The determinants of investing in the Pan-Asian markets: a multi-dimensional perspective

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The Determinants of Investing in the Pan-Asian Markets: a Multi-Dimensional Perspective

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

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by

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Statement of Original Authorship

I, Alina Maydybura, declare that work contained in this thesis submitted in fulfilment of the requirements for the award of Doctor of Philosophy in Finance, at the School of Accounting, Economics and Finance, Faculty of Business, the University of Wollongong, is entirely my own work unless otherwise referenced and/or acknowledged. To the best of my knowledge and belief, this dissertation contains no material previously published or written by another person, except for where due references are provided. I hereby certify that the work contained in this thesis has not been previously submitted for a degree or diploma at any other higher education institution.

Alina Maydybura

31 August 2014
Dedication and Acknowledgement

I dedicate this thesis to people who have had an immense influence on my life, both academic and personal. I would like to thank my parents Oleksandr and Valentyna, the people who have provided me with everything I have ever needed and who have supported me throughout my thorny journey of life. Your moral support and your understanding have inspired me to achieve what I have always cherished. I believe this thesis is a fine example of my ability which has been achieved by your hard work as parents and as role models.

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The statements and opinions expressed in this thesis represent my own ideas and those of my supervisors and do not necessarily correspond with the views of Regal Funds Management and/or CMCRC, and/or any of their affiliates.
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Abstract

To undertake a sophisticated analysis of individual securities, investors often rely on fundamental data as evidence of historical corporate performance. Financial statement analysis has therefore become an essential microscope for assessing the financial health of a company and thereby enabling more effective decision making. Using a cross country perspective, this thesis examines the predictive power of accounting fundamentals across the Pan-Asian region. It draws on a large fraction of published research that examines the relation between financial statement information and capital markets commonly referred to as capital markets research. Among the sources of demand for capital markets research that explain its popularity, Kothari (2001) lists fundamental analysis and valuation as well as tests of capital market efficiency.

The underlying theme of this dissertation is the informational efficiency of stock markets and the factors that drive prices in a number of countries. I include both developed and emerging or developing markets to provide a fuller spectrum of the differing economic, political, institutional and social conditions describing a diverse range of capital markets in the Pan-Asian region. Aiming to draw a link between past and future performance of capital market doctrines, this thesis adopts a two-dimensional perspective.

In Chapter 2, which discusses the ins and outs of value investing, I adopt a backward-looking methodological perspective and present some evidence on how investing based on the readily available public historical accounting information can help investors achieve positive returns in excess of the risk-free rate in a range of Pan-Asian countries. The first research objective of this thesis is to examine the
performance of value investing strategies in five Pan-Asian countries (Australia, Hong Kong, Japan, South Korea and Taiwan) over ten years from 2001 to 2010. In this study, I investigate the properties of the financial variables proposed as explanatory factors for future stock returns. The underlying proposition of this thesis is that investors tend to buy companies with particular characteristics, where these characteristics are fundamental accounting factors, such as earnings to price, for example. The idea is to compare the fundamental assessment of the stock’s value to its current stock price, and purchase stocks when the discrepancy between the assessment and the stock price is compelling.

In contrast, in Chapter 3, which presents a study of analyst forecasts of company earnings per share (or EPS), I embrace a forward-looking methodological perspective and examine how investing based on the not-so-readily available public accounting information that is provided by financial analyst forecasts can help investors realise positive returns in the future. As part of the study, I investigate the reliability of analyst forecasts in six Pan-Asian countries (Australia, Hong Kong, India, Singapore, South Korea and Taiwan) over twelve years from 2000 to 2011. The second research objective is to explore which method of consensus aggregation is more effective in predicting actual earnings and determine whether time weighted consensus estimates offer a more effective method for predicting company actual EPS figures than simple mean or median analysis. The evaluation of the reliability of analyst earnings forecasts is an important aspect of research for different reasons. Many empirical studies employ analyst forecasts as a proxy for the market’s expectations of future earnings and investors tend to rely on analyst forecasts when evaluating and selecting individual shares.
This thesis lays foundation for understanding the informational efficiency of capital markets and the factors that influence stock prices. The semi-strong concept of an efficient market proposes that share prices reflect the publicly available financial information. If that indeed were the case, investors would not be able to generate positive and significantly different from zero returns. The goal of this dissertation is not to make revolutionary conclusions on whether the efficient market hypothesis (EMH) should be dismissed. Instead, the aim is to present evidence suggesting that capital markets in the Pan-Asian countries covered in this thesis may not feature the semi-strong form of market efficiency.
Chapter One:

1. Background and Overview

“There is no present. There is only the immediate future and the recent past.”

