexpected findings, several sensitivity tests were performed. A summary of these tests can be found in table 4.7.

Table 4.7 – Summary of sensitivity tests performed	
Sensitivity test	**Description**
1	Market-to-book control variable
2	Lagged measures
3	EY integrated reporting scores and inflation
4	Factor analysis
5	Industry and year analysis

Table 4.8 details the measurement of the additional variables used in the sensitivity analysis

Table 4.8 – Measurement of additional sensitivity analysis variables		
Variable	**Measurement**	**Precedent**
Market-to-book	Measured as the market value of equity, calculated by multiplying the number of ordinary equity shares in issue at the beginning of Year t by the share price at the beginning of Year t, divided by the book value of equity, measured as total equity at the beginning of Year t.	Fama and French (1995), Penman (1996), Fama and French (2015)
EY integrated reporting scores	Ranked on a scale from 1-5, 1 being the lowest integrated report score and 5 being the highest. This score was allocated to 96 companies in the population over the period 2010-2016 for each year.	Barth et al. (2017)
Inflation[13]	Growth in the CPI index for Year t. Growth was calculated for one-, three- and five-year periods.	Ross (2013), Kisman and Restiyanita (2015), Chen et al. (1986)
Industry	The companies used in the sample were classified into the following industries: Oil & gas, Basic materials, Industrials, Consumer goods, Health care, Consumer services, Telecommunications, Utilities and Technology. The industry classification is based on the Industry classification benchmark issued by the Johannesburg Stock Exchange.	Zhou and Ruland (2006)

For the sensitivity tests, equation 3.1 was used. Equation 3.2, which includes real GDP, was not used because of the insignificance of the additional variable (see table 4.5).

[13] As inflation is an independent variable that was included in the sensitivity tests, the remaining independent and control variables were all adjusted for inflation using market prices at 1 January 1996.

4.4.1 Market-to-book control variable

A market-to-book control variable was included to account for the possibility that the market expects firms with high market-to-book ratios, relative to their peers, to deliver superior earnings growth. Firms with high market-to-book values indicate the market expects high future earnings growth (Fama and French, 1995, Penman, 1996). Results are summarised in table 4.9.

Table 4.9 – Standardized coefficients including price-to-book value control

Independent and control variables	Model 1 DV=Earnings growth 1-year		Model 2 DV=Earnings growth 3-year		Model 3 DV=Earnings growth 5-year	
	Standardized Beta	t-statistic	Standardized Beta	t-statistic	Standardized beta	t-statistic
Dividend pay-out	0.031	0.786	-0.032	-0.772	0.036	0.853
Debt/Assets	-0.027	-0.568	0.017	0.343	-0.036	-0.714
Earnings yield	-0.088	-1.617	0.015	0.270	0.068	1.182
Size	-0.078	-1.805*	-0.019	-0.420	-0.038	-0.828
Return on assets	-0.249	-5.009***	0.116	2.263**	-0.080	-1.517
Asset growth	0.263	6.723***	0.226	5.608***	0.022	0.534
Price-to-book value	0.036	0.579	0.026	0.397	0.164	2.449**
Model Summary						
R^2	0.128		0.077		0.014	
Adjusted R^2	0.118		0.066		0.002	
F-statistic	12.694		7.138		1.196	
Fixed year-effect	√					
Fixed firm-effect	√					

Model 1 is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

Per an un-tabulated ANOVA, for Model 1 (F=12.694, p<0,=.01), Model 2 (F=7.138, p<0.01) and Model 3 (F=1.196, p>0.1), the null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

From table 4.9, the inclusion of market-to-book value has no effect on the model. It is possible that the relationship (between market-to-book ratio and earnings growth) may be captured in the earnings yield as investors with high expectations for a company's future will result in a high market-to-book ratio: this will show also in a low earnings yield ratio.

