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A Study of The Variation of Price-Earnings with Intrinsic Market Value Indicators

Mncedisi Mlilo

A technical report submitted to the Faculty of Management of the University of Witwatersrand in partial fulfillment of the requirements for the degree of Master of Business Administration.

June 2001

ABSTRACT

In the last few years, there has been lively debate about the appropriateness of financial ratios in determining the value of high technology stocks especially in the US market. Of particular focus in this debate has been the high to very high P-E ratios assigned to companies that by any other measure seemed to be performing poorly. There is a need for an analysis that considers the whole market, rather than segmenting it, and that attempts to establish relationships based on intrinsic value indicators of companies. The reason for considering the whole market is to gain a market wide perspective, thus avoiding the peculiarities of segments of the market. There is also a need to do this, specifically, in the context of the JSE.

In trying to address the points raised above, this report set out to determine the relationship between different levels of P-E ratio values and Percentage Sales Growth, as well as the value addition spread for the JSE. The difference between the return on invested capital and the capitalization rate was used as the value addition spread, since it provides an unbiased measure of the use of deployable capital.

The findings of the report were that the relationship between these variables is obscure and cannot be captured in a

multiple regression relationship. The conclusion arrived at was that the relationship between the P-E ratio and intrinsic market value indicators is not apparent in the South African environment.

DECLARATION

I declare that this technical report is my own unaided work. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration in the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other university.

_____

Mncedisi Mlilo

June 2001

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I would like to express my gratitude for the love and unconditional support that I received from my family. My wife Lynda for her tireless efforts, my daughter Lusanda for the hugs and my son Wandile for his energy. A special word of acknowledgement to my mother for the love.

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LIST OF ABBREVIATIONS

ALSI	-	All Share Index
EBIT	-	Earnings Before Interest and Tax
JSE	-	Johannesburg Stock Exchange
LSE	-	London Stock Exchange
NOPLAT	-	Net Operating Profit Less Adjusted Tax
NYSE	-	New York Stork Exchange
OIC	-	Operating Invested Capital
P-E nY		Where n = 1 – 5, is the Price-Earnings Ratio average over n number of years
PP&E		Plant, Property and Equipment
PVGO	-	Present Value Growth Opportunity
ROIC	-	Return On Invested Capital
TMT	-	Technology, Media and Telecommunications
WACC	-	Weighted Average Cost of Capital
WC	-	Working Capital

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INTRODUCTION

The Price-to-Earnings ratio (P-E ratio), in all forms, is probably the most widely used and abused of the financial ratios. Although it gives valuable insight into stocks, its correlation to the intrinsic value of these stocks has come under close scrutiny, especially in light of the goings on in the Nasdaq bourse in the recent past. Very high P-E ratios were linked to some stocks that were making spectacular losses. A prominent example is Amazon, the on-line bookseller, whose P-E ratio valuation nudged upwards even as some analysts were debating whether it was ever going to generate a positive cashflow. The South African environment is generally conservative and has not reflected P-E ratios as high as those seen in the US, however there were some high figures seen particularly in the Technology, Media and Telecommunications (TMT) stocks.

In light of the trends noted above, this report sets out to investigate the relationship between P-E ratios and the intrinsic value indicators of stocks. The report focuses on the JSE as there is no previous documented study that has examined this relationship in the South African bourse.

Background

The real drivers of the P-E ratio values of companies are not well understood. Where variables that have an impact on the P-E ratio are known, there are still no clearly established relationships that govern these relationships, and that have universal applicability.

In the recent past a lot of attention and effort has been given to trying to establish drivers of P-E ratios in the technology stocks. The bulk of the work uses comparative asset and revenue based analyses. There have also been more exotic, at times irrational, metrics that have been used. Very few studies have used cashflow analyses since most of the high value stocks have not had any cashflows. More importantly, most of the relationships derived from these studies can only be used for high technology stocks.

Limitations of the Study

The data for the report was limited to a ten-year period from June 1990 to June 2000. Only nineteen companies had a full historical data set stretching for a ten-year period. This was found to be unsatisfactory for an indication of trends in the bourse. As a result, the periods finally considered were from one year to five years.

In the consideration of the financial data used, the changes in macroeconomic statistics were not factored in. Therefore, the P-E ratio figures do not take into account the impact of the inflation rate.

LITERATURE REVIEW

Background

Internationally, various ranges of correlational studies have been carried out to try and link P-E ratio to some drivers of intrinsic value. There are also many opinions on the true drivers of intrinsic value. The bulk of this work was carried out in the late sixties and seventies primarily in the American market.

In South Africa, there is no published work that looks specifically at relating P-E ratio to the value drivers of: growth, the spread between return on invested capital and the cost of capital or capitalisation rate. Some work has been done, however, in correlating price movement to the parameters of economic return (r), growth in new investments (g_I) and cost of capital (k). van Veen (2000) examined the influence of these parameters based on a random sample from the industrial sector of the JSE. His study concluded that variations in all these factors could be used to predict share prices. The study also concluded that the parameters were indicators of intrinsic value.

Price-to-Earnings Ratio and Intrinsic Value

The P-E ratio is the most commonly used metric for company valuation and presents in many forms. There are two conceptual definitions of the P-E ratio that bring out the value of this simple ratio. These define the ratio in the following ways:

Comment [MM1]: Bodie *et al* (1998)

- The P-E Ratio is the price paid to buy R1.00 worth of a company's earnings or profits.
- The P-E Ratio is a reflection of how many years in advance you are paying for this year's earnings.

The first definition relates to the value placed on the earnings of a company. The second definition, on the other hand, focuses on the amount of time it would take to realize the value of an acquired stock.

The P-E ratio can be broadly divided into two types namely, the accounting and the economic types. The treatment of earnings separates the two forms of valuation.

The accounting form, Copeland *et al* (1995), only considers the current year's (E_0) or next year's earnings (E_1). These accounting earnings are affected and can be manipulated depending on the country's Generally Accepted Accounting Practice (GAAP) convention. Such factors as reserving

practices, depreciation, intangibles, cyclicality, inventory accounting and interest treatment can have a considerable effect on reported earnings. Rappaport (1986) highlights the shortcomings of using the accounting form of the P-E ratio by pointing out that:

- The accounting form of the P-E ratio is based on a premise that price is driven by earnings. However, sustained growth as measured by EPS does not necessarily reflect an increase in stock value.
- The accounting form of P-E ratio approach does not explicitly take into account the cost of invested capital for financing growth, nor the levels of growth achieved
- The earnings figure used does not reflect changes in risk and inflation

To these we can add the pitfalls mentioned by Bodie et al (1999).

- Accounting earnings are influenced by accounting rules
- Bodie et al (1999) also reiterate the risk factor by noting that P-E ratios can fluctuate wildly, depending on the value of Beta. This means that a company's long run growth prospects must be considered in evaluating a given P-E ratio value.