– George Carlin

A large number of stakeholders are interested in the production and use of financial information. Consequently a great deal of finance and accounting studies have been concerned with whether sophisticated users\(^1\) of financial data understand such information, how they process and apply this knowledge and how it ultimately impacts the functioning of capital markets. As stated by Kothari (2001), shareholders, investors and lenders have an obvious interest in the value of a firm. Finance textbooks suggest that in an efficient market, firm value is defined as the present value of expected future net cash flows, with the discount rate being the applicable risk adjusted rate of return. Stemming from this definition, “a firm’s current performance as summarised in its financial statements is an important (but not the only) input to the market’s assessment of the firm’s future net cash flows and thus into the firm’s market valuation” (Kothari, 2001, p.108).

Research interest in the role of fundamental accounting factors is voluminous, as a deeper understanding of valuation principles is of interest to both academics concerned with a working framework that describes capital markets and practitioners who operate in this context. This thesis aims to provide some evidence of the

\(^1\) Some of the sophisticated users include financial analysts, institutional investors, regulators, the financial press and other market participants.
relationship between capital markets and financial statements. This is a broad area of research that originated with the seminal publication of Ball and Brown (1968). In the past four decades, the literature has grown rapidly with a myriad of papers published in leading accounting and finance journals. In order to offer competing hypotheses and explanations for the observed findings, the thesis contains a critical evaluation of the research findings reported in some of this past research. This naturally leads to unresolved issues and directions for future research noted throughout the thesis.

The underlying theme of this dissertation is the informational efficiency of the Pan-Asian stock markets and the factors that drive prices in these markets. Studies of the efficient market hypothesis (EMH), although not always explicitly stated, refer to the informational efficiency of a market. These studies can be traced back to as far as the pioneering theoretical contribution of French mathematician Bachelier (1900) and the empirical research of Cowles (1933). The concept of an efficient market was neatly defined by Fama (1970, p.383) as “a market in which prices always fully reflect available information”. This posits that if prices do not fully reflect the available information, an investor can seize the opportunity to exploit any inefficiencies. Subsequently, capital markets research on fundamental analysis has become extremely popular in recent years, in part because of mounting evidence in the financial literature against the efficient markets hypothesis. The primary goal of capital markets research on fundamental analysis is to identify and take advantage of some of the mispriced securities. It can therefore not be disentangled from capital markets research on testing market efficiency (Kothari, 2001).
Financial analysts have consistently investigated whether securities of listed firms are fairly priced. A myriad of methodologies have been used by both practitioners and researchers to identify under and overpriced securities. The importance of EMH studies to the functioning of stock markets lies within the crucial role stock markets play in sustaining the health of the economy. As a matter of fact, efficient markets promote optimal economic growth and development by providing unbiased price signals. Many developed nations have stock markets in place to support the capitalisation of firms. It is used as a mechanism to pool resources for capital investment and allow the transfer of ownership in an open and transparent manner. Furthermore, investors play a role in monitoring company performance (Tadesse, 2014).

A large fraction of published academic work in finance in the past four decades aims to unfold the topic of capital markets research, thus drawing a parallel between financial statement information and capital markets. Among the sources of demand for capital markets research that explain its popularity, Kothari (2001) lists fundamental analysis and valuation as well as tests of capital market efficiency. Aiming to provide a link between the past and future performance of capital market doctrines, this thesis adopts a two-dimensional perspective. Chapter 4, which discusses the ins and outs of value investing, contains a historical analysis and presents some evidence on how investing based on the readily available historical accounting information can help investors achieve positive returns in excess of the risk-free rate in a range of Pan-Asian countries. In contrast, in Chapter 5, which presents a study of analyst forecasts of company EPS, a forward-looking methodological perspective is embraced to examine how investing based on the not-
so-readily available public accounting information that is provided by financial analyst forecasts can help investors realise positive returns in the future.

Stock analysis is the analysis of tradable financial instruments. It is typically divided into fundamental analysis, which relies upon the examination of fundamental business factors such as financial statements; and technical analysis, which focuses upon price trends and momentum (RR Finance, 2011). It is fundamental analysis that lays the foundation stone for investment strategies. There are a large number of investment strategies that are inherently different from each other, yet almost all use the fundamental accounting factors. Fundamentalists believe that the market price of the stock does not always match the intrinsic value that the given stock represents. The principal focus of fundamental analysis is on valuation aimed at identifying mispriced securities, which has been a popular paradigm since Graham and Dodd (1934) published their famous book on security analysis. Fundamental analysis entails the use of information in the existing financial statements, in conjunction with industry and macroeconomic data to estimate a firm’s intrinsic value. A difference between the current price and the intrinsic value is an indication of the stock being either under- or overvalued. The former case represents potential expected rewards for investing in the security.

