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Comparative critique of the performance evaluation methods in the Australian energy industry

Feng Li

University of Wollongong

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Comparative Critique of the Performance Evaluation

Methods in the Australian Energy Industry

A thesis submitted in fulfillment of the requirements for the award of the degree of

Master of Accounting

By Research

From

University of Wollongong

By

Feng Li

School of Accounting and Finance

2008
Thesis Certification

I, Feng Li, declare that this thesis, submitted in fulfilment of the requirement for the master by research, in the School of Accounting and Finance, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Feng Li

8 October 2008
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<th>Description</th>
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<tbody>
<tr>
<td>AORD</td>
<td>All Ordinaries Index</td>
</tr>
<tr>
<td>APV</td>
<td>Adjusted present value approach</td>
</tr>
<tr>
<td>ASIC</td>
<td>Australian Securities and Investments Commission</td>
</tr>
<tr>
<td>ASX</td>
<td>Australian Stock Exchange Limited</td>
</tr>
<tr>
<td>B2B</td>
<td>Business-to-Business</td>
</tr>
<tr>
<td>CAPM</td>
<td>Capital Asset Pricing Model</td>
</tr>
<tr>
<td>DCF</td>
<td>Discounted Cash Flow</td>
</tr>
<tr>
<td>EBIT</td>
<td>Earnings before interest and taxes</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earning before interest, taxes, depreciation and amortization</td>
</tr>
<tr>
<td>EVA</td>
<td>Economic Value Added</td>
</tr>
<tr>
<td>FTE</td>
<td>Flows to equity approach</td>
</tr>
<tr>
<td>M &amp; A</td>
<td>Guideline Merged and Acquired Company Method</td>
</tr>
<tr>
<td>MetaC</td>
<td>MetaCapitalism</td>
</tr>
<tr>
<td>NWC</td>
<td>Net Working Capital</td>
</tr>
<tr>
<td>P/E ratio</td>
<td>Price to Earning Ratio</td>
</tr>
<tr>
<td>PP&amp;E</td>
<td>Portable Plants &amp; Equipment</td>
</tr>
<tr>
<td>PV</td>
<td>Present Values</td>
</tr>
<tr>
<td>TA</td>
<td>Total Asset</td>
</tr>
<tr>
<td>TCF</td>
<td>Total cash flow approach</td>
</tr>
<tr>
<td>VAC</td>
<td>Value Added Communities</td>
</tr>
<tr>
<td>WACC</td>
<td>Weighted Average Cost of Capital</td>
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Abstract

In a rapidly global developing economy today, the world economy and culture are becoming increasingly interconnected (Lippitt, Mastracchio & Lewis, 2008). However, the business valuation process has been changing at the pace that is even more accelerated than the pace of change in the world’s economy (Hitchner, 2006). Therefore, there is an ever-increasing demand for business valuation services pertaining to ownership interests and assets in non-public companies and subsidiaries, divisions, or segments of public companies (Hitchner, 2006). Business valuation is a process and a set of procedures used to estimate the economic value of an owner’s interest in a business (Soshnick, 2008). Valuation is used by financial market participants to determine the price they are willing to pay or receive to consummate a sale of a business (Soshnick, 2008).

The purpose of this thesis is to explore the efficiency of business evaluation methods in the Australian energy industry during the periods from 1989 to 2007. The seven commonly used business evaluation methods (CAPM, WACC, EVA, P/E ratio, DCF, MetaCapitalism and Merger and Acquisition) have been selected and compared with the share price in the whole market, listed market and delisted market to explore which valuation methods are better for evaluating business performance in the Australian energy sector for the long term.
In order to fulfill this purpose, a quantitative research project was conducted where the primary data was collected from FinAnalysis\(^1\) that listed a 19-year history of detailed financial information for all companies listed on ASX on a yearly basis from 1989 to 2007. The sample period spans 19 years from 1989 to 2007. There are 177 existing listed companies and 23 delisted companies in the sample, with different number of participating years. All the firms belong to the Australian energy industry. In addition, linear regression and t-tests were conducted to establish the strength of the link between the business evaluation methods and stock returns.

In conclusion, the results indicate that CAPM is a much better method for listed companies to measure the rate of return of an asset in a well-diversified portfolio in the Australian energy industry, and DCF is a better method for the whole of listed and delisted companies, to make capital budgeting decisions for public companies in the Australian energy sector.

Acknowledgements

First of all, I would like to express my sincerely appreciation and gratitude to my supervisor, George Mickhail. I thank him for always providing appropriate direction, advice and assistance in my research work. I am indebted to his knowledge and inspiration and have learned so much from him.

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Finally, I would like to thank my parents and my wife for their continuous encouragement, assistant during my research time.
CHAPTER ONE
INTRODUCTION
1.1 Introduction

With a rapidly developing economy today, the world economy and culture are becoming increasingly interconnected (Lippitt, Mastracchio & Lewis, 2008). However, the business valuation process has been changing at a pace that is even more accelerated than the pace of change in the world’s economy (Hitchner, 2006). Therefore, there is an ever-increasing demand for business valuation services pertaining to ownership interests and assets in non-public companies and subsidiaries, divisions, or segments of public companies (Hitchner, 2006). Business valuation is a process and a set of procedures used to estimate the economic value of an owner’s interest in a business (Soshnick, 2008). Valuation is used by financial market participants to determine the price they are willing to pay or receive to consummate a sale of a business (Soshnick, 2008).

Different valuation approaches and methods result in different levels of valuation. The valuation models commonly described in theory are income approach, market approach and asset-based approach (Hitchner, 2006). All models have problems, and nothing is perfect (Benninga, 2000). There is no right way to estimate the value since there are many factors that influence it. The best standard of value is the fair market value. Fair market value is a concept of value in exchange. It is defined as “the price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or sell and both having reasonable knowledge of the relevant facts” (Michael 2002, p. 123).
1.2 literature review

In the literature of corporate finance, many studies have been conducted over the last two decades. There are a number of studies [(Benninga, 2000); (Lund, 2000); (Hilton, 1991); (Tanzi, 2006); (Kruschwitz & Loffler, 2005); (Baur, Habib & Volkart, 1998); (Board, 2005); (Nicholsm, 1968); (Cook & Rozeff, 1984); (Jaffe, Keim & Westerfied, 1989); (Fuller, Huberts & Levinson, 1993); (Lakonishok, Schleifer & Vishny, 1994) and (Dremeu, 1998)] where simulations’ models have been applied in the business valuation. The estimation and application of business valuation models have been originated by academics and is a fast growing area in the corporate world. Nevertheless, there are a few systematic descriptions about comparing the different business valuation methods in Australia, especially in the energy sector. Therefore, it is useful to analyse the efficiency of the seven business valuation methods in Australian energy sector.

The studies into corporate finance in Koller, Goedhart & Wessels (2005) are based on financial accounting and arithmetic calculations. This book explores the CAPM, WACC, DCF, EVA and PE ratio’s fundamental principles and methodology applied in Australian industry. This book is organized in four parts. Part one provides the fundamental principles of value creation. Part two is a step-by-step approach to valuing a company. Part three applies value creation principles’ to managerial problems. Part four deals with more complex valuation issues and special cases.

In addition, this book is a very good example for quantitative methodology practice in Australian industry because it expands the practical application of financial to real
business problems and reflects economic events of the past decade along with new developments in academia within the finance industry. This book contains a new discussion on the market risk premium based on recent empirical work and practical ways to improve estimates.

The study on the financial economics in Hitihner (2006) presents a consensus view of thirty of the leading valuation analysts. There are also four parts in this book. Part one is financial statement and company risk analysis, which presents qualitative and quantitative methods for analysing companies. Part two describes market approach, presents a quantitative methods for using and adjusting guideline public company valuation multiples for size, and growth differences. Part three claims income approach, includes a detailed example on the application of invested capital versus direct equity method and the proper application of excess cash flow. Part four: cost of capital - includes a comprehensive presentation on the application of empirical data for determining risk premiums in discount and capitalization rates.

Hitihner’s book extensively examines the market approach to valuate business in Australian energy sector and focuses on both the guideline company methods, where valuation multiples are developed by comparisons of a subject company, and the guideline merged and acquired company method, where the multiples are developed based on change of control transactions involving companies similar to a subject company being valued. This book also covers analysis of adjusting financial statements, comparative financial analysis, selecting and weighting market value multiples and methods, discounts and premiums.
Based on Pratt’s (1998) studies, the cost of capital is a critical component in both the valuation and the corporate decision-making process. Cost of capital procedures are a frequent source of major logical errors, not just judgment errors. The cost of capital is one of the key components in business valuation. There are numerous models that can be used to estimate the cost of capital, such as build-up models, the capital asset pricing model, the discounted cash flow model. These models may require adjustments for risk, capital structure, and size of company. There are also many ways to estimate the parameters in these models. This is a book that is likely to serve as the standard reference on cost of capital.

Pratt’s book also examines the Australian electricity industry, including restructuring of the industry, technological advances, and changing environmental laws and regulations, which are providing opportunities for many electricity companies to substantially lower their cost of doing business. In addition, the journal explores the CAPM and DCF methodology, assumption and limitations as well as how the CAPM and DCF were adopted to evaluate business performance in Australian electricity industry.

1.3 Purpose of the thesis

The purpose of this thesis is to explore the efficiency of business evaluation methods in the Australian energy industry during the periods from 1989 to 2007. The seven commonly used business evaluation methods (CAPM, WACC, EVA, P/E ratio, DCF, MetaCapitalism and Merger and Acquisition) have been selected and compared with the share price in the whole market, listed market and delisted market to explore which
valuation methods are better for evaluating business performance in the Australian energy industry for the long term.

1.4 Structure of the theses

This thesis is organised into eight chapters following this introduction. Chapter 2 overviews the content of this thesis. Chapter 3 presents a review of the literature which explains and frames seven commonly used methodological assumptions and limitation. The aim of any literature review is to provide a theoretical background and context for the study, and typically consistent of an interrelated set of statements, which can be used to explain or understand the importance of the business valuation methods in the energy sector.

Chapter four will explain the data collected. The sample period spans 19 years from 1989 to 2007. There are 177 existing listed companies and 23 delisted companies in the sample with different number of participating years of them. All the firms belong to the Australian energy industry. Chapter five will examine the data analysis. The linear regression methods and t-test were adopted to assess whether there are the strength of the link between the business evaluation methods and share price.

Chapter six will critique seven business evaluation methods’ efficiency in Australian energy sector. The chapter provides an overview of seven business valuation methods, and provides the methodological processes and the empirical results. Chapter seven outlines the limitations of this thesis and includes data collection problems, data
adjustment problems and transactions problems for the guideline companies as well as further research study is advised. Chapter eight provides a summary and conclusion to the seven valuation methods and discusses implications arising from the results.
CHAPTER TWO

THESIS OBJECTIVES AND CONTENTS
2.1 Thesis objectives
There are four main objectives of this thesis:

1) To present a review of the literature that explains and frames the business valuation methods in the Australian energy sector.

2) To indicate data collection and data analysis of seven commonly used business evaluation methods (CAPM, WACC, EVA, P/E ratio, DCF, MetaCapitalism and Merger and Acquisition) in the whole market, listed market and delisted market.

3) To investigate how regression analysis has been conducted to develop an equation (a linear regression line) for predicting a value of the dependent variables given a value of the independent variable.

4) To perform a critical, thorough and detailed evaluation of business evaluation methods during the period from 1989 to 2007 and to determine whether a correlation exists between the business evaluation methods and the share price.

2.2 Organisation of contents

CHAPTER 1-Introduction

The first chapter describes the basic introduction about this thesis, and establishes the validity of the research by showing the previous research in the field contents.

CHAPTER 2- Thesis Objectives

This chapter explores the main objectives of thesis.
CHAPTER 3 – Literature Review

The purpose of this chapter is to present a review of the literature which explains and frames the business valuation methods in the energy companies in Australia.

CHAPTER 4 – Data Collection

This chapter describes data collection for seven commonly used business evaluation methods.

CHAPTER 5 – Data Analysis

This chapter explores data analysis for seven commonly used business evaluation methods.

CHAPTER 6 – Critique and Discussion

Chapter six will discuss and critique seven business evaluation methods’ efficiency in the Australian energy sector.

CHAPTER 7 – Limitation and future research

This chapter examines three main limitations in this thesis and discusses the future study contents.

CHAPTER 8 – Conclusion

The conclusion will give the results of the research and the implications of the research.
CHAPTER THREE
LITERATURE REVIEW
3.1 Introduction:

The purpose of this chapter is to present a review of the literature which explains and frames the business valuation methods in the energy companies in Australia. The aim of any literature review is to provide a theoretical background and context for the study and typically consistent of an interrelated set of statements, which can be used to explain or understand the importance of the business valuation methods in the energy company. This chapter is divided into three sections.

The first section identifies the most commonly used valuation methods that come from 221 articles are academic and related to the energy companies in Australia. The seven commonly used business valuation methods were selected, they include CAPM (Capital Asset Pricing Model), WACC (Weighted Average Cost of Capital), EVA (Economic Valued Added), DCF (Discounted Cash Flow), P/E ratio Method, Guideline Merged and Acquired Company Method and MetaCapitalism.

In the second section, previous research efforts into business valuation have been chosen to analyze the four aspects for the seven business valuation methods. The first aspect explores the overview of each method, including its history, first publication date, authors and the causes for those methods. The second aspect describes each method. The third aspect explains the methodology, including the analysis of the principles of methods, rules, and postulates employed by a discipline. The fourth part gives the limitations of each methods based on the literature review.
The last section examines the comparison of studies from previous literature. The literature research explores the differences between the net present values (NPVs) of North Sea oil projects obtained using the weighted average cost of capital and a modern asset pricing (MAP) method which involves the separate discounting of project cash flow components. The results obtained utilising the MAP method are very sensitive to the choice of parameter values for the stochastic process used to model oil prices. Therefore, more work should be done on the oil price model and the use of risk-free discounting of costs before the MAP method can be adopted as the only valuation method.

3.2 Identifying most commonly used methods

Accountants and professional business valuers may use any number of business valuation methods to determine the value of a business. The result of using these or other approaches is in an attempt to determine a fair and reasonable price for a business. Prospective buyers should calculate their own value and can use the advertised selling price of a business as the basis to commence negotiations. Prospective purchasers must scrutinise all those things that can affect the success, longevity and viability of a business. This chapter lists some of the most commonly used evaluation methods which come from 221 articles consulted in this research.
3.1 Table: Most Commonly Used Evaluation Methods of Energy Industry

<table>
<thead>
<tr>
<th>Method title</th>
<th>Number of articles mentioned / discussed the method</th>
<th>% frequently of method mentioned</th>
<th>Year of the first publication</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCF</td>
<td>48</td>
<td>22%</td>
<td>1938</td>
<td>John Burr Williams</td>
</tr>
<tr>
<td>CAPM</td>
<td>41</td>
<td>18%</td>
<td>1963</td>
<td>William Sharpe</td>
</tr>
<tr>
<td>EVA</td>
<td>26</td>
<td>12%</td>
<td>1982</td>
<td>Stern Steward</td>
</tr>
<tr>
<td>WACC</td>
<td>36</td>
<td>16%</td>
<td>1963</td>
<td>Ezra Solomon</td>
</tr>
<tr>
<td>Guideline merged and acquired company method</td>
<td>25</td>
<td>11%</td>
<td>Late 1960s</td>
<td>Unknown</td>
</tr>
<tr>
<td>P/E ratio method</td>
<td>31</td>
<td>14%</td>
<td>1960</td>
<td>Francis Nicholson</td>
</tr>
<tr>
<td>MetaCapitalism</td>
<td>14</td>
<td>7%</td>
<td>2000</td>
<td>Grady Means, David Schneider</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>221</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.3 CAPM (Capital Asset Pricing Model)

3.3.1 Overview

Hitchner (2006) describes that in 1952 economist Harry Markowitz, developed the modern portfolio theory which presented the efficient frontier of optimal investment. In 1963, the research of William Sharpe has developed upon Markowitz’s portfolio theory, in order to improve a means by which to measure this risk. William Sharpe who was a student at the University of California was searching for a dissertation topic which resulted in Markowitz suggesting that he explore the portfolio theory.

Sharpe studied the theory and modified it by connecting each portfolio with a single risk factor. He put these risks into two categories, systematic risk and unsystematic risk. Sharpe concluded that by diversifying one’s portfolio, one could reduce or eliminate
unsystematic risk. Therefore, the return of the portfolio would rest entirely on its correlation to the market. This model has now come to be known as the capital asset pricing model (Hitchner, 2006). The classic empirical studies, such as Fama and MacBeth (1973), Gibbons (1982) and Stambaugh (1982) presented some evidence in support of the formulation. The original formulation defined systematic risk as the contribution to the variance of a well-diversified market portfolio (the beta).

### 3.3.2 Assumption

Patterson (1995, p.35) demonstrates the following assumption of the CAPM:

- All models of security of price determination in capital markets are that all investors hold well-diversified portfolios;
- There are no transaction costs involved in trading securities;
- All relevant information for the pricing of securities is freely and instantaneously available to investors;
- All assets are marketable and divisible;
- These are no taxes that differentiate between securities or investors;
- All investors have the same one-period investment horizon and have identical views with respect to expected returns, variability, and the comovements of returns for securities; and
- All investors have the ability to borrow and lend unlimited amounts at a known risk-free rate of \( R_{f} \).
3.3.3 Methodology

The Capital Asset Pricing Model (CAPM) is used in finance to determine a theoretically appropriate required rate of return of an asset, providing that the asset is to be added to an already well-diversified portfolio and given that assets are a non-diversifiable risk. According to Capital Asset Pricing Mode (2007), the CAPM formula takes into account the asset’s sensitivity to non-diversifiable risk, often represented by the quantity beta (β) in the financial industry, as well as the expected return of the market and the expected return of a theoretical risk-free asset.

Cochrane (2001) claims that risk can be defined as the degree of uncertainty as to the expectation of future returns and can be divided into three segments: maturity risk; systematic risk; and unsystematic risk. In the capital market, the risk is divided risk into two types:

1. Systematic Risk. The uncertainty of future returns due to the sensitivity of the return on the subject investment to movements in the return for the investment market as a whole (Cochrane 2001, p.200);

2. Unsystematic Risk. The uncertainty of future returns as a function of the characteristics of the industry, company and type of investment interest. For example, circumstances can impact unsystematic risk including operating in an industry subject to high obsolescence (e.g., technology), management expertise, labor relations (Cochrane 2001, p.200).
The evidence shows that unsystematic risk can be freely eliminated by diversification, and the reward for bearing risk depends only on the level of systematic risk. The level of systematic risk in a particular asset relative to average is given by the beta of that asset.

According to Ross et al (2004, pp.374-375), the reward-to-risk ratio for Asset i is the ratio of its risk premium, \( E(R_m) - R_f \), to its beta, \( \beta_{i,m} \): \( \frac{E(R_m) - R_f}{\beta_{i,m}} \). In a well-functioning market, this ratio is the same for every asset. As a result, when expected returns are plotted against asset betas, all assets plot on the same straight line, called the security market line (SML). From the SML, the expected return on Asset i can be written: \( E(R_i) = R_f + \beta_{i,m} [E(R_m) - R_f] \).

### The Securities Market Line (SML)

![Diagram of Security Market Line (SML)](image)

3.1 Figure: the Security Market Line (SML)
The model that describes the relationship between risk and expected return and that is used in the pricing of risky securities (Capital Asset Pricing Mode, 2007).

\[ E(R_i) = R_f + \beta_{i,m}(E(R_m) - R_f) \]

Where:

- \( E(R_i) \) is the expected return on the capital asset
- \( R_f \) is the risk-free rate of interest in the economy (for example, the yield on Treasury bills or bonds)

Notes1: The risk-free interest rate is the interest rate that it is assumed can be obtained by investing in financial instruments with no default risk.

- \( \beta_{i,m} \) (the beta coefficient) the sensitivity of the asset returns to market returns, or also

\[ \beta_{i,m} = \frac{Cov(R_i, R_m)}{Var(R_m)} \]

- \( E(R_m) \) is the expected return of the market
- \( E(R_m) - R_f \) is sometimes known as the market premium or risk premium (the difference between the expected market rate of return and the risk-free rate of return)

Note 2: the expected market rate of return is usually measured by looking at the arithmetic average of the historical returns on a market portfolio (i.e. S&P 500). Note 3: the risk free rate of return used for determining the risk premium is usually the arithmetical average of historical risk free rates of return and not the current risk free rate of return.

Beta is calculated using regression analysis, and beta can be considered as the tendency of a security's returns to respond to swings in the market. “The beta coefficient, in terms
of finance and investing, describes how the expected return of a stock or portfolio is correlated to the return of the financial market as a whole” (Gujarati 1992, p. 177).

According to research by Gujarati (2003, pp. 200-201), a beta of 0 means that its security’s price is not at all correlated with the market. A beta of 1 indicates that the security’s price will move with the market. A beta of less than 1 means that the security will be less volatile than the market. A beta of greater than 1 indicates that the security’s price will be more volatile than the market. For example, if a stock’s beta is 1.2, it is theoretically 20% more volatile than the market. A negative beta shows that the asset price inversely follows the market and its security’s price generally decreases in value if the market goes up.

Research by Capital Asset Pricing Mode (2008) has shown that beta explores the volatility of the security, relative to the asset class. The equation means that investors require higher levels of expected returns to compensate them for higher expected risk. This evidence proves that the formula can be considered as predicting a security’s behaviour as a function of beta: CAPM is likely that if you know a security’s beta then you know the value of $E(R_i)$ that investors expect it to have.

According to Francis & Grout (2000), the general idea behind CAPM is that investors need to be compensated in two ways: time value of money and risk. The time value of money is represented by the risk-free (rf) rate in the formula and compensates the investors for placing money in any investment over a period of time. The other half of the formula represents risk and calculates the amount of compensation the investor needs for
taking on additional risk. This is calculated by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market premium (Rm-rf).

Francis & Grout (2000) claim that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should not be undertaken. The security market line plots the results of the CAPM for all different risks (betas).

3.3.4 Limitation

Lvkovic (2007) gives some following limitations to CAPM:

- The model assumes that asset returns are normally distributed random variables. It is however frequently observed that returns in equity and other markets are not normally distributed. As a result, large swings occur in the market more frequently than the normal distribution assumption would expect;

- The model assumes that the variance of returns is an adequate measurement of risk. This might be justified under the assumption of normally distributed returns, but for general return distributions other risk measures will likely reflect investors' preference more adequately;
- Model does not appear to adequately explain the variation in stock returns. Empirical studies show that low beta stocks may offer higher returns than the model would predict;

- The model assumes that given a certain expected return investors will prefer lower risk (lower variance) to higher risk and conversely given a certain level of risk will prefer higher returns to lower ones. It does not allow for investors who will accept lower returns for higher risk;

- The model assumes that all investors have access to the same information and agree about the risk and expected return of all assets;

- The model assumes that there are no taxes or transaction costs, although this assumption may be relaxed with more complicated versions of the model;

- The market portfolio consists of all assets in all markets, where each asset is weighted by its market capitalization. This assumes no preference between markets and assets for individual investors, and that investors choose assets solely as a function of their risk-return profile; and

- The market portfolio should in theory include all types of assets that are held by anyone as an investment. In practice, such a market portfolio is unobservable and people usually substitute a stock index as a proxy for the true market portfolio.
3.4 WACC (Weighted Average Cost of Capital)

3.4.1 Overview

Solomon (1963) states that business education has undergone fundamental transformation during 1950s in the United States. This transformation has been characterised by intensive application to managerial problems of the underlying disciplines - the social sciences, modern mathematics and statistics, a greater emphasis on analysis rather than description in the teaching process and the development of fundamental research on the business process.

In order to speed the diffusion of these social sciences, Ezra Solomon has demonstrated that the minimum acceptance level of return for an incremental investment is equal to the rate of discount which equates the flow of future payments to owners and creditors with the current value of the firm in 1963. Within the framework of Solomon’s restrictive assumptions, this true cost of capital is identical to the weighted average cost of capital (Raymond & William 1973, p.123). Thus, incremental investments yielding at least the weighted average cost of capital provide a net return on the equity capital, which is at least equal to the rate of return required by the owners of the firm.

3.4.2 Assumption

According to Emhjellen & Alaouze (2002), the general assumptions required before the weighted average cost of capital can be estimated:
Business risk - the risk to the firm of being unable to cover operating costs-is assumed to be unchanged. This means that the acceptance of a given project does not affect the firm’s ability to meet operating costs;

Financial risk - the risk to the firm of being unable to cover required financial obligations-is assumed to be unchanged. This means that the projects are financed in such a way that the firm’s ability to meet financing costs is unchanged;

After-tax costs are considered relevant-the cost of capital is measured on an after-tax basis;

There are no costs of financial distress and liquidation (if a firm is liquidated, shareholders will receive the same as the market value of their share prior to liquidation); and

There are perfect capital markets, with perfect information available to all economic agents and no transaction costs.

3.4.3 Methodology

Research by Hitchner (2006), the weighted average cost of capital (WACC) is the average of the cost of equity and debt, weighted by the proportions of equity and debt which an efficiently financed company can be expected to use to fund its activities. Hence to determine the WACC, it is necessary to determine the cost of debt and the cost
of equity and the proportions of debt and equity that would be employed by an efficiently financed company.

Evidence from Pratt (1998, pp.45-46) shows that WACC is especially correct for project selection in capital budgeting. The percentage of debt and equity that could be available to finance different kinds of projects could be different and the cost of capital should be based on the specific investment. This evidence has shown that the weight for each component of the capital structure should be calculated to determine the entire capital structure and the relative weightings of debt and equity or other capital components are based on the market values of each component rather than on the book values.

According to Weighted Average Cost of Capital (2002, p.10), in earlier reviews and determinations by Australian Regulators, the cost of capital was commonly expressed as a pre-tax real WACC. However, the regulators generally commented that the cost of capital would be reviewed in light of future developments.

Recently, the Australian Competition and Consumer Commission (ACCC) and Queensland Competition Authority (QCA) have released determinations where the WACC has been formulated based on a nominal post-tax approach. The Essential Services Commission (ESC) has adopted a real post-tax approach, while the Office of Gas Access Regulation (Ofgar) still expresses the WACC in terms of pre-tax real (Weighted Average Cost of Capital 2002, p.16).
Hitchner (2006, p.189) states that a company’s WACC is calculated in three steps:

1. Determine the proportionate weighting of each source of capital financial based on their market values;
2. Calculate the after-tax or pre-tax rate of return (cost) of each source; and
3. Calculate the weighted average cost of all sources.

The traditional formula used to develop a WACC is (Hitchner, 2006, p.190):

\[
WACC = (K_e \times W_e) + (K_p \times W_p) + (K_{d/(pt)} \times [1-t] \times W_d)
\]

Where:

\(WACC\) = Weighted average cost of capital

\(K_e\) = Cost of common equity capital

\(W_e\) = Percentage of common equity in the capital structure, at market value

\(K_p\) = Cost of preferred equity

\(W_p\) = Percentage of preferred equity in the capital structure, at market value

\(K_{d/(pt)}\) = Cost of debt (pre tax)

\(T\) = Tax Rate

\(W_d\) = Percentage of debt in the capital structure, at market value

According to Pratt (1998, pp.47-48), there are a few more pieces of information that should be calculated before working out the weighted average cost of capital:

1. Cost of common equity;
Regulatory decisions in Australia have generally determined that the cost of equity is calculated using CAPM (Weighted Average Cost of Capital 2002, p.6).

2. Cost of preferred equity;
“A measure of equity only takes into account the preferred stockholders, and disregards the common stockholders. It is equal to shareholders’ equity minus common equity” (Pratt 1998, p. 47).

3. Cost of debt (before tax effect).
Regulatory decisions in Australia have generally determined the cost of debt as a margin over the risk free rate (Weighted Average Cost of Capital 2002, p.13).

Evidence by Benninga (2000, p. 39), the cost of debt can be calculated as:
Total debt = long term debt + short term debt and current portion of long term debt
Cost of debt = interest expense / total debt

4. Tax rate.
Presently, the value for tax is a prominent issue. Regulatory decisions have begun to adopt effective tax rates rather than use the statutory rate (Weighted Average Cost of Capital 2002, p.8).

3.4.4 Limitations
Lund (2000) lists the following two limitations to WACC:
• Its main limitation is that it is only applicable to assets that have the same systematic risks and incremental debt ratio as the traded equity used to estimate its magnitude. In general, for assets that do not meet this criterion, it is still necessary to estimate a project-specific level of $K_j$.

• The premise of weighted average cost of capital is that an investor would pay no more to purchase the asset than would be paid to reproduce the asset. While this approach is suitable for some assets, particularly those which are not directly generating income, choosing this approach as cost is not always a reliable guide to value, for example, the vast amounts of money spent on pharmaceutical research projects which come to nothing.

3.5 DCF (Discounted Cash Flow)

3.5.1 Overview

Discounted Cash Flow (DCF) calculations have been used in some forms since money was first lent at interest in ancient times. As a method of asset valuation it has often been opposed to accounting book value, which is based on the amount paid for the asset (Discounted Cash Flow - DCF, 2008). Discounted Cash Flow was first formally published in 1938 in a text by John Burr Williams. This was after the market crash of 1929 and before auditing and public accounting was mandated by the SEC. Due to the economic crash, investors were wary of relying on the reporting earnings, or in fact any measures of value apart from cash (Discounted Cash Flow - DCF, 2008). Therefore, discounted cash flow analysis gained popularity as a valuation method for stocks.
3.5.2 Assumption

According to Hilton (1991), there are two primary methods of discounted cash flow analysis: Net-Present-Value method (NPV) and Internal-Rate-of-Return (IRR) method. Principal assumptions of these methods are as follows:

- All cash flows are treated as though they occur at the end of the year;
- DCF methods treat cash flows associated with investment projects as though they were known with certainty, whereas risk adjustments can be made in an NPV analysis to account in part for cash flow uncertainties;
- Both methods assume that all cash inflows are reinvested in other projects that earn monies for the company; and
- DCF analysis assumes a perfect capital market.

3.5.3 Methodology

Evidence from Tanzi (2006), DCF is one of the most important concepts underlying financial decision making. Also known as the “time value of money”, DCF applies to any situation in which money is paid at one point and received at a different point. Its methodology expresses the present value of a business as a function of its future cash earnings capacity. This evidence has carefully shown that DCF methodology works on the premise that the value of a business is measured in terms of future cash flow streams, discounted to the present time at an appropriate discount rate. If the value arrived at through DCF analysis is higher than the current cost of the investment, the opportunity may be a good one.
The discounted cash flow formula is derived from the future value formula for calculating the time value of money and compounding returns (Kruschwitz & Loffler, 2005).

\[ FV = PV \times (1+i)^n \]

The simplified version of the discounted cash flow equation (for one cash flow in one future period) is expressed as:

\[ DPV = \frac{FV}{(1+i)^n} = FV \times (1-d)^n \]

Where,

- DPV is the discounted present value of the future cash flow (FV), or FV adjusted for the opportunity cost of future receipts and risk of loss;
- FV is the nominal value of a cash flow amount in a future period;
- d is the discount rate, which is the opportunity cost plus risk factor (or the time value of money: “I” in the future-value equation);
- n is the number of discounting periods used (the period in which the future cash flow occurs). I.e. if the receipts occur at the end of year 1, n will be equal to 1; at the end of year 2, 2-likewise, if the cash flow happens instantly, n becomes 0, rendering the expression an identity (DPV=FV).