4.4.3 Lagged measures

The dependent variable was then changed to the one-year, three-year and five-year earnings growth lag for the base model (see equation 3.1). This was done to account for the delayed benefit which may result from the reinvestment of earnings. The tests as per table 4.10 also controlled for the possibility that the dependent variable could have an effect on the independent variables used in the model. Zhou and Ruland (2006) and Vermeulen and Smit (2011) did not perform a lagged measures test.

Table 4.10 provides the results from the lagged tests.

Table 4.10 – Standardized coefficients for lagged measures

Independent and control variables	Model 1 DV=Earnings growth 1-year		Model 2 DV=Earnings growth 3-year		Model 3 DV=Earnings growth 5-year	
	Standardized Beta	t-statistic	Standardized Beta	t-statistic	Standardized beta	t-statistic
Dividend pay-out	0.014	0.131	0.014	0.137	0.098	0.936
Debt/Assets	0.170	1.684*	0.081	0.814	0.147	1.452
Earnings yield	-0.006	-0.046	0.126	1.069	0.079	0.659
Size	0.078	0.687	0.098	0.875	0.033	0.292
Return on assets	0.061	0.629	0.191	1.978**	0.069	0.709
Asset growth	-0.061	-0.622	-0.011	-0.116	0.045	0.462
Model Summary						
R^2	0.036		0.057		0.032	
Adjusted R^2	-0.018		0.004		-0.023	
F-statistic	0.666		1.072		0.587	
Fixed year-effect	√					
Fixed firm-effect	√					

Model 1 is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

Per an un-tabulated ANOVA, for Model 1 (F=0.666, p>0.1), Model 2 (F=1.072, p>0.1) and Model 3 (F=0.587, p>0.1), the null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

The dividend pay-out remains insignificant. In addition, the control variables: earnings yield, size, return on assets and asset growth are no longer significant. The results of these tests suggest that there is no lag effect on earnings growth and confirm that the model is more appropriate for explaining short-term earnings growth.

4.4.4 EY integrated reporting scores and inflation

As an additional sensitivity test, an integrated report quality measure is introduced as a control for organisations' internal management processes. This is based on earlier research which suggests that firms with higher quality integrated reports take a more holistic approach to managing financial and non-financial capitals in order to generate more sustainable returns (Churet and Eccles, 2014, Guthrie et al., 2017, McNally and Maroun, 2018, de Villiers and Maroun, 2018). Consequently, firms with better quality integrated reports tend to outperform their peers in terms of market returns (Zhou et al., 2017) and offer better investment efficiency (Barth et al., 2017). Due to the fact that South Africa has higher levels of inflation than Europe and the USA, a control for inflation is also introduced.

Table 4.11 contains a substantiation of the variables included.

Table 4.11 – Sensitivity analysis variable inclusion explained	
Variable	**Description**
EY integrated reporting scores	There is currently limited research which looks at the influence management can have on earnings growth. This is primarily due to the inability to quantify management's efforts. Historically, literature has focused on financial elements only, whereas, the introduction of the EY integrated reporting scores provides the opportunity to measure the performance of management which is not quantified in the financials. De Villiers et al. (2014) and De Villiers et al. (2017) remind us that the integrated report provides additional clarity about the corporate strategy chosen, the way the company is run, the performance and future plans of the company are aligned with the end goal of providing value to the firm and its stakeholders. It is this additional information which is not accounted for in the financials which is worthy of consideration for (potentially) being able to increase earnings growth. The integrated reporting scores determined by EY serve as a proxy for management's efforts (Barth et al., 2017, McNally and Maroun, 2018). It was expected that those firms with higher EY integrated reporting scores would have higher earnings growth.
Inflation	This is a measure of the general increase in prices over a period of time. As earnings are stated in nominal terms, they absorb the effects of inflation and so should be correlated. Although inflation may be a minor determinant which can influence future earnings, research by Basu et al. (2010) shows that analysts do not consider its impact holistically. Analysts were shown to have a tendency for underestimating the impact inflation can have on the change in earnings. As inflation increases, the purchasing power of consumers decreases and fewer finished goods are purchased. Increasing inflation also increases the nominal earnings and then causes an adjustment to be made to the risk-adjusted return received by the shareholder. The researcher therefore expected inflation to be positively related to nominal earnings growth.