Key criticisms of fundamental analysis come primarily from two groups: the proponents of technical analysis and the followers of the efficient market hypothesis (EMH) (Reinganum, 1981b). Technical analysis is a security analysis methodology for forecasting the future direction of stock prices relying on the study of past market data, primarily price and volume. Yet the EMH, which belongs to the branch of fundamental analysis, believes that past results cannot be used to outperform the
market. This thesis places a great deal of importance on the association between the EMH and the functioning of capital markets. By definition, the EMH in its semi-strong form negates the use of technical analysis as a means to generate investment returns. With respect to fundamental analysis, the EMH also suggests that all publicly available information is already reflected in security prices, and as a result, abnormal returns are not achievable through the use of this information. This suggests that fundamental analysis cannot be used as a means to generate superior investment returns. Essentially, fundamental analysis presents investors with a toolkit that attempts to address one big question and that is whether the company’s stock is a good investment opportunity (RR Finance, 2011). It is well established in finance that fundamental analysis is a cornerstone of investing (Burgess, 2002; Senchak and Martin, 1987).

A big part of fundamental analysis involves delving into financial statements. Also known as quantitative analysis, this involves looking at revenue, expenses, assets, liabilities and other crucial aspects of a company’s financial health. Essentially, fundamental analysts evaluate this historical information to gain insight into a company’s future performance (RR Finance, 2011). When talking about stocks, fundamental analysis is a technique that attempts to determine a security’s value by focusing on the underlying factors that affect the company’s actual business and its future prospects. On a broader scope, fundamental analysis can be performed on industries or markets as a whole. The term refers to the analysis of the economic well-being of a financial entity versus its share price movements alone (RR Finance, 2011). Effectively, this leads one to consider some of the major assumptions of fundamental analysis and that is whether the price on the stock market fully reflects its fair or intrinsic value as revealed by the fundamentals.
A financial statement, or financial report, is a formal record of the financial activities of a business or some other form of entity. According to the IFRS (2013), the purpose of financial statements is to provide information about changes in the financial position and performance of a company, which is useful to a variety of users in making economic decisions. The primary users of financial reports include present and potential investors that use that information to make decisions about buying, selling or holding equity instruments. Importantly, the primary users require information about the resources of the entity not only to assess its prospects for future performance but also to evaluate how effectively and efficiently the firm’s management have been discharging their responsibilities in utilising the company’s existing resources (i.e. the stewardship role).

As part of fundamental analysis, the content of three classes of financially reported accounting data is examined in this dissertation: the income statement, the statement of financial position or balance sheet, and the statement of cash flows. The income statement and the statement of cash flows represent the company’s flow of activities over a specified period of time, whereas the balance sheet is representative of the company’s financial position at a specific point in time. In this regard, Chapter 4 on value investing deals with such accounting measures of corporate performance as: book value, cash flow, dividends, earnings and sales. Notably, book value appears in the company’s statement of financial position or balance sheet, cash flow is reported in the statement of cash flows, and the latter three accounting measures – dividends, earnings and sales – can normally be found in the firm’s income statement. Ohlson (1995) and Feltham-Ohlson (1995) have spawned much empirical research examining the comparative valuation relevance of the balance sheet and the
income statement. Chapter 5 deals with financial analyst predictions of earnings, which is regarded by analysts as a key output from the income statement.

Different countries have developed their own accounting principles over time, making international comparisons of companies difficult. To ensure comparability between financial statements prepared in different companies, a set of guidelines and rules is used which is commonly referred to as the Generally Accepted Accounting Principles (GAAP), this provides guidance in the preparation of financial statements. There has also been a movement towards global accounting standards made by the International Accounting Standards Board (IASB), which has developed the International Financial Reporting Standards (IFRS). Appendix A provides further information on the adoption of the IFRS on a country basis.

In this regard, back in the late 1960’s, Ball and Brown (1968, p.159) presented an interesting argument which postulated that because “accounting numbers cannot be defined substantively, they lack meaning and are therefore of doubtful utility”. This view “stems in part from the patchwork development of accounting practices, and because accounting lacks an all-embracing theoretical framework, dissimilarities in practices have evolved” (Ball and Brown, 1968, p.159-60). Hence, Ball and Brown (1968, p.160) suggest that “as an aggregate of components which are not homogeneous”, accounting metrics are alleged to be a set of somewhat meaningless figures, “not unlike the difference between twenty-seven tables and eight chairs”. Accounting profit has no empirical content it is an abstraction resulting from the application of a set of accounting rules and standards. Following this argument, accounting numbers “can only be defined as the result of the application of a set of
procedures to a set of events with no other definitive substantive meaning at all” (Ball and Brown, 1968, p.160). The authors further propose:

“An empirical evaluation of the reported accounting numbers requires agreement as to what real world outcome constitutes an appropriate test of usefulness. Because accounting numbers are of particular interest to investors, the outcome one uses as a predictive criterion is the investment decision as it is fundamentally reflected in security prices. Both the content and the timing of the annual net income numbers will be evaluated since usefulness could be impaired by deficiencies in either. Recent developments in capital theory provide justification for selecting the behaviour of security prices as an operational test of usefulness. An impressive body of theory supports the proposition that capital markets are both efficient and unbiased in that if information is useful in forming capital asset prices, then the market will adjust asset prices to that information quickly and without leaving any opportunity for further abnormal gain. If as the evidence indicates, security prices do in fact adjust rapidly to new information as it becomes available, then changes in security prices will reflect the flow of information to the market. An observed revision of stock prices associated with the release of the income report would thus provide evidence that the information reflected in income numbers is useful” (Ball and Brown, 1968, p.160-61).