Kruschwitz & Loffler (2005) explore that NPV is the difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital
budgeting to analyse the profitability of an investment or project. This is also called the net present value method.

\[ Value = C_0 + \sum_{i=1}^{T} \frac{E(C_t)}{(1 + r)^t} \]

Where value is the investment’s net present value, \( C_0 \) is the certain after-tax cash flow at time 0, \( E(C_t) \) is the expected after-tax cash flow at time t, \( T \) is the investment’s life, and \( r \) is the risk adjusted discount rate.

Benninga (2000) outlines four different DCF methods depending on the financing schedule of the company today. Due to different underlying financing assumptions, the value of the project or company do not need to arrive at the same. The following is the four DCF methods:

- **Equity-Approach**
  - Flows to equity approach (FTE)

- **Entity-Approach**:
  - Adjusted present value approach (APV)
  - Weighted average cost of capital approach (WACC)
  - Total cash flow approach (TCF)

This thesis will focus on the free cash flow to equity approach to determine the “fair value” of companies. The first step for using discounted cash flow (DCF) analysis is to determine how far out into the future we should project cash flows.
3.2 Table: good guideline to use when determining a company’s forecast period (Benninga 2000, p. 64):

<table>
<thead>
<tr>
<th>Company Competitive Position</th>
<th>Forecast Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow-growing company; operates in highly competitive, low margin industry</td>
<td>1 years</td>
</tr>
<tr>
<td>Solid company; operates with advantage such as strong marketing channels, recognizable brand name, or regulatory advantage</td>
<td>5 years</td>
</tr>
<tr>
<td>Outstanding growth company; operates with very high barriers to entry, dominant market position or prospects</td>
<td>10 years</td>
</tr>
</tbody>
</table>

The second step is to define the free cash flow. The easiest way to define the free cash flow is as following (Benninga 2000, p. 65):

**Defining the Free Cash Flow**

**Profit after taxes**

This is the basic measure of the profitability of the business, but it is an accounting measure that includes financing flows, as well as noncash expenses such as depreciation. Profit after taxes does not account for either changes in the firm’s working capital or purchase of new fixed assets, both of which can be important cash drains on the firm.

**+$Depreciation+ after tax interest payments**

Depreciation should be added back to the profit after tax. FCF is an attempt to measure the cash produced by the business activity of the firm. We should add back the after tax cost of interest on debt, and subtract out the after tax interest payments on cash and marketable securities.

**-Increase in current assets**

Since the firm’s sales increase, more investment should be put in inventories, accounts receivable, etc. This increase in current assets is not an expense for tax purpose.

**+$Increase in current liabilities**

An increase in the sales often causes in financing related to sales. This increases in current liabilities.

**-Increase in fixed assets at cost**


An increase in fixed assets is a use of cash, which reduces the firm’s free cash flow.

The enterprise value of the firm is defined to be the value of the firm’s debt, convertible securities and equity. “In financial theory, the enterprise value is the present value of the firm’s future anticipated cash flows. Accordingly, the enterprise value of the firm is the discounted value of the firm’s projected FCF plus its terminal value” (Benninga 2000, p. 68).

Enterprise value = \( \frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \ldots + \frac{FCF_5}{(1+WACC)^5} + \frac{Year\ 5\ terminal\ value}{(1+WACC)} \)

There are several ways to estimate a terminal value of cash flows, but one well-known method is to value the company as a perpetuity using the Gordon Growth Model. The model uses this formula (Benninga 2000, p. 70):

\[
Terminal\ Value = \frac{Final\ Projected\ Year\ Cash\ Flow \times (1+Long-Term\ Cash\ Flow\ Growth\ Rate)}{(WACC - Long-Term\ Cash\ Flow\ Growth\ Rate)}
\]

Calculating the Fair Value of Equity (Benninga 2000, p. 72):

\[
Fair\ Value\ of\ Company\ Equity = Enterprise\ Value - Debt
\]

We can judge the value of the company shares when having finished the DCF valuation. If the shares are trading at a lower value than this, they could represent a buying opportunity for investors. If they are trading higher than the per share fair value,
shareholders may want to consider selling the company shares. The formula has shown as the following (Benninga 2000, p. 73):

\[
\text{Share Price} = \frac{\text{Fair Value of Company Equity}}{\text{Shares Outstanding}}
\]

3.5.3 Limitation

Research by Baur, Habib & Volkart (1998), due to the difficulty of forecasting into the future, some constant rate of growth in cash flow must be assumed beyond some future year. In general, valuation is extremely sensitive to this growth rate, which is necessarily assumed to go on forever. This research explores that the choice of the growth rate can be made to serve some party’s agenda and satisfy their self interests. Therefore, this naturally damages the credibility of DCF valuations and causes the severe consequences for the public interest.

“A limitation of the NPV is that it is not related to the size of the project. If one project has a slightly lower NPV than another, but the capital outlays required are much lower, then the second project will probably be the preferred one” (Baur, Habib & Volkart 1998, p. 124). In addition, DCF is merely a mechanical valuation tool, which makes it subject to the axiom “garbage in, garbage out”. Small changes in inputs can result in large changes in the value of a company (Baur, Habib & Volkart, 1998). The evidence has shown that DCF models are powerful but they do have shortcomings. NPV has the larger problem in using DCF to evaluate the business performance because it can affect the size of the project. The DCF model is only a mathematical formula that people can utilize in order to reduce mistakes to achieve increased profits.
3.6 P/E ratio

3.6.1 Overview

The P/E ratio has been known for almost fifty years and is widely used to describe a company’s business activity. Evidence by Board (2005, p.5) shows that a large amount of academic work has demonstrated the effect and attempted to decide whether it is real or a proxy for other factors. The first work demonstrating P/E effect was the research published in 1960 by Nicholson. He collected 100 mainly industrial stocks over five-year periods from 1939 to 1959. The portfolio of lowest P/E quintile stock, rebalanced every five years, would have delivered an investor 14.7 times his original investment at the end of the twenty years, as compared to 4.7 times for the highest P/E quintile.

3.6.2 Assumption

Albrecht (1990, pp.2-3) states the assumption for P/E ratio, it is not significantly different from the average firm in the industry in terms of expected earnings growth rate and risk or that the differences off-set each other. And it should be recognized that both the growth rate of earnings and risk would be controlled by market forces which are common to all firms in the industry. Certainly, assuming average performance is a reasonable assumption.

3.6.3 Methodology

According to Price-Earnings-Ratio (2007), the P/E ratio (price to earnings ratio) of a stock is a measure of the price paid for a share related to the annual income or profit earned by the firm per share. When it comes to valuing stocks, the price/earnings ratio is one of the oldest and most frequently used metrics. It can be seen that a high P/E suggests
that investors are expecting higher earnings growth in the future compared to companies with a lower P/E. However, the P/E ratio doesn’t tell us the whole story by itself. It’s usually more useful to compare the P/E ratios of one company to other companies in the same industry, to the market in general or against the company’s own historical P/E.

P/E is short for the ratio of a company’s share price to its per-share-earnings. Basically, the P/E ratio formula is set as the following (Price-Earnings-Ratio, 2007):

\[
P/E \text{ ratio} = \frac{\text{Price per Share}}{\text{Annual Earning per Share}}
\]

- The price per share is the market price of a single share of the stock;
- The earnings per share are the net income of the company for the most recent 12 month period, divided by number of shares outstanding. The earnings per share (EPS) used can also be the “diluted EPS”, or the “comprehensive EPS”.

Its formula is: \[\text{EPS} = \frac{\text{Net Income}}{\text{Average Outstanding Shares}}\]

According to research by Little (2004), in the EPS calculation, it is more accurate to use a weighted average number of shares outstanding over the reporting term, because the number of shares outstanding can change over time. However, data sources sometimes simplify the calculation by using the number of shares outstanding at the end of the period.

Ordinarily, the P/E is calculated using EPS from the last four quarters. This is also known as the trailing P/E. However, occasionally the EPS figure comes from estimated earnings expected over the next four quarters. This is known as the leading or projected P/E.
Durell (2006) demonstrates that a stock’s P/E tells us how many investors are willing to pay per dollar earnings. For this reason it’s also called the “multiple” of a stock. This evidence has shown that a P/E ratio of 20 means that investors in the stock are willing to pay $20 for every $1 of earnings that the company generates.

3.6.4 Limitation

Sayeed (2008) states the three aspects of P/E ratio limitation, as the following:

- Accounting: There are too many methods to calculate the actual earnings per share (EPS), such as Primary EPS, Diluted EPS, and Headline EPS etc. Moreover, some investors can use the different way to calculate may get confused between the different types of EPS and thus reach a wrong P/E estimate;
- Inflation: during the periods of high inflation, inventory and depreciation costs may be understated because the replacement costs of goods and equipment rise with the general level of prices. Thus, P/E ratios tend to be lower during times of high inflation because the market sees earnings as artificially distorted upwards;
- Besides earnings, there are other factors that affect the value of a stock. For example:
  - Brand - The name of a product or company has value. Brands such as Coca-Cola are worth billions;
  - Human Capital - A company’s employees and their expertise are should add value to the company;
Expectations - The stock market is forward looking. People buy a stock because of high expectations for strong profits, not because of past achievements; and

Barriers To Entry - For a company to be successful in the long run, it must have strategies to keep competitors from entering the industry.

All these factors will affect a company’s earnings growth rate. Because the P/E ratio uses past earnings (trailing twelve months), it gives a less accurate reflection of these growth potentials.

### 3.7 EVA (Economic Value Added)

#### 3.7.1 Overview

“EVA (Economic Value Added) was developed by a New York Consulting firm, Stern Steward & Co in 1982 to promote value-maximizing behaviour in corporate managers” (Worthington & West 2001, p.6). It is a single, value-based measure that was intended to evaluate business strategies, capital projects and to maximize long-term shareholders wealth (Worthington & West 2001, p.7). This evidence states that EVA can be measured by comparing profits with the cost of capital used to produce them and it can help managers decide to withdraw value-destructive activities and invest in projects that are critical to shareholder’s wealth. Therefore, this will lead to an increase in the market value of the company.

Sharma (2004) describes that Cola-Cola is one of many companies that adopted EVA for measuring its performance. Coca-Cola CEO Roberto Goizueta accredited EVA for turning Coca-Cola into the number one Market Value Added Company. Coca-Cola’s
stock price increased from $3 to over $60 when it first adopted EVA in the early 1980s. In 1995, Coca-Cola’s investor received $8.63 wealth for every dollar they invested.

### 3.7.2 Methodology

According to Banerjee (2000), Economic Value Added (EVA) may be defined as the net operating profits after tax minus an appropriate charge for the opportunity cost of all capital invested in an enterprise. Thus

\[
\text{EVA} = \text{Net Operating Profit after tax} - \text{Weighted Average Cost of Capital}
\]

EVA can be rewritten as:

\[
\text{EVA} = (\text{ROI} - \text{WACC}) \times \text{CAPITAL EMPLOYED}
\]

- \( \text{ROI} = \frac{\text{NOPAT}}{K} \), called the return on invested capital

- Capita Employed: represents the total cash investment that shareholders and debt holders have made in a company. There are two different but completely equivalent methods for calculating invested capital.

The operating approach is calculated as:

- Invested capital = Operating Net Working Capital + Net PP&E + Capitalized Operating Leases + Other Operating Assets + Operating Intangibles – Other Operating Liabilities – Cumulative Adjustment for Amortization of R&D.

The financing approach is calculated as:
• Invested Capital = Total Debt and Leases + Total Equity and Equity Equivalents - Non-Operating Cash and Investments

“EVA captures the fact that equity should earn at least the return that is commensurate to the risk that the investor takes” (Mark1996, p.45). This evidence has shown that equity capital has to earn at least same return as similarly risky investments at equity markets. If that is not the case, then there is no real profit made and actually the company operates at a loss from the viewpoint of shareholders. On the other hand, if EVA is zero, this should be treated as a sufficient achievement because the shareholders have earned a return that compensates the risk.

Sharma (2004) also claims several advantages for EVA:

1. EVA eliminates economic distortions of GAAP to focus decisions on real economic results;

2. EVA provides for better assessment of decisions that affect balance sheet and income statement or tradeoffs between each through the use of the capital charge against NOPAT;

3. EVA decouples bonus plans from budgetary targets;

4. EVA covers all aspects of the business cycle; and

5. EVA aligns and speeds decision making, and enhances communication and teamwork.

3.7.3 Limitation
EVA also has its critics. The biggest limitation is that the only major publicly-available sample evidence on the evidence of EVA adoption on firm performance is an in-house study conducted by Stern Stewart and except that there are only a number of single-firm or industry field studies.

Keys, Azamhuzjaev & Mackey (2001) cite the following limitations to EVA:

- EVA does not control for size differences across plants or divisions;
- EVA is based on financial accounting methods that can be manipulated by managers;
- EVA may focus on immediate results which diminishes innovation; and
- EVA provides information that is obvious but offers no solutions in much the same way as historical financial statement do.

Also, Huang (2007) identifies the following two limitations of EVA:

- Given the emphasis of EVA on improving business-unit performance, it does not encourage collaborative relationship between business unit managers;
- EVA although a better measure than EPS, PAT and RONW is still not a perfect measure.

3.8 Guideline Merged and Acquired Company Method

3.8.1 Overview

According to Koller, Goedhart & Wessels (2005, p. 427), Mergers and acquisitions (M & A) have long been features of the corporate landscape. They first became notorious in the late 1800s in the United States with the activity of the “robber barons”, followed by the
consolidations of J.P. Morgan and others in the early 1900s. Since then, there have been several waves of M&A activity in the United States—during the booming economy of the late 1960s, through to the controversial wave of restructuring in the mid-1980s and most recently with the megadeals signed during the late 1990s.

3.8.2 Assumption

Hitcher (2006, pp. 270-273) outlines the several assumptions as the following:

- The company’s expected growth in sales or earnings is most important assumption in a guideline price multiple. And the short-term and perpetual growth rates are listed as assumptions;
- Other important assumptions such as expected risk and margins are not explicitly given. The implicit prices of publicly traded companies and transactions are some assumption about growth. Commonly, the higher the expected growth, the higher the value, all the things are equal; and
- In addition, it is difficult to get the detailed financial statements of the acquired company, so it is impossible to make certain adjustments to the data underlying the pricing multiples.

3.8.3 Methodology

According to Wise (2003), Guideline Merger and Acquisition method involves the valuation ratios derived from transactional pricing information that is related to the appropriate underlying financial data of guideline companies, and then applied to the corresponding data of the subject company to arrive at an indication of value. The
analysis involves the comparison of the respective qualitative and quantitative factors relating to the company being valued to those of the guideline companies.

Evidence by Hitcher (2006, pp.270-271), at its simplest, the method requires only multiplication and perhaps some subtraction, depending on the multiple selected. The basic format is (Hitcher, 2006):

\[
Value_{\text{subject}} = \left( \frac{\text{Price}}{\text{Parameter}} \right)_{\text{comps}} \times \text{Parameter}_{\text{subject}} - \text{Debt}_{\text{Subject}}
\]

Parameter might be sales, net incomes, book value.

The Price / Parameter multiple is the appropriate pricing multiple based on that parameter (e.g., price/ net income, price/ book value) and taken from the guideline companies. In some cases (invested capital multiples) the debt of the subject company may have to be subtracted.

**Basic Financial Indicators** (Hitcher, 2006, pp. 288-292):

Some financial measures that should be included in an analysis for both guideline and subject companies include:

- **Size Measures.** These include the magnitude of sales, profits, total assets, market capitalization, and total invested capital;

- **Historical Growth Rates.** Consider growth in sales, profits, assets or equity;

- **Measures of Profitability and Cash Flow.** Consider the four most common measures:
1. Earning before interest, taxes, depreciation and amortization (EBITDA)
2. Earnings before interest and taxes (EBIT)
3. Net income
4. Cash flow

- Profit Margins. The current level of profits is probably less important than the ratio of profits relative to some base item-usually sales, assets, or equity;
- Capital Structure. It is essential to use some measures derived from the current capital structure; and
- Other Measures. These will be a function of what is important in the industry in which the subject company operates.

**Displaying the Information** (Hitcher, 2006, pp. 292-293):

The key items have been chosen, the next stage is to put the information into a usable format. These data should be displayed in order to make comparisons easy. Further, so that comparisons are meaningful, the concepts must be consistent across companies. The financial information for the subject company should be shown in a consistent format.

**Financial statement measures** (Hitcher, 2006):

The second part of the pricing multiple is the denominator, the financial statement parameter that scales the value of the company. The four general groupings of valuation ratios include those based on:

1. Revenues;
2. Profitability or cash flows;
3. Book values; and

4. Some other measure.

**Matching price to parameter** (Hitcher, 2006, p.303):

Conventionally, price has been matched to the appropriate parameter based on which providers of capital in the numerator will be paid with the monies given in the denominator.

**Dispersion of pricing multiples** (Hitcher, 2006, pp.305-306):

The coefficient of variation is a useful statistic for analyzing multiples. It measures the dispersion of the data relation to its average value. The higher the coefficient of variation, the larger the range of pricing multiples.

**Applying the valuation multiples** (Hitcher, 2006, pp. 305-310):

The final step is to apply the valuation multiples to the subject company. The companies that remain in the guideline company set are usually ones that should be reasonably comparable to the subject.

**3.8.4 Limitation**

Palepu, Healy & Bernard (2004) cite the three limitations of Guideline Merger and Acquisition method as the following:
• No good guideline companies exist. This is the bigger reason the approach is not used in a valuation. Possibly, it is difficulty to find guideline companies that are sufficiently similar to the subject;
• Due to hard to obtain the detailed financial data, so some assumptions about the adjustments and growth are incorrect; and
• It is not as flexible or adaptable as other approaches. The market approach is hard to include unique operating characteristics of the firm in the value it produces.

3.9 MetaCapitalism

3.9.1 Overview

MetaCapitalism is e-business revolution and the design of 21st-century companies and markets (Means & Schneider, 2000); it is also the new corporate strategy that requires companies to follow if they are going to succeed in the competitive business world (Means & Schneider, 2000). MetaCapitalism advocates a radical or extreme outsourcing and downsizing of human capital, de-capitalization of all non-core capital assets and the diminished role of the State in the global free market economy (Mickhail and Ostrovsky, 2007). These transformations requires the traditional companies to shift to internet-leveraged styles of brand-owning, customer-focused companies and the company should focus on the business-to-business (B2B) e-business revolution, in order to archive the economy growth and value creation (Mickhail and Ostrovsky, 2007).

3.9.2 Assumption

3.9.2.1 Downsizing
Under the MetaCapitalism model, the downsizing achieved by recapitalizing non-core base which includes both physical and human capital. “Clearly, spinning off manufacturing and related operating processes, generally to an outsourced network, frees up enormous amounts of capital that can be focused on brand development, customers ownership, supply network management, and other industry leadership processes” (Means & Schneider, 2000, p. 7).

3.9.2.2 Recapitalization

The purpose of recapitalization or outsourcing is to reduce the firm’s non-core physical assets. “Accompanying the dramatic effort to lower the base of physical capital and outsource is an equally dramatic effort to lower working capital. As brand owners outsource parts manufacture, physical product systems, and large chunks of final assembly for their proprietary, designs and branded products, they keep little if any manufacturing inventory in-house” (Means & Schneider, 2000, p. 6).

Outsourcing became part of the business lexicon during the 1980s and refers to the delegation of non-core operations from internal production to an external entity specializing in the management of that operation. Outsourcing is utilizing experts from outside the entity to perform specific tasks that the entity once performed itself (Mickhail and Ostrovsky, 2007).

3.9.2.3 Value Added Communities
Effective VAC’s main assumption is that all firms will act efficiently and cooperatively for the mutual benefit. The model does not take into account that there are inherently conflicting commercial interests between these firms (Mickhail and Ostrovsky, 2005). VACs assumption ignored the inherent characteristic for the companies and social environments that caused possible impacts to the companies.

3.9.3 Methodology

The MetaCapitalism equation is used as a means of reducing the strategy to a measurable index. The core tenets of MetaCapitalism are decapitalisation, outsourcing and downsizing and these can be measured by PP&E, NWC and NOE (Means & Schneider, 2000). Measure a firm’s level of MetaCapitalisation by calculating its composite change value over time, based on:

\[
\frac{\text{NMC + PP&E} + \text{NOE} + \text{R&D}}{\text{TA}}
\]

This equation, and in particular the corresponding ratios, were taken to indicate the level of MetaCapitalisation because they precisely represent the main tenets of the strategy of decapitalisation (ie: Net Working Capital or NWC), selling of physical assets (Plant Property and Equipment or PPE), and reduction in the number of employees through downsizing and outsourcing (Number of Employees or NOE).

The highest negative change in each index represents an aggressive application of the strategy through to the highest positive change, which represents passive application or no application at all. It was then possible to categories the firms into groups, in the order
of the largest negative change in value of their MetaCapitalisation downwards (Mickhail and Ostrovsky, 2007).

\[ A = L + OE(R - E) \]

Asset declines because of the de-capitalization of all non-core capital assets (Lower PP&E, better use of Net Working Capital or NWC). Also, liability decrease (lower Long Term Debt); and reduction in the number of employees through downsizing and outsourcing lead to reduce of expenses (lower NoE, lower Transaction and Procurement Cost). Therefore, the profit increases.

Due to a lack of available information, the analysis on the NOE has been excluded and leaves six remaining indices to be tested. The original combined index was separated into the following individual indices (Farrell, 2005).

NWC Change

PP & E Change

TA Change

NWC/TA Change

PP & E /TA Change

NWC +PP&E/TA Change

The formula is comprised of six parts which compare the change in the share price. The formula indicates which indices are responsible for adverse effects. The period signifies which MetaCapitalism indices change correlates to the share price change.
3.10 Comparison of studies from literature

3.10.1 Introduction

According to Emhjellen & Alaouze (2002, p. 1213), the purpose of this study is to examine the difference between oil project NPVs obtained using the discounted cash flow method and a modern asset pricing (MAP) method and to identify any implications this might have for the project selection of energy companies. And the recommendation should be provided to change from the weighted average cost of capital (WACC) discounting method to the MAP discounting method.

Emhjellen & Alaouze (2002, p. 1214) highlights that the MAP approach should give better NPV estimates than the WACC method, the reason is that the MAP method discounts revenues and costs using discount rates that reflect the riskiness of each cash flow component. The MAP approach uses a discount rate for revenue that incorporates oil price volatility, a risk parameter, mean reversion of oil prices and time. However, MAP discounting method is very sensitive to the choice of the value for the parameters of the stochastic process used to model oil prices. Therefore, before the MAP method can be adopted as the only valuation method, more work should be done on the oil price model and the use of risk-free discounting of costs.

3.10.2 Valuation based on the WACC

Emhjellen & Alaouze (2002, pp. 1214-1215) explain the oil projects valuation based on the WACC. The oil exploration projects are in the North Sea and are subject to the Norwegian tax regime. Oil companies are invited to apply for interests in exploration
areas when these are made available by the Norwegian government. The oil projects structure come from two to five companies participating in planning and development of the project.

“The project NPV were calculated using the WACC as the discounted rate and the NPV of the portfolio was found to be $US 1236.9 million. However, project 1 was found to have a negative NPV, it was removed from the portfolio and the NPV of the portfolio changed to $US 1251.3 million” (Emhjellen & Alaouze 2002, pp. 1214-1215).

3.10.3 Valuation using a derivative asset methodology

Research by Emhjellen & Alaouze (2002, pp. 1215-1216), The PV of a barrel of oil $(V_0 (P_T))$ is given by Laughton and Jacoby (1993) as:

$$V_0 (P_T) = E_0 (P_T) \exp (-\phi \, \hat{\sigma} (1-\exp (-\lambda \, t))/ \lambda ) \exp(-it), \quad (3.0)$$

Where the risk discount factor is equal to $RDF_t = \exp (-\phi \, \hat{\sigma} (1-\exp (-\lambda \, t))/ \lambda ),$ the time discount factor is equal to $TDF_t = \exp(-it)$ (with $I$ being the real risk-free rate), $E_0(P_T)$ is the expected real oil price at time $t$ as determined at time zero, $\phi$ is the risk adjustment parameter of oil prices, $\hat{\sigma}$ is the volatility factor of oil prices and $\lambda$ is the rate of mean reversion of oil prices.

In the excel spreadsheet model used to calculate project values, the risk discount factor is calculated as:

$$RDF_t = \exp (-\phi \, \hat{\sigma} (1-\exp (-\lambda \, t))/ \lambda ), \quad (3.1)$$

Risk-free discounting for time is performed utilising

$$RDF_t = \exp (-it)/k_t, \quad (3.2)$$
In Eq. (3.2) \(i\) is the real risk-free rate and \(k_t\) is the inflation factor, which is defined as \(k_t = k_{t-1} \exp (k)\), where \(k_0 = 1\) and \(k\) the constant inflation rate.

Project NPV was calculated using the formula

\[
\text{NPV} = \sum R_ct - \sum C_ct - \sum T_ct \tag{3.3}
\]

Where \(\sum R_ct\) is the sum of the PVs of the expected real revenue cash flows, \(\sum C_ct\) is the sum of the PVs of the expected real cost cash flows and \(\sum T_ct\) is the sum of the PVs of the expected real tax cash flows.

Evidence by Emhjellen & Alaouze (2002, pp. 1217-1218), a comparison of the project NPVs obtained using the WACC discounting method with the project NPV obtained using the MAP method shows that the most undervalued projects are projects N (-14 million dollars), G (-12 million dollars) and J (-8.4 million dollars). The most overvalued are projects D (9.3 million dollars), B (8.3 million dollars), C (7.5 million dollars) and E (6.1 million dollars).

Due to the different time and risk discounting of the individual cash flows by the two models; it resulted in the differences in the NPVs of the projects. The WACC discounting method uses a constant annual discount rate to obtain the PV of the expected net after tax cash flows. “The risk discount factor in Eq. (3.0), however, has a time-varying component. The MAP methodology uses different discount rates for each individual cash flow (and period). Thus, negative end period NPVs is possible for some projects” (Emhjellen & Alaouze, 2002, pp.1217-1218).
3.10.4 Assessment of the MAP method for calculating oil project NPV

According to Emhjellen & Alaouze (2002, p. 1218), the correct specification of the oil price model and its parameters are beneficial for reducing valuation errors when using the MAP valuation method. The oil price based on the assumptions of the values of the parameters of the stochastic process are predictions and the volatility parameter ($\sigma$) cannot be calculated because there is not long-term market trading in oil market.

If mean reversion of oil prices is a feature of the MAP methodology, the reversion is strong enough that commodity owners will not find it optimal to sell their stock. Emhjellen & Alaouze (2002, p. 1219) explore that the principal usefulness of the MAP method is that it provides a methodology for calculating project NPVs for selected values of the volatility parameter ($\sigma$), the mean reversion of oil prices parameter ($\lambda$) and the risk parameter ($\phi$). Once base values of these parameters are chosen, oil project NPVs can be calculated for selected values of these parameters.

3.10.5 Conclusion

The use of the MAP method for practical oil project valuation play a vital role in oil project NPV estimates; because the MAP discounting method considered the tax system and the risk structure of the project cash flows in discounting oil revenues and costs. The results of the MAP discounting method are very sensitive to the choice of the value for the parameters of the stochastic process used to model oil prices. Therefore, more work should be done on the oil price model and the use of risk-free discounting of costs before the MAP method can be adopted as the only valuation method.
CHAPTER FOUR
DATA COLLECTION
4.1 Introduction

The data set used in this study consists of 177 existing listed companies and 23 delisted companies. All of the firms belong to the Australian energy industry. The seven commonly used business valuation methods (CAPM, WACC, EVA, P/E ratio, DCF, MetaCapitalism and Merger and Acquisition) have been selected and compared with the share price in the whole market, listed market and delisted market to evaluate business performance. The percentage change of the energy company’s index and the share price were calculated from one year to the next year and then cumulative methods have been used to calculate each year’s percentage of change rate for the share price and the business valuation methods.

Simple linear regression and correlation have been conducted to analyse the correlation between the business evaluation methods and the share price. Correlation analysis is a group of techniques to measure the association between two variables. In addition, the linear regression graph and t-test were used to assess whether the means of two groups are statistically different from each other. The main purpose of using simple linear regression is to establish the strength of the link between the business evaluation methods and the share price.

4.2 Data collection

The sample period spans 19 years from 1989 to 2007. There are 177 existing listed companies and 23 delisted companies in the sample with different number of participating years of them. All of the firms belong to the Australian energy industry.
The seven commonly used business valuation methods (CAPM, WACC, EVA, P/E ratio, DCF, MetaCapitalism and Merger and Acquisition) have been selected and compared with the share price in the whole market, listed market and delisted market to evaluate business performance. The percentage change of the energy company’s index and the share price were calculated from one year to the next year and then cumulative methods have been used to calculate each year’s percentage of change rate for the share price and the business valuation methods. Share price and energy company’s data were collected from online sources FinAnalysis that listed a 19-year history of detailed financial information for all companies listed on ASX on a yearly basis from 1989 to 2007.

When viewed over long periods, the share price is directly related to the earnings and dividends of the firm. Therefore, the share price is the main indicator for the business performance evaluation success. According to Barton (2006), energy industry is an important sector in the Australian economy, contributing about 13% of Australia’s GDP and 12% of employment as well as 16% of the value of all exports in 2006. The evidence shows that the energy industry is the largest and wealthiest sector in the Australia and they represent the stronger economy development situations. Therefore, the energy sector has been used to evaluate business performance.

Linear regression and correlation have been selected to analyse the relationship between the business valuation methods and the share price. Evidence from Dretzke (2007, p189) has examined that correlation analysis is a group of techniques to measure the association between two variables. The purpose of correlation analysis is to find the relationship

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between two variables. The sample correlation coefficient is designated by the lower case $r$, its value may range from -1.00 to +1.00 inclusive. A value of -1.00 indicates perfect negative correlation. A value of +1.00 indicates perfect positive correlation. A correlation coefficient of 0.00 indicates there is no relationship between the two variables under consideration (Lind & Marchal & Wathen, 2005, p. 430 - 433).

4.3 CAPM

The CAPM model that describes the relationship between risk and expected return and that is used in the pricing of risky securities (Capital Asset Pricing Mode, 2007).

$$E(R_i) = R_f + \beta_{i,m}(E(R_m) - R_f)$$

Where:

$E(R_i)$ is the expected return on the capital asset

$R_f$ is the risk-free rate of interest in the economy (for example, the yield on Treasury bills or bonds)

Notes1: The risk-free interest rate is the interest rate that it is assumed can be obtained by investing in financial instruments with no default risk.

$\beta_{i,m}$ (the beta coefficient) the sensitivity of the asset returns to market returns, or also $\beta_{i,m} = \frac{Cov(R_i, R_m)}{Var(R_m)}$

$E(R_m)$ is the expected return of the market

$E(R_m) - R_f$ is sometimes known as the market premium or risk premium (the difference between the expected market rate of return and the risk-free rate of return).
Note 2: the expected market rate of return is usually measured by looking at the
arithmetic average of the historical returns on a market portfolio (i.e. S&P 500). Note 3:
the risk free rate of return used for determining the risk premium is usually the arithmetic
average of historical risk free rates of return and not the current risk free rate of return.