The economic approach, on the other hand, considers the quality of earnings. Bodie et al (1999) define economic earnings as the sustainable cash flow that can be paid out to stockholders or re-invested without impairing the productive capacity of the firm. To this end, there are various forms of this ratio. Damodaran (1996) gives a comprehensive coverage of the application of these ratios. He considers the steady growth firm P-E ratio, derived from the Gordon Growth Model, as well as the fast growth firm P-E ratio. Bodie et al (1999) use a forward-looking format that highlights the contribution of investor growth expectations for the firm. They also link market price of a stock to its intrinsic value.

The following table is a summary of some of the P-E ratio formats used in literature.

Table 1: Price Earnings Ratios

P-E ratio	Formula

Focus	
Accounting earnings	$\frac{P_0}{E_0} = \frac{\text{Price per share}}{\text{EPS}}$ or $\frac{P_0}{E_1} = \frac{\text{Price per share}}{\text{EPS}}$
Steady Growth	$\frac{Po}{EPSo} = PE = \frac{\text{Payout Ratio} \times (1+g)^n}{r - g_n}$
Fast Growth	$\frac{Po}{EPSo} = PE = \frac{\text{Payout Ratio} \times (1+g) \times \left(1 - \frac{(1+g)^n\infty}{(1+r)^n}\right)}{r - g_n} + \frac{\text{Payout Ratio}_n \times (1+g)^n \times (1+g_n)}{(r - g_n) \times (1+r)^n}$ n_∞ - refers to n as it tends to infinity
Growth Opportunity Focus	$\frac{P_0}{E_1} = \frac{1}{k} \times \left(1 + \frac{PVGO}{E/k}\right)$
Plough back focus	$\frac{P_0}{E_1} = \frac{1 - b}{k - ROE*b}$
Continuing value focus	$\frac{P_0}{E_1} = \frac{1 - g/r}{k - g}$

The symbols and terms used in the table are defined below:

Payout Ratio – This is the ratio of earnings that is paid out as a dividend by the company

g - Annual earnings growth

g_n - Long term earnings growth

r and k - Cost of capital

PVGO - Present Value Growth Opportunity

ROE - Return on equity

B - Pay back or plough back ratio, which represents the ratio of earnings retained

Intrinsic value is defined as the present value of all cash payments to the investor in the stock, including dividends as well as the proceeds from the ultimate sale of the stock, discounted at the appropriate risk-adjusted interest rate, k[1]. For a given investor's horizon date, a forecast of the P-E ratio and the EPS will lead to a related intrinsic value. This derives from the following relationships:

P_n = P-E ratio_n x EPS_n

$$V_0 = \sum_{j=0}^{n} \frac{D_n}{(1+k)^n} + \sum_{j=0}^{n} \frac{P_n}{(1+k)^n}$$

Bodie et al (1999) effectively show that for constant growth companies the intrinsic value is not so easy to establish. This is because of the number of assumptions that have to be

[1] Bodie, Z., Kane, A., Marcus, A.J., (1999): Investments, Boston: Irwin McGraw-Hill, p532

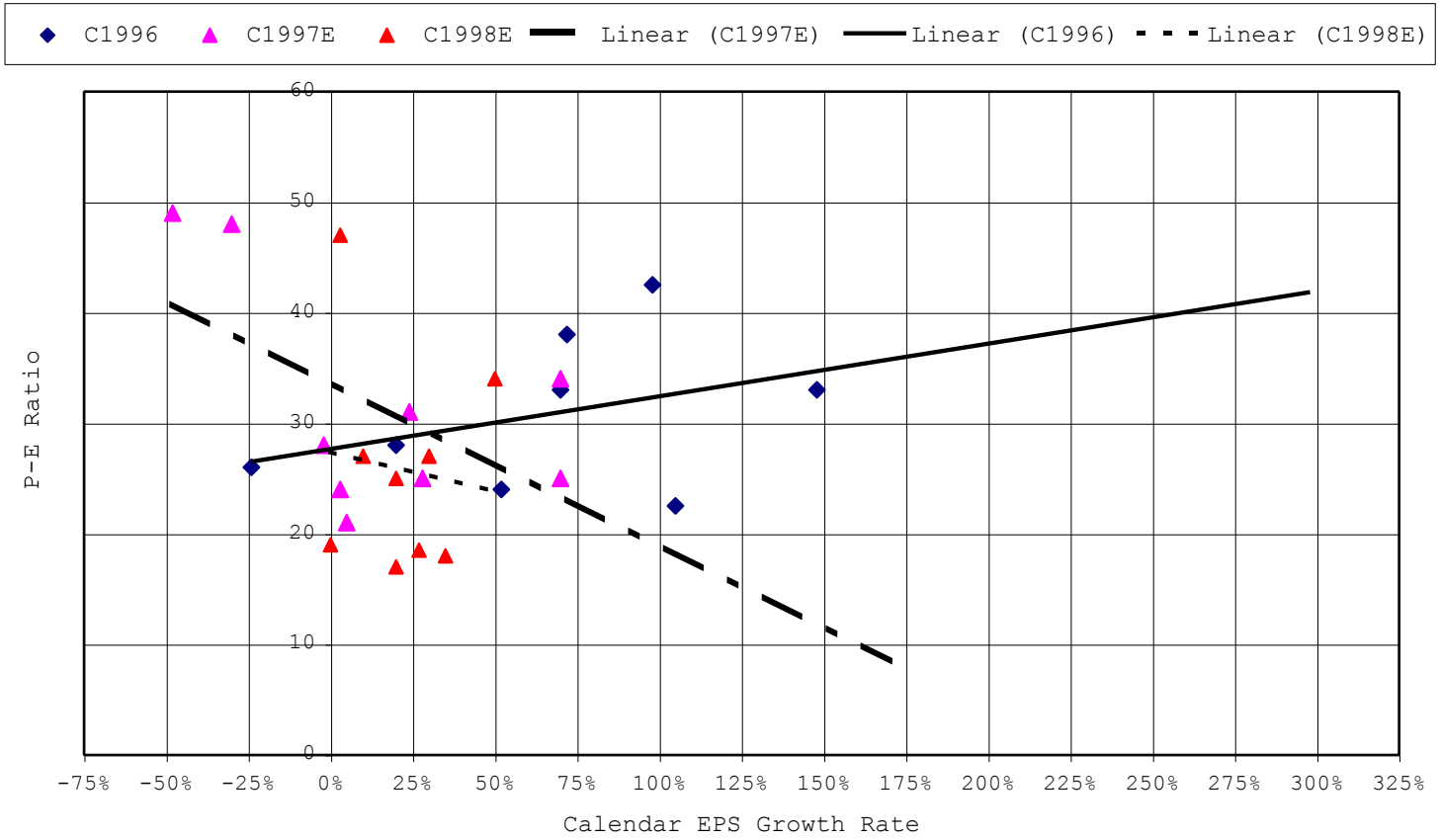
made and the sensitivity to slight changes in the capitalisation rate. For fast growth companies this relationship becomes even more complex and harder to establish because of the now variable dividend rate. Assumptions can be made, however, that link the intrinsic value to the market price. Bodie et al (1999) link the two using the assumption that the gap between the intrinsic value and the price is constant, as well as another that says the price converges with intrinsic value over time. Since the P-E Ratio is based on the market price of a stock, a relationship can then be established that links it to intrinsic value.