The initial aim of Ball and Brown’s (1968) study was to evaluate the usefulness of existing accounting income numbers by examining their information
content and timeliness and they concluded that because “of all the information about an individual firm which becomes available during a year, half or more is captured in the income number; its content is therefore considerable”. The authors effectively draw our attention to the fact that accounting numbers are subjected to the perceptive reality of the individuals who construct them, i.e. accountants and professionals alike. According to Ball and Brown (1968), these accounting figures remain useful as long as they reflect the company’s true and fair state of financial affairs. Another proposition put forward by the authors points to the importance of earnings in particular in communicating the firm’s financial health to the market.

This thesis adopts a multi-country approach in studying the valuation usefulness and predictive power of accounting fundamentals. I include both developed and emerging or developing markets to provide a fuller spectrum of the differing economic, political, institutional and social conditions describing a diverse range of capital markets in the Pan-Asian region. Some of the most common criteria for evaluating a country’s degree of development are: per capita income or gross domestic product (GDP), level of industrialisation, general standard of living, and infrastructure. Over the years, the non-economic elements have increasingly been included in assessing a country’s level of development. Such factors include the Human Development Index (HDI) which reflects relative degrees of education, literacy and health. While there does not appear to be much convergence as to the definition of the term ‘developed economy’, it generally refers to a country with a relatively high level of economic growth, prosperity and security. On the other hand, terms such as ‘emerging countries’, ‘third world countries’ or ‘developing countries’ are commonly used to describe nations with a lower level of economic security, industrialisation and growth than the developed countries.
Following the MSCI (2013) country classification framework\textsuperscript{2}, the developed countries include Australia, Hong Kong, Japan and Singapore; while the developing economies comprise India, South Korea and Taiwan. This study acknowledges the developed markets as countries that are well established and have a long standing economic history. The emerging markets concept encompasses some of the developing Pan-Asian nations whose markets are characterised by common features such as thin trading\textsuperscript{3}, limited information and illiquidity as they are establishing. It is interesting to note that the FTSE (2012) country classification index further subdivides the emerging block of countries into advanced and secondary; where the advanced emerging markets include Taiwan and the secondary emerging markets include India. Also, unlike the MSCI (2013) country classification index, FTSE (2012) marks South Korea as a developed market. Studies on developing and emerging markets began to appear in the 1970’s (Rand and Finn, 2002). In recent years there has been a growth in studies on the developing markets, this trend which has mainly been attributed to the many emerging economies seeking funds for infrastructure and investment and for expanding their financial markets.

The remainder of this dissertation is organised as follows. In Chapter 2, the theoretical foundations underpinning the study are reviewed. Chapter 3 provides the overview of literature forming the foundation for this study. Chapters 4 and 5 present the two main pieces of analysis discussed in this thesis. Each one contains sections describing the data and sample, methods used, research design, empirical results,

\textsuperscript{2} which considers country’s economic development, size, liquidity and market accessibility in order to be classified as either developed or emerging

\textsuperscript{3} A thin market is characterised by a relatively small number of buyers and sellers. In case of thin trading, few transactions take place, and as a result, prices tend to be more volatile and assets are likely to be less liquid.
robustness tests and conclusions reached. In particular, in Chapter 4, I discuss the determinants of value investing in some Pan-Asian markets, adopting a cross country approach. Chapter 5 presents a study of analyst forecasts of company EPS in the Pan-Asian region, with the aim of improving the accuracy, reliability and quality of analyst consensus estimates. Finally, Chapter 6 concludes the dissertation by highlighting how the evidence presented in this study can be used by academics and practitioners to enhance their understanding of the functioning of capital markets and make better use of accounting fundamental data, including both historical data and forecast figures.
Chapter Two:

2. Literature Review

“Nothing can better deserve our patronage than the promotion of science and literature. Knowledge is in every country the surest basis of public happiness.”