In this model, Australian All Ordinaries Index end of year close from 1989 to 2007
(Renton 2007, pp.181-182) has been conducted for the expected market rate of return,
and its rate of return is usually measured by looking at the arithmetic average of the
historical returns on a market portfolio. The following table lists All Ordinaries Index:

4.1 Table: All Ordinaries Index

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<tbody>
<tr>
<td>ALL Ords</td>
<td>1649</td>
<td>1279.8</td>
<td>1651.4</td>
<td>1549.9</td>
<td>2173.6</td>
<td>1912.7</td>
<td>2203</td>
<td>2424.6</td>
<td>2616.5</td>
<td>2813.4</td>
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<tr>
<td>Change Rate</td>
<td>10.86%</td>
<td>-22.39%</td>
<td>29.04%</td>
<td>-6.15%</td>
<td>40.24%</td>
<td>-12.00%</td>
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<td>Change Rate</td>
<td>12.05%</td>
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<td>11.11%</td>
<td>22.60%</td>
<td>16.18%</td>
<td>19.87%</td>
<td>13.76%</td>
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According to research by Truong (2008), the risk-free rate can be represented by 20-year,
5-year, or 30-day treasury or bonds yield as of valuation data. Therefore, the Australian
Government 10 yrs bonds rate end of year close from 1989 to 2007 (Year Book Australia,
2007) has been conducted for the risk free rate of return used for determining the risk
premium and it is usually the arithmetic average of historical risk free rates of return and
not the current risk free rate of return.
4.2 Table: The Australian Government 10 yrs bonds rate:

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<tr>
<td>Bonds Rate</td>
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<td>12.07%</td>
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<td>8.94%</td>
<td>6.68%</td>
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<td>Bonds Rate</td>
<td>6.96%</td>
<td>5.46%</td>
<td>6.01%</td>
<td>5.16%</td>
<td>5.60%</td>
<td>5.33%</td>
<td>5.11%</td>
<td>5.79%</td>
<td>6.26%</td>
</tr>
</tbody>
</table>

Systematic risk is measured in the capital asset pricing model by a factor called beta. Abdeghany (2005) claims that beta is a function of the relationship between the return on an individual security and the return on the market as measured by a broad market index such as the Standard & Poor’s 500 Stock Composite Index.

A common method of calculating beta is to compute the slope of the best-fit line between the return on the individual security and the return on the market.

\[
\text{Beta} = \frac{\text{Covariance (Security A, S & P index)}}{\text{Variance of S & P Index}}
\]

Here, the return on All Ordinaries Index end of year stands for security A and the individual share price end of year close stands for the S & P Index to calculate the beta for each individual companies.

4.3 Table: The average $\beta$ for the listed and delisted companies:

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com $\beta$</td>
<td>1.3630</td>
<td>0.7459</td>
<td>0.5594</td>
<td>0.6057</td>
<td>0.6561</td>
<td>-0.2587</td>
<td>3.2882</td>
<td>7.1158</td>
</tr>
<tr>
<td>Delisted Com $\beta$</td>
<td>-0.2991</td>
<td>0.2959</td>
<td>-0.2086</td>
<td>-0.0050</td>
<td>-0.1678</td>
<td>-1.7642</td>
<td>-0.2503</td>
<td>6.5978</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com $\beta$</td>
<td>2.0938</td>
<td>1.1140</td>
<td>0.9645</td>
<td>0.4889</td>
<td>0.3086</td>
<td>0.9221</td>
<td>0.7330</td>
<td>1.3404</td>
</tr>
<tr>
<td>Delisted Com $\beta$</td>
<td>0.1128</td>
<td>-2.7375</td>
<td>-2.7545</td>
<td>-1.1014</td>
<td>-0.7670</td>
<td>0.8248</td>
<td>0.7377</td>
<td>-3.5075</td>
</tr>
</tbody>
</table>
Finally, the cumulative CAPM for the listed and delisted companies can be calculated as the following:

4.4 Table: The cumulative CAPM for the listed and delisted companies:

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com CAPM</td>
<td>-0.85%</td>
<td>163.82%</td>
<td>129.59%</td>
<td>137.31%</td>
<td>137.06%</td>
<td>177.15%</td>
<td>151.22%</td>
<td>192.37%</td>
</tr>
<tr>
<td>Delisted Com CAPM</td>
<td>54.13%</td>
<td>60.55%</td>
<td>64.28%</td>
<td>68.27%</td>
<td>67.70%</td>
<td>86.45%</td>
<td>70.58%</td>
<td>77.54%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com CAPM</td>
<td>205.73%</td>
<td>234.18%</td>
<td>220.68%</td>
<td>272.05%</td>
<td>325.61%</td>
<td>361.29%</td>
<td>392.96%</td>
<td>546.29%</td>
</tr>
<tr>
<td>Delisted Com CAPM</td>
<td>73.73%</td>
<td>93.77%</td>
<td>123.50%</td>
<td>71.76%</td>
<td>75.70%</td>
<td>72.13%</td>
<td>66.86%</td>
<td>6.24%</td>
</tr>
</tbody>
</table>

4.4 WACC

The weighted average cost of capital (WACC) is the average of the cost of equity and debt, weighted by the proportions of equity and debt which an efficiently financed company can be expected to use to fund its activities.

The traditional formula used to develop a WACC is (Hitchner, 2006, p.190):

\[
WACC = (K_e \times W_e) + (K_p \times W_p) + (K_{d/(p0)} [1-t] \times W_d)
\]

Where:

\(WACC\) = Weighted average cost of capital

\(K_e\) = Cost of common equity capital

\(W_e\) = Percentage of common equity in the capital structure, at market value

\(K_p\) = Cost of preferred equity

\(W_p\) = Percentage of preferred equity in the capital structure, at market value

\(K_{d/(p0)}\) = Cost of debt (pre tax)

\(T\) = Tax Rate

\(W_d\) = Percentage of debt in the capital structure, at market value
According to Weighted Average Cost of Capital (2002, p. 6), regulatory decisions in the Australia have generally determined that the cost of equity is calculated using CAPM. Therefore, the CAPM has been used for the cost of equity in this study.

The cost of debt in this research is measured as (Weighted Average Cost of Capital (2002, p. 22):

Total debt = long term debt + short term debt and current portion of long term debt
Cost of debt = interest expense / total debt

The data of interest expense was only found on the database from 1996 to 2007, so the WACC was calculated during this period.

Due to a lack of available information, the analysis on the cost of preferred equity has been excluded. In addition, the cost of capital was expressed as a pre-tax real WACC in this thesis.

Therefore, the cumulative WACC for the listed and delisted companies can be calculated as the following:

4.5 Table: The cumulative WACC for listed and delisted companies:

<table>
<thead>
<tr>
<th>Year</th>
<th>Listed Com WACC</th>
<th>Delisted Com WACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>60.32%</td>
<td>14.04%</td>
</tr>
<tr>
<td>1997</td>
<td>56.01%</td>
<td>34.80%</td>
</tr>
<tr>
<td>1998</td>
<td>117.13%</td>
<td>32.95%</td>
</tr>
<tr>
<td>1999</td>
<td>130.71%</td>
<td>202.95%</td>
</tr>
<tr>
<td>2000</td>
<td>155.94%</td>
<td>43.73%</td>
</tr>
<tr>
<td>2001</td>
<td>164.56%</td>
<td>-24.62%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Listed Com WACC</th>
<th>Delisted Com WACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>168.54%</td>
<td>-22.71%</td>
</tr>
<tr>
<td>2003</td>
<td>209.30%</td>
<td>29.25%</td>
</tr>
<tr>
<td>2004</td>
<td>260.46%</td>
<td>10.54%</td>
</tr>
<tr>
<td>2005</td>
<td>292.95%</td>
<td>85.64%</td>
</tr>
<tr>
<td>2006</td>
<td>338.70%</td>
<td>58.36%</td>
</tr>
<tr>
<td>2007</td>
<td>492.32%</td>
<td>35.34%</td>
</tr>
</tbody>
</table>
4.5 EVA

According to Banerjee (2000), Economic Value Added (EVA) may be defined as the net operating profits after tax minus an appropriate charge for the opportunity cost of all capital invested in an enterprise. Thus:

\[ \text{EVA} = \text{Net Operating Profit after tax} - \text{Weighted Average Cost of Capital} \]

EVA can be rewritten as:

\[ \text{EVA} = (\text{ROI} - \text{WACC}) \times \text{CAPITAL EMPLOYED} \]

Therefore, in finding economic profit, the important step is to calculate net operating profit after taxes (NOPAT).

Firstly, the earnings before interest and taxes (EBIT) and invested capital have been selected from the database and WACC has been found from the previous work. Key adjustments should be made, for example, by eliminating accounting distortions and reclassifying some expenses as investments as well as subtracting cash operating taxes. Due to the data limitation, the reclassifying some expenses are not included in the adjustment.

Therefore, the EVA can be calculated using its formula. But there are lower correlations between the EVA change rate and share price change rate, -0.00039, 0.12354 and 0.028137, respectively in the whole market, listed market and delisted market.
4.6 Table: The cumulative change rate of EVA for the listed and delisted companies:

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</thead>
<tbody>
<tr>
<td>Listed Com Change Rate EVA</td>
<td>-27.27%</td>
<td>32.45%</td>
<td>18.20%</td>
<td>136.22%</td>
<td>0.11%</td>
<td>-19.94%</td>
</tr>
<tr>
<td>Delisted Com Change Rate EVA</td>
<td>97.30%</td>
<td>-20.12%</td>
<td>30.88%</td>
<td>29.91%</td>
<td>-24.37%</td>
<td>-19.14%</td>
</tr>
</tbody>
</table>

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com Change Rate EVA</td>
<td>-32.74%</td>
<td>57.62%</td>
<td>74.00%</td>
<td>12.65%</td>
<td>-7.04%</td>
</tr>
<tr>
<td>Delisted Com Change Rate EVA</td>
<td>64.63%</td>
<td>-52.03%</td>
<td>161.44%</td>
<td>-48.58%</td>
<td>-96.23%</td>
</tr>
</tbody>
</table>

4.6 P/E ratio

The P/E ratio formula is set as the following (Price-Earnings-Ratio, 2007):

\[
P/E \text{ ratio} = \frac{\text{Price per Share}}{\text{Annual Earning per Share}}
\]

- The price per share is the market price of a single share of the stock;
- The earnings per share are the net income of the company for the most recent 12 month period, divided by number of shares outstanding.

P/E ratio is short for the ratio of the companies share price to its per-share earning. The listed companies and delisted companies have been chosen to calculate the P/E ratio. In the EPS calculation, the weighted average number of shares outstanding over the reporting term has been used, in order to get more accurate EPS. It is very interesting from the following table; there are bigger different P/E ratios for listed companies from 6.52 to 30.53 and the slight different for the delisted companies between 0.69 and 2.05. However, both of them exist the higher correlation with the share price change rate, 0.53 and 0.64, respectively in the listed companies and in the delisted companies.
4.7 Table: The cumulative change rate of P/E rations for the listed and delisted companies:

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</tr>
</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>23.16%</td>
<td>-3.24%</td>
<td>98.51%</td>
<td>-21.35%</td>
<td>-12.76%</td>
<td>70.11%</td>
<td>52.84%</td>
<td>-60.61%</td>
<td>10.92%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>0.88%</td>
<td>35.47%</td>
<td>-17.05%</td>
<td>11.29%</td>
<td>79.42%</td>
<td>7.63%</td>
<td>-33.01%</td>
<td>3.01%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>-51.16%</td>
<td>69.42%</td>
<td>-36.47%</td>
<td>-0.18%</td>
<td>60.22%</td>
<td>-8.87%</td>
<td>123.25%</td>
<td>-25.75%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>-8.77%</td>
<td>-3.83%</td>
<td>4.79%</td>
<td>12.75%</td>
<td>53.74%</td>
<td>8.19%</td>
<td>2.48%</td>
<td>25.67%</td>
</tr>
</tbody>
</table>

4.7 DCF

There are four different DCF methods depending on the financing schedule present. They are: flows to equity approach (FTE), adjusted present value approach (APV), weighted average cost of capital approach (WACC) and total cash flow approach (TCF). In this thesis, flows to equity approach will be used to evaluate the energy company’s performance in the Australia.

Middleton describes (2008) that discounted cash flow tries to calculate the value of a company today, depending on projections of much money it’s going to make in the future. The ten listed energy companies (CEY, ERA, HED-NZ, OSH, STO, WPL, NHC, AZA, BNT and PVE) and five delisted energy companies (BSO, CHL, NGC-NZ, NVS and OCA) have been selected to calculate the company’s fair value using DCF. Let’s assume that the companies are keeping strong marketing channels, outstanding growth, efficient factories and reasonable competitive position. So, the research will project cash flows for the next five years of business.
We have decided to estimate the free cash flow that the selected companies will produce over the next five years. Forecasting the companies’ revenue is the most important assumption one that decides the company’s free cash flow.

We have got the company average revenue growth rate at 15% for the past 10 years and the companies will keep at 10% in the future five years. We then calculate the past 10 years average operating costs margin of 65%, in order to derive the operating costs. We assume that the net investment is 10% of the revenue and the working capital has increased by 10% each year.

So the free cash flow can be calculated as the following (Benninga 2000, p. 65):


And we should calculate the terminal value approach that involves making some assumptions about long-term cash flow growth (Benninga 2000, p.70).

\[
\text{Terminal Value} = \text{Final Projected Year Cash Flow} \times \left( \frac{1+\text{Long-Term Cash Flow Growth Rate}}{\text{WACC} - \text{Long-Term Cash Flow Growth Rate}} \right)
\]

In this formula, let’s assume that the company’s cash flows will grow in perpetuity by 4% per year.

Then the enterprise value of the firms becomes the discounted value of the firm’s projected FCF plus its terminal value (Benninga 2000, p. 72)

\[
\text{Enterprise value} = \frac{\text{FCF}_1}{(1+\text{WACC})} + \frac{\text{FCF}_2}{(1+\text{WACC})^2} + \ldots
\]
After that, we should deduct its net debt from the value to calculate the companies’ fair value of equity. Finally, the companies’ share price can be calculated by the enterprise value of equity divided by the shares outstanding.

4.8 Table: The cumulative forecasting share price change rate for the listed and delisted companies:

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</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>29.99%</td>
<td>-44.99%</td>
<td>62.36%</td>
<td>-38.06%</td>
<td>63.19%</td>
<td>-0.65%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>-48.15%</td>
<td>-1317.86%</td>
<td>-174.19%</td>
<td>17.00%</td>
<td>82.43%</td>
<td>-3.52%</td>
</tr>
</tbody>
</table>

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>-79.45%</td>
<td>359.44%</td>
<td>-49.34%</td>
<td>34.93%</td>
<td>172.01%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>9.79%</td>
<td>9.97%</td>
<td>-48.65%</td>
<td>-42.41%</td>
<td></td>
</tr>
</tbody>
</table>

4.8 MetaCapitalism

To examines the MetaCapitalism: the e-business revolution and the design of 21st century companies and markets and its role of efficiency changes to capital, technology and labour in the private and public sectors, and their overall impact on global financial markets.

MetaCapitalism Equation

The MetaCapitalism equation is used as a means of reducing the strategy to a measurable index. The core tenets of MetaCapitalism are de capitalisation, outsourcing and downsizing and these can be measured by PP&E, NWC and NOE (Means & Schneider, 2000). Measure a firm’s level of MetaCapitalisation by calculating its composite change value over time, based on:
\[
\frac{NWC + PP \& E + NOE + R \& D}{TA}
\]

This equation and corresponding ratios, were taken to indicate the level of MetaCapitalisation because they precisely represent the main tenets of the strategy-decapitalisation (ie: Net Working Capital or NWC), selling of physical assets (Plant Property and Equipment or PPE) and reduction in the number of employees through downsizing and outsourcing (Number of Employees or NOE). Due to a lack of available information, the analysis on the NOE has been excluded.

**Calculation of indices and share price**

Evidence from Means and Schneider (2000) has shown that the share price is the main indicator of MetaCapitalism success. The share price of energy companies has been collected as the measure of company performance. Share price data was collected from online sources on the yearly basis from the 1989 to 2007. The percentage change of the company’s index was calculated from one year to the next year.

Then linear regression and correlation has been used to analyse the relationship between the MetaCapitalism indices and the share price of the company. The individual trend among them include NWC change, PP & E change, TA change, NWC/TA change, PP & E /TA change, NWC +PP&E/TA change for the same time to see whether the trend that is the same with the ASX 200 trends.
The following tables are the cumulative NWC Change, PP & E Change, TA Change, NWC/TA Change, PP & E /TA Change, NWC +PP&E/TA Change for the listed and delisted companies.

4.9 Table: the cumulative change rate of MetaC – NWC for the listed and delisted companies

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<tr>
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</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>-9861.94%</td>
<td>45819.80%</td>
<td>-13025.90%</td>
<td>-9239.70%</td>
<td>-23922.78%</td>
<td>-26723.59%</td>
<td>-58005.15%</td>
<td>-14050.29%</td>
<td>610.18%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>-6735.34%</td>
<td>-2405.13%</td>
<td>-1573.72%</td>
<td>243.83%</td>
<td>-971.07%</td>
<td>83.42%</td>
<td>168.61%</td>
<td>3401.42%</td>
<td>-2082.93%</td>
</tr>
<tr>
<td>Listed Com</td>
<td>52041.73%</td>
<td>-6434.89%</td>
<td>-87809.89%</td>
<td>-22672.68%</td>
<td>-4373.00%</td>
<td>-1554.19%</td>
<td>-207559.96%</td>
<td>-11653.08%</td>
<td>-4164.34%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>-474.92%</td>
<td>2051.69%</td>
<td>-25193.61%</td>
<td>-8737.77%</td>
<td>-426.54%</td>
<td>4794.15%</td>
<td>-2730.58%</td>
<td>-8154.75%</td>
<td>-498.00%</td>
</tr>
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</table>

4.10 Table: the cumulative change rate of MetaC - PP&E for the listed and delisted companies

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<tbody>
<tr>
<td>Listed Com</td>
<td>-1363.74%</td>
<td>-7608.58%</td>
<td>-87809.89%</td>
<td>-22672.68%</td>
<td>-4373.00%</td>
<td>-1554.19%</td>
<td>-207559.96%</td>
<td>-11653.08%</td>
<td>-4164.34%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>135.79%</td>
<td>-98.57%</td>
<td>216.87%</td>
<td>190.99%</td>
<td>36.07%</td>
<td>100.65%</td>
<td>-5.47%</td>
<td>357.33%</td>
<td>-2838.82%</td>
</tr>
<tr>
<td>Listed Com</td>
<td>288.91%</td>
<td>-56539.66%</td>
<td>-85332.85%</td>
<td>-7245.66%</td>
<td>-7711.50%</td>
<td>-8870.35%</td>
<td>-132366.91%</td>
<td>-33480.78%</td>
<td>-55679.73%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>54.97%</td>
<td>251.02%</td>
<td>293.00%</td>
<td>82.91%</td>
<td>-170.79%</td>
<td>456.13%</td>
<td>405.62%</td>
<td>134.19%</td>
<td></td>
</tr>
</tbody>
</table>

4.11 Table: the cumulative change rate of MetaC – TA for the listed and delisted companies

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>306.53%</td>
<td>-269.10%</td>
<td>844.89%</td>
<td>370.11%</td>
<td>7813.53%</td>
<td>1620.07%</td>
<td>2329.28%</td>
<td>3632.87%</td>
<td>3095.22%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>-15.60%</td>
<td>17712.23%</td>
<td>2943.80%</td>
<td>459.94%</td>
<td>64.90%</td>
<td>-22.23%</td>
<td>256.08%</td>
<td>532.78%</td>
<td>-18.70%</td>
</tr>
<tr>
<td>Listed Com</td>
<td>1601.49%</td>
<td>37728.49%</td>
<td>2974.43%</td>
<td>1514.45%</td>
<td>3178.51%</td>
<td>4473.60%</td>
<td>27418.29%</td>
<td>20023.01%</td>
<td>-4769.44%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>57.36%</td>
<td>205.87%</td>
<td>165.62%</td>
<td>-39.75%</td>
<td>69.68%</td>
<td>313.37%</td>
<td>215.59%</td>
<td>-423.51%</td>
<td>-500.00%</td>
</tr>
</tbody>
</table>

4.12 Table: the cumulative change rate of MetaC – NWC/TA for the listed and delisted companies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com</td>
<td>-5499.91%</td>
<td>31741.86%</td>
<td>-7180.41%</td>
<td>9658.46%</td>
<td>-2689.94%</td>
<td>24391.69%</td>
<td>-19126.42%</td>
<td>-9124.39%</td>
<td>1890.20%</td>
</tr>
<tr>
<td>Delisted Com</td>
<td>-3743.16%</td>
<td>-5637.47%</td>
<td>-802.82%</td>
<td>-103.54%</td>
<td>-1008.30%</td>
<td>98.61%</td>
<td>-45.95%</td>
<td>1064.77%</td>
<td>-2075.22%</td>
</tr>
</tbody>
</table>
4.13 Table: the cumulative change rate of MetaC – PP&E/TA for the listed and delisted companies

<table>
<thead>
<tr>
<th>Year</th>
<th>Listed Com</th>
<th>Delisted Com</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-1999</td>
<td>25044.01%</td>
<td>-404.16%</td>
</tr>
<tr>
<td>1999-2000</td>
<td>-1456.15%</td>
<td>1244.29%</td>
</tr>
<tr>
<td>2000-2001</td>
<td>-4016.64%</td>
<td>-12903.69%</td>
</tr>
<tr>
<td>2001-2002</td>
<td>-3634.68%</td>
<td>-9616.88%</td>
</tr>
<tr>
<td>2002-2003</td>
<td>-4125.30%</td>
<td>-363.57%</td>
</tr>
<tr>
<td>2003-2004</td>
<td>-11500.96%</td>
<td>686.05%</td>
</tr>
<tr>
<td>2004-2005</td>
<td>-320768.04%</td>
<td>-2443.87%</td>
</tr>
<tr>
<td>2005-2006</td>
<td>25162.13%</td>
<td>-5021.68%</td>
</tr>
<tr>
<td>2006-2007</td>
<td>-11209.26%</td>
<td>-500.00%</td>
</tr>
</tbody>
</table>

4.14 Table: the cumulative change rate of MetaC – (NWC+PP&E)/TA for the listed and delisted companies

<table>
<thead>
<tr>
<th>Year</th>
<th>Listed Com</th>
<th>Delisted Com</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989-1990</td>
<td>1076.19%</td>
<td>972.96%</td>
</tr>
<tr>
<td>1990-1991</td>
<td>5009.09%</td>
<td>222.59%</td>
</tr>
<tr>
<td>1991-1992</td>
<td>12309.35%</td>
<td>103.44%</td>
</tr>
<tr>
<td>1992-1993</td>
<td>2085.20%</td>
<td>54.52%</td>
</tr>
<tr>
<td>1993-1994</td>
<td>2488.51%</td>
<td>17.51%</td>
</tr>
<tr>
<td>1994-1995</td>
<td>2701.76%</td>
<td>191.19%</td>
</tr>
<tr>
<td>1995-1996</td>
<td>18958.02%</td>
<td>-103.63%</td>
</tr>
<tr>
<td>1996-1997</td>
<td>2767912.55%</td>
<td>42263.41%</td>
</tr>
<tr>
<td>1997-1998</td>
<td>10.68%</td>
<td>-24.53%</td>
</tr>
</tbody>
</table>

4.9 Merger and Acquisition

CCI Holdings is the delisted company whereby Bureau Veritas Australia Pty Ltd acquired all the shares in the company in June 2007. Bureau Veritas Australia Pty Ltd has seen significant growth in the Pacific Zone region after this acquisition, which helped it to grow the Pacific Zone operations into a force of over 2000 employees, serving over 5000 clients across a network of over 40 offices. This acquisition also helped to expand the Pacific Zone service portfolio to lead international trade services for the mining and coal industries across Australia and New Zealand. The evidence shows that this acquisition was a very successful business activity. Therefore, CCI Holdings is
considered as a subject company and contrived to illustrate the guideline merger and acquisition of the market approach.

**Summary Description of CCI Holdings**

According to Australian companies’ information and details (2008), CCI Holdings was providing a range of services, including equipment monitoring, engineering, superintending and laboratory services to the coal industry and to other industries, such as oil and gas, steel, petrochemical and construction. Operations are conducted from a leased facility located in Sydney. As of the company’s fiscal year ended December 31, 2006, CCI Holdings reported operating and net income of $1.5 million and $2.7 million, respectively, on revenues of $59 million.

**Australian Economic Outlook**

Odell (2007) outlines that the Australian real GDP in 2006 increased at a 2.7% compared to 2005. Consumer price index (CPI) and producer price index (PPI) which are key indicators of inflation in the Australian economy remained steady between in 2005 and in 2006. Unemployment rates also slightly decreased during the same periods, and its unemployment is at a 28-year low at 4.1 per cent. This evidence indicates that the Australian economy has developed very well and the governments efficiently control the CPI and the unemployment rate index. The economic outlook for the Australia at the end of 2006 appeared to be optimistic for the CCI Holdings.

**Energy Industry Outlook**
Odell (2007) claims that the Australian energy sector has undergone significant change over the past twenty-five years and its growth in energy consumption has closely followed that in Australia’s total output or GDP trend. Australia is a major exporter and user of coal, the burning of which creates carbon dioxide. Consequently, in 2000 Australia was the fifth highest emitter of greenhouse gases per capita in the developed world when emissions from land clearing are not included. “Australia’s renewable energy industries cover numerous energy sources and scales of operation, and currently contribute about 5.9% of Australia’s total energy supply” (Haralambopoulos 2003, p. 49).

Fundamental Position of the Company

CCI Holdings was incorporated in 1997 and it is in a NSW based ASX listed company. The company’s primary line is to supply technical services to the Australian and international coal industries. The following will explain the company fundamental position.

History

CCI Holdings provides a range of services to the Australian and international coal industries. While the coal industry is the company major focus, the company’s services are utilised by a number of large industries such as oil and gas, steel, petrochemical and construction (CCI Holdings Limited, 2007).

CCI Holdings listed on the Australian Stock Exchange (ASX) in 1991, and has experienced rapid growth over the last ten years. The company has approximately 1700
shareholders who have enjoyed substantial dividends over the years. The company is old fashioned in that it is focused on earning profits, paying tax and rewarding shareholders (CCI Holdings Limited, 2007).

**Employees**

CCI Holdings employs more than 600 people world wide, many whom have worked for the company for more than ten years. The staff has a real interest in ensuring the continued success of CCI Holdings (CCI Holdings Limited, 2007).

CCI Holdings’ organisational structure remained the fixed pattern; the key management personnel consisted of (CCI Holdings Limited, 2007):

Mr Peter EJ Murray (Chairman, Director)

Mr David Butel (Director, CEO)

Mr Brian Milton (CFO)

Mr Sean G.S Hughes (Independent Director, Executive Director, Non Exec. Director)

Mr Robin Chenery (Independent Director, Non Exec. Director)

Mr Brendan Thomas Birthistle (Independent Director, Non Exec. Director)

**Capitalisation and Ownership**

The major top five shareholders of CCI Holdings (as at 21 February 2007) are (CCI Holdings Limited, 2007):

<table>
<thead>
<tr>
<th>Shareholder</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRALIAN LABORATORY SERVICES PTY LTD</td>
<td>21.52 %</td>
</tr>
<tr>
<td>IMPERIAL PACIFIC FUND MANAGERS PTY LTD</td>
<td>13.38 %</td>
</tr>
</tbody>
</table>
Dividend Policy

Dividends are generally paid to shareholders of CCI Holdings biannually. The shareholders may continue to take the full dividend in cash or may reinvest all or part of the dividend into further shares under the CCI Dividend Reinvestment Plan (CCI Holdings Limited, 2007).

Selected Market Data

We start to value CCI Holdings by using the guideline merger and acquisition method of the market approach. To establish a reasonable basis for comparison between the subject company and the selected guideline companies, market data was collected by the following criteria (Pratt, 2001, pp191):

- Similar business description or market;
- Revenues between $ 1 million and $750 million;
- Positive operating earnings for the latest reported fiscal year-end;
- Positive cash flow for the latest reported fiscal year-end; and
- Business located in the Australia,

The five companies were selected by the criteria of selected guideline companies, and the following is brief description of each selected guideline transactions:
1. Magellan Petroleum Australian Limited (MAG)

Magellan Petroleum Australian Limited delisted on 3 July 2006. Magellan Petroleum Corporation acquired Magellan Petroleum Australian Limited and it was successful with an offer of 7.5 Magellan Petroleum Corporation shares and $1.00 cash for every 10 Magellan Petroleum Australian Limited shares (Magellan Petroleum Australian Limited, 2008).

Magellan Petroleum Australian Limited engages in the sale of oil and gas and exploration and development of oil and gas reserves. In addition, it holds interest in various oil and gas properties in New Zealand and the United Kingdom. The company was founded in 1957 and is based in Hartford, Connecticut (Magellan Petroleum Australian Limited, 2008).

2. Excel Coal Limited (EXL)

Peabody Energy Corporation acquired all of the shares in Excel for $9.50 per share on 11 April 2006. Excel Coal Limited invests in and manages coalmines in New South Wales and Queensland and is based in Sydney, Australia. It produces a diverse range of products including thermal coal, hard coking coal, semi-hard coking coal and coke, most of which is sold under contract to major customers in both the export and domestic markets. The company holds interests in the production of metallurgical coke and industrial minerals and holds certain other mining related investments (Excel Coal Limited, 2008).
3. Oil Company of Australia Limited (OCA)

Origin Energy Limited was successful with a cash offer of $4.25 cash per share compulsory acquired Oil Company of Australia Limited (Oil Company of Australia Limited, 2008).

4. Novus Petroleum Limited (NVS)

Medco Energy (Australia) Pty Ltd was successful with a cash offer of $1.90 per share compulsory acquired Novus Petroleum Limited on 13 July 2004. Novus Petroleum Limited is an Australian upstream petroleum company that focused on the exploration and the production of crude oil, natural gas and associated liquids. The Company’s production activities are carried out in four countries: Australia, United States, Oman and Indonesia. Active exploration is also undertaken in all these countries in addition to Pakistan and the United Arab Emirates (Novus Petroleum Limited, 2008).

5. NGC Holdings Limited (NGC – NZ)

Natural Gas Corporation Holdings Ltd. (NGC) is a New Zealand-based energy infrastructure and service company. The Company has interests in natural gas and liquefied petroleum gas (LPG) transportation, sales and energy marketing. NGC’s energy sales business is involved in the acquisition, processing and sales of natural gas and associated by-products, including LPG. It owns approximately 55,000 gas meters, and holds a market share of approximately 24% of total gas meter installations in New Zealand (NGC Holdings Limited, 2008).
CHAPTER FIVE
DATA ANALYSIS
5.1 Introduction
Simple linear regression and correlation have been conducted to analyse the relationship between the business evaluation methods and the share price. Correlation analysis is a group of techniques to measure the association between two variables. In addition, the linear regression graph and t-test were used to assess whether the means of two groups are statistically different from each other. The main purpose of using simple linear regression is to establish the strength of the link between the business evaluation methods and the share price.

5.2 Data analysis
Evidence from Hill (2001, p. 20) shows that regression analysis is a statistical tool for the investigation of relationships between variables. Usually, the investigator seeks to ascertain the causal effect of one variable upon another. This evidence shows that the dependent variables are those that are observed to change in response to the independent variables. The independent variables are those that are deliberately manipulated to invoke a change in the dependent variables.