Price Earnings and the Drivers of Intrinsic Value

Various studies have adequately demonstrated that, although an EPS growth is generally thought to be strongly correlated to higher P-E ratio prices, this is not borne out in practice. Copeland *et al* (1995) plotted the average EPS growth of all S & P 500 non-financial stocks for a five-year period against their P-E ratios and found no significant correlation. More proof was given by Johnson and Silverstein (1997) who plotted P-E ratio vs. EPS growth for companies in the networking industry in the USA, and found unsatisfactory correlations. The authors stated the following with regards to Figure 1, which is extracted from their paper:

"…the current regression of P-E ratios on historic 1996 growth rates yields a coefficient of determination (R^2)of 0.61, which leaves 39% of the movement in the sampled companies' stock prices unexplained. The regressions of P-E ratios on analysts' consensus projected 1997 and 1998 EPS growth rates yield relatively weak R^2s of 0.3629 and 0.0184, respectively. Even worse, the regression of P-E ratios on projected EPS growth rates shows a negative correlation between P-E ratios and projected EPS growth rates. Further attenuating any argument for a causal relationship between P-E ratios and earnings growth rates—and thus, for using growth rates to project or to explain stock prices—historically all three regressions (i.e., based on EPS growth for the past year and projected EPS growth for the current and following years) have ranged between 0 and 0.25."

Figure 1: P-E ratio versus earnings growth



Michael Mauboussin (1997) also shows a similarly weak correlation from plotting the food industry sector EPS growth against their respective Enterprise Value/Invested Capital ratios. Enterprise Value is the market value of equity (shares outstanding times stock price) plus total debt (short-term and long-term) plus preferred stock. This ratio of Enterprise Value/Invested Capital is termed the firm's Market Value Added (MVA) by Joel Stern in Stewart (1990).

Mauboussin (1997) goes on to show that the correlation improves for a plot of P-E ratio against return on equity (ROE) and gets even better for the spread between return on invested capital and the cost of capital or capitalisation rate.

Copeland, Koller and Murrin (1995) deal with the issue of the relationship between the P-E ratio and the intrinsic value of a business. They carried out a study of all the non-financial stocks on the S&P 500 for a period of five years from 1987 to 1991. The results of their study are reproduced in Table 2.

Table 2: Historical relationship between market values, spreads, and growth for S&P non-financial companies, market to book ratios

1987-91 Average sales growth rate	1987-91 Average Spread (ROIC, r – Cost of Capital, k)				
	<-5%	-5% to -2%	-2% to 2%	2% to 5%	>5%
<3%	1.5	1.8	1.8	*	*
3% - 6%	1.7	1.6	2.1	1.9	*
6% - 9%	1.5	1.6	2	2.9	3.6
9% - 12%	1.3	2	2.3	4	5.1
12% - 15%	1.8	1.8	2.8	*	5.5
>15%	*	1.7	3.1	3.6	5.3

The results highlight the following:

- When (ROIC-k) is high and positive - there is a higher market/book value ratio association
- When (ROIC-k) positive and close to zero; higher growth generally results in higher market/book value ratios

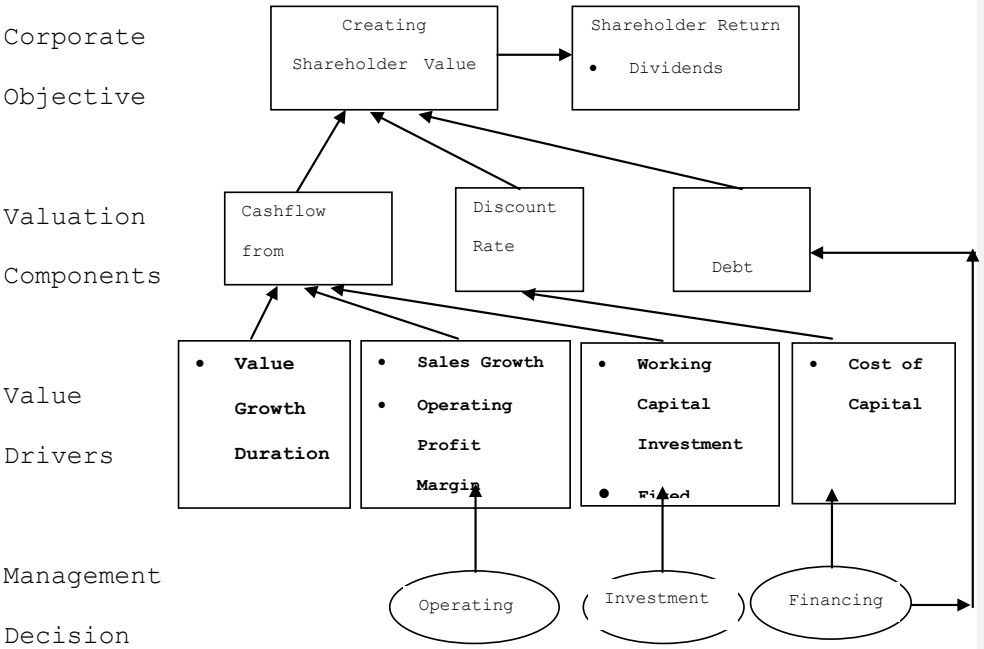
The authors conclude that growth and spreads of (ROIC-k) are the primary drivers of value.

Rappaport (1986) develops a shareholder value network which depicts the link between the corporate objectives of

creating shareholder value and the basic value drivers. These relationships are shown in Figure 2. The value drivers are highlighted in bold lettering.

The point that P-E ratio is influenced by growth, cost of capital and investment returns is amply made. What is not clear, however, is which of these factors become dominant in the markets' decisions as the P-E ratio changes. Another unexplored aspect is what happens when b is greater than one.

Figure 2 – The Share Value Network[2]



Factors Influencing Price Earnings

Bodie *et al* (1999) point out that many of the practitioners' discussions about valuation use the P-E ratio figures of companies. In the same text, they further note that the P-E ratios are primarily driven by the earnings potential that the market allocates to the companies. They sum up their point in the following equation, which is a slightly

[2] Rappaport, A. (1986): Creating Shareholder Value: The New Standard for Business Performance, London: The Free Press, p76

modified from their text[3] and gives the economic P-E ratio as:

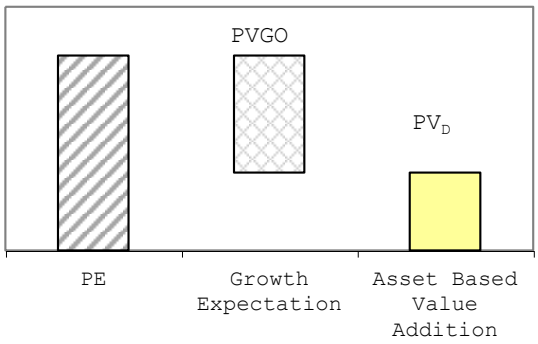
$$\frac{P_0}{E_1} = \frac{1}{k\left(1 + \frac{(\text{growth based value})}{(\text{asset based value})}\right)}$$

Ross et al (1996) also supports this point. The factors that are considered by the market in establishing the earnings potential figure include among others, earnings growth (g) potential of the company, the return on investment offered by the company (r), and the cost of capital to the company (k).