— George Washington

This study adds to the literature in four major ways. First, most studies conducted on value investing strategies and analyst forecasts relate to the US firms and only a handful cover these two topics in the context of the Pan-Asian region. This study extends earlier research work on evaluating value investing and analysts’ forecasts of EPS for firms and does so by including a wider range of the Pan-Asian markets. In this thesis, the focus is on Australia, Hong Kong, India, Japan, Singapore, South Korea, and Taiwan. These countries have been selected for a number of reasons. First, since the economies of many Pan-Asian countries have been growing more than twice as fast as the rest of the world since the 1980’s (IMF, 2012), these dynamic economies are certainly worthy of attention. Second, with the deregulation of domestic financial markets, the Pan-Asian markets have become strategically important for international investment decisions, as demonstrated by the impressive growth and success of many mutual funds that invest in the Pan-Asian region. Given the vast cultural and religious differences among the Pan-Asian countries and considering the emerging economic importance of the region, using such a sample in this study provides a good experimental setting to explore analyst forecasting reliability outside of the US subpopulation.
The second contribution of this study is such that it spans across a large sample period of ten years for the study on value investing and twelve years for the study on financial analyst forecasts, thus providing a more comprehensive historical coverage of the available data. In addition, I include a much larger sample of companies for each country than any other previous academic study known to us. Sections 4.2 and 5.2 on Data and Methodology would further outline this point. This would allow one to obtain more reliable and meaningful results possibly generalisable to a wide range of other companies.

Third, in this piece of research, I seek to develop a more refined framework for constructing a valuation portfolio as opposed to merely selecting stocks on their price-to-earnings ratio or other earnings based measures. As it shall be further outlined in Chapter 4 of this thesis, it has been long accepted in the financial industry, both formally and informally, that corporate performance is best communicated via the firm’s earnings figures. This may lead one to believe that other financial performance measures are inferior. Nonetheless, as evidence suggests, earnings figures do not always present a realistic view of the company’s affairs and may therefore not be the best prerogative when evaluating the firm’s financial well-being (Damodaran, 2011; Dechow et al, 1998). It is therefore critical to revise this long-standing favouritism towards earnings and explore other accounting variables in terms of their ability to provide indication of the firm’s value.

Finally, I aim to propose a more sophisticated methodology for deriving estimated consensus EPS figures, as compared to simply relying on a mean or median. As mentioned later on in Chapter 5, a fundamental assumption behind the mean and/or median approach is that the available forecasts impartially reflect the
analysts’ private information. However, as evidence suggests, this is not always the case (Trueman, 1994). Sometimes analysts choose to release earnings forecasts that do not differ greatly from their own prior expectations, even though their private information justifies the more extreme earnings forecasts. In other scenarios, analysts tend to report forecasts similar to those previously released by other analysts, even when this is not justified by the information they currently possess; that is, analysts exhibit herding behaviour (Trueman, 1994). In fact, Givoly and Lakonishok (1979) reveal that revisions of various forecasters generally move together. These results are shown to have interesting empirical implications. This therefore goes to suggest that simply calculating a consensus analyst forecast by either averaging or alternatively taking the median of individual analyst forecasts is unsophisticated and inappropriate. Not all analysts are characterised by the same level of skills, experience, and frequency of updates. It is therefore crucial to devise a more sophisticated distinguishing technique for calculating predicted EPS consensus.

2.1. Value Investing

At stated by Qian et al (2009), over the past seventy years, value investing has become a universal centre piece of modern portfolio management. Furthermore, “the dominance of this general approach has survived the ages, due in part to the evidence that value strategies tend to work overtime” (Qian et al, 2009, p.42). Prior to the 1990s, there was little published academic research in leading scholarly journals on value investing (Nocera, 2005). Analysis by Elze (2010) shows that value investing has been profitable while growth strategies have not worked equally well. This finding has also been documented by De Bondt and Thaler (1985), Fama and French (1992, 1998, 2012), Haig (2008) and Lakonishok et al (1994). Following the
conventional definition of value investing, I define value stocks as firms that have high ratios of book to price, earnings to price, cash flow to price, dividends to price, or sales to price. There is plenty of evidence out there that value stocks have higher average returns than growth stocks, which have low ratios of fundamentals to price.

According to Damodaran (2011), the conventional definition of value investing is selecting stocks with a low price-to-book value and/or a low price-to-earnings ratio. In the context of this research, this would translate into investing in stocks with a high book value yield, earnings yield, dividend yield, cash flow yield, and sales yield. On the other hand, the generic definition of value investing as put forward by Damodaran (2011) is paying a price less than the value of the assets in place of a firm. The idea behind value investing is to hold stocks that are believed to be undervalued, either due to information asymmetry and/or unfavourable market conditions. In other words, value investing is an investment paradigm that generally involves buying securities whose shares appear underpriced by some form(s) of fundamental analysis (Graham, 1949). For instance, such securities may trade at a discount to book value, have high dividend yields, low price-to-earnings or price-to-sales ratios. High-profile proponents of value investing have argued that the essence of value investing is buying stocks at less than their intrinsic value (Elze, 2010). The difference between the market price of a security and its intrinsic value is what Benjamin Graham famously called the ‘margin of safety’ (Graham, 1949).