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables given a value of the independent variable. The simple regression equation is given by (Linear Regression and Excel, 2008):

\[ Y = a + b \times X \]
Where $X$ is the independent variable, $Y$ is the dependent variable, $a$ is the intercept and $b$ is the slope of the line. For every fixed value of $X$, the $E’S$ are assumed to be independent random quantities normally distributed with mean zero.

In this study, the main purpose is to establish the strength of the link between the business evaluation methods and the share prices, so the simple regression analysis has been used to analyse their relationship. The business evaluation methods are the predicted value, so it is termed the dependent variable. The share prices are actual value and it is termed the independent variable. The following steps are to describe the regression index and graph, in order to explore the relationship between them.

5.3 The regression between business evaluation methods and share prices in the whole market

The purpose of this part is to analyse the regression between the different business evaluation methods and the share price in the whole market. CAPM, WACC, EVA, P/E ratio, DCF, MetaC – NWC, MetaC - PP&E, MetaC - TA, MetaC - NWC/TA, MetaC - PP&E/TA, MetaC (NWC+PP&E)/TA included in business evaluation methods.
5.3.1 CAPM

5.1 Figure: Regression between CAPM and Share Price in whole market

![Regression of CAPM on Share Price](image)

5.1 Table: Descriptive statistics and regression between CAPM and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0446</td>
<td>2.5102</td>
<td>0.4371</td>
<td>0.1911</td>
</tr>
</tbody>
</table>

T- stat  | Std - Error  | P Value | Observations (n) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8204</td>
<td>0.0245</td>
<td>0.0904</td>
<td>16</td>
</tr>
</tbody>
</table>

The regression equation \( Y=0.0446X+2.5102 \). Share price \( b \) equals to 0.0446, this indicates that for each unit increase in the share price change rate, average CAPM change rate increases by 0.0446. The constant term \( a \) represents the setup CAPM for each unit of share price change rate and is approximately 2.5 units of the share price change rate.
$R^2 = 19.11\%$ is moderately small. It tells us that 19.11\% of the variation in percentage of CAPM change rate is explained by the independent variable share price. Furthermore, it is implied that 81.89\% of the variation in the percentage of CAPM change rate remains unexplained. Overall, the model provides a poor fit.

$P$ Value with a value ranges from zero to one - the probability of observing a test statistic that is as extreme as or more extreme than currently observed assuming that the null hypothesis is true. Convention is that we accept a $P$ value of 0.05 or below as being statistically significant. $P$ Value 0.0904 is more than 0.05, so it is not accepted as statistically significant. The standard error 0.0245 balances the dispersion associated with the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship) \hspace{1cm} n=16

$H_1$: $\mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$

$\text{t}_{\text{crit}} = t_{\alpha/2, \ n-1 \text{df}}$

$\text{t}_{0.025, \ 15 \text{df}} = 2.131$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.131$ or if $t_{\text{calc}} < -2.131$

Do not reject $H_0$ if $-2.131 \leq t_{\text{calc}} \leq 2.131$

Test statistic: $t = \frac{\hat{b}}{s_b}$
Conclusion: Since $t_{calc} < t_{critical}$ (1.8204 < 2.131) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, CAPM change rate.

### WACC

#### 5.2 Figure: Regression between WACC and Share Price in whole market

![Regression of WACC on Share Price](image)

#### 5.2 Table: Descriptive statistics and regression between WACC and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y-Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0483</td>
<td>1.8827</td>
<td>0.4599</td>
<td>0.2116</td>
</tr>
<tr>
<td>T-stat</td>
<td>Std-Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>1.6372</td>
<td>0.0295</td>
<td>0.1324</td>
<td>12</td>
</tr>
</tbody>
</table>

The regression equation $Y=0.0483X+1.8827$. The constant term, $a$ represents the setup WACC for each unit of share price change rate and is approximately 1.8827 units of the
share price change rate. Share price $b$ equals to 0.0483; this means that for each unit increase in the share price change rate, average WACC change rate increases by 0.0483.

$R^2 = 21.16\%$ is moderately small. It tells us that 21.16% of the variation in percentage of WACC change rate is explained by the independent variable share price. Furthermore, it is implied that 78.84% of the variation in the percentage of WACC change rate remains unexplained. Overall, the model provides a poor fit. $P$ Value 0.1324 is more than 0.05, so it is not rejected as $H_0$ hypothesis test. The standard error 0.0295 balances the dispersion associated with the underlying population and the error associated with the sampling process.

Tests of Hypotheses

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship) $n=12$

$H_1$: $\mu \neq 0$ (there is a linear relationship) (two – tailed test)

Significance level: $\alpha = 0.05$

$t_{crit} = t_{\alpha/2, n-1df} = t_{0.025, 11df} = 2.201$

Decision rule: Reject $H_0$ if $t_{calc} > 2.201$ or if $t_{calc} < -2.201$

Do not reject $H_0$ if $-2.201 \leq t_{calc} \leq 2.201$

Test statistic: $t = \frac{\hat{b}}{s_b}$
Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ (1.6372 < 2.201) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, WACC change rate.

5.3.3 EVA

5.3 Table: Descriptive statistics and regression between EVA and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3E-0.5</td>
<td>0.3348</td>
<td>-0.0004</td>
<td>0</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-0.0012</td>
<td>0.0241</td>
<td>0.9991</td>
<td>11</td>
</tr>
</tbody>
</table>
The regression equation $Y=-3E-0.5X+0.3348$. The $b$ is very small $-3E-0.5$ and represents that each unit increase in the share price change rate, average EVA change rate decreases by $-3E-0.5$. The constant term $a$ represents the setup EVA for each unit of share price change rate and is approximately 0.3348 units of the share price change rate.

$R^2=0$, It tells us that 0% of the variation in percentage of EVA change rate is explained by the independent variable share price. Furthermore, it is implied that 100% of the variation in the percentage of EVA change rate remains unexplained. Overall, the model provides nothing. $P$ Value 0.9991 is nearly 100%, so it is not accepted as statistically significant. The standard error 0.0241 measured the dispersion associated with the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

$H_0: \mu =0$ (there is no linear relationship) \hspace{1cm} n=11

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$

$t_{crit} = t_{\alpha/2, n-1 df} = t_{0.025, 10 df} = 2.228$

Decision rule: Reject $H_0$ if $t_{calc} > 2.228$ or if $t_{calc} < -2.228$

Do not reject $H_0$ if $-2.228 \leq t_{calc} \leq 2.228$

Test statistic: $t = \frac{\hat{b}}{s_b}$
Conclusion: Since $t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} (-2.228 < -0.0012 < 2.228)$ $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest that share price change rate is linearly related to the dependent variable, EVA change rate.

5.3.4 P/E ratio

5.4 Figure: Regression between P/E ratio and Share Price in whole market

![Regression of P/E Ratio on Share Price](image)

5.4 Table: Descriptive statistics and regression between P/E ratio and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0396</td>
<td>-0.1345</td>
<td>0.6588</td>
<td>0.4339</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>3.3846</td>
<td>0.0117</td>
<td>0.0040</td>
<td>17</td>
</tr>
</tbody>
</table>
The regression equation Y=0.0396X–0.1345. Share price b equals to 0.0396, this means that each unit increase in the share price change rate, average P/E ratio change rate increases by 0.0396. The constant term a represents the setup P/E ratio for each unit of share price change rate and is approximately -0.1345 units of the share price change rate.

R² =43.39%, moderately large. It tells us that 43.39% of the variation in percentage of P/E ratio change rate is explained by the independent variable share price. Furthermore, it is implied that 46.61% of the variation in the percentage of P/E ratio change rate remains unexplained. Overall, the model provides a good fit. P Value 0.0040 is smaller than 0.05, so it is accepted as statistically significant.

Tests of Hypotheses

Hypotheses:
H₀: μ =0 (there is no linear relationship)  n=17
H₁: μ ≠0 (there is a linear relationship) (two – tailed test)

Significance level: α = 0.05

\[ t_{crit} = t_{\alpha/2, n-1df} = t_{0.025, 16df} = 2.120 \]

Decision rule: Reject H₀ if \( t_{calc} > 2.120 \) or if \( t_{calc} < -2.120 \)
Do not reject H₀ if \(-2.120 \leq t_{calc} \leq 2.120 \)

Test statistic: \[ t = \frac{\hat{b}}{s_{\hat{b}}} \]
\[ t = 3.3846 \]
Conclusion: Since $t_{\text{calc}} > t_{\text{critical}}$ (3.3846 > 2.120) $H_0$ was rejected, it can be concluded that there is sufficient sample evidence at the 5% level of significance to suggest that there is a stronger linear relationship between share price change rate and P/E ratio change rate.

5.4.1 DCF

5.5 Figure: Regression between DCF and Share Price in whole market

5.5 Table: Descriptive statistics and regression between DCF and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2251</td>
<td>-3.3351</td>
<td>0.6744</td>
<td>0.4549</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>2.7418</td>
<td>0.0821</td>
<td>0.0229</td>
<td>11</td>
</tr>
</tbody>
</table>
The regression equation $Y=0.2251X-3.3351$. $R^2=45.49\%$ is moderately large. It tells us that 45.49\% of the variation in percentage of DCF change rate is explained by the independent variable share price. Furthermore, it is implied that 54.51\% of the variation in the percentage of DCF change rate remains unexplained. Overall, the model provides a good fit.

Share price $b$ equals to 0.2251, this meaning is for each unit increase in the share price change rate, average DCF change rate increases by 0.2251. And DCF change rate trends are similar with the share price change rate. The constant term $a$ represents the setup DCF for each unit of share price change rate and is approximately -3.3351 units of the share price change rate.

Generally, $P$ Value with a value ranges from zero to one. $P$ Value 0.0229 is less than 0.05, so the hypothesis 1 null $\mu=0$ is rejected. The standard error 0.0821 explores the dispersion associated with the underlying population and the error associated with the sampling process.

Tests of Hypotheses

Hypotheses:

$H_0$: $\mu =0$ (there is no linear relationship) $n=11$

$H_1$: $\mu \neq 0$ (there is a linear relationship) (two – tailed test)

Significance level: $\alpha = 0.05$ $t_{crit} = t_{\alpha/2, n-1\text{df}}$
Decision rule: Reject $H_0$ if $t_{calc} > 2.228$ or if $t_{calc} < -2.228$

Do not reject $H_0$ if $-2.228 \leq t_{calc} \leq 2.228$

Test statistic: $t = \frac{\hat{b}}{s_b}$

$t = 2.7418$

Conclusion: Since $t_{calc} > t_{critical}$ ($2.7418 > 2.228$) $H_0$ was rejected, it can be concluded that there is sufficient sample evidence at the 5% level of significance to suggest that there is a linear relationship between share price change rate and DCF change rate.

5.4.2 MetaC – NWC

5.6 Figure: Regression between MetaC – NWC and Share Price in whole market
5.6 Table: Descriptive statistics and regression between MetaC – NWC and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-14.7230</td>
<td>-2.7673</td>
<td>-0.4659</td>
<td>0.2171</td>
</tr>
</tbody>
</table>

The regression equation $Y=-14.7230X-2.7673$. $R^2=21.77\%$ is moderately small. It tells us that 21.77% of the variation in percentage of MetaC–NWC change rate is explained by the independent variable share price. Furthermore, it is implied that 78.32% of the variation in the percentage of MetaC–NWC change rate remains unexplained. Overall, the model provides a poor fit.

Share price $b$ equals to -14.7230; it is clearly that each unit increases in the share price change rate, average MetaC – NWC change rate decreases $b$-14.7230. $P$ Value is 0.0513 and T-stat is -2.1061, so the test statistic has not rejected and the null hypothesis is true. The standard error 6.9907 is bigger figure and it has shown the dispersion associated with the underlying population and the error associated with the sampling process.

Tests of Hypotheses

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship)   \hspace{1cm} n=18

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$   \hspace{1cm} $t_{crit} = t_{\alpha/2, n-1df}$
Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$

Test statistic: 
\[
t = \frac{\hat{b}}{s_b}
\]

$t = -2.1061$

Conclusion: Since $-t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}}$ ($-2.110 < -2.1061 < 2.110$) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC–NWC change rate.
5.4.3 MetaC - PP&E

5.7 Figure: Regression between MetaC - PP&E and Share Price in whole market

5.7 Table: Descriptive statistics and regression between MetaC - PP&E and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25.1731</td>
<td>-166.3237</td>
<td>-0.5302</td>
<td>0.2817</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-2.5015</td>
<td>10.0631</td>
<td>0.0236</td>
<td>18</td>
</tr>
</tbody>
</table>

The regression equation $Y=-25.1731X-166.3237$. The constant term $a$ stands for the setup MetaC - PP&E for each unit of share price change rate and is approximately -166.3237 units of the share price change rate. The term $b$ equals to -25.1731, it can be seen that each unit increases in the share price change rate, average MetaC - PP&E change rate decreases by 25.1731.
\( R^2 = 28.17\% \) is moderately small. It tells us that 28.17\% of the variation in percentage of MetaC - PP&E change rate is explained by the independent variable share price. Furthermore, it is implied that 71.83\% of the variation in the percentage of MetaC - PP&E change rate remains unexplained. Overall, the model provides a poor fit. \( P \) Value 0.0236 is smaller than 0.05, but the t-stat is -2.5015, so it is not accepted as statistically significant.

**Tests of Hypotheses**

Hypotheses:

\[ H_0: \mu = 0 \text{ (there is no linear relationship) } \quad n=18 \]

\[ H_1: \mu \neq 0 \text{ (there is a linear relationship) } \quad \text{(two – tailed test)} \]

Significance level: \( \alpha = 0.05 \)

\[ t_{\text{crit}} = t_{\alpha/2, n-1\text{df}} = t_{0.025, 17\text{df}} = 2.110 \]

Decision rule: Reject \( H_0 \) if \( t_{\text{calc}} > 2.110 \) or if \( t_{\text{calc}} < -2.110 \)

Do not reject \( H_0 \) if \(-2.110 \leq t_{\text{calc}} \leq 2.110 \)

Test statistic: \[ t = \frac{b}{s_{\hat{b}}} \]

\[ t = -2.5015 \]

Conclusion: Since \( t_{\text{calc}} < t_{\text{critical}} (-2.5015 < -2.110) \) \( H_0 \) was not rejected, it can be concluded that there is sufficient evidence at the 5 \% level of significance to suggest that
share price change rate is negatively linearly related to the dependent variable, MetaC – PP&E change rate.

5.4.4 MetaC – TA

5.8 Figure: Regression between MetaC – TA and Share Price in whole market

The regression equation $Y = 1.5479X + 60.5675$. $R^2 = 0.0278$ is very small. It tells us that 2.78% of the variation in percentage of MetaC - TA change rate is explained by the independent variable share price. Furthermore, it is implied that 97.22% of the variation

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5479</td>
<td>60.5675</td>
<td>0.1666</td>
<td>0.0278</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>0.6758</td>
<td>2.2905</td>
<td>0.5088</td>
<td>18</td>
</tr>
</tbody>
</table>

The regression equation $Y = 1.5479X + 60.5675$. $R^2 = 0.0278$ is very small. It tells us that 2.78% of the variation in percentage of MetaC - TA change rate is explained by the independent variable share price. Furthermore, it is implied that 97.22% of the variation
in the percentage of MetaC - TA change rate remains unexplained. Overall, the model does not provide a good fit.

Share price $b$ equals to 1.5479, this means that each unit increases in the share price change rate, average MetaC - TA change rate increases by 1.5479. $P$ Value 0.5088 is much bigger than 0.05, so it is not accepted as statistically significant. The standard error 2.2905 measured the dispersion associated with the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship)  \hspace{1cm} n=18

$H_1$: $\mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$

$t_{crit} = t_{\alpha/2, n-1df} = t_{0.025, 17df} = 2.110$

Decision rule: Reject $H_0$ if $t_{calc} > 2.110$ or if $t_{calc} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{calc} \leq 2.110$

Test statistic: $t = \frac{\hat{b}}{s_{\hat{b}}}$

$t = 0.6758$
Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ (0.6758 < 2.110) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC - TA change rate.

5.4.5 MetaC - NWC/TA

5.9 Figure: Regression between MetaC - NWC/TA and Share Price in whole market

5.9 Table: Descriptive statistics and regression between MetaC - NWC/TA and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-18.5211</td>
<td>-65.0266</td>
<td>-0.2855</td>
<td>0.0815</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-1.1917</td>
<td>15.5414</td>
<td>0.2507</td>
<td>18</td>
</tr>
</tbody>
</table>
The regression equation $Y=-18.5211X-65.0266$. The term $b$ is a huge negative number -18.5211; this means that for each unit increase in the share price change rate, average MetaC – NWC/TA change rate decreases by -18.5211.

$R^2=8.15\%$ is very small. It tells us that 8.15% of the variation in percentage of MetaC – NWC/TA change rate is explained by the independent variable share price. Furthermore, it is implied that 91.85% of the variation in the percentage of MetaC – NWC/TA change rate remains unexplained. Overall, the model provides a poor fit.

$P$ Value is also a bigger number with 25.07% and it is much bigger than 0.05, so it is not accepted as statistically significant. The standard error 15.5414 stands for the dispersion associated with the underlying population and the error associated with the sampling process.

Tests of Hypotheses

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) \hspace{1cm} n=18

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{\text{crit}}=t_{\alpha/2, \, n-1\text{df}}=$

\[
t_{0.025, \, 17\text{df}}=2.110
\]

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$
Test statistic: \[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

\[ t = -1.1917 \]

Conclusion: Since \( t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} \ (-2.110 < -1.1917 < 2.110) \), \( H_0 \) was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – NWC/TA change rate.

5.4.6 MetaC - PP&E/TA

5.10 Figure: Regression between MetaC - PP&E/TA and Share Price in whole market

\[
\text{Regression of MetaC - PP&E/TA on Share Price} \\
y = -67.691x + 3392.7
\]
5.10 Table: Descriptive statistics and regression between MetaC - PP&E/TA and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-67.6909</td>
<td>3392.7441</td>
<td>-0.1143</td>
<td>0.0131</td>
</tr>
</tbody>
</table>

The regression equation \( Y = -69.691X + 3392.7441 \). The share price term \( b \) equals to -67.691 and it is negative huge number, it can be seen that each unit increase in the share price change rate, average MetaC – PP&E/TA change rate decreases by 69.691. The constant term \( a \) represents the setup MetaC – PP&E/TA change rate for each unit of share price change rate and is approximately 3392.7441 units of the share price change rate.

The standard error 147.1110 stands for the bigger error between the MetaC – PP&E/TA change rate and the share price change rate. \( R^2 = 0.131 \% \) is very small. It tells us that 1.31% of the variation in percentage of MetaC – PP&E/TA change rate is explained by the independent variable share price. Furthermore, it is implied that 98.69% of the variation in the percentage of MetaC – PP&E/TA change rate remains unexplained. Therefore, the model provides a poor fit.

**Tests of Hypotheses**

Hypotheses:

\[ H_0: \mu = 0 \text{ (there is no linear relationship)} \quad n=18 \]

\[ H_1: \mu \neq 0 \text{ (there is a linear relationship)} \quad \text{(two – tailed test)} \]
Significance level: $\alpha = 0.05$  

$t_{\text{crit}} = t_{\frac{\alpha}{2}, n-1\text{df}}$  

$t_{0.025, 17\text{df}} = 2.110$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$

Test statistic: $t = \frac{\hat{b}}{s_{\hat{b}}}$

$t = -0.4601$

Conclusion: Since $t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}}$ ($-2.110 < -0.4601 < 2.110$) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – PP&E/TA change rate.
5.3.11 MetaC (NWC+PP&E)/TA

5.11 Figure: Regression between MetaC (NWC+PP&E)/TA and Share Price in whole market

![Graph showing regression between MetaC and Share Price](image)

5.11 Table: Descriptive statistics and regression between MetaC (NWC+PP&E)/TA and Share Price in whole market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-24.3595</td>
<td>-5.0247</td>
<td>-0.3491</td>
<td>0.1218</td>
</tr>
</tbody>
</table>

The regression equation $Y = -24.3595X - 5.0247$. The term $b$ equals to -24.3595, it stands for each unit increases in the share price change rate, average MetaC (NWC+PP&E)/TA change rate decreases by 24.3595 units. The constant term $a$ represents the setup (NWC+PP&E)/TA change rate for each unit of share price change rate and is approximately -5.0247 units of the share price change rate.
R² = 12.18% is moderately small. It tells us that 12.18% of the variation in percentage of (NWC+PP&E)/TA change rate is explained by the independent variable share price. Furthermore, it is implied that 87.82% of the variation in the percentage of (NWC+PP&E)/TA change rate remains unexplained. Therefore, the model provides a poor fit. P Value is the value ranges from zero to one. P Value 15.57% is more than 0.05, so it is not accepted as statistically significant. The standard error 16.3496 is the bigger errors between the (NWC & PP&E)/TA change rate and share price change rate.

**Tests of Hypotheses**

Hypotheses:

H₀: μ = 0 (there is no linear relationship) \hspace{1cm} n=18
H₁: μ ≠ 0 (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: α = 0.05 \hspace{1cm} t_{crit} = t_{α/2, n-1df} =
\hspace{1cm} t_{0.025, 17df} = 2.110

Decision rule: Reject H₀ if \( t_{calc} > 2.110 \) or if \( t_{calc} < -2.110 \)

Do not reject H₀ if \(-2.110 \leq t_{calc} \leq 2.110 \)

Test statistic: \( t = \frac{\hat{b}}{s_b} \)
\( t = -1.4899 \)

Conclusion: Since \( t_{critical} \leq t_{calc} \leq t_{critical} \) (-2.110 <= -1.4899 < 2.110) H₀ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to
suggest that share price change rate is linearly related to the dependent variable, MetaC (NWC+PP&E)/TA change rate.

5.4 The regression between business evaluation methods and share prices in the listed market

The purpose of this part is to analyse the regression between the different business evaluation methods and the share price in the listed market. CAPM, WACC, EVA, P/E ratio, DCF, MetaC – NWC, MetaC - PP&E, MetaC - TA, MetaC - NWC/TA, MetaC - PP&E/TA, MetaC (NWC+PP&E)/TA included in business evaluation methods.

5.4.1 CAPM

5.12 Figure: Regression between CAPM and Share Price in listed market
5.12 Table: Descriptive statistics and regression between CAPM and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intersect (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0976</td>
<td>1.5762</td>
<td>0.7069</td>
<td>0.4998</td>
</tr>
<tr>
<td>T-stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>3.7266</td>
<td>0.02619</td>
<td>0.00219</td>
<td>16</td>
</tr>
</tbody>
</table>

The regression equation $Y=0.0976X+1.5762$. $R^2=49.98\%$ is moderately large. It tells us that 49.98% of the variation in percentage of CAPM change rate is explained by the independent variable share price. On the other hand, it is implied that 50.02% of the variation in the percentage of CAPM change rate remains unexplained. Therefore, the model provides a good fit.

The term $b$ equals to 0.0976, it is clear that each unit increases in the share price change rate, average CAPM change rate increases by 0.0976. The term $a$ is equal to 1.5762. $P$ Value 0.00219 is less than 0.05 and t-stat 3.7266 is more than 1.96, so it is accepted as statistically significant. The standard error 0.02619 has shown that there is not large difference in error between CAPM change rate and the share price change rate.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu=0$ (there is no linear relationship) $n=16$

$H_1$: $\mu \neq 0$ (there is a linear relationship) (two – tailed test)

Significance level: $\alpha = 0.05$  
$t_{crit} = t_{\alpha/2, n-1df}$
Decision rule: Reject $H_0$ if $t_{calc} > 2.131$ or if $t_{calc} < -2.131$

Do not reject $H_0$ if $-2.131 \leq t_{calc} \leq 2.131$

Test statistic: $t = \frac{\hat{b}}{s_{\hat{b}}}$

$t = 3.7266$

Conclusion: Since $t_{calc} > t_{critical} (3.7266 > 2.131)$ $H_0$ was rejected, it can be concluded that there is sufficient sample evidence at the 5% level of significance to suggest that there is a stronger linear relationship between share price change rate and CAPM change rate.

5.4.2 WACC

5.13 Figure: Regression between WACC and Share Price in listed market
5.13 Table: Descriptive statistics and regression between WACC and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0839</td>
<td>1.3491</td>
<td>0.7053</td>
<td>0.4974</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>3.1482</td>
<td>0.02665</td>
<td>0.0104</td>
<td>12</td>
</tr>
</tbody>
</table>

The regression equation $Y=0.0839X+1.3491$. $P$ Value 0.0104 is less than 0.05, and $T$-stat 3.1482 is much more than 1.96 so it is accepted as statistically significant. The standard error 0.02665 balances the dispersion associated with the underlying population and the error associated with the sampling process.

Share price $b$ equals to 0.0839. This means that each unit increases in the share price change rate, average WACC change rate increases by 0.0839 units. The constant term $a$ stands for the setup WACC for each unit of share price change rate and is approximately 1.3491 units of the share price change rate.

$R^2=49.74\%$ is moderately large. It tells us that 49.74 % of the variation in percentage of WACC change rate is explained by the independent variable share price change rate. Furthermore, it is implied that 50.26% of the variation in the percentage of WACC change rate remains unexplained. Therefore, the model provides a good fit.

**Tests of Hypotheses**

Hypotheses:
H₀: μ = 0 (there is no linear relationship)  
H₁: μ ≠ 0 (there is a linear relationship)  
Significance level: α = 0.05  

\[ t_{\text{crit}} = t_{\alpha/2, n-1 \text{df}} \]

\[ t_{0.025, 11 \text{df}} = 2.201 \]

Decision rule: Reject H₀ if \( t_{\text{calc}} > 2.201 \) or if \( t_{\text{calc}} < -2.201 \)  
Do not reject H₀ if \(-2.201 \leq t_{\text{calc}} \leq 2.201 \)

Test statistic:  
\[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

\[ t = 3.1482 \]

Conclusion: Since \( t_{\text{calc}} > t_{\text{critical}} \) (3.1482 > 2.201) H₀ was rejected, it can be concluded that there is sufficient sample evidence at the 5 % level of significance to suggest that there is a stronger linear relationship between share price change rate and WACC change rate.
5.4.3 EVA

5.14 Figure: Regression between EVA and Share Price in listed market

Regression between EVA and Share Price in listed market

Regression of EVA on Share Price

\[ y = 0.0057x + 0.1749 \]

5.14 Table: Descriptive statistics and regression between EVA and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00567</td>
<td>0.1749</td>
<td>0.1235</td>
<td>0.0153</td>
</tr>
</tbody>
</table>

T-stat | Std - Error | P Value | Observations |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3730</td>
<td>0.0152</td>
<td>0.7174</td>
<td>11</td>
</tr>
</tbody>
</table>

The regression equation \(Y=0.00567X+0.1749\). The term \(b\) equals to 0.00567, it is clear that each unit increase in the share price change rate, average EVA change rate increases by 0.00567.

\(R^2=1.53\%\) is very small. It can be seen that 1.53 % of the variation in percentage of EVA change rate is explained by the independent variable share price. Furthermore, it means
that 98.47 of the variation in the percentage of EVA change rate remain unexplained. Therefore, the model does not provide a good fit.

$P$ Value with 0.7174 is much more than 0.05, so it is not accepted as statistically significant. The standard error 0.0152 represents the dispersion associated with the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship) $\quad n=11$

$H_1$: $\mu \neq 0$ (there is a linear relationship) (two – tailed test)

Significance level: $\alpha = 0.05$ 

$t_{\text{crit}} = t_{\alpha/2, n-1\text{df}} = t_{0.025, 10\text{df}} = 2.228$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.228$ or if $t_{\text{calc}} < -2.228$

Do not reject $H_0$ if $-2.228 \leq t_{\text{calc}} \leq 2.228$

Test statistic: $t = \frac{\hat{b}}{s_{\hat{b}}}$

$t = 0.3730$

Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ (0.3730 < 2.228) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest
that share price change rate is linearly related to the dependent variable, EVA change rate.

### 5.4.4 P/E ratio

5.15 Figure: Regression between P/E ratio and Share Price in listed market

[Graph showing regression between P/E ratio and Share Price]

5.15 Table: Descriptive statistics and regression between P/E ratio and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0309</td>
<td>-0.0423</td>
<td>0.5322</td>
<td>0.2832</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>2.4331</td>
<td>0.0127</td>
<td>0.0278</td>
<td>17</td>
</tr>
</tbody>
</table>

The regression equation $Y = 0.0309X - 0.0423$. The term $b$ equals to 0.0309, it represents that each unit increases in the share price change rate, average P/E ratio change rate increases by 0.0309.
P Value 0.0278 is much less than 0.05 and T-stat 2.4331 much more than 1.96, so it is accepted as statistically significant. \( R^2 = 28.32\% \), moderately medium, It tells us that 28.32 % of the variation in percentage of P/E ratio change rate is explained by the independent variable share price.

In addition, it is implied that 71.68% of the variation in the percentage of P/E ratio change rate remains unexplained. Overall, the model provides a poor fit. The standard error 0.0127 stands for the existing error between the P/E ratio change rate and the share price change rate.

**Tests of Hypotheses**

Hypotheses:

\( H_0: \mu = 0 \) (there is no linear relationship) \quad n=17

\( H_1: \mu \neq 0 \) (there is a linear relationship) \quad (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\[ t_{crit} = t_{\alpha/2, n-1 df} = t_{0.025, 16 df} = 2.120 \]

Decision rule: Reject \( H_0 \) if \( t_{calc} > 2.120 \) or if \( t_{calc} < -2.120 \)

Do not reject \( H_0 \) if \(-2.120 \leq t_{calc} \leq 2.120 \)

Test statistic:

\[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

\[ t = 2.4331 \]
Conclusion: Since $t_{\text{calc}} > t_{\text{critical}}$ (2.4331 > 2.120) $H_0$ was not rejected, it can be concluded that there is sufficient sample evidence at the 5% level of significance to suggest that there is a linear relationship between share price change rate and P/E ratio change rate.

5.4.5 DCF

5.16 Figure: Regression between DCF and Share Price in listed market

5.16 Table: Descriptive statistics and regression between DCF and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y-Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0704</td>
<td>-0.1227</td>
<td>0.6208</td>
<td>0.3853</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>2.3704</td>
<td>0.0297</td>
<td>0.04154</td>
<td>11</td>
</tr>
</tbody>
</table>
The regression equation $Y=0.0704X–0.1227$. $R^2=38.53\%$ is moderately medium. It is clear that 38.53\% of the variation in percentage of DCF change rate is explained by the independent variable share price. On the other hand, it is implied that 61.47\% of the variation in the percentage of DCF change rate remains unexplained. Overall, the model provides a better fit.

$P$ Value 0.04154 is less than 0.05 and T-stat is 2.3704, it has shown that it is accepted as statistically significant. The standard error 0.0297 represents the dispersion associated with the underlying population and the error associated with the sampling process. Share price term $b$ equals to 0.0704; this means that each unit increases in the share price change rate, average DCF change rate increases by 0.0704.

Tests of Hypotheses

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) \hspace{1cm} n=11

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{crit} = t_{\alpha/2, \ n-1\ df}$

\[ t_{0.025, \ 10\ df} = 2.228 \]

Decision rule: Reject $H_0$ if $t_{calc} > 2.228$ or if $t_{calc} < -2.228$

Do not reject $H_0$ if $-2.228 \leq t_{calc} \leq 2.228$

Test statistic: \[ t = \frac{\hat{b}}{s_b} \]
t= 2.3704

Conclusion: Since \( t_{\text{calc}} > t_{\text{critical}} \) (2.3704 > 2.228) \( H_0 \) was rejected, it can be concluded that there is sufficient sample evidence at the 5 % level of significance to suggest that there is a stronger linear relationship between share price change rate and DCF change rate.