The inclusion of EY integrated reporting scores, over and above the base model, has an insignificant effect on the model. The test is un-tabulated in the interest of brevity. The un-tabulated results indicate that the integrated report quality is not contributing to the model's explanatory power (Model 1 – B = -0.045, p>0.1, Model 2 – B = 0.186, p>0.1, Model 3 – B = 0.257, p<0.1). In addition, for Model 1 there is little difference in adjusted R^2 before (adj. R^2 = 0.119) and after (adj. R^2 = 0.083) the inclusion of the control variable. There was, however, an improvement in adjusted R^2 for Model 2 and 3 (adj. R^2 before = 0.067 and 0.006 versus adj. R^2 after = 0.108 and 0.151). The research suggests that integrated report quality (as a proxy for internal management) is not significantly associated with historical earnings.

The un-tabulated results indicate, that when including inflation, there was a positive and significant relationship for all models except Model 3 (Model 1 – B = 0.121, p<0.01, Model 2 – B = 0.08, p<0.05, Model 3 – B = 0.067, p>0.1). There is also an insignificant improvement in the adjusted R^2. This agrees with the initial expectation and is in line with economic theory which states that general price increases are passed through the organisation and increase the nominal earnings growth.

4.4.5 Factor analysis

Although there were no material multi-collinearity issues, a factor analysis was conducted to ensure that the interaction between independent variables has no effect on the results.

An un-tabulated factor analysis using the original and additional control variables generated five factors which accounted for 89% of the total model variance. The factor scores were generated using principle component analysis with varimax rotation and 1 as the eigen-value cut-off[14]. Table 4.12 shows the factor grouping with labels assigned by the researcher.

Table 4.12 details the factor analysis groupings.

Table 4.12 – Factor analysis groupings

Factor grouping	Variables included
1	Earnings yield, size, price-to-book value and EY integrated reporting scores
2	Real GDP and inflation
3	Dividend pay-out and industry
4	Asset growth and turnover per employee
5	Earnings yield and debt-to-cash ratio

[14] Kaiser-Meyer-Olkin measure suggests that the sample size is adequate (KMO = 0.722) and based on the result of Bartlett's test of sphericity, the null hypothesis, that the variables included in the analysis are uncorrelated is rejected (X^2=1258.14, p<0.01). An un-tabulated scree plot showed points of infliction at 3 and 5 factors and confirmed the decision to retain 5 factors.

Per the un-tabulated results, the independent variables (per factors) were insignificant. Findings presented in the primary analysis (see section 4.3) are unchanged.

4.4.6 Industry and year analysis

Finally, a regression which controlled for each industry and a specific time period was used. This was done for the one-, three- and five-year earnings growth periods using the base model. As the sensitivity tests per section 4.4.1-4.4.5 did not yield substantially different results, the base model (see equation 3.1) is used for the regression models below.

The regression was split into the following industry categories:

Table 4.13 – Industry categories	
Industry	**Industries included**
1	Basic materials, industrials and oil & gas
2	Consumer goods, consumer services and health care
3	Technology, telecommunications and utilities

Industry 1 has firms which are capital intensive and have a large impact on the environment. Industry 2 has firms which have low capital requirements and minimal impacts on the environment. Industry 3 has the remaining sub-industries which have varying capital requirements and influences on the environment.

To analyse change over time the following periods were chosen. The first two periods cover the bull runs leading up the subsequent dot-com and financial market crashes. The last period covers the challenging economic and political landscape present in South Africa at the time (Redl, 2018, Hlatshwayo and Saxegaard, 2016).

Table 4.14 – Year categories	
Period	**Years (inclusive)**
1	1996-2001
2	2002-2007
3	2008-2016

Industry analysis

Table 4.15 contains the results of the industry analysis.

Past earnings growth was included in the one-, three- and five-year industry analysis. The data suggests there is no significant mean reversion.