Therefore, it is only when markets underestimate the value of a company’s quality that the value investing strategy provides an opportunity to generate abnormal returns. Notably, value investing relies on many different valuation factors, such as book value yield, earnings yield, dividend yield, cash flow yield and sales yield, for
example. These factors seem to have yielded excess returns over long time horizons. It is not clear, however, whether these excess returns are truly abnormal returns, that is rewards for investing over a long time frame or the appropriate rewards for risk that have not been adequately measured (Damodaran, 2011).

Damodaran (2011) defines two types of value investors: active and contrarian. Importantly, contrarian value investors tend to take positions in firms which have performed poorly in terms of share prices and/or corporations that have acquired a reputation of a ‘bad’ company. While activist investors are the ones “who take positions in undervalued and/or badly managed companies and by virtue of their holdings try to introduce changes that unlock this value” (Damodaran, 2011, p.43). Otherwise stated, these are investors who invest in poorly managed firms but then try to change the way the companies are run.

The academic literature shows that overall value investing has proven to be a successful investment strategy (Sorensen and Thum, 1992). One way to test this assumption is to examine the performance of simple value strategies, such as buying stocks with high yields. Numerous published academic studies investigate the effects of buying value stocks. As mentioned earlier in the thesis, these studies have consistently found that value stocks outperform growth stocks and the market as a whole (Barber and Lyon, 1997; Dreman and Berry, 1995; Fama and French, 1992 and 2007). According to one of the most prominent value investors of all times Warren Buffet, value stock is a cheap stock and a value investor is someone who has the ability to distinguish cheap stocks that do not deserve to be cheap and the insight to understand why certain such companies have a sustained competitive advantage that will be borne out over time (Buffett and Cunningham, 2001). Importantly,
Warren Buffet also referred to the patience to wait for the market to come around to his view of things and the discipline to stick to established value parameters (Buffett and Cunningham, 2001). Interestingly, Warren Buffett’s conclusion is identical to that of the academic research on simple value investing strategies, agreeing that on average value investing proves successful in the long run (Nocera, 2005).

2.2. Framework for Constructing a Value Portfolio

Given the advantages of diversification, many experts recommend maximum diversification, also known as buying the market portfolio. Unfortunately, identifying that portfolio is not straightforward. This line of argument leads to portfolios that are weighted according to some definition of economic footprint, such as book value of total underlying assets at a point in time or annual cash flow. According to Senchack and Martin (1987, p.46), “in search for improved investment performance, a growing number of money managers and investors have turned to using the ‘black box’ technology, employing computers and large databases to screen stocks on the base of such variables as earnings to price, book to price, dividend to price and others”. The goal of such attribute investing is to select stocks which exhibit one or more of the characteristics that are indicative of superior investment performance. In developing the list of potential valuation factors, I have assembled a library of literature on the historical performance review of the valuation metrics considered in this study (book to price, earnings to price, dividends to price, cash flow to price, sales to price) and outline their role in the context of value investing. The relative ease and simplicity of these relative valuation methods turns them into a useful valuation tool. Typically B/P, C/P, D/P, E/P and S/P are analysed when comparing the prices of various stocks based on a desired valuation standard. These ratios essentially all use scaled versions
of price and are used by investors to evaluate the investment attractiveness of a company’s stock from a value standpoint. The next section of the chapter explains the meaning and application of these valuation factors. Price multiples are commonly used to determine the equity value of a company.

**Book to price (B/P)** is a valuation ratio used to compare a stock’s market value to its book value and offers investors a handy, albeit a fairly crude, approach to finding undervalued companies. The B/P ratio, expressed as a multiple (how many times a company’s stock is trading per share compared to the company’s book value per share), is an indication of how much shareholders are paying for the net assets of a company. B/P is the ratio of a company’s book value of equity per share over the market price of its shares. The book value of equity, in turn, is the amount of a company’s assets expressed on the balance sheet. This number is defined as the difference between the book value of assets and the book value of liabilities and may serve as a rough estimator of the firm’s worth (in an accounting sense), if it were to be liquidated. The ratio, often expressed simply as book-to-price, provides investors a way to compare the market value, or what they are paying for each share, to a conservative measure of the value of the firm. A higher B/P could mean that the stock is undervalued signalling that when buying the stock shareholders are paying a relatively low price for the net assets of a company. This may be the case when the stock is being incorrectly valued by investors because of some transitory circumstances and represents an attractive purchase opportunity at a bargain price. That is the essence of value investing. It is assumed that the company’s positive fundamentals are still in place and will eventually lift it to a much higher price level. However, it could also mean that something is fundamentally wrong with the company. Thus, if the market’s low opinion and valuation of the company are correct
(the way growth investors think), at least over the foreseeable future, as a stock investment, it will be perceived at its worst as a losing proposition and at its best as being a stagnant investment.