5.4.6 MetaC – NWC

5.17 Figure: Regression between MetaC - NWC and Share Price in listed market

![Regression of MetaC - NWC on Share Price](image)

\[ y = -14.89x - 23.43 \]

5.17 Table: Descriptive statistics and regression between MetaC - NWC and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-14.8902</td>
<td>-23.4304</td>
<td>-0.3562</td>
<td>0.1269</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-1.5248</td>
<td>9.7651</td>
<td>0.1468</td>
<td>18</td>
</tr>
</tbody>
</table>
The regression equation $Y=-14.8902X-23.4304$. The term $b$ equals to -14.8902, this means that each unit increases in the share price change rate, average MetaC - NWC change rate decreases by 14.8902. It has shown that the slope for share price is the big negative number. The share price increase or decrease, but the MetaC - NWC has the inverse trend.

$R^2 = 12.69\%$ is moderately small. It tells us that 12.69% of the variation in percentage of MetaC - NWC change rate is explained by the independent variable share price. In addition, it is implied that 87.31% of the variation in the percentage of MetaC - NWC change rate remains unexplained. Therefore, the model provides a poor fit.

Convention is that we accept a $P$ value of 0.05 or below as being statistically significant, but here $P$ Value 0.1468 is more than 0.05, so it is not accepted as statistically significant. The standard error 9.7651 stands for it is the bigger error existed between the MetaC – NWC change rate and the share price change rate.

**Tests of Hypotheses**

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) \hspace{1cm} n=18

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{crit} = t_{\alpha/2, n-1df}$

$\begin{align*}
& t_{0.025, 17df} = 2.110
\end{align*}$
Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$

Test statistic:
\[
\frac{\hat{b}}{s_b}
\]

\[t = -1.5248\]

Conclusion: Since $t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} (-2.110 < -1.5248 < 2.110)$ $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – NWC change rate.

5.4.7 MetaC - PP&E

5.18 Figure: Regression between MetaC - PP&E and Share Price in listed market
5.18 Table: Descriptive statistics and regression between MetaC - PP&E and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-15.4678</td>
<td>-311.2695</td>
<td>-0.2528</td>
<td>0.0639</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-1.0452</td>
<td>14.7987</td>
<td>0.3115</td>
<td>18</td>
</tr>
</tbody>
</table>

The regression equation $Y=-15.4678X -311.2695$. The MetaC - PP&E term $b$ of 15.4678 is the bigger slope for the share price, it means that each unit increases in the share price change rate, average MetaC - PP&E change rate decreases by -15.4678. And the MetaC - PP&E term $b$ has the bigger inverse relationship with the share price change rate.

$R^2=6.39\%$ is very small. It tells us that 6.39 % of the variation in percentage of MetaC - PP&E change rate is explained by the independent variable share price. Furthermore, it is implied that 6.39 % of the variation in the percentage of MetaC - PP&E change rate remains unexplained. Therefore, the model provides a poor fit.

Generally, $P$ value stands for the probability of observing a test statistic that is as extreme as or more extreme than currently observed assuming that the null hypothesis is true. $P$ Value 0.3115 is more than 0.05, so it is not accepted as statistically significant. The standard error 14.7987 represents the bigger error that existing between MetaC - PP&E change rate and the share price change rate.

Tests of Hypotheses
Hypotheses:

H₀: μ = 0 (there is no linear relationship)  \quad n = 18
H₁: μ ≠ 0 (there is a linear relationship)  \quad (two – tailed test)

Significance level: \( \alpha = 0.05 \)  \quad t_{\text{crit}} = t_{\alpha/2, n-1\text{df}} =
\quad t_{0.025, 17\text{df}} = 2.110

Decision rule: Reject H₀ if \( t_{\text{calc}} > 2.110 \) or if \( t_{\text{calc}} < -2.110 \)

Do not reject H₀ if \(-2.110 \leq t_{\text{calc}} \leq 2.110 \)

Test statistic:  \quad t = \frac{\hat{b}}{s_{\hat{b}}}
\quad t = -1.0452

Conclusion: Since \( t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} (-2.110 < -1.0452 < 2.110) \) H₀ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – PP&E change rate.
5.4.8 MetaC – TA

5.19 Figure: Regression between MetaC – TA and Share Price in listed market

\[ y = 2.3806x + 48.272 \]

5.19 Table: Descriptive statistics and regression between MetaC – TA and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3806</td>
<td>48.2719</td>
<td>0.2012</td>
<td>0.04047</td>
</tr>
</tbody>
</table>

T-stat: 0.8216
Std-Error: 2.8974
P Value: 0.4234
Observations: 18

The regression equation \( Y=2.3806X+48.2719 \). The constant term \( a \) 48.2719 represents the setup MetaC – TA for each unit of share price change rate and is approximately 48.27 units of the share price change rate. And the term \( b \) equals to 2.3806, it can be explained that each unit increase in the share price change rate, average MetaC – TA change rate increases by 2.3806.
$R^2 = 4.047\%$ is very small. It tells us that 4.047\% of the variation in percentage of MetaC – TA change rate is explained by the independent variable share price. Furthermore, it is implied that 95.953\% of the variation in the percentage of MetaC – TA change rate remains unexplained. It is clear that the model provides a poor fit.

Commonly, we accepted the $P$ value of 0.05 or below as being statistically significant. $P$ Value 0.4234 is much more than 0.05, so it is not accepted as statistically significant. The standard error 2.8974 stands for the dispersion associated with the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship) \hspace{1cm} n=18  
$H_1$: $\mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{crit} = t_{\alpha/2, \ n-1 df}$

$$t_{0.025, \ 17 df} = 2.110$$

Decision rule: Reject $H_0$ if $t_{calc} > 2.110$ or if $t_{calc} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{calc} \leq 2.110$

Test statistic:  

$$t = \frac{\hat{b}}{s_{\hat{b}}}$$

$t = 0.8216$
Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ (0.8216 < 2.110) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – TA change rate.

5.4.9 MetaC - NWC/TA

5.20 Figure: Regression between MetaC - NWC/TA and Share Price in listed market

Regression of MetaC - NWC/TA on Share Price

\[ y = -27.115x - 49.518 \]

5.20 Table: Descriptive statistics and regression between MetaC - NWC/TA and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y-Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-27.1154</td>
<td>-49.5175</td>
<td>-0.3258</td>
<td>0.1062</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-1.3786</td>
<td>19.6684</td>
<td>0.1869</td>
<td>18</td>
</tr>
</tbody>
</table>
The regression equation $Y=-27.1154X-49.5175$. Share price term $b$ equals to -27.1154, this is the bigger slope and it represents for each unit increase in the share price change rate, average MetaC - NWC/TA change rate decrease by -27.1154.

$R^2 = 10.62\%$ is moderately small. It seems likely that that 10.62 \% of the variation in percentage of MetaC - NWC/TA change rate is explained by the independent variable share price. Furthermore, it explains that 89.38\% of the variation in the percentage of MetaC - NWC/TA change rate remains unexplained. Therefore, the model provides a poor fit. $P$ Value is the probability of observing a test statistic that is as extreme as or more extreme than currently observed assuming that the null hypothesis is true. $P$ Value 0.1869 is more than 0.05, so it is not accepted as statistically significant.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship) \hspace{1cm} n=18

$H_1$: $\mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{\text{crit}} = t_{\alpha/2, n-1\text{df}}$

$t_{0.025, 17\text{df}} = 2.110$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$

Test statistic: $t = \frac{\hat{b}}{s_{\hat{b}}}$
Conclusion: Since \( t_{\text{calc}} \leq t_{\text{critical}} \leq -2.110 < -1.3786 \leq 2.110 \) \( H_0 \) was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – NWC/TA change rate.

5.4.10 MetaC - PP&E/TA

5.21 Figure: Regression between MetaC - PP&E/TA and Share Price in listed market

5.21 Table: Descriptive statistics and regression between MetaC - PP&E/TA and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-72.2466</td>
<td>3168.8629</td>
<td>-0.09608</td>
<td>0.00923</td>
</tr>
</tbody>
</table>

T-stat | Std - Error | P Value | Observations

| -0.3861 | 187.1189 | 0.7045 | 18 |
The regression equation \( Y = -72.2466X + 3168.8629 \). It can be seen that there is a larger figure for the constant term \( a \) of 3168.8629. Where the term \( b \) equals to -72.2466; this means that each unit increases in the share price change rate, average MetaC - PP&E/TA change rate decreases by -72.2466 units.

\( R^2 = 0.923 \% \). It seems like 0.923 % of the variation in percentage of MetaC - PP&E/TA change rate is explained by the independent variable share price. Furthermore, it is implied that 99.077 % of the variation in the percentage of MetaC - PP&E/TA change rate remains unexplained. \( P \) Value 0.7045 is much more than 0.05, so it is not accepted as statistically significant. On the other hand, there are very bigger standard error of 187.11 between the share price change rate and the MetaC - PP&E/TA change rate.

**Tests of Hypotheses**

Hypotheses:

- \( H_0: \mu = 0 \) (there is no linear relationship) \hspace{1cm} n=18
- \( H_1: \mu \neq 0 \) (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\[ t_{\text{crit}} = t_{\alpha/2, n-1df} = t_{0.025, 17df} = 2.110 \]

Decision rule: Reject \( H_0 \) if \( t_{\text{calc}} > 2.110 \) or if \( t_{\text{calc}} < -2.110 \)

Do not reject \( H_0 \) if \(-2.110 \leq t_{\text{calc}} \leq 2.110 \)

Test statistic:

\[ t = \frac{\hat{b}}{s_{\hat{b}}} \]
Conclusion: Since $t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} (-2.110 < -0.3861 < 2.110)$ $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – PP&E/TA change rate.

### 5.4.11 MetaC (NWC+PP&E)/TA

5.22 Figure: Regression between MetaC (NWC+PP&E)/TA and Share Price in listed market

![Regression of MetaC - (NWC+PP&E)/TA on Share Price](image)

5.22 Table: Descriptive statistics and regression between MetaC (NWC+PP&E)/TA and Share Price in listed market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-37.7563</td>
<td>-28.3007</td>
<td>-0.4096</td>
<td>0.1677</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T- stat</th>
<th>Std - Error</th>
<th>P Value</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.7957</td>
<td>21.0256</td>
<td>0.09145</td>
<td>18</td>
</tr>
</tbody>
</table>
The regression equation $Y = -37.7563X - 28.3007$. The term $b$ equals to $-37.7563$, it has shown that each unit increase in the share price change rate, average MetaC – (NWA+PP&E)/TA change rate decreases by 37.7563. The constant term $a$ has the bigger number as the same with the term $b$, and it represents when share price equals to 0, the started point of MetaC – (NWA+PP&E)/TA was -37.756 units.

$R^2 = 16.77\%$ is moderately small. It can be seen that 16.77% of the variation in percentage of MetaC – (NWA+PP&E)/TA change rate is explained by the independent variable share price. It is implied that 83.23% of the variation in the percentage of CAPM change rate remains unexplained. Therefore, the model provides a poor fit. $P$ Value 0.09145 is more than 0.05, so it is not accepted as statistically significant. The standard error 21.0256 stands for the dispersion associated with the underlying population and the error associated with the sampling process.

Tests of Hypotheses

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) \hspace{1cm} n=18

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{\text{crit}} = t_{\frac{\alpha}{2}, n-1\text{df}}$

$t_{0.025, 17\text{df}} = 2.110$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$
Test statistic: \[ t = \frac{\hat{b}}{s_b} \]

\[ t = -1.7957 \]

Conclusion: Since \( t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} \) (-2.110 < -1.7957 < 2.110) \( H_0 \) was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – (NWA+PP&E)/TA change rate.

5.5 The regression between business evaluation methods and share prices in the delisted market

The purpose of this part is to analyse the regression between the different business evaluation methods and the share price in the delisted market. CAPM, WACC, EVA, P/E ratio, DCF, MetaC – NWC, MetaC - PP&E, MetaC - TA, MetaC - NWC/TA, MetaC - PP&E/TA, MetaC (NWC+PP&E)/TA included in business evaluation methods.
5.5.1 CAPM

5.23 Figure: Regression between CAPM and Share Price in delisted market

![Regression of CAPM on Share Price](image)

5.23 Table: Descriptive statistics and regression between CAPM and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.00743</td>
<td>0.7343</td>
<td>-0.1804</td>
<td>0.03254</td>
</tr>
<tr>
<td>T-stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-0.6861</td>
<td>0.01083</td>
<td>0.5037</td>
<td>16</td>
</tr>
</tbody>
</table>

The regression equation $Y=-0.00743X+0.7343$. This model has the bigger $P$ value of 0.5037 and T-stat of -0.6861, so it is not accepted as statistically significant. But the standard error of 0.01083 is very small and it balances the dispersion associated with the underlying population and the error associated with the sampling process.

The term $b$ equals to -0.00743, which means that each unit increases in the share price change rate, average CAPM change rate decreases by 0.00743. The constant term $a$
represents the setup CAPM for each unit of share price change rate and is approximately 0.7343 units of the share price change rate.

\( R^2 = 3.25\% \) is very small. It has shown that 3.25 \% of the variation in percentage of CAPM change rate is explained by the independent variable share price. Furthermore, it is implied that 3.25 \% of the variation in the percentage of CAPM change rate remains unexplained. Therefore, the model provides a poor fit.

**Tests of Hypotheses**

Hypotheses:

\( H_0: \mu = 0 \) (there is no linear relationship) \hspace{1cm} n=16

\( H_1: \mu \neq 0 \) (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\[
t_{\text{crit}} = t_{\alpha/2, n-1}\text{df} = t_{0.025, 15}\text{df} = 2.131
\]

Decision rule: Reject \( H_0 \) if \( t_{\text{calc}} > 2.131 \) or if \( t_{\text{calc}} < -2.131 \)

Do not reject \( H_0 \) if \( -2.131 \leq t_{\text{calc}} \leq 2.131 \)

Test statistic:

\[
t = \frac{\hat{b}}{s_{\hat{b}}}
\]

\( t = -0.6861 \)
Conclusion: Since $-\text{t}_{\text{critical}} \leq t_{\text{calc}} \leq \text{t}_{\text{critical}}$ (-2.131 < -0.6861 < 2.131) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, CAPM change rate.

5.5.2 WACC

5.24 Figure: Regression between WACC and Share Price in delisted market

![Regression of WACC on Share Price](image)

5.24 Table: Descriptive statistics and regression between WACC and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.02496</td>
<td>0.5075</td>
<td>-0.2253</td>
<td>0.0507</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-0.7319</td>
<td>0.0341</td>
<td>0.4814</td>
<td>12</td>
</tr>
</tbody>
</table>
The regression equation $Y=-0.02496X+0.5075$. $R^2=5.07\%$ is very small. It can be seen that 5.07\% of the variation in percentage of WACC change rate is explained by the independent variable share price.

Furthermore, it is implied that 94.93\% of the variation in the percentage of WACC change rate remains unexplained. Therefore, the model provides a poor fit. $P$ Value 0.4814 is much larger than 0.05, so it is not accepted as statistically significant. The standard error 0.0341 stands for the smaller error between the share price change rate and the WACC change rate.

Share price term $b$ equals to 0.5075, it means that each unit increases in the share price change rate, average WACC change rate increases by 0.5075 units. The constant term $a$ represents the setup CAPM for each unit of share price change rate and is approximately 0.5 units of the share price change rate.

**Tests of Hypotheses**

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) $\quad n=12$

$H_1: \mu \neq 0$ (there is a linear relationship) $\quad$ (two – tailed test)

Significance level: $\alpha = 0.05$ $\quad t_{\text{crit}} = t_{\alpha/2, \, n-1\text{df}}$

$t_{0.025, \, 11\text{df}} = 2.201$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.201$ or if $t_{\text{calc}} < -2.201$
Do not reject $H_0$ if $-2.201 \leq t_{calc} \leq 2.201$

Test statistic: 
\[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

\[ t = -0.7319 \]

Conclusion: Since $t_{critical} \leq t_{calc} \leq t_{critical}$ ($-2.201 < -0.7319 < 2.201$) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, WACC change rate.

5.5.3 EVA

5.25 Figure: Regression between EVA and Share Price in delisted market

Regression of EVA on Share Price
\[ y = 0.0059x + 0.0981 \]
5.25 Table: Descriptive statistics and regression between EVA and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00587</td>
<td>0.098112</td>
<td>0.02813</td>
<td>0.00079</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>0.0844</td>
<td>0.06956</td>
<td>0.9346</td>
<td>11</td>
</tr>
</tbody>
</table>

The regression equation $Y=0.00587X+0.098112$. The term $b$ equals to 0.00587, it seems likely that each unit increases in the share price change rate, with the average EVA change rate increases by 0.00587. The term $a$ represents when $x$ (share price) equals to 0, the started point of EVA was 0.098112 percentages.

$R^2=0.079\%$, it represents 0.079 % of the variation in percentage of EVA change rate is explained by the independent variable share price. On the other hand, it is implied that 99.921% of the variation in the percentage of EVA change rate remains unexplained. Therefore, the model was not able to explain a correlation between the share price and the EVA.

$P$ is the probability of observing a test statistic that is as extreme as or more extreme than currently observed assuming that the null hypothesis is true. $P$ Value 0.9346 is much more than 0.05, so it is not accepted as statistically significant. The standard error of 0.06956 represents the errors between the predicted value and true value.
Hypotheses:

H₀: μ = 0 (there is no linear relationship) \hspace{1em} n=11
H₁: μ ≠ 0 (there is a linear relationship) (two – tailed test)

Significance level: α = 0.05

\[ t_{\text{crit}} = t_{\alpha/2, n-1\text{df}} \]
\[ t_{0.025, 10\text{df}} = 2.228 \]

Decision rule: Reject H₀ if \( t_{\text{calc}} > 2.228 \) or if \( t_{\text{calc}} < -2.228 \)
Do not reject H₀ if \(-2.228 \leq t_{\text{calc}} \leq 2.228 \)

Test statistic: \[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

\[ t = 0.0844 \]

Conclusion: Since \( t_{\text{calc}} < t_{\text{critical}} \) \( 0.0844 < 2.201 \) H₀ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest that share price change rate is linearly related to the dependent variable, EVA change rate.
5.5.4 P/E ratio

5.26 Figure: Regression between P/E ratio and Share Price in delisted mark

![Regression of P/E Ratio on Share Price](image)

5.26 Table: Descriptive statistics and regression between P/E ratio and Share Price in delisted mark

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0304</td>
<td>0.007808</td>
<td>0.64007</td>
<td>0.4097</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T- stat</th>
<th>Std - Error</th>
<th>P Value</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1020</td>
<td>0.0098</td>
<td>0.00757</td>
<td>16</td>
</tr>
</tbody>
</table>

The regression equation Y=0.0304X+0.007808. The term b equals to 0.0304, which means that each unit increase in the share price change rate, average P/E ratio change rate increases by 0.0304, where a positive relationship between the share price change rate and the P/E ratio change rate. The constant term a represents the setup P/E ratio for each unit of share price change rate and is approximately 0.007808 units of the share price change rate.
$R^2 = 40.97\%$ is moderately large. It tells us that 40.97\% of the variation in percentage of P/E ratio change rate is explained by the independent variable share price. Furthermore, it is implied that 59.03\% of the variation in the percentage of P/E ratio change rate remains unexplained, and the T-stat of 3.10 is much more than 1.96.

Convention is that we accept a $P$ value of 0.05 or below as being statistically significant. $P$ Value of 0.00757 is much less than 0.05 and the T-stat of 3.10 is much more than 1.96. Therefore it is accepted as statistically significant. The standard error 0.0098 balances the dispersion associated with the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) $n=16$

$H_1: \mu \neq 0$ (there is a linear relationship) (two – tailed test)

Significance level: $\alpha = 0.05$

$t_{\text{crit}} = t_{\alpha/2, n-1\text{df}}$

$t_{0.025, 15\text{df}} = 2.131$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.131$ or if $t_{\text{calc}} < -2.131$

Do not reject $H_0$ if $-2.131 \leq t_{\text{calc}} \leq 2.131$

Test statistic: $t = \frac{\hat{b}}{s_b}$

$t = 3.1020$
Conclusion: Since $t_{calc} > t_{critical}$ (3.1020 > 2.131) $H_0$ was rejected, it can be concluded that there is sufficient sample evidence at the 5 % level of significance to suggest that there is a stronger linear relationship between share price change rate and P/E ratio change rate.

5.5.5 DCF

5.27 Figure: Regression between DCF and Share Price in delisted market

![Regression of DCF on Share Price](image)

5.27 Table: Descriptive statistics and regression between DCF and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7171</td>
<td>-3.1677</td>
<td>0.6469</td>
<td>0.4184</td>
</tr>
<tr>
<td>T-stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>2.3991</td>
<td>0.2989</td>
<td>0.0432</td>
<td>10</td>
</tr>
</tbody>
</table>

The regression equation $Y=0.7171X-3.1677$. $P$ Value of 0.0432 is less than 0.05, and the T-stat of 2.3991 is more than 1.96, so it is accepted as statistically significant. The
standard error 0.2989 embodies dispersion between the underlying population and the error associated with the sampling process.

\[ R^2 = 41.84\% \] is moderately large. The results indicate that 41.84 \% of the variation in percentage of DCF change rate is explained by the independent variable share price. Furthermore, it tells us 58.16 \% of the variation in the percentage of DCF change rate remains unexplained.

The term \( b \) equals to 0.7171; it stands for each unit increases in the share price change rate, average DCF change rate increases by 0.7171. The constant term \( a \) represents the setup DCF for each unit of share price change rate and is approximately -3.1677 units of the share price change rate.

**Tests of Hypotheses**

Hypotheses:

- \( H_0: \mu = 0 \) (there is no linear relationship) \hspace{1cm} n=10
- \( H_1: \mu \neq 0 \) (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\[ t_{crit} = t_{\alpha/2, \ n-1\ df} \]

\[ t_{0.025, \ 9\ df} = 2.262 \]

Decision rule: Reject \( H_0 \) if \( t_{\text{calc}} > 2.262 \) or if \( t_{\text{calc}} < -2.262 \)

Do not reject \( H_0 \) if \(-2.262 \leq t_{\text{calc}} \leq 2.262 \)

Test statistic:

\[ t = \frac{\hat{b}}{\hat{s}_b} \]
Conclusion: Since $t_{\text{calc}} > t_{\text{critical}}$ ($2.3991 > 2.262$) $H_0$ was rejected, it can be concluded that there is sufficient sample evidence at the 5% level of significance to suggest that there is a linear relationship between share price change rate and DCF change rate.

5.5.6 MetaC – NWC

5.28 Figure: Regression between MetaC – NWC and Share Price in delisted market

5.28 Table: Descriptive statistics and regression between MetaC – NWC and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5920</td>
<td>-35.9983</td>
<td>0.2121</td>
<td>0.0449</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>0.8683</td>
<td>2.9853</td>
<td>0.3981</td>
<td>18</td>
</tr>
</tbody>
</table>
The regression equation \( Y = 2.5920X - 35.9983 \). The constant term \( a \) = -35.9983 represents when share price is equal to 0, the started point of MetaC – NWC was -35.9983. The term \( b \) equals to 0.0446, it stands for each unit increase in the share price change rate, average MetaC – NWC change rate increases by 2.5920.

\( R^2 = 4.49\% \) is very small. The results indicate that 4.49\% of the variation in percentage of MetaC – NWC change rate is explained by the independent variable share price. The results further indicate that 95.51\% of the variation in the percentage of MetaC – NWC change rate remains unexplained. Therefore, the model provides a poor fit.

Generally, we accept a \( P \) value of 0.05 or below as being statistically significant. \( P \) Value of 0.3981 is significantly more than 0.05, so it is not accepted as statistically significant. The standard error 2.9853 explains the dispersion between the underlying population and the error associated with the sampling process.

**Tests of Hypotheses**

Hypotheses:

\( H_0: \mu = 0 \) (there is no linear relationship) \hspace{1cm} n = 18

\( H_1: \mu \neq 0 \) (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\( t_{\text{crit}} = t_{\alpha/2, n-1\text{df}} = t_{0.025, 17\text{df}} = 2.110 \)

Decision rule: Reject \( H_0 \) if \( t_{\text{calc}} > 2.110 \) or if \( t_{\text{calc}} < -2.110 \)
Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$

Test statistic: \[ t = \frac{\hat{b}}{s_b} \]

$t = 0.8683$

Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ ($0.8683 < 2.110$) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – NWC change rate.

5.5.7 MetaC - PP&E

5.29 Figure: Regression between MetaC - PP&E and Share Price in delisted market

![Regression of MetaC - PP&E on Share Price](image)

\[ y = 0.4633x - 1.6474 \]
5.29 Table: Descriptive statistics and regression between MetaC - PP&E and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4633</td>
<td>-1.6474</td>
<td>0.3716</td>
<td>0.1381</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>1.5505</td>
<td>0.2988</td>
<td>0.1419</td>
<td>17</td>
</tr>
</tbody>
</table>

The regression equation \( Y=0.4633X–1.6474 \). The term \( b \) equals to 0.4633, and represents each unit increase in the share price change rate, with an average MetaC - PP&E change rate increase by 0.4633. The constant term \( a \) represents the setup MetaC - PP&E for each unit of share price change rate and is approximately -1.65 units of the share price change rate.

\( R^2 =13.81\% \) is moderately small. It seems as though 13.81 % with a variation in percentage of MetaC - PP&E change rate is explained by the independent variable share price. Furthermore, it is implied that 86.19 % of the variation in the percentage of MetaC - PP&E change rate remains unexplained. Therefore, the model provided a poor fit.

The standard error 0.2988 stands for the errors between the underlying population and the error associated with the sampling process. The accepted level of the \( P \) value of 0.05 or less is statistically significant. \( P \) Value 0.1419 is more than 0.05, so it is not accepted as statistically significant.

**Tests of Hypotheses**
Hypotheses:

H₀: μ = 0 (there is no linear relationship)       n=17
H₁: μ ≠ 0 (there is a linear relationship)          (two – tailed test)

Significance level: α = 0.05

\[ t_{\text{crit}} = t_{\alpha/2, \ n-1\text{df}} \]

\[ t_{0.025, \ 16\text{df}} = 2.120 \]

Decision rule: Reject H₀ if \( t_{\text{calc}} > 2.120 \) or if \( t_{\text{calc}} < -2.120 \)

Do not reject H₀ if \(-2.120 \leq t_{\text{calc}} \leq 2.120\)

Test statistic:

\[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

\[ t = 1.5505 \]

Conclusion: Since \( t_{\text{calc}} < t_{\text{critical}} \) (1.5505 < 2.120) \( H_0 \) was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – PP&E change rate.
5.5.8 MetaC – TA

5.30 Figure: Regression between MetaC – TA and Share Price in delisted market

\[ y = 1.1149x + 8.4934 \]

5.30 Table: Descriptive statistics and regression between MetaC – TA and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1149</td>
<td>8.4934</td>
<td>0.1449</td>
<td>0.021</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>0.5859</td>
<td>1.9029</td>
<td>0.5661</td>
<td>18</td>
</tr>
</tbody>
</table>

The regression equation \( Y=1.1149X+8.4934 \). R-squared equals to 2.1%, it tells us that 2.1% of the variation in percentage of MetaC - TA change rate is explained by the independent variable share price. Furthermore, it is implied that 97.9% of the variation in the percentage of CAPM change rate remains unexplained. Overall, the model provides a poor fit.
P Value 0.5661 is more than 0.05, so it is not accept statistically significant generally, the accepted the level is 0.05. The standard error represents that there are 1.9029 errors existed between the share price change rate and the MetaC - TA change.

Share price $b$ equals to 1.1149; it seems likely that each unit increases in the share price change rate, average MetaC - TA change rate increases by 1.1149. The constant term $a$ represents the setup MetaC - TA for each unit of share price change rate and is approximately 8.4934 units of the share price change rate.

Tests of Hypotheses

Hypotheses:

$H_0: \mu = 0$ (there is no linear relationship) \hspace{1cm} n=18

$H_1: \mu \neq 0$ (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: $\alpha = 0.05$ \hspace{1cm} $t_{\text{crit}} = t_{\alpha/2, n-1\text{df}}$

$t_{0.025, 17\text{df}} = 2.110$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$

Test statistic: \[ t = \frac{\hat{b}}{s_{\hat{b}}} \]

$t = 0.5859$

Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ (0.5859 < 2.110) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5 % level of significance to suggest
that share price change rate is linearly related to the dependent variable, MetaC – TA change rate.

5.5.9 MetaC - NWC/TA

5.31 Figure: Regression between MetaC - NWC/TA and Share Price in delisted market

![Regression of MetaC - NWC/TA on Share Price](image)

\[ y = 1.6021x - 28.438 \]

5.31 Table: Descriptive statistics and regression between MetaC - NWC/TA and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6021</td>
<td>-28.4383</td>
<td>0.2271</td>
<td>0.05157</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T- stat</th>
<th>Std - Error</th>
<th>P Value</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9326</td>
<td>1.7178</td>
<td>0.3649</td>
<td>18</td>
</tr>
</tbody>
</table>

The regression equation \( Y=1.6021X-28.4383 \). \( P \) Value is the probability of observing a test statistic. Convention is that we accept \( P \) value of 0.05 or below as being statistically significant. \( P \) Value of 0.3649 is more than 0.05, so it is not accepted as statistically
significant. The standard error of 1.7178 represents the relationship between the underlying population and the error associated with the sampling process.

R² of 5.157 % tells us that 5.157 % of the variation in percentage of MetaC –NWC/TA change rate is explained by the independent variable share price. And, it is implied that 94.943 % of the variation in the percentage of CAPM change rate remains unexplained. Overall, the model provides a poor fit.

Where share price term \( b \) equals to 1.6021 each unit increases in the share price change rate, average MetaC –NWC/TA change rate increases by 1.6021. The constant term \( a \) of -28.43 represents that when \( x \) (share price) is equal to 0, the started points of MetaC –NWC/TA is 2.51 units.

**Tests of Hypotheses**

Hypotheses:

H₀: \( \mu = 0 \) (there is no linear relationship) \( n=18 \)

H₁: \( \mu \neq 0 \) (there is a linear relationship) (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\[ t_{\text{crit}} = t_{\alpha/2, n-1df} \]

\[ t_{0.025, 17df} = 2.110 \]

Decision rule: Reject \( H₀ \) if \( t_{\text{calc}} > 2.110 \) or if \( t_{\text{calc}} < -2.110 \)

Do not reject \( H₀ \) if \(-2.110 \leq t_{\text{calc}} \leq 2.110 \)

Test statistic:

\[ t = \frac{\hat{b}}{s_{\hat{b}}} \]
Conclusion: Since $t_{\text{calc}} < t_{\text{critical}}$ ($0.9326 < 2.110$) $H_0$ was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – NWC/TA change rate.