Table 4.15 – Standardized coefficients - Industry[15]

Independent and control variables	Significance – Industry 1			Significance – Industry 2			Significance – Industry 3		
	One-year	Three-year	Five-year	One-year	Three-year	Five-year	One-year	Three-year	Five-year
Dividend pay-out								+ effect ; 10% level	
Debt/Assets						+ effect ; 10% level			
Earnings yield							- effect ; 10% level		
Size					+ effect ; 5% level	- effect ; 10% level			
Return on assets	- effect ; 1% level			- effect ; 1% level	+ effect ; 1% level		- effect ; 1% level		
Asset growth	+ effect ; 1% level	+ effect ; 1% level		+ effect ; 1% level	+ effect ; 1% level		+ effect ; 1% level	+ effect ; 5% level	
Model Summary									
R^2	0.120	0.065	0.007	0.108	0.155	0.026	0.318	0.131	0.040
Adjusted R^2	0.097	0.041	-0.019	0.090	0.138	0.006	0.259	0.056	-0.042
F-statistic	5.210	2.677	0.254	5.931	8.981	1.323	5.433	1.757	0.490
Fixed year-effect	√			√			√		
Fixed firm-effect	√			√			√		
Assumptions testing[16]									

[15] Industry 1: Basic materials, industrials and oil & gas

Industry 2: Consumer goods, consumer services and health care

Industry 3: Technology, telecommunications and utilities

[16] Model 1 (one-year) is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

The null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

Table 4.15 illustrates that despite the industry categories having different traits, such as capital intensity and environmental affect, there were no additional findings. For all industries, the dividend pay-out is irrelevant when determining the impact on future earnings growth. In addition, both return on assets and asset growth remain significant in the short-term.

In addition, industry category 1, 2 and 3, across the one-, three- and five-year earnings period, generated a differing adjusted R^2 than the base model in certain circumstances. This highlights the possibility that there are industry specific factors which are not considered in the model.[17]

Period analysis

Table 4.16 contains the results of the period analysis.

Past earnings growth was included in the one-, three- and five-year period analysis. The data suggests there is no significant mean reversion.

[17] For example, deregulation in the airline and health insurance industries.

Table 4.16 – Standardized coefficients – Period

Independent and control variables	Significance – Period 1 1996-2001			Significance – Period 2 2002-2007			Significance – Period 3 2008-2016		
	One-year	Three-year	Five-year	One-year	Three-year	Five-year	One-year	Three-year	Five-year
Dividend pay-out									
Debt/Assets		+ effect ; 1% level							
Earnings yield		- effect ; 1% level					- effect ; 1% level	+ effect ; 10% level	
Size		- effect ; 1% level	- effect ; 5% level				- effect ; 10% level		
Return on assets	- effect ; 10% level	- effect ; 5% level	+ effect ; 10% level	- effect ; 1% level	+ effect ; 1% level		- effect ; 1% level	+ effect ; 5% level	
Asset growth	+ effect ; 5% level			+ effect ; 1% level	+ effect ; 1% level		+ effect ; 1% level	+ effect ; 1% level	
Model Summary									
R^2	0.168	0.331	0.178	0.130	0.157	0.020	0.150	0.0.088	0.011
Adjusted R^2	0.085	0.265	0.095	0.109	0.136	-0.004	0.132	0.069	-0.009
F-statistic	2.022	4.958	2.160	6.020	7.475	0.839	8.566	4.702	0.563
Fixed year-effect	√			√			√		
Fixed firm-effect	√			√			√		
Assumptions testing[18]									

[18] Model 1 (one-year) is robust to fixed year-effects. Case-wise diagnostic confirmed that there were only 20 observations with residual errors more than 3 standard deviations from the norm which – based on their Cook's (average < 0.1) and Mahalanobis (<10) distance – are not having a significant impact on results. The un-tabulated VIF scores give no indication of multi-collinearity problems.