It is therefore important to understand what the ratio can tell you and when it may not be an appropriate measurement tool. As with most ratios, the meaning of this measure tends to vary by industry or sector. If the company had many assets with a high realisable value then B/P gives some idea of whether investors are paying too much for what would be left if the company went bankrupt immediately. Importantly, B/P is considered a reliable indicator of undervaluation in firms that have a lot of tangible assets that could be sold (Damodaran, 2011). For value investors, B/P remains a tried and tested method for finding low-priced stocks that the market has neglected. If a company is trading for less than its book value, it tells investors one of two things: either the market believes the asset value is overstated, or the company is earning a very poor (even negative) return on its assets. If the former is true, then investors are well advised to steer clear of the company's shares because there is a chance that asset value will face a downward correction by the market, leaving investors with negative returns. If the latter is true, there is a chance that new management or new business conditions will prompt a turnaround in prospects and give strong positive returns. Even if this does not happen, a company trading at less than book value may be broken up for its asset values, earning shareholders a profit. A company with a very high share price relative to its asset values, on the other hand, is likely to be one that has been earning a very high return on its assets. Any additional good news may already be accounted for in the price.
Despite its simplicity, B/P comes with its own repercussions. First, the ratio is mainly useful when you are looking at capital-intensive businesses or financial businesses with plenty of realisable assets on the books. It is probably more relevant for use by investors looking at capital-intensive or finance-related businesses, such as banks. Taking into account conservative accounting rules, book value ignores intangible assets like brand name, goodwill, patents and other intellectual property created by a company. Book value therefore does not carry much meaning for service-based firms with few tangible assets or for firms with a large quantity of written-down non-current assets measured at a figure which bears no relationship to the market value of the assets. Think of a software giant like Microsoft, whose bulk asset value is determined by intellectual property rather than physical property; its shares have rarely sold for less than 10 times book value. In other words, Microsoft’s share value bears little relation to its book value.

Second, book value does not really offer insight into companies that carry high debt levels or sustained losses. Debt can boost a company’s liabilities to the point where they wipe out much of the book value of its hard assets, creating artificially low B/P values. Highly leveraged companies, like those involved in cable and wireless telecommunications, have B/P ratios that understate their assets. For companies with a string of losses, book value can be negative and hence meaningless.

Third, companies can boost or lower their cash reserves, which in effect changes book value, but with no change in operations. For example, if a company chooses to make transfers from the balance sheet, placing it in reserves to fund a
pension plan, its book value may drop. Share buybacks also distort the ratio by reducing the capital on a company's balance sheet.

Fourth, some analysts feel that because a company’s assets are recorded at historical cost that its book value is of limited use. The accounting standards of some countries allow for the revaluation of the property, plant and equipment components of fixed assets in accordance with prescribed revaluation adjustments. Depending on the age of these assets and their physical location, the difference between current market value and book value can be substantial and most likely favour the former with a much higher value than the latter. Although the B/P ratio has its shortcomings, it is still widely used as a valuation metric.

Empirical evidence suggests that historically stocks with high B/P have outperformed low B/P stocks and the overall market (Capaul et al, 1993; Chan et al, 1991; Fama and French, 1992 and 2007). Further, Navin (2011) emphasised that if the stock is trading far below its book value, then you would have to call this stock undervalued, so it probably is the right time to take a look at it. In fact, Capaul et al (1993) expand the analysis of B/P across other countries and conclude that between 1981 and 1992 stocks with a high B/P earned excess returns in each of the six countries they analysed: France, Germany, Switzerland, the UK, the US and Japan. Conducting a study on US firms, Rosenberg et al (1985) and Stattman (1980) find that average stock returns are positively related to the ratio of a firm’s book value of common equity to its market value. Bryant and Eleswarapu (1997) and Vos and Pepper (1997) established the presence of the book-to-market effect in New Zealand. Both studies found a positive relationship of book value to price and returns. In their several studies, Fama and French (1992 and 2007) point out that high B/P may
operate as a measure of risk or a so-called risk proxy, as companies with stock prices significantly below the book value are more likely to be in distress. It is at this point that investors should rethink whether the additional returns generated by such firms justify the additional risk taken on by investing in them (Damodaran, 2011).

**Cash flow to price (C/P)** ratio measures how well the company generates cash from its current operations. Effectively, C/P is a measure of the market’s expectations of a firm’s future financial health. A low C/P ratio indicates that a firm is trading at a high price but is not generating enough cash flows to support the multiple. Thus, a larger C/P would generally be preferred, as it may signal that a firm is generating ample cash flows that are not yet properly considered in the current share price. Because this measure deals with cash flow, the effects of depreciation and other non-cash factors are removed. There are several advantages that the C/P holds over other investment multiples. Most importantly, in contrast to such measures as earnings, sales and book value, it is not as easy for companies to manipulate cash flow. While sales and earnings can be manipulated through such practices as aggressive accounting, and book value of assets falls victim to subjective estimates and depreciation methods. Cash flow multiples provide a more consistent picture of a company.