The following chart can represent this combination of a forward focus as well as a focus on fundamentals:

[3] Actual equation is: P/E = 1/k (1 + PVGO/(E/k)) from p.544

Figure 3: Breakdown of contributions to P-E ratio



The contributions of the different portions will differ depending on the nature of the industry and the age of the company, as well as its positioning within that industry. The asset based value addition represents the present value of the base business.

The factors considered thus far are all internal to the company. There are other non-financial and external considerations, which have to be considered, as well. Elton and Gruber (1987) list these as:

- Market tastes – as market tastes change the weightings on the variables affecting P-E ratio will change.
- Change in input data over time – the estimates and actuals used in the input variables will change over time.
- Firm effects – factors that influence price but are not captured by the model. An example is pending regulatory

changes that will affect the environment of business and therefore impact on the price.

Elton and Gruber (1987) use cross-sectional regression analysis to establish the relationship between P-E ratios and different parameters. Damodaran (1996) also uses this method, especially for comparing P-E ratios of different companies.

HYPOTHESIS

The primary objective of this study was to test the following hypotheses:

1. "Net asset growth or sales growth, as an intrinsic value indicator, becomes increasingly more important as P-E ratio values increase".

2. "As P-E ratio values decrease, the return on investment less cost of capital spread becomes dominant as an indicator of intrinsic value".

METHODOLOGY

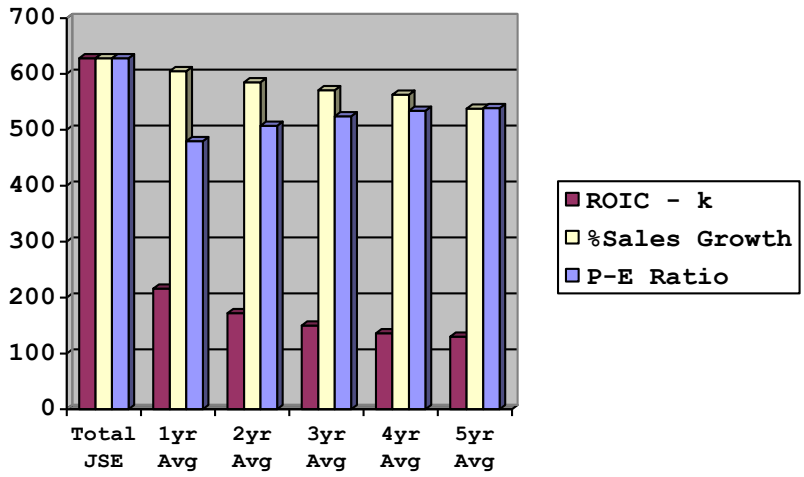
Choosing the Sample

At the time of collection of data, there were 633 listed companies on the JSE altogether. It must be noted that the term "companies" means the primary stock security issuers. There are over a thousand listed securities on the JSE which cover stocks and bonds as primary securities, as well as other derivative securities. It was felt, therefore, that to constitute a sizeable sample in each band of P-E ratio

values, for the stock securities, the whole population must be considered.

However, only companies with a complete data set were used in the analyses and this reduced the number of companies in the working sample as shown in Figure 3.

Figure 4: Number of companies sampled for data analysis



It must be noted that since P-E ratios depend on earnings, no P-E ratios are available in a period with negative earnings. This explains the trend of the increasing P-E ratio data with time.

Research Design

This study sought to measure the reliability of the variables of return on investment: ROIC, rate of growth of

sales, g_s and cost of capital, as predictors of market value and price-earnings. The design of the study was primarily based on a similar study carried out by Koller, Copeland and Murrin (1995). However, the difference was that instead of examining the (Market Value)/(Book Value), the present study focused on the relative influences of the correlation co-efficients of ROIC – k and g_s. The following relationship would then be examined for various time horizons:

$$\text{P-E Ratio} = \alpha + \beta_1 \times g_s + \beta_2 \times (\text{ROIC}-k)$$

Periods of 120, 60, 48, 36, 24 and 12 months were considered.

Robert Shiller (1996) points out that according to Benjamin Graham and David Dodd, authors of the famous textbook Security Analysis (1934), one should use an average of earnings of "not less than five years, preferably seven or ten years." This means that the figures of four years and below, although useful in trending, should be treated with caution. This is because the spikes that occur in the P-E ratio figures start influencing the average results increasingly, whereas the longer periods tend to smooth-out the effect. In line with this thought, it would have been interesting to look at a period greater than 10 years but unfortunately over this period the data starts thinning out considerably.

Data Sources and Collection

The preliminary issues dealt with in the proposed paper were the establishment of the growth figures to be used in the study, as well as the capitalisation rate. It had been envisaged that the rest of the data would be readily available from secondary data sources. In the end the following methods were used to derive unavailable data:

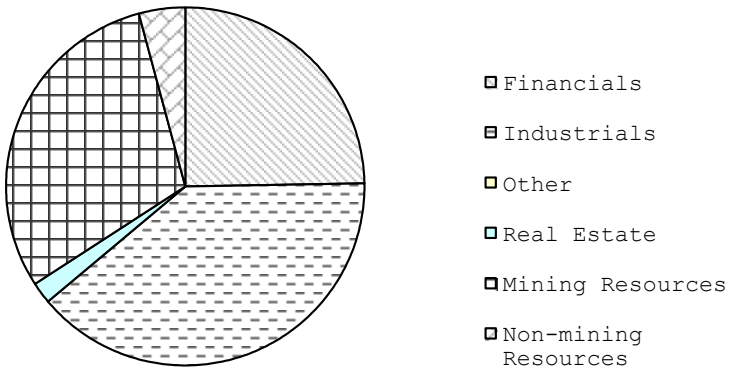
Sales Growth Figure

There was no line item directly representing sales figures in the primary data source used (BFANet), nor any readily available in any other data source consulted. This led to the turnover figure being adopted as a proxy for the sales figure.

Beta Values

The generally accepted practice in the calculation of betas is the use of five-year averages. This is done to smooth the variability of data over time. The market return rates were calculated from the ALSI whose sectoral composition is shown in Figure 5 below:

Figure 5: All Share Composition (31 August 2000)



Fund Manager's Companion (2000)

Return on Invested Capital

The Return on Invested Capital (ROIC) metric looks at how a company is performing with operating capital rather than financial capital. Operating capital is the productive capital that can be deployed by the operational management. It represents the actual amount of investable assets of a company under the control of its operating people. It is an improvement on the Return on Equity (ROE) ratio. ROE is distorted by the mandatory deductions, which are required to get from the equity figure to net assets. The judgment of a company's operation is therefore made based on the capital that the operational managers have control over. Financial capital on the other hand would include factors such as

goodwill and non-cash expenses such as depreciation and amortisation.

The main aim is to exclude gearing in order to arrive at economic earnings. A further aim is to examine the earnings power of the companies across the board, and not compare the efficiency of their tax planning. In this way, distortions to return on capital due to accounting conventions are avoided, giving a cash-on-cash return.