The null hypothesis, that the independent and control variables make no contribution to the predicted outcome, is rejected. A Breusch-Pagan and White test for heteroscedasticity produced conflicting results for Models 1-3, while a Doornik-Hansen test for multivariate normality and Shapiro Wilk test on residual terms showed that errors were not always normally distributed. As a result, the models were re-run for robust standard errors and subject to bootstrapping with 10 000 iterations and a bias-corrected and accelerated method (un-tabulated). A heteroskedastic regression model with the same dependent, independent and control variables was also used to corroborate the results per the pooled and panel models. Findings remain qualitatively consistent.

*** significance at 1% level; ** significance at 5% level; * significance at 10% level

In comparison to the industry analysis, table 4.16 shows the dividend pay-out remains insignificant. In certain instances, however, the model is more robust than the base model. For example, industry 3 for the one-year earnings growth period (R^2 = 0.259) and period 1 for the three-year earnings growth period (R^2 = 0.265) were able to produce substantially higher adjusted R^2's than the base model.

Where the industry analysis had no identifiable pattern, the period analysis illustrates that when the South African outlook is doubtful (period 3), there is a return to investor fundamentals in the short-term. This is evident in period 3 for the one-year earnings growth period, when South Africa was consumed with political uncertainty brought on by the South African government (Hlatshwayo and Saxegaard, 2016), financial instability introduced through the threatening junk status downgrades (Redl, 2018) and the prevailing state-owned company crisis in the form of South African Airways (Thomas, 2012) and the national energy provider (Pollet et al., 2015). Table 4.16 shows the increased significance of the variables: earnings yield and size. Period 3 was based on the period 2008-2016, for this reason, the emergence of a new investing philosophy by investors in the face of uncertainty is present, one which involves a return to fundamentals. In times of uncertainty, there is still no evidence of the free cash flow theory.

This illustrates a company/micro level focus by investors when the economy is characterised by high levels of uncertainty. This micro level of focus is lost when there is a low level of uncertainty, evident from the results of period 1 and 2, which covered 1998-2006. Bear in mind that the South African economy was not affected as badly as other economies during the dotcom and financial crash of 2001 and 2008 because of the limited interdependencies evident between South Africa and the United States (Wang et al., 2003).

In addition, table 4.16 indicates that for the three- and five-year earnings growth period, investors are unable to make the predictions they were able to for the one-year earnings growth period during times of uncertainty.[19] When looking at the three- and five-year period, in times of uncertainty the model becomes less efficient and the number of variables which are significant reduces. This contrasts with the one-year earnings growth model and is indicative of low investor sentiment.[20]

[19] In relation to year category 3.

[20] To summarize, similar to the base model tests and the lagged model tests, the efficiency of the model in predicting the attributable earnings growth remains relatively strong in the short-term, indicative of the temporary ability of the model to explain variation in earnings growth. In the presence of low and high levels of uncertainty, the dividend pay-out is irrelevant in determining the impact of future earnings growth.

Combined year and industry results can be found in the appendix (see appendix – table 1.5 and 1.6).[21]

[21] The model has a much higher adjusted r^2 than the base model in certain years and industries. The results of these tests purely show that the model only performs well in certain years and industries.

Across the sample period, asset growth has the most significant relationship with earnings growth, which is in line with the original expectation. Return on assets and price-to-book value appeared to have a significant relationship with earnings growth in some industries and during some time periods, however, this was not as consistent as asset growth. The combined results also illustrate the ability of the model to only be efficient in certain years and industries.

5: Concluding remarks

This study analysed the relationship between attributable earnings growth and dividend pay-out. This study was based on prior literature from Arnott and Asness (2003), Zhou and Ruland (2006) and Vermeulen and Smit (2011). The effect of dividend pay-out on earnings growth has been analysed in the USA (Arnott and Asness, 2003, Zhou and Ruland, 2006), Canada (Parker, 2005), Europe (ap Gwilym et al., 2006), Australia (Parker, 2005, Flint et al., 2010), South Africa (Vermeulen and Smit, 2011), Taiwan (Huang et al., 2009), Singapore (Lee, 2010) and Malaysia (Al-Twaijry, 2007).