5.5.10 MetaC - PP&E/TA

5.32 Figure: Regression between MetaC - PP&E/TA and Share Price in delisted market

5.32 Table: Descriptive statistics and regression between MetaC - PP&E/TA and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5387</td>
<td>28.7456</td>
<td>-0.0296</td>
<td>0.000875</td>
</tr>
<tr>
<td>T- stat</td>
<td>Std - Error</td>
<td>P Value</td>
<td>Observations</td>
</tr>
<tr>
<td>-0.1183</td>
<td>4.5515</td>
<td>0.9073</td>
<td>18</td>
</tr>
</tbody>
</table>
The regression equation \( Y = -0.5387X + 28.7456 \). The term \( b \) equals to -0.5387; it stands for each unit increase in the share price change rate, average MetaC – PP&E/TA change rate decreases by 0.5387. The \( a \) of appropriate 28.75 represents that when \( x \) (share price) equals to 0, the started point of MetaC – PP&E/TA change rate was 2.51 percentage.

\( R^2 \) of 0.0875 % tells us 0.0875 % of the variation in MetaC – PP&E/TA change rate is explained by the independent variable share price. Furthermore, it is implied that nearly 100 % of the variation in the percentage of MetaC – PP&E/TA change rate remains unexplained. Overall, the model is totally useless. \( P \) Value of 90.73% is far much more than the 0.05, this means that there exists 100% probability to say that neither hypothesis is true.

**Tests of Hypotheses**

Hypotheses:

H0: \( \mu = 0 \) (there is no linear relationship) \hspace{1cm} n=18

H1: \( \mu \neq 0 \) (there is a linear relationship) \hspace{1cm} (two – tailed test)

Significance level: \( \alpha = 0.05 \)

\[ t_{\text{crit}} = t_{\alpha/2, n-1\text{df}} = t_{0.025, 17\text{df}} = 2.110 \]

Decision rule: Reject H0 if \( t_{\text{calc}} > 2.110 \) or if \( t_{\text{calc}} < -2.110 \)

Do not reject H0 if \( -2.110 \leq t_{\text{calc}} \leq 2.110 \)

Test statistic: \( t = \frac{\hat{b}}{s_{\hat{b}}} \)
t\_calc = -0.1183 \\

Conclusion: Since \( t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} \) (-2.110 < -0.1183 < 2.110) \( H_0 \) was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – PP&E/TA change rate.

5.5.11 MetaC (NWC+PP&E)/TA

5.33 Figure: Regression between MetaC (NWC+PP&E)/TA and Share Price in delisted market

5.33 Table: Descriptive statistics and regression between MetaC (NWC+PP&E)/TA and Share Price in delisted market

<table>
<thead>
<tr>
<th>Slope (m)</th>
<th>Y- Intercept (b)</th>
<th>Correlation (r)</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.4141</td>
<td>34.5287</td>
<td>-0.08845</td>
<td>0.007826</td>
</tr>
</tbody>
</table>

\[
y = -2.4141x + 34.529
\]
The regression equation $Y = -2.4141X + 34.5287$. The term $b$ equals to -2.4141; it is seems that each unit increases in the share price change rate, average MetaC – (NWC+PP&E)/TA change rate decreases by 2.4141. The constant term $a$ represents the setup MetaC – (NWC+PP&E)/TA for each unit of share price change rate and is approximately 34.5 units of the share price change rate.

$R^2$ of 0.7826 % stands for only 0.7826 % of the variation in percentage of MetaC – (NWC+PP&E)/TA change rate is explained by the independent variable share price. Furthermore, it is implied that nearly 100 % of the variation in the percentage of MetaC – (NWC+PP&E)/TA change rate remains unexplained. Overall, the model proves nothing. $P$ Value with 72.71 % has shown that it is much more than 0.05 and identified that this model has no practice value.

**Tests of Hypotheses**

Hypotheses:

$H_0$: $\mu = 0$ (there is no linear relationship) $\quad n=18$

$H_1$: $\mu \neq 0$ (there is a linear relationship) $\quad$ (two – tailed test)

Significance level: $\alpha = 0.05$ $\quad t_{\text{crit}} = t_{\alpha/2, n-1\text{df}}$

$t_{0.025, 17\text{df}}=2.110$

Decision rule: Reject $H_0$ if $t_{\text{calc}} > 2.110$ or if $t_{\text{calc}} < -2.110$

Do not reject $H_0$ if $-2.110 \leq t_{\text{calc}} \leq 2.110$
Test statistic: \[ t = \frac{\hat{b}}{s_b} \]

\[ t = -0.3552 \]

Conclusion: Since \( t_{\text{critical}} \leq t_{\text{calc}} \leq t_{\text{critical}} (\{-2.110 < -0.3552 < 2.110\}) \), \( H_0 \) was not rejected, it can be concluded that there is insufficient evidence at the 5% level of significance to suggest that share price change rate is linearly related to the dependent variable, MetaC – (NWC+PP&E)/TA change rate.

5.5.12 Merger and Acquisition

5.5.12.1 Financial Statement Analysis

Audited financial statements reflect the company’s financial position and results of operations for each of the five years ending 31 December 2002-2006. This statement accurately reflects the operations and position of the company.

5.5.12.1.1 Balance Sheet

CCI Holdings assets decreased 16.4% between 2002 and 2006, dropping down from 37.5 million to 31.4 million. Current assets stand for the majority of the company’s assets, comprising 60% of Holdings asset balance at the end of 2006. Accounts receivable, the single largest asset account, decreased -49.53% to $389,146 in 2006 from $771029 in 2002, reflecting the company’s lack of revenue growth.

As of December 31, 2006, the company’s current liabilities and total liabilities amounted to 12 million and 21 million, and the percentage of current liability/total liability
increased from 50% to 57% between 2002 and 2006, respectively. The current accounts payable increased at 9.45% of the total revenue in 2006 from at 4.37% of the total revenue in 2002.

As of December 31, 2006, long term liabilities totaled 32.75%, compared with 42.30% in 2002. Consistent with the company’s business long term growth strategy, leverage was expected to keep the important component of the company’s capital structure. Shareholder’s equity had decreased modestly since 2002 at 12 million, totaling $9 million in 2006. And the equity represented 43% of the total liability, down from 52% as of December 31, 2006. (See 5.34 Table)

5.5.12.1.2 Income Statement

CCI Holdings year to year revenue growth increased from 5.29% in 2002 ($42 million) to 13% in 2006, ($59 million), reflecting increased revenue associated with the increased productivity. Operating expenses remained the stable relative to sales from 87.92% in 2002 to 87.64% in 2006. It can be seen that the operating expense represented the sales was keeping the high percentage.

There is uneven growth in CCI Holdings net profit margin over the five years ending 31 December 2006. In particular, CCI Holdings net profit margin increased at 4.5% in 2002, then it dramatically decreased at -16.5 % in 2003, -11.32% in 2004, -0.51% in 2005. Following on from this period, the growth margin increased at 3.22% in 2006. According to management’s growth and operating expectations for 2007 and 2008, the CCI
Holdings net profit margin was projected to approximate at 5% of sales in the following years. (See 5.35 Table)

5.34 Table: CCI Holdings Limited Main Items in Annual Balance Sheet

<table>
<thead>
<tr>
<th>Items/Years</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulated Depr</td>
<td>-8,018,053</td>
<td>-8,409,802</td>
<td>-8,576,069</td>
<td>-8,090,637</td>
<td>-9,029,804</td>
</tr>
<tr>
<td>Cash</td>
<td>1,763,362</td>
<td>1,396,794</td>
<td>3,198,654</td>
<td>1,578,821</td>
<td>6,384,208</td>
</tr>
<tr>
<td>Curr Accounts Payable</td>
<td>1,857,939</td>
<td>2,995,699</td>
<td>2,836,076</td>
<td>5,041,732</td>
<td>5,575,666</td>
</tr>
<tr>
<td>Current Inventories</td>
<td>1,730,181</td>
<td>2,093,795</td>
<td>1,618,026</td>
<td>1,370,257</td>
<td>1,431,633</td>
</tr>
<tr>
<td>Debtors</td>
<td>6,709,133</td>
<td>7,525,803</td>
<td>7,244,820</td>
<td>8,706,498</td>
<td>9,913,918</td>
</tr>
<tr>
<td>Goodwill</td>
<td>2,566,633</td>
<td>2,658,737</td>
<td>2,281,955</td>
<td>2,102,608</td>
<td>3,222,027</td>
</tr>
<tr>
<td>PP&amp;E</td>
<td>12,994,841</td>
<td>13,348,071</td>
<td>14,094,562</td>
<td>13,232,591</td>
<td>14,994,830</td>
</tr>
<tr>
<td>Receivables</td>
<td>771,029</td>
<td>1,547,896</td>
<td>1,320,543</td>
<td>59,513</td>
<td>389,146</td>
</tr>
<tr>
<td>Retained Profit</td>
<td>-3,599,932</td>
<td>-3,829,658</td>
<td>-8,854,596</td>
<td>-17,478,618</td>
<td>-15,396,720</td>
</tr>
<tr>
<td>Share Capital</td>
<td>16,596,846</td>
<td>16,770,165</td>
<td>20,042,878</td>
<td>24,575,770</td>
<td>24,858,175</td>
</tr>
<tr>
<td>Total Assets</td>
<td>37,560,834</td>
<td>38,239,160</td>
<td>35,443,077</td>
<td>27,169,885</td>
<td>31,400,985</td>
</tr>
<tr>
<td>Total CL</td>
<td>12,361,889</td>
<td>14,274,352</td>
<td>15,186,682</td>
<td>8,290,112</td>
<td>12,618,495</td>
</tr>
<tr>
<td>Total Curr Assets</td>
<td>11,507,159</td>
<td>11,934,602</td>
<td>14,001,050</td>
<td>14,575,976</td>
<td>18,835,270</td>
</tr>
<tr>
<td>Total Equity</td>
<td>12,996,914</td>
<td>12,940,507</td>
<td>11,868,247</td>
<td>7,717,935</td>
<td>9,442,938</td>
</tr>
<tr>
<td>Total Liability</td>
<td>24,563,920</td>
<td>25,298,653</td>
<td>23,574,830</td>
<td>19,451,950</td>
<td>21,958,047</td>
</tr>
<tr>
<td>Total NCA</td>
<td>26,053,675</td>
<td>26,304,558</td>
<td>21,442,027</td>
<td>12,593,909</td>
<td>12,565,715</td>
</tr>
</tbody>
</table>
### 5.35 Table: CCI Holdings Limited Main Items in Annual Profit & Loss

#### CCI Holdings Limited Main Items In Annual Profit & Loss

<table>
<thead>
<tr>
<th>Items/Years</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amortisation</td>
<td>-1,440,284</td>
<td>-1,717,485</td>
<td>-4,605,938</td>
<td>-4,038,849</td>
<td>-359,603</td>
</tr>
<tr>
<td>Depreciation</td>
<td>-876,903</td>
<td>-975,824</td>
<td>-807,992</td>
<td>-1,828,685</td>
<td>-1,288,672</td>
</tr>
<tr>
<td>EBIT</td>
<td>2,932,686</td>
<td>485,167</td>
<td>331,013</td>
<td>1,142,333</td>
<td>5,475,187</td>
</tr>
<tr>
<td>EBITDA</td>
<td>5,249,873</td>
<td>3,178,476</td>
<td>5,744,943</td>
<td>7,009,867</td>
<td>7,123,462</td>
</tr>
<tr>
<td>EBT Before Abs</td>
<td>1,742,225</td>
<td>-746,868</td>
<td>-1,649,460</td>
<td>-1,170,681</td>
<td>4,662,135</td>
</tr>
<tr>
<td>Interest Revenue</td>
<td>26,481</td>
<td>13,124</td>
<td>70,312</td>
<td>86,007</td>
<td>154,265</td>
</tr>
<tr>
<td>Net Abnormals</td>
<td>0</td>
<td>615,185</td>
<td>-3,450,792</td>
<td>-7,407,235</td>
<td>-955,031</td>
</tr>
<tr>
<td>Net Capital Profit</td>
<td>-4,641</td>
<td>39,052</td>
<td>72,000</td>
<td>-326,255</td>
<td>0</td>
</tr>
<tr>
<td>NPAT Before Abs</td>
<td>1,370,825</td>
<td>-844,908</td>
<td>-1,574,146</td>
<td>-1,216,787</td>
<td>3,664,400</td>
</tr>
<tr>
<td>NPAT Pre-cap Profits</td>
<td>1,375,466</td>
<td>-268,775</td>
<td>-5,096,938</td>
<td>-8,297,767</td>
<td>2,709,369</td>
</tr>
<tr>
<td>Operating Expense</td>
<td>-37,258,608</td>
<td>-41,577,964</td>
<td>-38,510,594</td>
<td>-45,205,008</td>
<td>-51,877,419</td>
</tr>
<tr>
<td>Operating Revenue</td>
<td>38,262,364</td>
<td>40,918,559</td>
<td>43,305,183</td>
<td>51,602,659</td>
<td>58,500,500</td>
</tr>
<tr>
<td>Other Revenue</td>
<td>4,246,117</td>
<td>3,837,881</td>
<td>950,354</td>
<td>612,216</td>
<td>500,381</td>
</tr>
<tr>
<td>Reported NPAT</td>
<td>1,370,825</td>
<td>-229,723</td>
<td>-5,024,938</td>
<td>-8,624,022</td>
<td>2,709,369</td>
</tr>
<tr>
<td>Share of Associates</td>
<td>67,051</td>
<td>30,796</td>
<td>-280,201</td>
<td>124,129</td>
<td>-102,481</td>
</tr>
<tr>
<td>Tax Expense</td>
<td>-371,400</td>
<td>-98,040</td>
<td>75,314</td>
<td>-46,106</td>
<td>-1,230,259</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>42,508,481</td>
<td>44,756,440</td>
<td>44,255,537</td>
<td>52,214,875</td>
<td>59,000,881</td>
</tr>
</tbody>
</table>

### 5.5.12.1.3 Ratio Analysis

Activity ratios indicated that CCI Holdings assets utilization was generally improving over the five year ended 2006. In particular accounts receivable turnover and average collection periods remained the stable during these periods. However, there are dramatically increase in the asset turnover and working capital turnover between 2002 and 2006. The reason for that is the company’s accounts receivable and working capital have significantly grew. Meanwhile, this phenomenon indicates that CCI Holdings was utilising its assets more effectively.
Profitability measures have shown that CCI Holdings return on total assets and return on equity significantly increased from 5.92%, 10.55% in 2002 to 13.83%, and 38.81% in 2006, respectively. This evidence has carefully shown that there is dramatic increase in the number of net income for CCI Holdings increasing from 1.3 million in 2002 to 2.7 million in 2006. On the other hand, there is the slight grow in the number of the net profit margin, from 3.22% in 2002 to 5.49% in 2006. This has indicated that there are the stronger competitions in the energy industry. (See 5.36 Table)

### 5.36 Table: CCI Holdings Limited Financial and Operating Ratio Analysis

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LIQUIDITY RATIO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Ratio</td>
<td>1.49</td>
<td>1.76</td>
<td>0.92</td>
<td>0.84</td>
<td>0.93</td>
</tr>
<tr>
<td>Quick Ratio</td>
<td>1.38</td>
<td>1.59</td>
<td>0.82</td>
<td>0.69</td>
<td>0.79</td>
</tr>
<tr>
<td>ACTIVITY RATIO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable Turover</td>
<td>16.95%</td>
<td>16.87%</td>
<td>16.73%</td>
<td>18.39%</td>
<td>17.53%</td>
</tr>
<tr>
<td>Average Collection Period</td>
<td>61.86</td>
<td>61.58</td>
<td>61.06</td>
<td>67.13</td>
<td>64.00</td>
</tr>
<tr>
<td>Asset Turover</td>
<td>186.30%</td>
<td>189.93%</td>
<td>122.18%</td>
<td>107.01%</td>
<td>101.87%</td>
</tr>
<tr>
<td>Working Capital Turnover</td>
<td>2597.31%</td>
<td>803.92%</td>
<td>1211.66%</td>
<td>1354.52%</td>
<td>740.54%</td>
</tr>
<tr>
<td>COVERAGE/LEVERAGE RATIO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Debt Total Assets</td>
<td>69.93%</td>
<td>71.59%</td>
<td>66.51%</td>
<td>66.16%</td>
<td>65.40%</td>
</tr>
<tr>
<td>Long-term Debt to Equity</td>
<td>139.83%</td>
<td>123.67%</td>
<td>118.23%</td>
<td>132.55%</td>
<td>101.80%</td>
</tr>
<tr>
<td>Net Interest Cover</td>
<td>5.66</td>
<td>0.48</td>
<td>0.16</td>
<td>0.39</td>
<td>2.41</td>
</tr>
<tr>
<td>PROFITABILITY RATIOS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOPLAT Margin</td>
<td>7.45%</td>
<td>8.61%</td>
<td>10.20%</td>
<td>4.24%</td>
<td>9.52%</td>
</tr>
<tr>
<td>Operating Profit Margin</td>
<td>9.36%</td>
<td>2.21%</td>
<td>0.76%</td>
<td>1.19%</td>
<td>7.66%</td>
</tr>
<tr>
<td>Net Profit Margin</td>
<td>4.59%</td>
<td>-16.52%</td>
<td>-11.35%</td>
<td>-0.51%</td>
<td>3.22%</td>
</tr>
<tr>
<td>Return on Total Assets</td>
<td>13.83%</td>
<td>1.70%</td>
<td>-0.39%</td>
<td>0.07%</td>
<td>5.92%</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>38.81%</td>
<td>-15.77%</td>
<td>-13.26%</td>
<td>-6.53%</td>
<td>10.55%</td>
</tr>
</tbody>
</table>

### 5.5.12.2 Peer Comparison

In addition to analysing CCI Holdings financial and operating trends over time, this thesis also considered the subject’s performance relative to other firms in the energy industry.
CCI Holdings financial condition and operating performance were compared to similarly sized energy industry companies. It can be seen that from the common size comparison of CCI Holdings and selected guideline transactions balance sheet, the subject company was similar to the average of selected guideline transactions. In addition, there was slight decrease at -16.40% in CCI Holdings total assets from 2002 to 2006, but the number of total assets for selected guideline transactions increased at 4.7% in the same periods. The number of total liability decreased by 10.7% for CCI Holdings and increased by 61% for selected guideline transactions.

A common size comparison of the subject’s income statements and selected companies income statements reveal that the number of operating expense have increased rapidly at 39% and 81% for the subject and selected companies from 2002 to 2006. In the addition, there was dramatic grow in the number of total revenue at 99% and slight increase at 38% for the selected company and subject company in the same periods.

An analysis of CCI Holdings financial and operating ratios relative to the selected companies indicated that there were similar current ratios for the subject company and selected companies at 1.49 and 1.76 in 2006, respectively. Compared to this situation, CCI Holding quick ratio was 1.38 and the selected guideline transactions were 1.59. The most notable differences between the subject and those firms were the net profit margin; CCI Holding was 3.22% in 2002 and slight increased to 4.59% in 2006. But, there were dramatic increase in the net profit ratio for the selected guideline transactions, growing
from 5.62% in 2002 to 18.91% in 2006. In particular, relative to guideline transaction data, CCI Holdings exhibited:

- Average receivable turnover;
- Average asset turnover;
- High working capital turnover;
- Average total debt;
- Below average operating and net profit margins;
- Below average return on total assets and equity; and
- Below cash flow to sales.

See 5.37 Table, 5.38 Table & 5.39 Table:

### 5.37 Table: Selected Guideline Transactions of Financial Ratio Comparison

<table>
<thead>
<tr>
<th>Fiscal Year Ended</th>
<th>MAG</th>
<th>EXL</th>
<th>OCA</th>
<th>NVS</th>
<th>NGC-NZ</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIQUIDITY RATIOS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Ratio</td>
<td>6.27</td>
<td>1.24</td>
<td>0.59</td>
<td>1.7</td>
<td>1.65</td>
<td>1.65</td>
</tr>
<tr>
<td>Quick Ratio</td>
<td>6.13</td>
<td>0.68</td>
<td>0.4</td>
<td>1.45</td>
<td>1.51</td>
<td>1.45</td>
</tr>
<tr>
<td>ACTIVITY RATIOS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acc Receivable Turnover</td>
<td>13.57%</td>
<td>16.40%</td>
<td>5.92%</td>
<td>9.34%</td>
<td>12.61%</td>
<td>12.61%</td>
</tr>
<tr>
<td>Ave Collection Periods</td>
<td>49.52</td>
<td>59.88</td>
<td>21.61</td>
<td>34.08</td>
<td>46.01</td>
<td>46.01</td>
</tr>
<tr>
<td>Asset Turnover</td>
<td>41.71%</td>
<td>53.77%</td>
<td>28.15%</td>
<td>32.08%</td>
<td>43.93%</td>
<td>41.71%</td>
</tr>
<tr>
<td>Working Capital Turnover</td>
<td>13.57%</td>
<td>59.23%</td>
<td>31.84%</td>
<td>44.57%</td>
<td>70.87%</td>
<td>44.57%</td>
</tr>
<tr>
<td>Asset/Equity Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Debt</td>
<td>15.70%</td>
<td>59.23%</td>
<td>31.84%</td>
<td>44.57%</td>
<td>70.87%</td>
<td>44.57%</td>
</tr>
<tr>
<td>Long Term Debt to Equity</td>
<td>76.33%</td>
<td>13.91%</td>
<td>49.64%</td>
<td>156.97%</td>
<td>62.99%</td>
<td></td>
</tr>
<tr>
<td>Net Interest Cover</td>
<td>10.73</td>
<td>33.76</td>
<td>2.73</td>
<td>4.27</td>
<td>7.5</td>
<td></td>
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<tr>
<td>PROFITABILITY RATIOS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOPLAT Margin</td>
<td>15.44%</td>
<td>22.09%</td>
<td>44.81%</td>
<td>35.01%</td>
<td>31.36%</td>
<td>31.36%</td>
</tr>
<tr>
<td>Operating Profit Margin</td>
<td>0.03%</td>
<td>31.46%</td>
<td>42.01%</td>
<td>20.63%</td>
<td>33.45%</td>
<td>31.46%</td>
</tr>
<tr>
<td>Net Profit Margin</td>
<td>4.86%</td>
<td>18.91%</td>
<td>30.44%</td>
<td>7.57%</td>
<td>17.14%</td>
<td>17.14%</td>
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<tr>
<td>ROA</td>
<td>2.19%</td>
<td>11.60%</td>
<td>8.84%</td>
<td>4.13%</td>
<td>10.50%</td>
<td>8.84%</td>
</tr>
<tr>
<td>ROE</td>
<td>2.59%</td>
<td>26.75%</td>
<td>12.61%</td>
<td>4.38%</td>
<td>28.38%</td>
<td>12.61%</td>
</tr>
</tbody>
</table>
### 5.38 Table: Ave Selected Guideline Transactions Main Items in Annual Balance Sheet

<table>
<thead>
<tr>
<th>Items/Years</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulated Depr</td>
<td>-58,411,500</td>
<td>-59,284,000</td>
<td>-55,195,333</td>
<td>-64,560,833</td>
<td>0</td>
</tr>
<tr>
<td>Cash</td>
<td>15,472,167</td>
<td>15,907,167</td>
<td>15,736,000</td>
<td>25,173,667</td>
<td>6,633,667</td>
</tr>
<tr>
<td>Curr Accounts Payable</td>
<td>6,611,167</td>
<td>14,076,167</td>
<td>11,900,667</td>
<td>18,132,000</td>
<td>17,713,000</td>
</tr>
<tr>
<td>Current Inventories</td>
<td>2,225,500</td>
<td>4,057,500</td>
<td>3,649,167</td>
<td>5,837,667</td>
<td>18,042,333</td>
</tr>
<tr>
<td>Goodwill</td>
<td>0</td>
<td>1,025,167</td>
<td>3,915,167</td>
<td>4,489,167</td>
<td>0</td>
</tr>
<tr>
<td>Other Debtors</td>
<td>5,860,667</td>
<td>5,199,667</td>
<td>1,941,833</td>
<td>1,272,167</td>
<td>0</td>
</tr>
<tr>
<td>Other NCA</td>
<td>14,025,833</td>
<td>57,583,500</td>
<td>9,818,000</td>
<td>8,094,500</td>
<td>644,500</td>
</tr>
<tr>
<td>PP&amp;E</td>
<td>165,735,000</td>
<td>280,549,500</td>
<td>229,340,333</td>
<td>89,791,167</td>
<td>89,791,167</td>
</tr>
<tr>
<td>Prepaid Expense</td>
<td>284,500</td>
<td>310,167</td>
<td>16,000</td>
<td>1,581,333</td>
<td>0</td>
</tr>
<tr>
<td>Retained Profit</td>
<td>20,280,333</td>
<td>5,221,833</td>
<td>-43,531,333</td>
<td>-35,222,333</td>
<td>1,854,000</td>
</tr>
<tr>
<td>Total Assets</td>
<td>151,325,000</td>
<td>160,531,333</td>
<td>238,439,000</td>
<td>295,606,167</td>
<td>160,531,333</td>
</tr>
<tr>
<td>Total CL</td>
<td>12,376,333</td>
<td>24,704,333</td>
<td>67,442,000</td>
<td>33,860,000</td>
<td>32,166,333</td>
</tr>
<tr>
<td>Total Curre Assets</td>
<td>29,495,667</td>
<td>45,510,333</td>
<td>42,480,167</td>
<td>57,575,667</td>
<td>39,969,167</td>
</tr>
<tr>
<td>Total Equity</td>
<td>92,483,500</td>
<td>227,614,167</td>
<td>91,936,833</td>
<td>116,631,667</td>
<td>65,454,500</td>
</tr>
<tr>
<td>Total Liability</td>
<td>58,841,500</td>
<td>100,480,167</td>
<td>146,502,167</td>
<td>178,974,500</td>
<td>95,076,833</td>
</tr>
<tr>
<td>Total NCA</td>
<td>203,048,889</td>
<td>470,973,333</td>
<td>326,598,056</td>
<td>396,717,500</td>
<td>200,936,944</td>
</tr>
</tbody>
</table>

### 5.39 Table: Ave Selected Guideline Transactions Main Items in Annual Profit & Loss Sheet

<table>
<thead>
<tr>
<th>Items/Years</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amortisation</td>
<td>-10,797,292</td>
<td>-23,871,250</td>
<td>-13,723,333</td>
<td>-12,855,000</td>
<td>0</td>
</tr>
<tr>
<td>Depreciation</td>
<td>38,362,292</td>
<td>46,860,417</td>
<td>49,456,667</td>
<td>73,365,000</td>
<td>135,763,333</td>
</tr>
<tr>
<td>EBIT</td>
<td>53,780,000</td>
<td>87,459,375</td>
<td>78,437,778</td>
<td>102,609,167</td>
<td>135,763,333</td>
</tr>
<tr>
<td>EBITDA</td>
<td>36,225,833</td>
<td>35,843,542</td>
<td>44,524,722</td>
<td>62,861,944</td>
<td>126,926,667</td>
</tr>
<tr>
<td>EBT Before Abs</td>
<td>36,225,833</td>
<td>35,843,542</td>
<td>44,524,722</td>
<td>62,861,944</td>
<td>126,926,667</td>
</tr>
<tr>
<td>Interest Revenue</td>
<td>1,144,167</td>
<td>415,625</td>
<td>2,079,444</td>
<td>1,983,333</td>
<td>3,820,833</td>
</tr>
<tr>
<td>NPAT Before Abs</td>
<td>28,369,167</td>
<td>22,273,125</td>
<td>31,505,833</td>
<td>49,646,389</td>
<td>81,718,333</td>
</tr>
<tr>
<td>NPAT Pre-cap Profits</td>
<td>35,000,208</td>
<td>18,808,542</td>
<td>44,290,000</td>
<td>62,830,278</td>
<td>126,926,667</td>
</tr>
<tr>
<td>Operating Expense</td>
<td>-162,994,375</td>
<td>-98,125,833</td>
<td>-116,029,444</td>
<td>-138,637,778</td>
<td>-296,342,500</td>
</tr>
<tr>
<td>Operating Revenue</td>
<td>1,144,167</td>
<td>415,625</td>
<td>2,079,444</td>
<td>1,983,333</td>
<td>3,820,833</td>
</tr>
<tr>
<td>Ordinary Dividends</td>
<td>-6,366,042</td>
<td>-12,882,292</td>
<td>-27,065,845</td>
<td>-648,611</td>
<td>-42,045,000</td>
</tr>
<tr>
<td>Other Revenue</td>
<td>9,242,500</td>
<td>17,766,250</td>
<td>33,471,111</td>
<td>21,109,722</td>
<td>505,000</td>
</tr>
<tr>
<td>Outside Equity</td>
<td>-335,833</td>
<td>-1,476,667</td>
<td>-4,815,000</td>
<td>-12,937,917</td>
<td>-7,423,333</td>
</tr>
<tr>
<td>Reported NPAT</td>
<td>6,650,208</td>
<td>39,303,542</td>
<td>31,505,833</td>
<td>49,646,389</td>
<td>81,718,333</td>
</tr>
<tr>
<td>Share of Asso Profit</td>
<td>0</td>
<td>0</td>
<td>2,927,500</td>
<td>2,454,583</td>
<td>369,167</td>
</tr>
<tr>
<td>Tax Expense</td>
<td>-7,772,708</td>
<td>-13,201,250</td>
<td>-9,808,889</td>
<td>-4,590,278</td>
<td>-37,785,000</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>216,774,375</td>
<td>185,585,208</td>
<td>194,467,222</td>
<td>241,246,944</td>
<td>432,105,833</td>
</tr>
</tbody>
</table>

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5.5.12.3 Identification and application of valuation multiples

In conducting the preceding comparative analysis of CCI Holdings to the selected market data we found that Bureau Veritas Australia Pty Ltd acquired all the shares in the company in June 2007. It can be seen that the merger and acquired company data are for controlling interest transactions. Therefore, historical financial data that we selected to value the company’s common equity should be based on the market value of invested capital (MVIC). Market multiples calculated for the purpose of pricing CCI Holdings MVIC included:

- MVIC/sales;
- MVIC/EBITDA;
- MVIC/EBIT;
- MVIC/GCF.

In addition to considering multiples based on historical financial data, we have used analysis estimates and revenue and expense projections discussed in the analysis of CCI Holdings financial statements to prepare projected fiscal 2006 income statements for the subject and the selected guideline transactions. It should also be stated that a comparison of CCI Holdings financial condition, operating performance and ratios with that of the selected guideline transactions were calculated using only end-of-year financial data. (See 5.40 Tables)

**MVIC Multiple Adjustments**

The following sections summarise the analysis and subsequent weighting of the selected MVIC multiples. There are organised according to the mature of the underlying data.
Regression analysis was conducted using EBITDA/sales as the independent variable and MVIC/sales as the dependent variable. The results of this model were lower, as evidenced by an $R^2$ to 46% and the t-stat is 1.6. Therefore, analysis of the median selected guideline transactions multiple has been rejected. Due to CCI Holding quite low return to sales and the very high operating expenses to the selected guideline transactions, we decided to adjusted the median CCI Holdings multiple downward by 15%. The resulting multiple received a weight of 25% due to the relatively low coefficient variance.

CCI Holdings EBITDA represented to the sales was very low that the median for the selected guideline companies, 12.35% versus 48.5%. It can be seen that CCI Holdings 2006 EBITDA has increased by 1.62%, but there were huge increase in the average of selected guideline transactions as 101.91%. Comparative financial analysis indicated that CCI Holdings had the lower asset utilization and operating profit than the average of the selected guideline companies. Therefore, we have decided to reduce the median MVIC/EBITDA multiples by 20%.

Given the relatively low coefficient variance demonstrated by the MVIC/EBITDA multiple, we will calculate this multiple a weight of 25%.