The ROIC figure was derived from the division of Net Operating Profit Less Adjusted Tax (NOPLAT) by Operating Invested Capital (OIC). The NOPLAT figure was established from its principal components as follows:

NOPLAT = Earnings Before Interest and Tax (EBIT) – Adjusted Tax

The OIC figure was derived from the operational capital side of the balance sheet figures, as:

OIC = Working Capital (WC) + Plant, Property & Equipment (PP&E) – Intangibles

The ROIC captures the rand on rand cash return of capital. This is a useful measure since it ignores all adjustments that shield the true performance of the deployed capital and therefore unmasks the effective performance of a company. The OIC, which is the denominator in ROIC ratio, measures deployed and deployable capital under operational management. There are two approaches to obtaining the OIC figure. There is the financing capital approach as well as the operational capital approach. The latter method was used and it is constituted as follows:

Invested Capital: Operating Approach

	Net Working Capital
+	Net PP&E
+	Other Operating Assets
-	Other Operating Liabilities
=	OIC

OIC = Net Working Capital + Net PP&E +Other Operating Assets - Other Operating Liabilities

RESULTS

Graphical Analysis

Primary scatter plots of P-E ratio vs. %Sales Growth as well as P-E ratio vs. ROIC-k, showed that there was non-linear relationship between these sets of figures. Some of the plots are shown below. The P-E ratio ranges were split into low(0 – 20), medium(20 – 50) and high(+50).

In all the plots, there was a significant bunching up of data around a ROIC –k spread or sales growth figure of zero. The P-E ratio range for this bunched data stretched from a value of zero to 195.