The results indicate that the dividend pay-out is positive but statistically insignificant (B = 0.033, p>0.1). This suggests that the dividend pay-out does not have a significant effect on future earnings growth. This is in contrast to the sustainable growth rate model by Higgins (1977) and the free cash flow theory. Prior research suggests management are prone to investing in value-destroying projects when profits are retained (Zhou and Ruland, 2006, Vermeulen and Smit, 2011). As the free cash flow theory does not uphold, a proxy for investment opportunities was not needed to test the free cash flow theory as was done in Zhou and Ruland (2006).[22]

To explain the insignificance of the dividend pay-out, DeAngelo et al. (1996) suggest dividends are insufficient proxies for determining future earnings growth. This was attributed to the behavioural bias inherent in management's perception of future growth prospects. Management may retain too much cash in a time of little growth. On the other hand, management may envision future earnings growth and will reduce the dividend pay-out to fuel the growing cash needs of the enterprise. This is problematic when the cash is invested in non-value adding projects or the cash is left to pile.

In addition to dividend pay-out, the relevance of real GDP is evaluated. This variable has no statistically significant impact on earnings growth.

5.2 Recommendation

This contributes to the prior literature by analysing a different time period in South Africa's history compared to Vermeulen and Smit (2011) and considering additional variables such as real GDP, EY integrated reporting scores and inflation as part of the base model proposed by Zhou and Ruland (2006).

[22] When testing the free cash flow theory, the ratio of the market value of equity and the book value of debt divided by the book value of total assets was used as per Fama and French (2002). This is very similar to *Tobin's q*.

The results indicate that investors should not judge the potential earnings growth of companies based on the dividend policies adopted. This contrasts with Vermeulen and Smit (2011), who recommended that it is important for investors to consider the dividend pay-out. In addition, caution is issued towards any investors attempting to accurately predict the future earnings growth for industries or spans of time based on the projected GDP statistics.

The earnings growth of a firm is similar to organizational contingency theory in that the resultant growth is dependent on internal and external factors. The random walk theory presents a compelling argument for not only stock prices, but the underlying earnings movement. It may be best that one does not attempt to predict.

5.3 Areas for future research

The model employed in this study can be expanded in several ways.

- For example, real GDP and inflation were taken into consideration but there is no direct control for investor sentiment and how this interacts with attributable earnings growth.
- This study used EY integrated reporting scores in the sensitivity analysis to act as a proxy for management. A better proxy for the strategies chosen by management could be investigated. This can include CEO rankings or intra-industry performance rankings measured using return on assets (Jennings et al., 2015).
- A future study should also investigate those variables which have an influence on the cash flows of a business. This study focused on earnings because of the lack of historic cash flow information for the length of the sample period.
- It is recommended for future South African studies that a longer sample period be used. Vermeulen and Smit (2011) also had a smaller sample period when compared to the American studies.

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Appendix

Equation 5 derivation:

$$Market\ value\ of\ equity = \frac{D_{t0}(1+g)}{k_e - g}$$

$$Market\ value\ of\ equity(k_e - g) = D_{t0}(1+g)$$

$$Market\ value\ of\ equity(k_e) - Market\ value\ of\ equity(g) = D_{t0} + D_{t0}(g)$$

$$Market\ value\ of\ equity(k_e) - D_{t0} = Market\ value\ of\ equity(g) + D_{t0}(g)$$

$$Market\ value\ of\ equity(k_e) - D_{t0} = g(Market\ value\ of\ equity + D_{t0})$$

$$\frac{Market\ value\ of\ equity(k_e) - D_{t0}}{Market\ value\ of\ equity + D_{t0}} = g$$

Multiply each side by

$$\left(\frac{1}{Market\ value\ of\ equity}\right) / \left(\frac{1}{Market\ value\ of\ equity}\right) = 1$$

$$\frac{k_e - \dfrac{D_{t0}}{Market\ value\ of\ equity}}{1 + \dfrac{D_{t0}}{Market\ value\ of\ equity}} = g$$