Similarly, CCI Holdings very low net profit margin, operating profit margin and the high risk of operating expenses make us to reduce the reported median MVIC/EBIT multiple by 20% as well.
The weight accorded the MVIC/EBIT multiple was 35% due to the relatively higher coefficient variance demonstrated by this multiple.

**MVIC/GCF**  
CCI Holdings had much lower GCF growth over the past five years than that of any of the selected guideline companies. In addition, the CCI Holdings year to year GCF growth had fallen off by 2006. Analysis of CCI Holdings GCF/sales relative to that of the median selected guideline companies revealed that the selected guideline companies produced double GCF/sales compared to CCI Holdings. Therefore, the MVIC/GCF has been reduced the MVIC/GCF by 25%.

The MVIC/GCF multiple was accorded a weight of 35% on the basis of its low coefficient variance. (See 5.41 Table)

### 5.40 Table: Selected Guideline Transaction Pricing Multiples

<table>
<thead>
<tr>
<th>Selected Guideline Transaction Pricing Multiples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Equity</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>MAG 59,115,000</td>
</tr>
<tr>
<td>L-T Debt 0</td>
</tr>
<tr>
<td>MVIC 59,115,000</td>
</tr>
<tr>
<td>Net Sales 31,558,000</td>
</tr>
<tr>
<td>EBITDA 8,937,000</td>
</tr>
<tr>
<td>EBIT 10,000,000</td>
</tr>
<tr>
<td>GCF 8,934,000</td>
</tr>
<tr>
<td>MVIC/Net Sales 1.87</td>
</tr>
<tr>
<td>MVIC/EBITDA 6.61</td>
</tr>
<tr>
<td>MVIC/EBIT 5.91</td>
</tr>
<tr>
<td>MVIC/GCF 6.62</td>
</tr>
</tbody>
</table>
5.41 Table: Guideline Market Data MVIC Multiple Adjustments

Guideline Market Data MVIC Multiple Adjustments

<table>
<thead>
<tr>
<th>Guideline Trans Data</th>
<th>Median Pricing</th>
<th>Adjustment</th>
<th>Adjusted Pric</th>
<th>Multiple</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVIC/Net Sales</td>
<td>1.87</td>
<td>-15.00%</td>
<td>1.59</td>
<td>25.00%</td>
<td></td>
</tr>
<tr>
<td>MVIC/EBITDA</td>
<td>4.10</td>
<td>-20.00%</td>
<td>3.28</td>
<td>25.00%</td>
<td></td>
</tr>
<tr>
<td>MVIC/EBIT</td>
<td>5.76</td>
<td>-20%</td>
<td>4.61</td>
<td>15.00%</td>
<td></td>
</tr>
<tr>
<td>MVIC/GCF</td>
<td>5.84</td>
<td>-25%</td>
<td>4.38</td>
<td>35.00%</td>
<td></td>
</tr>
</tbody>
</table>

5.42 Table: Guideline Transaction Methods Weighting and MVIC Calculation

Therefore, the company’ share price equals to common equity / outstanding

CCI Holdings share price = 30,394,868/132,556,491

= $0.22

The control value base on guideline transaction common equity $ 30,394,868

The CCI Holdings share price is $0.32 in the financial reports

The CCI Holdings common equity is $40,400,000 in the financial reports
5.6 SUMMARY:

5.43 Table: Estimates of the Methods

Estimates of the Methods

<table>
<thead>
<tr>
<th>Methods</th>
<th>Whole Market</th>
<th>Listed Market</th>
<th>Delisted Market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>correlation</td>
<td>t-stat</td>
</tr>
<tr>
<td>CAPM</td>
<td>1.8204</td>
<td>0.4371</td>
<td>3.7266</td>
</tr>
<tr>
<td>WCC</td>
<td>1.6372</td>
<td>0.4599</td>
<td>3.1482</td>
</tr>
<tr>
<td>EVA</td>
<td>-0.0012</td>
<td>-0.0004</td>
<td>0.373</td>
</tr>
<tr>
<td>PE Ratio</td>
<td>3.3846</td>
<td>0.6588</td>
<td>2.4331</td>
</tr>
<tr>
<td>DCF</td>
<td>2.7418</td>
<td>0.6744</td>
<td>2.3704</td>
</tr>
<tr>
<td>MetaC - NWC Change</td>
<td>-2.1061</td>
<td>-0.4659</td>
<td>-1.5248</td>
</tr>
<tr>
<td>MetaC - PP&amp;EChange</td>
<td>-2.5015</td>
<td>-0.5302</td>
<td>-1.0452</td>
</tr>
<tr>
<td>MetaC - TA Change</td>
<td>0.6758</td>
<td>0.1666</td>
<td>0.8216</td>
</tr>
<tr>
<td>MetaC - NWC/TA Change</td>
<td>-1.1917</td>
<td>-0.2855</td>
<td>-1.3786</td>
</tr>
<tr>
<td>MetaC - PP&amp;E/TA Change</td>
<td>-0.4601</td>
<td>-0.1143</td>
<td>-0.3861</td>
</tr>
<tr>
<td>MetaC (NWC+PP&amp;E)/TA Change</td>
<td>-1.4899</td>
<td>-0.3491</td>
<td>-1.7957</td>
</tr>
</tbody>
</table>

* At the 5 % level of significance

* Two – tailed test
CHAPTER SIX

CRITIQUE AND DISCUSSION
6.1 Introduction

This chapter will critique seven business valuation methods’ efficiency for the Australian energy sector. The chapter starts with a brief overview of seven business valuation methods, and provides the methods application processes and the results. The linear regression and t-test have been used to compare business valuation methods and the share price, in order to obtain which method is better for evaluation business performance in Australian energy sector.

6.2 CAPM

6.2.1 Overview of CAPM

Capital asset pricing model (CAPM) is a model of financial economics that is used to measure the rate of return of an asset in a well-diversified portfolio, and thus determining its value (Truong, 2008). Therefore, CAPM is a model used to determine the price of an asset.

CAPM was introduced by Jack Treynor, Willian Sharpe, John Lintner and Jan Mossin independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory (Truong, 2008). Under the capital asset pricing model, the price of an asset is determined in accordance to its reward-to-risk ratio, where the reward is the expected rate of return in the market and the risk is the asset’s non-diversifiable risk ($\beta$), also referred to as systematic risk, or market risk (Truong, 2008). The $\beta$ here is the
measure of the risks involved in a particular stock or portfolio in relation to the overall market risk.

6.2.2 Application of Method

Derived from this formula, the capital asset pricing model (CAPM) is expressed as:

\[ E(R_i) = R_f + \beta_i \cdot (E(R_m) - R_f) \]

Where:

- \( E(R_i) \) is the expected return on the capital asset
- \( R_f \) is the risk-free rate of interest in the economy (for example, the yield on Treasury bills or bonds).

Notes1: The risk-free interest rate is the interest rate that it is assumed can be obtained by investing in financial instruments with no default risk.

- \( \beta_i \) (the beta coefficient) the sensitivity of the asset returns to market returns, or

\[ \beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)} \]

- \( E(R_m) \) is the expected return of the market
- \( E(R_m) - R_f \) is sometimes known as the market premium or risk premium (the difference between the expected market rate of return and the risk-free rate of return).

In this model, the Australian All Ordinaries Index end of year close from 1989 to 2007 has been used for the expected market rate of return and its rate of return is usually measured by looking at the arithmetic average of the historical returns on a market portfolio.
According to research by Truong (2008), the risk-free rate can be represent by 20-year, 5-year, or 30-day treasury or bonds yield as of valuation data. Therefore, the Australian Government 10 yrs bonds rate end of year close from 1989 to 2007 (Year Book Australia, 2008) has been conducted for the risk free rate of return and it is usually the arithmetic average of historical risk free rates of return and not the current risk free rate of return.

6.2.3 Empirical Results

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables given a value of the independent variable. Regression analysis formula is:

\[ Y = a + b X \]

Where \( X \) is the independent variable (share price), \( Y \) is the dependent variable (CAPM), \( a \) is the intercept and \( b \) is the slope of the line. For every fixed value of \( X \), the \( E'S \) are assumed to be independent random quantities normally distributed with mean zero.

6.2.3.1 T – Test Results

The t-test was conducted to show whether the means of the share price and CAPM are statistically different from each other. This thesis selected the significant level at the 0.05 and two-tailed test in the whole market, listed market and delisted market to analyse the relationship between them.

6.1 Table: t- test for CAPM
<table>
<thead>
<tr>
<th>Methods</th>
<th>Whole Market</th>
<th>Listed Market</th>
<th>Delisted Market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>correlation</td>
<td>t-stat</td>
</tr>
<tr>
<td>CAPM</td>
<td>1.8204</td>
<td>0.4371</td>
<td>3.7266</td>
</tr>
</tbody>
</table>

It can be seen that CAPM is more highly associated with the share price in listed markets and weak correlation with share price in delisted markets.

### 6.2.4 Strength and Weakness of CAPM

Lvkovic (2007) identifies the following three strength of CAPM:

- CAPM is that it provides a precise and measurable definition of risk as applied to stocks;
- CAPM remains the most straight-forward and widely used quantitative tool for estimating the cost of equity capital; and
- CAPM is the idea that risk-return relation of every portfolio can be optimized to attain lowest risk for a specific level of return.

Lvkovic (2007) also gives some following weakness to CAPM:

- The model assumes that asset returns are normally distributed random variables. It is however frequently observed that returns in equity and other markets are not normally distributed. As a result, large swings occur in the market more frequently than the normal distribution assumption would expect;
- The model assumes that the variance of returns is an adequate measurement of risk. This might be justified under the assumption of normally distributed returns,
but for general return distributions other risk measures will likely reflect the investors’ preferences more adequately; and

- Model does not appear to adequately explain the variation in stock returns. Empirical studies show that low beta stocks may offer higher returns than the model would predict.

6.2.5 Empirical Analysis

6.2.5.1 Based on the market value

CAPM is used to determine a theoretically appropriate required rate of return of an asset, CAPM is expressed as: $E(R_i) = R_f + \beta_i (E(R_m) - R_f)$. Here, $R_f$ is the risk-free rate of interest in the economy, the Australian Government 10 yrs bonds rate end of year close from 1989 to 2007 has been conducted for the risk free rate of return. $E(R_m)$ is the expected return of the market, the Australian All Ordinaries Index end of year close from 1989 to 2007 has represented for the expected market rate of return $E(R_m) - R_f$ is sometimes known as the market premium or risk premium, it is the return in excess of the risk-free rate of return that an investment is expected to yield. An asset’s risk premium is a form of compensation for investors who tolerate the extra risk, compared to that of a risk-free asset in a given investment. The evidence shows that the CAPM model based on the market value rather than the book value, it can exactly measure the rate of return of an asset for the firms in the market. Therefore, CAPM is the higher associated with the share price in the listed market.
6.2.5.2 Beta Affects CAPM

According to CAPM, beta is the only relevant measure of a stock’s risk. A share’s beta factor is the measures of measure of its volatility in terms of market risk (Francis & Grout, 2000). The beta factor of the market as a whole is 1.0. Market risk makes market returns volatile and the beta factor is simply a yardstick against which the risk of other investments can be measured. Risk or uncertainty describes a situation where there is not first one possible outcome but array of potential returns. Risk is measured as the beta factor or B (Francis & Grout, 2000).

- The market as a whole has $B = 1$;
- Risk free security has a $B = 0$;
- A security with a $B < 1$ is lesser risky than average Market;
- A security with a $B > 1$ has risk above market; and
- A security with a $B < 0$ has inversely follows the market and its.

6.2.5.3 Low Beta and Negative Beta Affect on CAPM

From the calculated results, there is only one year negative beta -0.2587 (1997) in the listed companies and its average beta is 0.99 (excluded unusual 7.1158 in 1999). But, delisted companies have 11 years’ negative beta, -0.2991 (1992), -0.2086 (1994), -0.0050 (1995), -0.1678 (1996), -1.7642 (1997), -0.2503 (1998), -2.7375 (2001), -2.7545(2002), -1.1014(2003), -3.5075(2007) and its average beta is -0.77 (excluded unusual 6.5978 in 1999).
6.2 Table: The Listed and Delisted Company Beta

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com β</td>
<td>1.3630</td>
<td>0.7459</td>
<td>0.5594</td>
<td>0.6057</td>
<td>0.6561</td>
<td>-0.2587</td>
<td>3.2882</td>
<td>7.1158</td>
</tr>
<tr>
<td>Delisted Com β</td>
<td>-0.2991</td>
<td>0.2959</td>
<td>-0.2086</td>
<td>-0.0050</td>
<td>-0.1678</td>
<td>-1.7642</td>
<td>-0.2503</td>
<td>6.5978</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Com β</td>
<td>2.0938</td>
<td>1.1140</td>
<td>0.9645</td>
<td>0.4889</td>
<td>0.3086</td>
<td>0.9221</td>
<td>0.7330</td>
<td>1.3404</td>
</tr>
<tr>
<td>Delisted Com β</td>
<td>0.1128</td>
<td>-2.7375</td>
<td>-2.7545</td>
<td>-1.1014</td>
<td>-0.7670</td>
<td>0.8248</td>
<td>0.7377</td>
<td>-3.5075</td>
</tr>
</tbody>
</table>

It is clear that there is low beta (0.99) in the listed companies from 1989 to 2007. According to evidence by Richard (1995) has shown that in the period from 1931 through 1965 low beta stocks in the United States did better than the capital asset pricing model (CAPM) predicts while high beta stocks did worse and this pattern continued in subsequent years, at least through 1989. This evidence has shown that low beta is preferable to high beta in predicting a firm’s performance using CAPM model, because the low beta predicts the expected return rate better than the high beta predicts. Therefore, CAPM is more closely associated with the share price in the listed companies.

It can be seen that there is an average negative beta (-0.77) in the delisted companies from 1989 to 2007. Research by Larcker, Gordon & Pinches (1980), the well-documented negative correlation between index returns and volatility generates a strongly negative beta, but this negative beta can only explain a small portion of the negative variance risk premium. On the other hand, evidence by Santaularia (2006) details that a negative beta estimate implies that investors require a return from the companies, less than the yield on risk-free government bonds, which is clearly economically implausible. The evidence proves that the negative beta produces the inefficient role on the market,
which resulted in CAPM have a poor correlation with the share price in the delisted market.

6.2.5.4 Share Price Change Rate Affects Beta

The following is the share price change rate from 1989 to 2007, it is likely that delisted companies have experienced dramatically change rate during this periods, from -37.55% (1997-1998) to 235.4% (1991-1992). However, there are slight fluctuations in change rate in the listed companies, between -24.41% (1997-1998) and 58.86% (1992-1993). The beta is the average of 0.99 in the listed market and -0.77 in the delisted market. This evidence has carefully shown that the beta is more accurately affects the market risk under the moderate market condition; otherwise the beta is not able to measure the companies’ undertaking risk and making CAPM misleading under stronger fluctuated market.

6.3 Table: Share Price Change Rate for Listed and Delisted Company

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Lis Com</td>
<td>-17.40%</td>
<td>6.11%</td>
<td>12.45%</td>
<td>58.86%</td>
<td>7.01%</td>
<td>20.78%</td>
<td>31.55%</td>
<td>9.44%</td>
<td>-24.41%</td>
</tr>
<tr>
<td>Delis Com</td>
<td>-9.76%</td>
<td>62.70%</td>
<td>235.40%</td>
<td>22.40%</td>
<td>-18.02%</td>
<td>-25.12%</td>
<td>186.21%</td>
<td>24.50%</td>
<td>-37.55%</td>
</tr>
</tbody>
</table>

Therefore, CAPM model is more highly associated with share price in listed market and weak correlation with share price in delisted market. This is because the beta is the only relevant measure of a stock’s risk. The low beta and negative beta have an essential role in the CAPM.
6.3 WACC

6.3.1 Overview

The weighted average cost of capital is the rate that a company is expected to pay to finance its assets. WACC is the minimum return that a company must earn on existing asset base to satisfy its creditors, owners, and other providers of capital (Truong, Partington, & Peat, 2008). The most obvious instance in which to use WACC is when the objective is to value the entire capital structure of a company. WACC is especially appropriate for project selection in capital budgeting. The proportions of debt and equity that could be available to finance different kinds of project could be different and the cost of capital should be based on the specific investment (Pratt, 1998).

6.3.2 Application of Method

The traditional formula used to develop a WACC is (Hitchner, 2006, p.190):

\[
WACC = (K_e \times W_e) + (K_p \times W_p) + \left(\frac{K_{d/(1-t)}}{W_d}\right)
\]

Where:

- \(WACC\) = Weighted average cost of capital
- \(K_e\) = Cost of common equity capital
- \(W_e\) = Percentage of common equity in the capital structure, at market value
- \(K_p\) = Cost of preferred equity
- \(W_p\) = Percentage of preferred equity in the capital structure, at market value
- \(K_{d/(1-t)}\) = Cost of debt (pre tax)
- \(T\) = Tax Rate
- \(W_d\) = Percentage of debt in the capital structure, at market value
According to Weighted Average Cost of Capital (2002, p. 6), regulatory decisions in Australia have generally determined that the cost of equity is calculated using CAPM. Therefore, the CAPM has been used for the cost of equity in this thesis.

The cost of debt in this thesis is measured as:

- Total debt = long term debt + short term debt and current portion of long term debt (Benninga, 2000);
- Cost of debt = interest expense / total debt (Benninga, 2000).

The data of interest expense was only found on the database from 1996 to 2007, so the WACC was calculated during this period.

Due to the lack of available information, the analysis on the cost of preferred equity has been excluded. In addition, the cost of capital was expressed as a pre-tax real WACC in this thesis.

6.3.3 Empirical Results

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables (WACC) given a value of the independent variable (Share Price).

6.3.3.1 T – Test Results
The t-test was conducted to show whether the means of the share price and WACC are statistically different from each other. This thesis selected the significant level at the 0.05 and two-tailed test in the whole market, listed market and delisted market to analyse the relationship between them. The results can be seen from the following table:

6.4 Table: t-test for WACC

<table>
<thead>
<tr>
<th>Methods</th>
<th>Whole Market</th>
<th>Listed Market</th>
<th>Delisted Market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>correlation</td>
<td>t-stat</td>
</tr>
<tr>
<td>WACC</td>
<td>1.6372</td>
<td>0.4599</td>
<td>3.1482</td>
</tr>
</tbody>
</table>

It is clear that WACC is more highly associated with the share price in the listed market and poor correlation with the share price in the delisted market.

6.3.4 Strength and Weakness of WACC

Eschenbach & Cohen (2006) cite the following strength to WACC:

- Corporations raise money from two main sources: equity and debt. Therefore, the WACC takes into account the relative weights of each component of the capital structure and presents the expected cost of new capital for a firm;

- A firm’s WACC is the overall required return on the firm as a whole and, as such, it is often used internally by company directors to determine the economic feasibility of expansionary opportunities and mergers; and

- Since people are measuring expected cost of new capital, they should use the market values of the components, rather than the book values to evaluate the business value.
Also, Eschenbach & Cohen (2006) identify the following two weaknesses of WACC:

- WACC is only applicable to assets that have the same systematic risks and incremental debt ratio as the traded equity used to estimate its magnitude. In general, for assets that do not meet this criterion, it is still necessary to estimate a project-specific level of $K_j$, and

- The premise of weighted average cost of capital is that an investor would pay no more to purchase the asset than would be paid to reproduce the asset. While this approach is suitable for some assets, particularly those which are not directly generating income, choosing this approach as cost is not always a reliable guide to value. For example, the vast amounts of money spent on pharmaceutical research projects which come to nothing.

### 6.3.5 Empirical Analysis

The WACC is a weighted average of the cost of equity and debt. Regulatory decisions in Australia have generally determined the cost of debt as a margin over the risk-free rate, while the cost of equity is calculated using CAPM (Weighted Average Cost of Capital 2002, p. 6).

The weighted average cost of capital (WACC) is used in finance to measure a firm’s cost of capital. It has been used by many firms in the past as a discount rate for financed projects, since the cost of the financing seems like a logical price tag to put on it (Truong, Partington & Peat, 2008).
WACC is more closely associated with the share price in the listed market. This is because when people are measuring expected cost of new capital, they should use the market values of the components, rather than their book values (Truong, Partington & Peat, 2008). From its traditional formula: \( WACC = (K_e \times W_e) + (K_p \times W_p) + (K_d / (1 - t)) \times W_D \), it can be seen that the cost of equity and cost of debt (pre – tax) mainly consist of WACC and both of them should be calculated by the market value. Market value is the price at which an asset would trade in a competitive market and it reflects the market real options (Galbraith & Stiles, 2008). The book value is value at which an asset is carried on a balance sheet and it focus on the accounting measures. Therefore, using the market value makes WACC model significant correlation with stock returns in listed market.

However, WACC model has a poor relationship with share price in a delisted market. This is because estimated beta affects estimating WACC. According to evidence by the Equity Beta of an Energy Distribution Business (2005), the estimated betas will vary dramatically over time resulting in substantial swings in WACC estimates. In a commercial setting, this would cause the firm’s investment strategy to be driven by statistical aberrations in small data sets rather than economic fundamentals. “The estimates could be dramatically different if a different data period, frequency, or statistical method had been adopted” (The Equity Beta of an Energy Distribution Business, 2005, p.65). These evidences have shown that the uncertainty surrounding beta estimates and the effect this has on estimates of WACC. There is the negative beta in the delisted market in the Australian energy sector, which resulted in weak relationship between the stock returns and WACC in delisted market.
6.4 EVA

6.4.1 Overview

Evidence by Putnam (1997), Economic Value Added (EVA) is a trademark of the Stern Stewart consulting organisation. Stern Stewart maintains that the implementation of a complete EVA-based financial management and incentive compensation system gives managers better information and superior motivation to make decisions that will create the greatest shareholder wealth in any publicly-owned or private organisation.

EVA figures have also been conducted in the UK, Australia, Canada, Brazil, Germany, Mexico, Turkey and France, and have been used to provide published rankings of managerial performance, and several international companies have adopted EVA for performance measurement in Australia. For example, the ANZ Banking Group, Fletcher Challenge Limited, James Hardie Industries and the Wrightson Group have implemented EVA financial management systems in recent years (Worthington, 2001).

6.4.2 Application of Method

EVA is essentially the surplus left after making an appropriate charge for the capital employed in the business. It can be calculated in the following way (Economic Value Added, 2007).

\[
EVA = NOPAT - (TCE \times WACC)
\]

Where,

\[\text{NOPAT} = \text{Net operating profit after tax}\]

\[\text{TCE} = \text{Total capital employed}\]
WACC = Weighted average cost of capital

While calculation of NOPAT, the non-operating items will not be considered in these steps. The total capital employed is the sum of shareholders funds as well as loan funds. But this does not include investments outside the business (Economic Value Added, 2007).

In this thesis, the earnings before interest and taxes (EBIT) have been selected from the database for the listed companies and delisted companies. We then should make the key adjustments, for example, eliminating accounting distortions, and reclassifying some expenses as investments as well as subtract cash operating taxes. Due to the data limitation, we only adjusted one term, eliminating accounting distortions. Then invested capital has been selected from the database and WACC has been found from the previous work.

6.4.3 Empirical Results

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables (EVA) given a value of the independent variable (Share Price).

6.4.3.1 T – Test Results

The t-test was conducted to show whether the means of the share price and EVA are statistically different from each other. We selected the significant level at the 0.05 and
two-tailed test in the whole market, listed market and delisted market to analyse the relationship between them.

6.5 Table: t-test for EVA

<table>
<thead>
<tr>
<th>Methods</th>
<th>Whole Market</th>
<th>Listed Market</th>
<th>Delisted Market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>correlation</td>
<td>t-stat</td>
</tr>
<tr>
<td>EVA</td>
<td>-0.0012</td>
<td>-0.0004</td>
<td>0.3730</td>
</tr>
</tbody>
</table>

It is likely that EVA is weak correlation with share price in whole market, listed market and delisted market.

6.4.4 Strength and Weakness of EVA

EVA is more than just a performance measurement system. It is also marketed as a motivational, compensation-based management system that facilitates economic activity and accountability at all levels in the firm (Grant, 2003).

Several strength claimed for EVA (Grant, 2003):

- EVA eliminates economic distortions of GAAP to focus decisions on real economic results;
- EVA provides for better assessment of decisions that affect balance sheet and income statement or tradeoffs between each through the use of the capital charge against NOPAT;
- EVA decouples bonus plans from budgetary targets;
- EVA covers all aspects of the business cycle; and
• EVA aligns and speeds decision making, and enhances communication and teamwork.

Listed below are the weaknesses of EVA (Bartunek, 2007):

• Unless fully loaded and all cash adjustments are made, economic profit can be subject to accrual distortions. For example, because NOPAT is after depreciation and amortization, a company that does not reinvest capital to maintain its plant and equipment can improve its accrual bottom line simply by virtue of the declining D&A line. This sort of attempt at boosting economic profit is known as harvesting the assets; and

• It has the limitations of any single-period, historical metric: last year’s economic profit will not necessarily give you an insight into future performance. This can be especially true if a company is in a turnaround situation or makes a large lump-sum investment, in which case, economic profit will immediately suffer (due to the higher invested capital base) but the expected future period payoff will not show up as a benefit in the calculation.

6.4.5 Empirical Analysis

From the regression analysis, the EVA was the poor associated with the share price in the whole market, listed market and delisted market. The reasons for which, will be examined below.

EVA is considered as the centre-piece of a completely integrated financial framework for financial management and incentive compensation (Steward, 1994). And EVA is
calculated as the business multiplied by the spread between the rate of return on capital, defined as \( r \), and the cost of capital, defined as \( c^* \) (Stewart, 1991). The evidence has shown that EVA is an accounting-based measure of operating performance. So it is one last limitation of EVA is that it is still based on accounting figures, irrespective of the GAAP-related adjustments (Worthington, 2001).

To define and refine its EVA measure, Stern Stewart & Co has identified a total of 164 performance measurement issues, including methods of addressing shortcomings in conventional accounting such as: inventory costing and valuation, seasonality, depreciation, revenue recognition, the write-off of bad debts, the capitalisation and amortisation of R&D, intangibles, mandated investments in safety and environmental compliance, valuation of contingent liabilities and hedges, special issues for taxation, inflation, currency translation, etc. (Stewart, 1994).

Nevertheless, because of the great number of possible adjustments, no company is intended to apply all of them (Stewart, 1994; Stern, 1995; Ehrbar 1998). In general, they found it necessary to address only 20 to 25 key measurement issues in detail and as few as 5 to 10 key adjustments to be actually made in practice. Young (1999) argued that many of the adjustments are of little importance to the company level, and some may be difficult and costly as well, if not impossible, to replicate at the security level. Finally, Young (1997, p. 338) summarizing the critique on the adjustment processing suggested as a rule that ‘adjustments should be made only if the amounts are significant, the required information is readily available, and no finance professionals can understand them’.
Evidence by Keys, Azamhuzjaev and Mackey (2001), the general limitations for EVA are as follows. Managers will have fewer choices in financing operations, risky projects will be accepted and moderate ones will be rejected, EVA is too complex, EVA is easy to manipulate, EVA is a short term measure, EVA is a single performance measure that includes no measures for quality or time, EVA terminology is misleading, and EVA should not be used for capital budgeting.

Therefore, EVA is an accounting-based measure of operating performance. It has complex and costly accounting adjustments problems. In addition, these are not consistent with standards for the EVA accounting adjustments, and the companies that used the EVA to evaluate the performance have not revealed the processes for the using the EVA.

6.5 DCF

6.5.1 Overview

Discounted Cash Flow (DCF) analysis is the technique used to derive economic and financial performance criteria for investment projects (Herbohn & Harrison, 2008), and it is a cash flow summary that has been adjusted to reflect the time value of money (Moses, 2008). Discounted cash flow was first formally published in 1938 in a text by John Burr Williams: ‘The Theory of Investment Value’. This was after the market crash of 1929 and before auditing and public accounting was mandated by the SEC. Due to the economic crash, investors were wary of relying on the reporting earnings, or in fact any
measures of value apart from cash (Discounted Cash Flow - DCF, 2008). Therefore, discounted cash flow analysis gained popularity as a valuation method for stocks.

6.5.2 Application of Method

Middleton describes (2008) that discounted cash flow tries to calculate the value of a company today. Ten listed energy companies (CEY, ERA, HED-NZ, OSH, STO, WPL, NHC, AZA, BNT and PVE) and five delisted energy companies (BSO, CHL, NGC-NZ, NVS and OCA) have been selected to calculate the company’s fair value using DCF and will project cash flows for the next five years of business. The criteria for choosing the companies is that the companies were keeping strong marketing channels, outstanding growth, efficient factories and reasonable competitive position.

This thesis has decided to estimate the free cash flow that the selected companies will produce over the next five years. Forecasting each of the companies revenue is the most important assumption one that decides the company’s free cash flow.

We have got companies average revenue growth rate at 15% for the past 10 years and the companies will keep at 10% in the future five years. Then we calculated the past 10 years average operating costs margin of 65%, in order to get the operating costs. We assume that the net investment is 10% of the revenue and the working capital has increased by 10% each year.

So the free cash flow can be calculated as the following (Benninga 2000, p. 65):

After that we should calculate the terminal value approach that involves making some assumptions about long-term cash flow growth (Benninga 2000, p.70).

\[ \text{Terminal Value} = \text{Final Projected Year Cash Flow} \times \frac{(1+\text{Long-Term Cash Flow Growth Rate})}{(\text{WACC} – \text{Long-Term Cash Flow Growth Rate})} \]

In this formula, let’s assume that the company’s cash flows will grow in perpetuity by 4% per year.

Then the enterprise value of the firms is the discounted value of the firm’s projected FCF plus its terminal value (Benninga 2000, p. 72):

\[ \text{Enterprise value} = \frac{\text{FCF}_1}{(1+\text{WACC})} + \frac{\text{FCF}_2}{(1+\text{WACC})^2} + \ldots \]

\[ \frac{\text{FCF}_5}{(1+\text{WACC})^5} + \frac{\text{Year 5 terminal value}}{(1+\text{WACC})} \]

Finally, we should deduct its net debt from the value to calculate the companies’ fair value of equity.

\section*{6.5.3 Empirical Results}

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables (DCF) given a value of the independent variable (Share Price).
6.5.3.1 T – Test Results

The t-test was conducted to show whether the means of the share price and DCF are statistically different from each other. We selected the significant level at the 0.05 and two-tailed test in the whole market, listed market and delisted market to analyse the relationship between them.

6.6 Table: t-test for DCF

<table>
<thead>
<tr>
<th>Methods</th>
<th>Whole Market</th>
<th>Listed Market</th>
<th>Delisted Market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>correlation</td>
<td>t-stat</td>
</tr>
<tr>
<td>DCF</td>
<td>2.7418</td>
<td>0.6744</td>
<td>2.3704</td>
</tr>
</tbody>
</table>

It can be seen that there is a stronger relationship between DCF and share price in whole market, listed market and delisted market.

6.5.4 Strength and Weakness of DCF

Hoff (1997) lists the following three strength to DCF:

- DCF is that it produces the closest thing to an intrinsic stock value;
- Free cash flow is a trustworthy measure that cuts through much of the arbitrariness and “guesstimates” involved in reported earnings; and
- The DCF model can be applied as a sanity check. People can plug the company’s current stock price into the DCF model and, working backwards, calculate how quickly the company would have to grow its cash flows to achieve the stock price.