Figure 6: Low P-E ratio Range vs (ROIC – k) spread

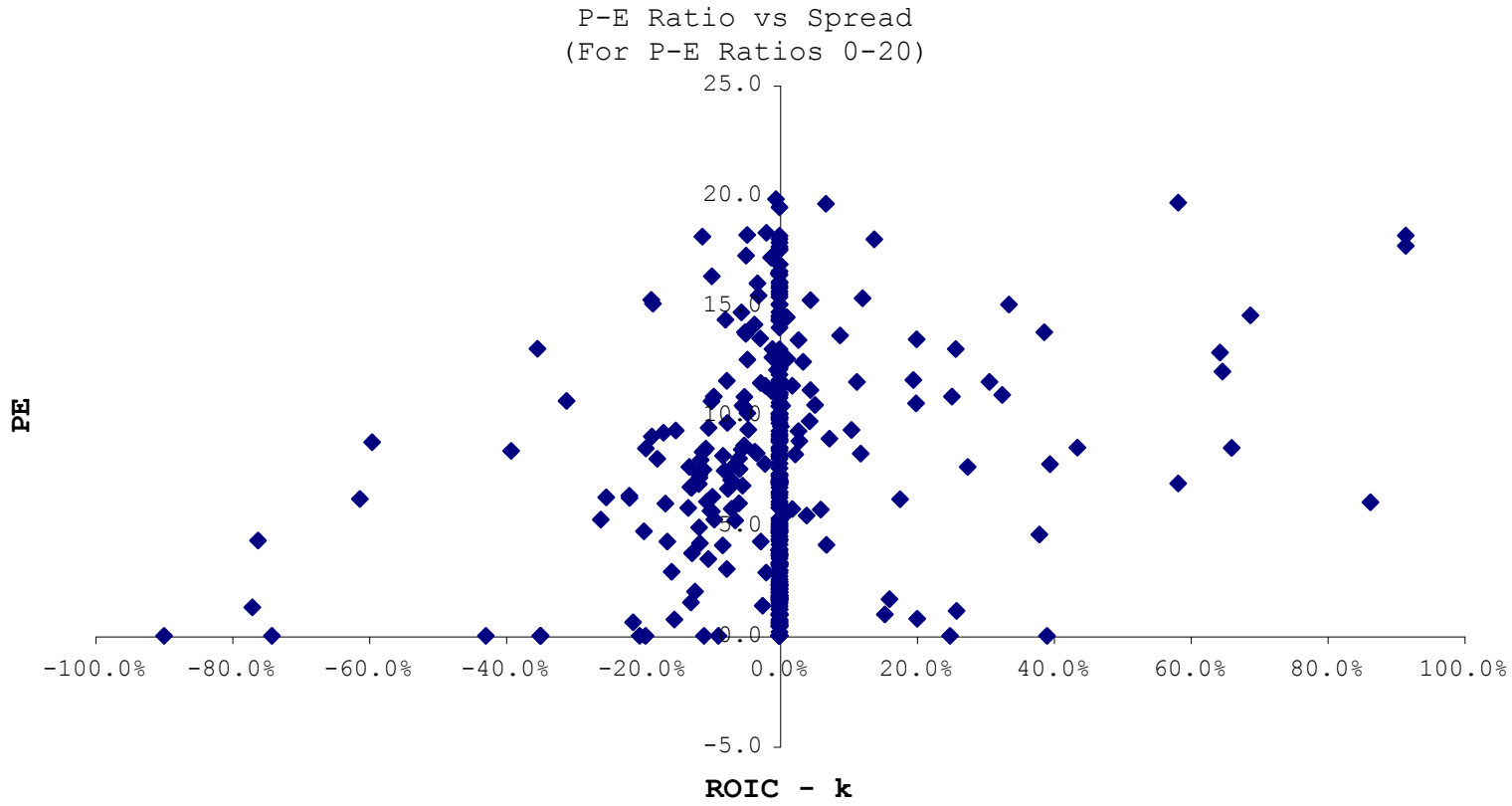


Figure 7: Medium P-E ratio Range vs (ROIC – k) spread

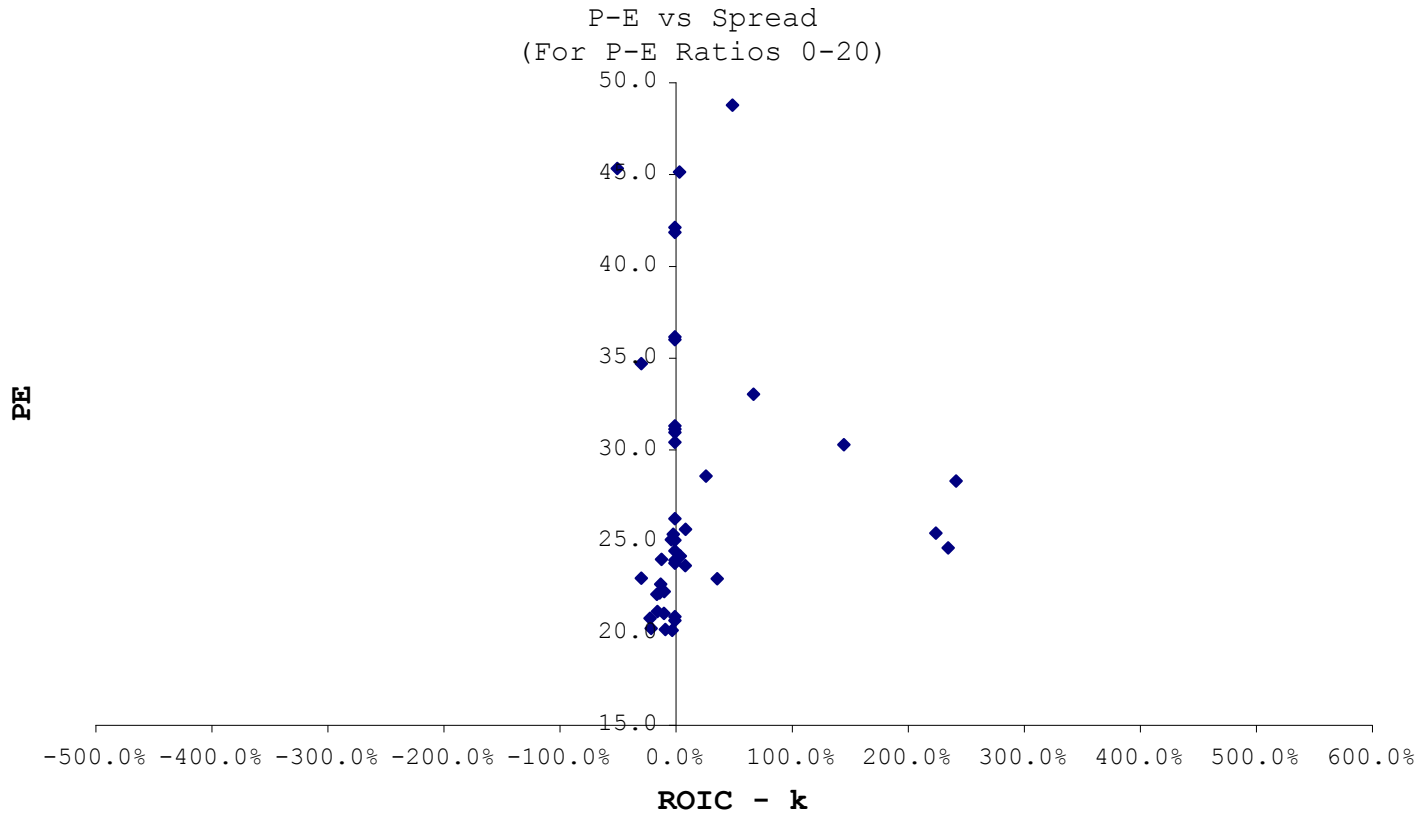


Figure 8: High P-E ratio Range vs. (ROIC – k) spread