Bearing in mind

$$\frac{D_{t0}}{Market\ value\ of\ equity} = \left[\frac{EPS_{t0}}{V_{t0}}\right]\left[\frac{DPS_{t0}}{EPS_{t0}}\right]$$

Finally, you derive

$$g = \frac{k_e - \left[\frac{EPS_{t0}}{V_{t0}}\right]\left[\frac{DPS_{t0}}{EPS_{t0}}\right]}{1 + \left[\frac{EPS_{t0}}{V_{t0}}\right]\left[\frac{DPS_{t0}}{EPS_{t0}}\right]} = \frac{k_e - EYxPR}{1 + EYxPR}$$

Equation 5

Table 1.1

VIF Statistics

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	*Debt/Assets	0,871	1,149
	*Earnings yield	0,622	1,607
	*Size	0,830	1,205
	*Dividend pay-out	0,964	1,038
	*Return on assets	0,531	1,883
	*Asset growth	0,936	1,069

a. Dependent Variable: Attributable earnings growth (1-year)

Table 1.2

Collinearity diagnostics

Model		Eigenvalue	Condition Index	Variance Proportions						
				(Constant)	*Debt/Assets	*Earnings yield	*Size	*Dividend pay-out	*Return on assets	*Asset growth
1	1	6,211	1,000	0,00	0,00	0,00	0,00	0,01	0,00	0,01
	2	0,609	3,195	0,00	0,00	0,00	0,00	0,18	0,00	0,73
	3	0,419	3,852	0,00	0,03	0,03	0,00	0,70	0,01	0,24
	4	0,318	4,423	0,00	0,05	0,07	0,00	0,04	0,20	0,01
	5	0,280	4,708	0,00	0,11	0,18	0,00	0,00	0,15	0,00
	6	0,104	7,719	0,01	0,73	0,00	0,01	0,07	0,11	0,00
	7	0,057	10,467	0,01	0,07	0,71	0,01	0,00	0,53	0,01
	8	0,003	47,263	0,98	0,01	0,02	0,98	0,01	0,00	0,00

a. Dependent Variable: Attributable earnings growth (1-year)
Casewise diagnostics[23]

[23] There were only 20 cases which had SD residuals greater than 3, which is less than 1% of the population. The average Mahalanobis distance was 6.997 which is substantially less than the 35 cut-off for a population. The average Cooks distance was 0.001, which is also below the benchmark of 1. Finally the Centered leverage value of 0.003 was also well below the cut-off of 1. This illustrates that any of the remaining outliers in the population used do not have a significant effect on the model.

Table 1.3

Outliers were excluded based on the following ranges	
Variable	**Selected range**
One-year earnings (1Y %)	-160<1Y<176
Three-year earnings (3Y %)	-157<3Y<158
Five-year earnings (5Y %)	-163<5Y<165
One-year lag (1YL %)	-150<1YL<164
Three-year lag (3YL %)	-138<3YL<143
Five-year lag (5YL %)	-148<5YL<151
One-year past earnings growth (1PEG %)	-165<1PEG<176
Three-year past earnings growth (3PEG %)	-163<3PEG<162
Five-year past earnings growth (5PEG %)	-175<5PEG<173
Debt/Assets (DA)	DA<1.13
Earnings yield (EY)	-5<EY<23.5
Size (S)	21.9<S
Price/Book value (PB)	-2.5<PB<6.3
Dividend pay-out (DP)	-86<DP<132
Return on assets (ROA)	-10<ROA<35
Total asset growth (TAG)	-32<TAG<57
Debt to operating cash flow (D/CF)	-8.7<D/CF<22.8
Turnover per Employee (T/E)	T/E<2 631 723