Hoff, (1997) also states the two aspects of DCF weakness, as the following:
• The DCF model is only as good as its input assumptions. Depending on what you believe about how a company will operate and how the market will unfold, DCF valuations can fluctuate wildly; and

• DCF works best when there is a high degree of confidence about future cash flows. But things can get tricky when a company’s operations lack what analysts call “visibility”. This is simple meant to mean, when it is difficult to predict sales and cost trends with any certainty.

6.5.5 Empirical Analysis

At the present, DCF techniques have become the most popular techniques in making capital budgeting decisions for public companies in Australia, as well as in other countries (Kaplan & Ruback, 1995). In this thesis, the free cash flow to equity approach has been used to analyse the energy companies’ fair value. Through the long term analysis on this model, the t-stat is 2.7418, 2.3704 and 2.3991, respectively in whole market, listed market and delisted market. The evidence has shown that using DCF model is appropriate for the energy sector in the Australia.

It is clear that DCF analysis tries to work out the value of a company today, based on projections of how much money it will generate in the future. The basic idea is that the value of any company is the sum of the cash flows that it produces in the future, discounted to the present at an appropriate rate (Lehn & Poulsen, 1989). Moreover, the model is not suited to short-term investing, the DCF focuses on long-term value. A well-crafted DCF may help you avoid buying into a bubble, but it may also make you miss short-term share price run-ups that can be profitable (Lehn & Poulsen, 1989).
According to the evidence by Buckley (2002), DCF used the market values to measure expected cost of new capital, rather than their book values, and it is based on realistic rather than optimistic growth expectations. For the most part, free cash flow is a trustworthy measure that cuts through much of the arbitrariness of “guesstimates” involved in reported earnings (Farisssi, 2008).

On the other hand, DCF model produces the closest thing to an intrinsic stock value. The alternatives to DCF are relative valuation measures, which uses multiples to compare stocks within a sector (Morris, 2008). While relative valuation metrics such as price-earnings (P/E), EV/EBITDA and price-to-sales ratios are fairly simple to calculate, they are not very useful if an entire sector or market is over or undervalued. A carefully designed DCF, by contrast, should help investors steer clear of companies that look inexpensive against expensive peers (Morris, 2008).

The DCF model used the market values to measure expected cost of new capital rather than their book values and DCF model produces the closest thing to an intrinsic stock value. Therefore, the DCF model is suitable measure for the energy sectors in the long term in Australia.

6.6 P/E ratio

6.6.1 Overview

The Price to Earnings (P/E) ratio is one of the oldest and most commonly used valuations metric by investors to help determine whether individual stocks are reasonably priced (Leibowitz & Kogelman, 1990). P/E is short for the ratio of a company’s share price to its per-share earnings. The price per share is the market price of a single share of the stock.
The earnings per share is the net income of the company for the most recent 12 month period, divided by number of shares outstanding. The P/E ratio can also be calculated by dividing the company’s market capitalization by its total annual earnings (Maiello, 2008).

Theoretically, a stock’s P/E tells us how much investors are willing to pay per dollar of earnings. For this reason it's also called the “multiple” of a stock. In other words, a P/E ratio of 20 suggests that investors in the stock are willing to pay $20 for every $1 of earnings that the company generates (Minter & Weinter, 2008). Historically, the average P/E ratio in the market has been around 15-25. This fluctuates significantly depending on economic conditions. The P/E can also vary widely between different companies and industries (Minter & Weinter, 2008).

### 6.6.2 Application of Method

The P/E ratio formula is set as the following (Price-Earnings-Ratio, 2007):

\[
P/E \text{ ratio} = \frac{\text{Price per Share}}{\text{Annual Earning per Share}}
\]

- The price per share is the market price of a single share of the stock;
- The earnings per share are the net income of the company for the most recent 12 month period, divided by number of shares outstanding.

P/E ratio is short for the ratio of the companies share price to its per-share earning. The listed companies and delisted companies have been chosen to calculate the P/E ratio. In the EPS calculation, the weighted average number of shares outstanding over the reporting term has been used, in order to get more accurate EPS. It is very interesting from the following table; there are a bigger different P/E ratio for listed companies from
6.52 to 30.53 and the slight different for the delisted companies between 0.69 and 2.58. However, both of them exists the higher correlation with the share price, 0.53 and 0.64, respectively in the listed companies and in the delisted companies.

6.7 Table: P/E ratio for Listed and Delisted Companies

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lis Com</td>
<td>7.23</td>
<td>8.91</td>
<td>8.62</td>
<td>17.11</td>
<td>13.46</td>
<td>11.74</td>
<td>19.98</td>
<td>30.53</td>
<td>12.03</td>
</tr>
<tr>
<td>Delis Com</td>
<td>0.69</td>
<td>0.70</td>
<td>0.94</td>
<td>0.78</td>
<td>0.87</td>
<td>1.56</td>
<td>1.68</td>
<td>1.13</td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lis Com</td>
<td>13.34</td>
<td>6.52</td>
<td>11.04</td>
<td>7.01</td>
<td>7.00</td>
<td>11.22</td>
<td>10.22</td>
<td>22.82</td>
<td>16.94</td>
</tr>
<tr>
<td>Delis Com</td>
<td>1.16</td>
<td>1.06</td>
<td>1.02</td>
<td>1.07</td>
<td>1.20</td>
<td>1.85</td>
<td>2.00</td>
<td>2.05</td>
<td>2.58</td>
</tr>
</tbody>
</table>

6.6.3 Empirical Results

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables (P/E ratio) given a value of the independent variable (Share Price).

6.6.3.1 T – Test Results

The t-test was conducted to show whether the means of the share price and P/E ratio are statistically different from each other. We selected the significant level at the 0.05 and two-tailed test in the whole market, listed market and delisted market to analyse the relationship between them.

6.8 Table: t-test for P/E ratio

<table>
<thead>
<tr>
<th></th>
<th>Whole Market</th>
<th>Listed Market</th>
<th>Delisted Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE Ratio</td>
<td>3.3848</td>
<td>2.4331</td>
<td>3.1020</td>
</tr>
<tr>
<td></td>
<td>0.6588</td>
<td>0.5322</td>
<td>0.6401</td>
</tr>
</tbody>
</table>
It is likely that there are stronger relationships between share price and P/E ratio in whole market, listed market and delisted market.

6.6.4 Strength and Weakness of P/E ratio

Henderson & Gart (1999) state the three aspects of P/E ratio strength, as the following:

- P/E ratio is best viewed over time, looking for a trend. A company with a steadily increasing P/E is being viewed by the investment community as becoming more and more speculative. A company’s P/E ratio changes every day as the stock price fluctuates;
- P/E ratio is commonly used as a tool for determining the value of the market has placed on a common stock. Companies expected to grow and have higher earnings in the future should have a higher P/E than companies in decline; and
- The P/E ratio is a much better indicator of a stock’s value than the market price alone.

Sayeed (2008) states the four aspects of P/E ratio weakness, as the following:

- The denominator (earnings) is based on an accounting measure of earnings that is susceptible to forms of manipulation, making the quality of the P/E only as good as the quality of the underlying earnings number;
- Accounting: there are too many methods to calculate the actual earnings per share (EPS), such as primary EPS, diluted EPS, and headline EPS etc. Moreover, some
investors can use the different way to calculate may get confused between the different types of EPS and thus reach a wrong P/E estimate;

- Inflation: during the periods of high inflation, inventory and depreciation costs may be understated because the replacement costs of goods and equipment rise with the general level of prices. Thus, P/E ratio tend to be lower during times of high inflation because the market sees earnings as artificially distorted upwards;

- Besides earnings, there are other factors that affect the value of a stock. For example:

  - Brand - The name of a product or company has value. Brands such as Coca-Cola are worth billions;
  - Human Capital - A company’s employees and their expertise are should add value to the company;
  - Expectations - The stock market is forward looking. People buy a stock because of high expectations for strong profits, not because of past achievements; and
  - Barriers To Entry - For a company to be successful in the long run, it must have strategies to keep competitors from entering the industry.

All these factors will affect a company’s earnings growth rate. Because the P/E ratio uses past earnings (trailing twelve months), it gives a less accurate reflection of these growth potentials.

**6.6.5 Empirical Analysis**
We had the analysis on the energy industry in Australia through the long term periods. The results have shown that there are a stronger relationship between share price and P/E ratio in whole market, listed market and delisted market. Here, we will discuss the phenomena why P/E ratio model has the stronger relationship with share price in the three markets.

P/E ratio is frequently used as a tool to measure the market value. For example, companies expected to grow and have higher earnings in the future should have a higher P/E than companies in decline. In addition, P/E ratio is best viewed over time, looking for a trend. A company with a steadily increasing P/E is being viewed by the investment community as becoming more and more speculative.

However, from the P/E ratio formula we can find the some issues:

\[
P/E \text{ ratio} = \frac{\text{Price per Share}}{\text{Annual Earning per Share}}
\]

The price per share is the market price of a single share of the stock. The earnings per share are the net income of the company for the most recent 12 month period, divided by number of shares outstanding. It is clear that the price per share is the current company share price and based on the market value. However, an important problem that the denominator (earnings) is based on an accounting measure of earnings that is susceptible to forms of manipulation, making the quality of the P/E only as good as the quality of the underlying earnings number (Johnson & Shirer, 2008). This evidence has carefully shown that people can get into a lot of troubles by valuing stocks using only simple indicators such as the P/E ratio, because the P/E ratio is based on the book value rather
than the market value and the companies can easily manipulate the earning per share to make the quality of the P/E ratio. On the other hand, it is difficult to say whether a particular P/E is high or low without taking into account growth rates and the industry. Therefore, although the P/E ratio has some problems, such as the accounting measure of earnings and the inflation issues, it is also the most commonly used valuations metric by investors, because it is the indicator of the market value and easily to calculate.

6.7 Merger and Acquisition

6.7.1 Overview

Mergers and acquisition (M&A) have long existed in the world of the corporate landscape. They first appeared in the late 1800s in the United States with the activity of the “robber barons,” followed by the consolidations of J.P. Morgan and others in the early 1900s. Since then, there have been several waves of M&A activity in the United States during the booming economy of the late 1960s, in the controversial restructuring wave of the mid-1980s, and most recently with the mega-deals signed during the late 1990s (Hitchner, 2006).

6.7.2 Application of Method

Guideline Merger and Acquisition Method involves the valuation ratios derived from transactional pricing information that is related to the appropriate underlying financial data of guideline companies, and then applied to the corresponding data of the subject company to arrive at an indication of value (Hitcher 2006, pp.260). The analysis involves
the comparison of the respective qualitative and quantitative factors relating to the company being valued to those of the guideline companies (Hitcher 2006, pp.280).

Evidence by Hitcher (2006, pp.270-271), at its simplest, the method requires only multiplication and perhaps some subtraction. The basic format is (Hitcher 2006, p. 272):

\[
\text{Value}_{\text{subject}} = \left[ \left( \frac{\text{Price}}{\text{Parameter}} \right)_{\text{comps}} \times \text{Parameter}_{\text{subject}} \right] - \text{Debt}_{\text{Subject}}
\]

Parameter might be sales, net incomes, book value.

**6.7.3 Empirical Results**

Market multiples calculated for the purpose of pricing CCI Holdings, MVIC included:

- MVIC/sales
- MVIC/EBITDA
- MVIC/EBIT
- MVIC/GCF

In addition to considering multiples based on historical financial data, we have used analysis estimates and revenue and expense projections discussed in the analysis of CCI Holdings financial statements to prepare projected fiscal 2006 income statements for our subject and the selected guideline transactions. It should be stated that a comparison of CCI Holdings financial condition, operating performance and ratios with that of the selected guideline transactions were calculated using only end-of-year financial data. Finally, the CCI Holdings common equity can be calculated through the analysis of subject company and guideline companies data as the following:
CCI Holdings common equity is equal to $30,394,868

Therefore, the company’s share price is equal to common equity / outstanding

CCI Holdings share price = $30,394,868/132,556,491

=$ 0.22

The CCI Holdings common equity is $ 46,309,644 in the financial reports

The CCI Holdings share price is $ 0.32 in the financial reports

6.7.4 Strength and Weakness of M&A

Hitchner (2006) lists the following strength to M&A:

- It is fairly simple to understand. Companies with similar product, geographic, or financial situations should have similar pricing characteristics;
- It uses actual simple to apply. The M&A approach derives estimates of value from relatively simple financial ration, drawn from a group of similar companies;
- It uses actual data. The estimates of value are based on actual stock prices or transaction prices, not estimates based on a number of assumptions or judgments; and
- It includes the value of all of a business’s operating assets.

Hitchner (2006) also states the four aspects of M&A weakness, as the following:

- No good guideline companies exist. This may be the biggest reason the approach is not used in a valuation. The analyst may not able to find guideline companies that are sufficiently similar to the subject;
• Most of the important assumptions are hidden. Among the most important assumptions in a guideline price multiple is the company’s expected growth in sales or earnings;
• The application of these data to the subject company is complex because of the difficulty determining whether a transaction is truly comparable given the limited information available in the database; and
• It is not as flexible or adaptable as other approaches.

6.7.5 Empirical Analysis

6.7.5.1 How much is the business worth

Establishing an acceptable and realistic price for the acquired company is difficult. Traditional appraisals by accountants depend on a profitable history of three to five years of recent operations, plus a net worth value derived from the financial statements E and F. In the absence of profits, the net worth becomes the basis for the selling price. Therefore, acquirers often overpay in merger and acquisition transactions. The overpayment results in the following phenomenon:

• A reduction in the value of the buyer’s stockholders’ equity;
• A dilution in the buyer’s ownership interest in a merger transaction;
• A reduction of the buyer’s cash and credit resources available to make more economically sound investments;
• A loss of investor confidence. This is particularly true with regard to investors in public companies; and
• Increasing the buyer’s cost of capital.

Therefore, the detailed commonly used M&A approach that compared the subject company with the selected guideline transactions companies through the analysis on the financial statement, income statement and financial ratio to get the subject company’s common equity, which method is essential for the acquire to use suitable price to buy the company.

In this analysis, the control value based on guideline transaction common equity is $30,394,868. The share price in the market is $0.22. However, CCI Holdings common equity and share price are $46,309,644 and $0.32 respectively in the financial reports. This evidence has shown that the investors should adjust the acquire plan to avoid the overpay. Because there is overvalued in CCI Holdings value.

6.7.5.2 M&A efficiency in the market

Research by Farrel & Shapiro (2000) have carefully examined that virtually any significant horizontal merger involves some loss of direct competition, and would thus be at least slightly anti-competitive in the absence of all efficiencies. Accordingly, the question of efficiencies need be explicitly reached only if a merger created substantial competitive concern. “The efficiencies of M&A for firms are truly combined their core hard-to-trade assets in new ways that lead to lower costs or improved quality and productivity” (Farrel & Shapiro, 2000,p.54). The evidences prove that the firms generate efficiencies for the M&A based on competition of economic scale and should reduce the operating costs and improve the product quality to satisfy the customer’s needs.
The following we will analyze the M&A efficiencies in CCI Holdings case. Bureau Veritas Australia Pty Ltd paid 55.0 cents per share (dispatched to shareholders on 5 July 2007) and there was also a fully franked dividend of 3.0 cents per share paid on the same date to acquire CCI Holdings. The evidence has shown that this acquisition involved the direct competitors and was not monopolistic behaviour. On the other hand, Bureau Veritas Australia Pty Ltd had seen significant growth in the Pacific Zone region after this acquisition, which helped to grow the Pacific Zone operations into a force of over 2000 employees, serving over 5000 clients across a network of over 40 offices. This acquisition also helped to expand the Pacific Zone service portfolio to lead international trade services for the mining and coal industries across Australia & New Zealand.

It can be seen from this evidence, Bureau Veritas Australia Pty Limited acquired the CCI Holdings is efficiencies, because this acquisition based on the competition and the company improved the productivity as well as decreased the cost for the products.

6.7.5.3 How to be a successful M&A

Disciplined acquirers can extract value from mergers and acquisitions. The following lists companies how become successful merger and acquisition in business activities (Farrel & Shapiro, 2000):

- Consider only targets for which the companies can improve future free cash flow;
- Excel in estimating overall value creation;
- Maintain discipline during negotiation;
- Rigorously plan and execute the integration; and
• Earn the right to acquire by having a strong core business.

6.8 MetaCapitalism

6.8.1 Overview of MetaCapitalism

MetaCapitalism, written by Grady Means and David Schneider, is based on the effects that technology has and will have on all businesses. MetaCapitalism advocates a radical or extreme outsourcing and downsizing of human capital, de-capitalization of all non-core capital assets and the diminished role of the state in the global free market economy (Means & Schneider, 2000). These transformations require the traditional companies shift to internet-leveraged styles of brand-owning, customer-focused companies, and the company should focus on the business-to-business (B2B) e-business revolution, in order to archive the economy growth and value creation (Means & Schneider, 2000).

6.8.2 Application of Method

The MetaCapitalism equation is used as a means of reducing the strategy to a measurable index. The core tenets of MetaCapitalism are decapitalisation, outsourcing and downsizing and these can be measured by PP&E, NWC and NOE (Means & Schneider, 2000). Measure a firm’s level of MetaCapitalisation by calculating its composite change value over time, based on:

\[
\frac{\text{NMC} + \text{PP&E} + \text{NOE} + \text{R&D}}{\text{TA}}
\]
Due to a lack of available information, the analysis on the NOE has been excluded. This leaves six other indices to be tested. The original combined index was separated into the following individual indices (Farrell, 2005):

NWC Change
PP & E Change
TA Change
NWC/TA Change
PP & E /TA Change
NWC +PP&E/TA Change

The formula is separated into six parts in order to compare with the change in the share price. And to indicate some indices that are more responsible for such adverse effects than others. And the period is the most significant as well as which MetaC indices change is the most correlated to the share price change.

6.8.3 Empirical Results

Regression analysis has been used to develop an equation (a linear regression line) for predicting a value of the dependent variables (NWC, PP&E, TA, NWC/TA, PP&E/TA and NWC+PP&E/TA) given a value of the independent variable (Share Price). The results have shown that the six dependent variables have the poor associated with the share price. The following is the details about these results.

6.8.3.1 NWC+PP&E/TA Index
NWC+PP&E/TA are the other important index for the companies. This equation and in particular the corresponding ratios, were taken to indicate the level of MetaCapitalisation because they precisely represent the main tenets of the strategy-decapitalisation, selling of physical assets, and reduction in the number of employees through downsizing and outsourcing (Mickhail, Ostrovsky, 2005). According to the research study, the NWC+PP&E/TA change correlation rate in the delisted companies is -18%, which was negative correlation with the share price change. Due to MetaCapitalism strategies, when the share price is the negative correlation with the NWC+PP&E/TA change, which can make companies production more efficiency and bring more benefits for them. However, in this case, collapse, mergers, taken over, suspended and down in rank groups was included in the delisted company list. Therefore, these results contradict the claims of MetaCapitalim.

6.8.3.2 Extreme Changes

Empirical reflections got the results that all the companies that were selected from each group experienced the extreme changes in the total periods. For example, there was a dramatic increase by 17729.41% in the TA change of CXR in 1990-1991, then the change of TA significant decreased by 80.48% in 1991-1992 and continually dropped by -14.51% in 1993-1994. Finally, the company went to bankruptcy in 1998. The other example, the PP&E change of SPP was -28.26% in 1994-1995, -3517.97% in 1995-1996, and then the change have dramatically increased by 4.01% in 1998-1999. At the last, the company was closed in the year of 2000. Therefore, the most companies experienced the
extreme changes during the periods and then the companies quickly suffered the severe damage.

6.8.3.3 Comparison with ASX 200 Energy Company
And the market clearly does consider PP&E to be important. PP&E was found to be the single most important index for the individual companies (Farrell, 2005). Empirical reflections have shown that most companies experienced the negative correlations with ASX 200 Energy Company. For example, CXR, VOY, OMO, EXL and these companies’ PP&E were not consistent with the ASX 200 Energy Company. And these companies experienced negative correlations with the share price when PP&E reduced. It is clear that most PP&E change in the ASX 200 Energy Company was the positive correlation with the share price change. Therefore, this evidence has shown that the ASX 200 Energy Company PP&E change is the positive correlation with the share price change, which refutes MetaCapitalism assumptions that decrease in PP&E change will increase the share price change.

6.8.4 The Reason to Fail?
6.8.4.1 Value Added Communities
Value Added Communities are external network that address supply chain issues involved in producing and delivering products (Means and Schneider, 2000). The purpose of the VAC is to provide a central platform for members to interact that reduce transaction costs by streamlining value chain processes. However, in the fact, there are intensive competitions existed in the business market; it is unlikely that they will
cooperate together all of the time. Ostrovsky argues that the two main reasons why the VACs do not function effectively. First, there are ‘insufficient trust and cooperation, and a poor mix of firms if too much emphasis on selection is placed on competitive or political reasons as posed to the firm’s ability to add value and generate wealth’ (Ostrovsky, 2003). Second, there is an ‘unrelenting quest for efficiency and market dominance is facilitated by the ability of dominant firms to control smaller member forms within the VACs, including deciding who to let in and on what terms, opportunities for price manipulation and collusion within and between VACs, and the resulting concentration and centralisation of capital and power’ (Ostrovsky, 2003).

6.8.4.2 Outsourcing

Outsourcing is the transfer of the delivery of services which affects both jobs and individuals. Downsizing results in increased local unemployment, which has repercussions such as social dislocation, increased crime and poverty (Moore, 2002). The social cost is very high where the pursuit of efficiency maximization is completely disconnected from human well being (Gray, 2002). Although it is difficult to dispute that outsourcing has a detrimental effect on individuals who face job disruption and employment insecurity, it damages a local labour market and causes increased local employment and social turbulent situation. These effects threaten social stability and people’s lives.

6.9 Conclusion
According to data analysis and t-test for seven commonly used business valuation methods over the long periods in the Australian energy sector, it can be seen that CAPM and WACC have a close association with the share price in the listed market, and DCF and P/E ratio have the higher correlation with the share price in the whole market, listed market and delisted market. However, an important problem for P/E ratio is that the denominator (earnings) is based on an accounting measure of earnings that is susceptible to forms of manipulation, making the quality of the P/E only as good as the quality of the underlying earnings figures. In addition, it is difficult to say whether a particular P/E is high or low without taking into account growth rates and the industry. On the other hand, the weighted average cost of capital (WACC) is used in finance to measure a firm’s cost of capital. It has been used by many firms in the past as a discount rate for financed projects, since the cost of the financing seems like a logical price tag to put on it. Although the M&A method is good one for the companies to acquire and merger the other companies, merger and acquisition do not conveniently occur on the effective date if the subject company valuation. And the analyst may not be find guideline companies that are sufficiently similar to the subject.

The survey sample by Truong & Partington (2006) has been found about business valuation methods used in estimating the cost of capital in Australia in the different sectors. The authors started with a sample of 488 stocks included in the All Ordinaries Index as at August 2004. The focus of this survey is the capital budgeting practice of Australian corporations; therefore the survey excluded all foreign companies. The final sample comprises 356 companies in nine sectors. The survey results have shown that
CAPM was the most popular method of estimating the cost of capital in Australia with 73% of respondents relying mainly on the CAPM. The use of other asset pricing models is virtually non-existent. In addition to the CAPM, this survey confirmed the popularity of DCF methods in Australia with 75% of respondents used DCF techniques.

Therefore, the results can be achieved from the above analysis and shows that a CAPM is a better method for the listed companies to measure the rate of return of an asset in a well-diversified portfolio in Australian energy industry and DCF is better method for the whole, listed and delisted companies to make capital budgeting decisions for public companies in Australian energy sector.
CHAPTER SEVEN
LIMITATIONS AND FUTURE RESEARCH
7.1 Limitations

Data Collection Problems

Several problems were found in the stage of data collection. Firstly, each company releases their financial statements at the different periods. Apart from the UOW resource, it was necessary to check each company’s website to collect the company financial statements. Nevertheless, sometimes the companies did not release their 2006-2007 annual reports either in company’s website or UOW website.

Secondly, due to a lack of available information, the analysis on the cost of preferred equity has been excluded in the WACC formula. In addition, the data of interest expense was only found on the database from 1996 to 2007, so the WACC was calculated during this period.

Thirdly, measure a firm’s level of MetaCapitalisation by calculating its composite change value over time, based on:

\[
\frac{NWC + PP \& E + NOE + R \& D}{TA}
\]

Due to a lack of available information, the analysis on the NOE and R&D has been excluded.

Data Adjustment Problems

To define and refine EVA measure, Stern Stewart & Co identified a total of 164 performance measurement issues. In addition, there were not consistent standards for the
EVA accounting adjustments, and the companies that used the EVA to evaluate the performance have not revealed the processes for using the EVA. Due to data limitations, the reclassifying some expenses are not included in the adjustment.

Problems to guideline companies’ transactions

Selected guideline companies for the M&A, the market data was collected by the following criteria:

- Similar business description or market;
- Revenues between $1 million and $750 million;
- Positive operating earnings for the latest reported fiscal year-end; and
- Positive cash flow for the latest reported fiscal year-end.

Actually, the analyst may not able to find guideline companies that are sufficiently similar to the subject.

7.2 Future research

The aims of this thesis are to explore the efficiency of business evaluation methods in the energy industry for the long term. Seven commonly used business evaluation methods (CAPM, WACC, EVA, P/E ratio, DCF, MetaCapitalism and Merger and Acquisition) have been selected with comparisons draw to the share price in the whole market, listed market and delisted market to evaluate the firm performance during the periods from 1989 to 2007.
Future study could seek to evaluate seven different business evaluation methods including comparing these with the share price in the whole market, listed market and delisted market in the other business sectors such as telecommunication, industry and real estate, in order to explore which valuation methods are better for evaluating business performance in Australia.

On the other hand, recently, China’s economy has developed rapidly and its business valuation methods have been widely used, but there is lack of practical and theoretical knowledge in using business valuation methods. Therefore, I am planning to analyse China’s listed and delisted companies business valuation methods based on seven commonly used methods.
CHAPTER EIGHT
CONCLUSION
Conclusion

The purpose of this thesis is to explore the efficiency of business evaluation methods in the Australian energy industry during the periods from 1989 to 2007. Seven commonly used business evaluation methods (CAPM, WACC, EVA, P/E ratio, DCF, Meta-Capitalism and Merger and Acquisition) were selected and compared with the share price in the whole market, listed market and delisted market to determine which valuation methods are better for evaluating business performance in the Australian energy sector over the long term.

According to data analysis and t-test of the different business valuation methods over the long-term in the Australian energy sector, it can be seen that CAPM and WACC have a close association with the share price in the listed market, and DCF and P/E ratio have the higher correlation with the share price in the listed and delisted market. However, an important problem in the use of the P/E ratio is that the denominator (earnings) is based on an accounting measure of earnings that is susceptible to forms of manipulation, making the quality of the P/E ratio only as good as the quality of the underlying earnings number.

On the other hand, the weighted average cost of capital (WACC) is used in finance to measure a firm’s cost of capital. It has been used by many firms in the past as a discount rate for financed projects, since the cost of financing seems like a logical price tag to put on it. Although the M&A method is a good one for companies that acquire and merge with other companies, the application of this data to the subject company is complex because of the difficulty in determining whether a transaction is truly comparable given
the limited information available. And, the analyst may not find guideline companies that are sufficiently similar to the subject.

The survey results by Truong & Partington (2006) of business valuation methods used in estimating the cost of capital in Australia in the different sectors, have shown that CAPM was the most popular method of estimating the cost of capital in Australia with 73% of the respondents relying mainly on CAPM. The use of other asset pricing models is virtually non-existent. In addition to CAPM, this survey confirmed the popularity of DCF methods in Australia with 75% of the respondents to have used it.

This supports my findings that CAPM was a better method for the listed companies to measure the rate of return of an asset in a well-diversified portfolio in the Australian energy industry and DCF is often a better method for the listed and delisted companies to make capital budgeting decisions for public companies in the Australian energy sector.

Business valuation plays a vital role in business success, especially in the modern technology society. The movement underway to improve corporate governance will encourage companies to focus on long term value creation (Hitchner, 2006). The evidence shows that managers and board members should set long-term shareholder value creation as their primary objective and create healthier companies, which in turn provide spillover benefits, such as stronger economies, higher living standard, and more employment opportunities.

In addition, managers must not only have a theoretical understanding of value creation, but be able to create tangible links between their strategies and value creation (Hitchner,
2006). The evidence shows that once managers have mastered the economics of value creation, they need to be able to educate their internal and external constituents. They need to install performance management systems that encourage real value creation, not merely short-term accounting results. Finally, they need to educate their investors about how and when the company will create value.
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### Appendix A

List of all Companies in ASX 200 Energy Company

<table>
<thead>
<tr>
<th>Code</th>
<th>Company Name</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>AAE Agri Energy Limited</td>
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<td>2</td>
<td>AAL Apac Coal Limited</td>
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<tr>
<td>3</td>
<td>ABJ Australian Biodiesel Group Limited</td>
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<tr>
<td>4</td>
<td>ADE Adelaide Energy Limited</td>
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<tr>
<td>5</td>
<td>ADI Adelphi Energy Limited</td>
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<tr>
<td>6</td>
<td>AED AED Oil Limited</td>
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<tr>
<td>7</td>
<td>AEE Aura Energy Limited</td>
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<tr>
<td>8</td>
<td>AFR African Energy Resources (Guernsey) Limited</td>
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<tr>
<td>9</td>
<td>AGP Anglo Pacific Group Plc</td>
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<td>10</td>
<td>AKK Austin Exploration Limited</td>
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<tr>
<td>11</td>
<td>AQA Aquila Resources Limited</td>
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<tr>
<td>12</td>
<td>ARW Australian Renewable Fuels Limited</td>
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<tr>
<td>13</td>
<td>AUQ Alara Resources Limited</td>
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<tr>
<td>14</td>
<td>AUT Aurora Oil &amp; Gas Limited</td>
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<td>15</td>
<td>AVD Advance Energy Limited</td>
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<td>16</td>
<td>BAS Bass Strait Oil Company Limited</td>
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<td>17</td>
<td>BCC Buccaneer Energy Limited</td>
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<td>18</td>
<td>BFE Black Fire Energy Limited</td>
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<td>19</td>
<td>BKP Baraka Petroleum Limited</td>
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<td>20</td>
<td>BLY Boart Longyear Limited</td>
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<td>21</td>
<td>BND Bandanna Energy Limited</td>
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<td>22</td>
<td>BNT Bounty Industries Limited</td>
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<td>23</td>
<td>BOW Bow Energy Limited</td>
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<td>24</td>
<td>BPT Beach Petroleum Limited</td>
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<td>25</td>
<td>BUL Blue Energy Limited</td>
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<td>26</td>
<td>BUR Burleson Energy Limited</td>
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<td>27</td>
<td>BUY Bounty Oil &amp; Gas NL</td>
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<td>28</td>
<td>BWN Bowen Energy Limited</td>
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<td>29</td>
<td>CES Coal Fe Resources Limited</td>
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<td>30</td>
<td>CEY Centennial Coal Company Limited</td>
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<td>31</td>
<td>CTP Central Petroleum Limited</td>
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<td>32</td>
<td>CTX Caltex Australia Limited</td>
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<td>33</td>
<td>CUE Cue Energy Resources Limited</td>
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<td>34</td>
<td>CUX Crossland Uranium Mines Limited</td>
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<td>CUY Curnamona Energy Limited</td>
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<td>36</td>
<td>CVI Cityview Corporation Limited</td>
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<td>CVN Carnarvon Petroleum Limited</td>
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## Appendix B

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