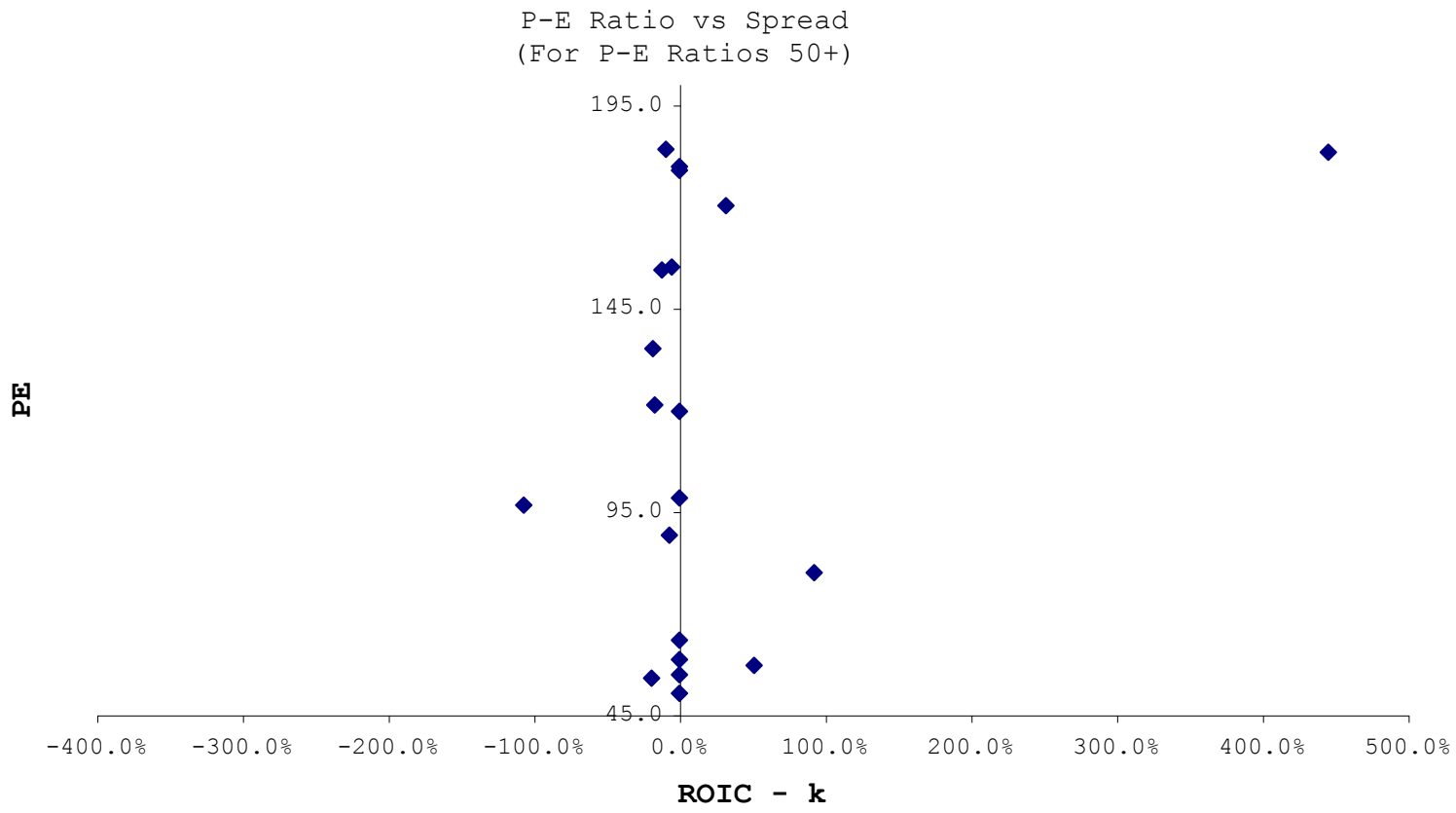


Figure 9: Low P-E ratio Range vs. %Sales Growth Spread

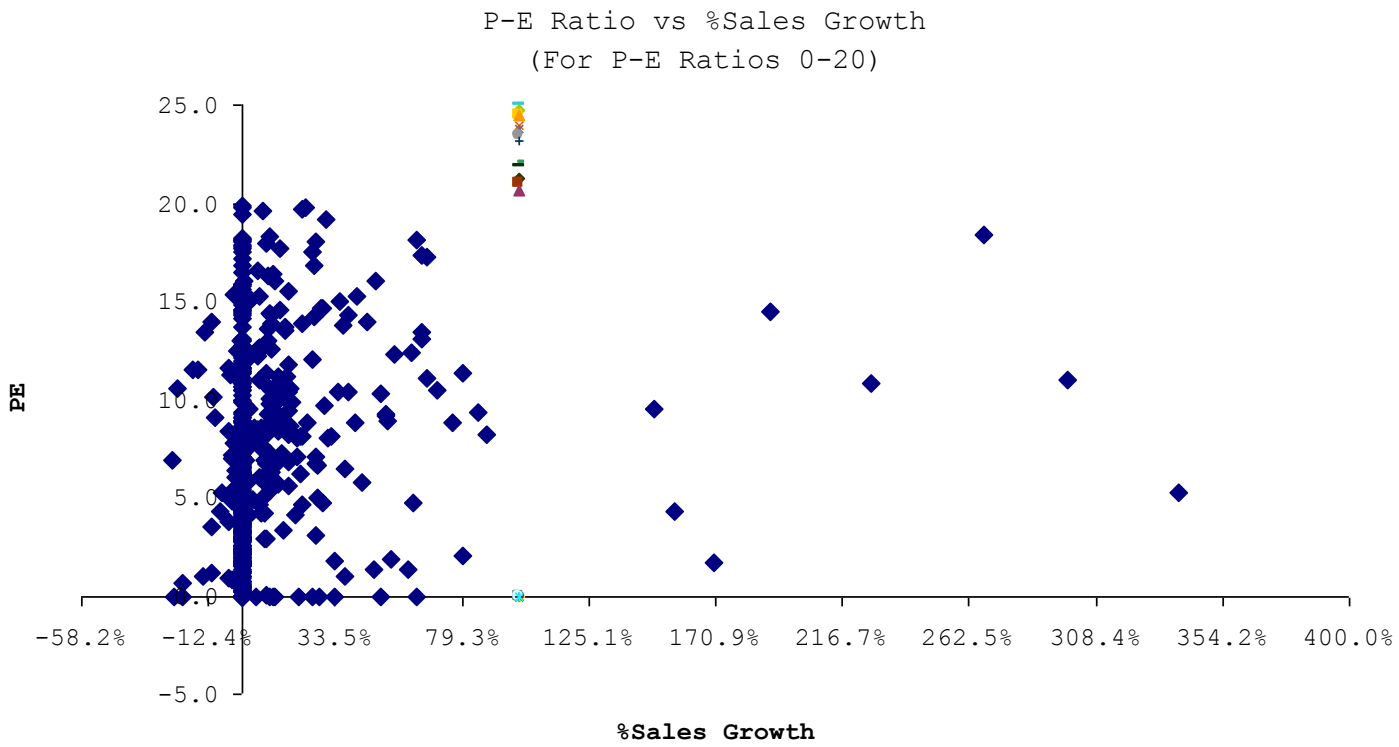


Figure 10: Medium P-E ratio Range vs. %Sales Growth Spread

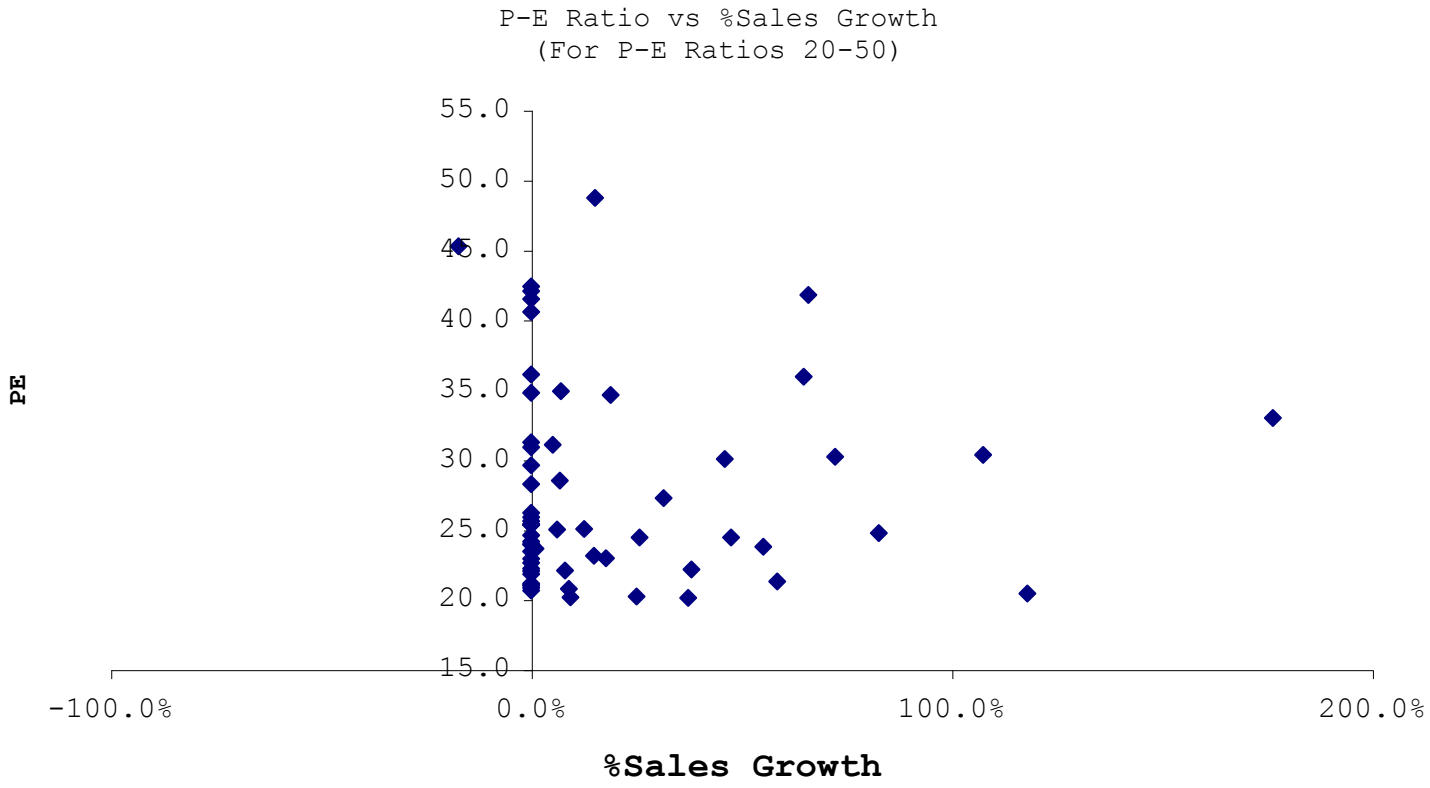
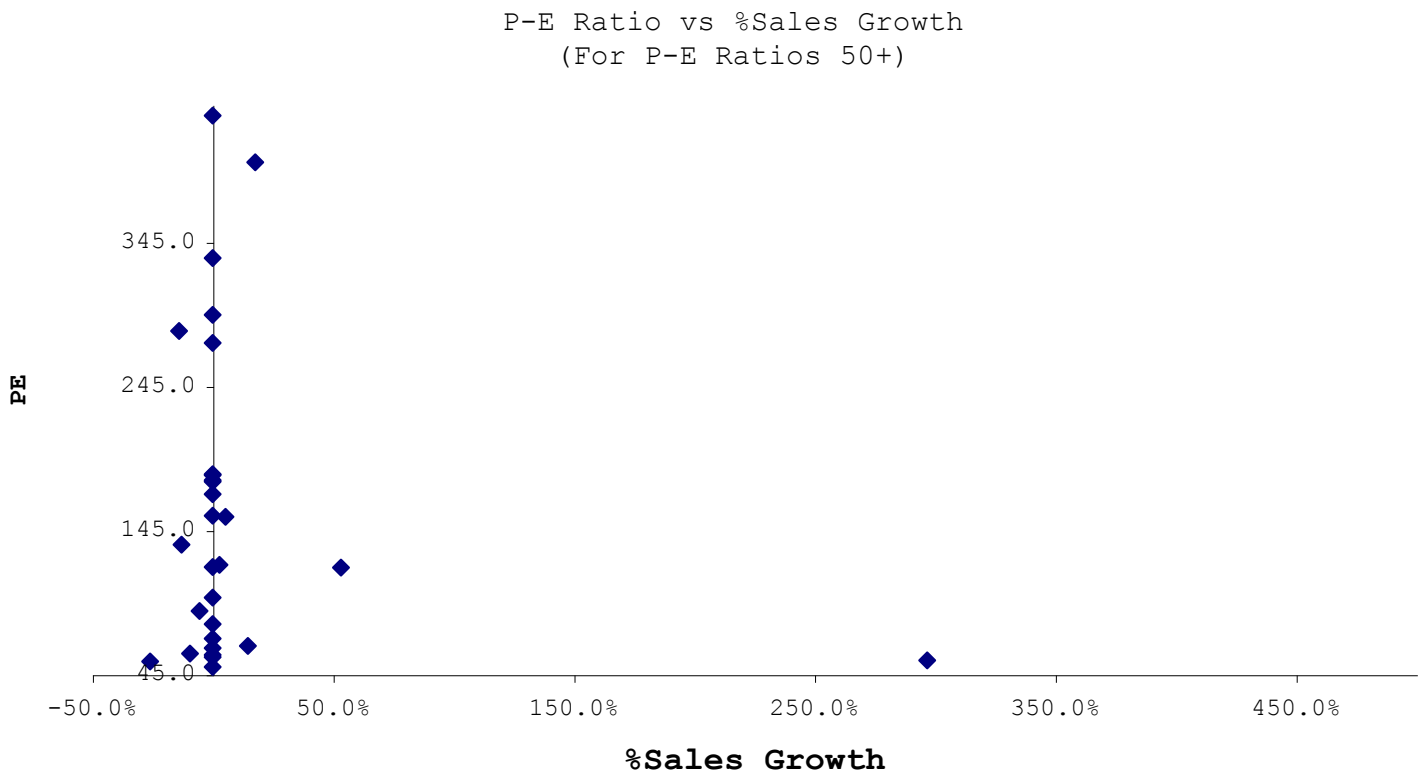