Table 1.4

Interest rates over sample period 1996-2016				
Year	**Repo (%)**	**Interbank (%)**	**Treasury bill (%)**	**Prime lending (%)**
2016	6.6	5.4	7.1	10.1
2015	5.7	4.3	5.9	9.2
2014	5.2	4.0	5.6	8.7
2013	5	3.5	5	8.5
2012	5.4	3.7	5.3	8.9
2011	5.6	3.9	5.5	9
2010	6.7	4.9	6.6	10.2
2009	10.3	6.8	8.3	13.5
2008	10.6	10.1	10.7	14.3
2007	8.5	8.1	8.8	12.1
2006	7	6.1	7.1	10.5
2005	7.5	5.6	6.9	10.9
2004	9.2	6.3	7.5	12.4
2003	13.1	10.1	11.2	16.6
2002	10.9	10.6	10.8	14.5
2001	-	8.8	9.7	-
2000	-	9.5	10.1	-
1999	-	13	13.6	-
1998	-	17.1	16.2	-
1997	-	15.5	15.3	-
1996	-	15.5	14.8	-

[24] [25] [26]

[24] All interest rates were extracted from the Reserve Bank database.
https://www.resbank.co.za/Research/Statistics/Pages/Statistics-Home.aspx

[25] The table was split based on the year categories listed in the sensitivity analysis section.

[26] Results remained unchanged even after considering interest rates.

Table 1.5

One-year earnings growth[27]

Results of year and industry categories combined – 1-year									
Year category	Period 1 1996-2001			Period 2 2002-2007			Period 3 2008-2016		
Industry category	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Independent	**Significance**								
Debt/Assets									
Earnings yield							**1%**		
Size				5%	**1%**				
Price/Book value	5%						5%	10%	
Dividend pay-out							5%		
Return on assets	10%	5%			5%				
Asset growth	**1%**	**1%**		**1%**	**1%**	**1%**	**1%**	**1%**	**1%**

Standardized coefficients for year and industry categories combined – 1-year									
Year category	Y1 DV=Earnings growth 1-year			Y2 DV=Earnings growth 1-year			Y3 DV=Earnings growth 1-year		
Industry category	1	2	3	1	2	3	1	2	3
Model Summary									
R^2	0.232	0.167	0.076	0.174	0.176	0.274	0.207	0.081	0.236
Adjusted R^2	0.207	0.136	-0.147	0.146	0.148	0.201	0.198	0.063	0.202
F-statistic	9.296	5.487	0.341	6.279	6.319	3.725	23.903	4.709	6.847

[28]

[27] Past earnings growth was included in the one-year, year and industry test. The data suggests there is no significant mean reversion.

[28] The model is very weak at predicting the earnings growth for industry category 3, in year category 1. This comes as no surprise, because during these times, technology companies were notoriously well known for lofty valuations accompanied with meagre profits. It was during this time period that the market had high expectations of profits for technology companies, but what the market soon realised was the inability many of these firms had for converting their technological advancements into positive cash flows and earnings growth (Lieberman, 2005). The model is weak at predicting earnings growth in industry category 2 for year category 3.

Table 1.6

3-years earnings growth[29]

Results of year and industry categories combined – 3-years									
Year category	Period 1 1996-2001			Period 2 2002-2007			Period 3 2008-2016		
Industry category	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Independent	**Significance**								
Debt/Assets					10%				10%
Earnings yield		5%			10%				
Size						5%		5%	**1%**
Price/Book value					5%				5%
Dividend pay-out									
Return on assets									
Asset growth		**1%**		**1%**				**1%**	

Standardized coefficients for year and industry categories combined – 3-years									
Year category	Y1 DV=Earnings growth 3-years			Y2 DV=Earnings growth 3-years			Y3 DV=Earnings growth 3-years		
Industry category	1	2	3	1	2	3	1	2	3
Model Summary									
R^2	0.094	0.187	0.659	0.077	0.074	0.250	0.010	0.068	0.098
Adjusted R^2	0.028	0.133	-0.533	0.039	0.041	0.160	-0.004	0.049	0.050
F-statistic	1.430	3.423	0.553	2.012	2.213	2.763	0.736	3.600	2.052

[29] Past earnings growth was included in the three-year, year and industry test. The data suggests there is no significant mean reversion.