Figure 11: High P-E ratio Range vs. %Sales Growth



Statistical Analysis

The statistical packages NCSS and Statistica were used to run descriptive statistics and regressional analyses on the data.

Test for normality

Normality for the dependent variable (i.e. the P-E ratio) and both independent variables (ROIC – k spread and sales growth data) was generally rejected by all the tests. The kurtosis and skewness figures, as seen in the statistical analysis results table in Appendix B, all showed double digit deviation from the critical acceptance value of 1.96. This was an indication that there was significant bunching up of data, as was shown by the histograms. The normal probability plots for the overall data showed significant deviation from the normal spread, especially at higher values. When the data was broken up to the different P-E ratio ranges, the picture was different.

The kurtosis and skewness figures were in the low single digits. The shapes of the probability plots and histograms were similar for the different year averages (i.e. from the one year average data to the five year average data). The data for P-E ratio equivalent or less than twenty showed a good fit

in the probability plots. The histograms had fair spreads with fat tails.

The P-E ratios between twenty and fifty showed significant deviation from the normal plot trend in the probability plot. The histograms also showed significant bunching up of data. The data for P-E ratio equal to or greater than fifty, showed more than one mode in the histograms. There was also an indication of the possibility of outliers. This was shown by few values that fell outside the critical limits in the probability plot.

Regression test

The results of the ANOVA tests showed that there was, generally, no strong case for assuming that the model had strong predictive value. On the other hand, the predictive value could not be clearly rejected either. This was shown by the very close results of the F-ratios at a significant level of five percent (5%). Where:

Ho : $\beta 1 = \beta 2 = 0$

H_A : $\beta 1$ and $\beta 2$ not all 0

Test statistic : $F = R2/p/((1-R2)/(n-p-1))$

Decision rule : Reject Ho if $F > F(\alpha, p, n-p-1)$

The tests for multi-collinearity showed that this was not a problem. Tests done for lagged serial correlation also, generally, showed no relationship.

Results from the multiple regression analyses carried out on the data served to confirm that the coefficients of predictor variables were not significant. The R^2 values from the data showed that the two variables explained very little of the variability of the data around the regression line. This would mean that either power transformations should have been carried out or more data added in order to fully explain this variability. The following table summarises the multiple R and R^2 values from the analyses. The following key must be used in reading the table:

P-E nY	Where n = 1 – 5, is the Price-Earnings Ratio average over n number of years

Table 3: Multiple Regression Results For the Different Classes of P-E ratio values from Statistica

	Dependant Variable	Multiple R	Percentage Variability Explained	Cases Used
Low P-E ratio	P-E5Y	0.01978	1.3%	294
	P-E4Y	0.1367	1.87%	309
	P-E3Y	0.119	1.43%	329
	P-E2Y	0.114	1.3%	392
	P-E1Y	0.024	0.057%	465
Average P-E ratio	P-E5Y	0.3432	11.78%	47
	P-E4Y	0.3459	11.96%	48
	P-E3Y	0.3890	15.18%	48
	P-E2Y	0.189	3.56%	38
	P-E1Y	0.2058	4.3%	47
High P-E ratio	P-E5Y	0.5543	44.12%	22
	P-E4Y	0.54037	29.2%	26
	P-E3Y	0.193	3.73%	23
	P-E2Y	0.2355	5.54%	23
	P-E1Y	0.06452	0.42%	31

* Percentage Variability explained is the same as R^2*100

CONCLUSION

All the statistical and graphical results attest to the fact that the relationship between the P-E ratio and the chosen intrinsic value indicators is obscure. This finding, therefore, raises the question of the exact nature of the relationship on the JSE. It also raises interesting questions about the differences in behaviour of stocks between the JSE and other bourses, especially the NYSE and the LSE where a strong correlation was established.

It is recommended that a study should be carried out to explore these questions in order to gain a better understanding of the relationship between the P-E ratio and intrinsic value indicators in the JSE.

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APPENDIX

APPENDIX A: SOURCE DATA

APPENDIX B: STATISTICAL OUTPUT