Similar to earnings to price (E/P), this ratio provides an indication of the firm’s relative value. Yet the C/P ratio is seen by some as a more reliable basis than earnings per share to evaluate the acceptability of a current stock’s pricing. The argument for using C/P over E/P earnings is that cash flow is not easily manipulated, while the same cannot be said for earnings that are affected by a range of accruals including depreciation and other non-cash factors, which also vary across
jurisdictions. Investors need to remind themselves that there are a number of non-cash items in the income statement that lower reported earnings. Recognising the primacy of cash flow over earnings leads some analysts to prefer using the C/P ratio rather than, or in addition to, the company’s E/P ratio.

Many consider this valuation measure to be one of the most important fundamental factors in evaluating the quality of earnings, cash flow and the overall health of a company. Studies regarding fundamental analysis have concluded that the C/P ratio provides a reliable indication of long-term returns. In particular, Jacobs and Levy (1988) argue that because of disparate accounting practices, C/P is superior to earnings to price as a measure of a firm’s value. The authors conclude that on average a high C/P ratio has yielded excess returns between 1978 and 1986, averaging 36 basis points monthly. Jacobs and Levy (1988) point out that a regression of returns on just the C/P, for example, may unintentionally pick up part of the high earnings to price effect, as the average correlation between a stock’s C/P and earnings to price ratios is 0.65 for the sample they have studied. Further, Black Book (2009) focuses on the efficacy of key quantitative metrics as indicators of world stock performance and concludes that C/P was one of the most effective valuation metrics in 2009.

Dividends to price (D/P) ratio\(^4\) shows how much the company pays out in dividends each year relative to its share price and effectively is a partial measure of return on investment. D/P measures how much short-term cash flow an investor gets for each dollar invested in the equity position. Investors who require a stream of cash flow from their investment portfolio can secure this cash flow by investing in stocks

\(^4\) also known as dividend yield
that pay high stable dividends. Stocks with lower growth potential are likely to offer higher dividends to compensate investors. Similar to cash flow, the power of this ratio comes from the fact that unlike earnings, dividends cannot be manipulated by creative accounting. In fact, the nature of dividends is such that they are either declared and paid out in cash or they are not. In addition, dividends are not affected by year to year shocks such as write-offs which can affect earnings. Dividends are important because they send a clear and strong signal about the company’s financial strength to the market.

A stock’s D/P depends on the nature of a company's business, its position in the marketplace, its earnings and cash flow, and its dividend policy. D/P is a relevant metric for industries that do not have stable earnings but provide consistent dividends. Whatever the investing style, it is a matter of historical record that dividend-paying stocks have performed better than non-dividend paying stocks over the long term. According to Litzenberger and Ramaswamy (1979), the effect of dividend policy on the prices of equity securities has been an issue of interest in financial theory. The authors indicate that the traditional view is such that investors bid up the price of high D/P securities relative to low D/P stocks. Importantly for this thesis, this view has existed since the 1960’s and is also shared by Gordon (1963) and Walter (1963). Litzenberger and Ramaswamy (1979) show a significant positive relationship between D/P and returns on common stocks in 1936-1977. In particular, Litzenberger and Ramaswamy (1979) determine that the before tax expected return on a security is linearly related to its dividends to price. In describing the influence of dividend policy on the value of the enterprise, Walter (1963) concludes that the choice of dividend policies almost always affects the value of the enterprise.
Historically, a higher D/P has been considered a powerful tool that investors can add to their repertoire of value searching techniques. A high D/P can signal one of the two things. One is that a stock is either under-priced, or two being the probability that the company is in financial distress and future dividends will not be as high as previous ones. If the stock is under-priced, then a high D/P would suggest that investors are paying a relatively low share price in return for their right to receive the firm’s dividends. Consider an example of one company trading at $6 and paying a $2.40 dividend and another company trading at $8 and also paying a $2.40 dividend. D/P would be higher for the first firm (0.40) while D/P for the second firm would be 0.30. This is true because for receiving the same amount of dividend of $2.40 you pay a lower share price for the first stock. Alternatively, if the company is experiencing financial difficulties, then a high D/P might indicate that the firm would be unable to maintain the current dividend payout ratio. Here, consider an example of two firms where both companies are trading at $6. The first firm pays out a $1.80 dividend, while the second one pays out a $1.20 dividend. D/P for the first stock will be 0.30 and 0.20 for the second stock. In this case, if the first company goes into financial distress, its dividend payout ratio is likely to fall, thus reducing the size of its dividends and lowering its D/P ratio. Similarly, following the same logic, a low D/P can be considered evidence that the stock is over-priced or that future dividends might be higher than the current ones.

Notably, D/P fell out of favour somewhat during the 1990’s due to an increasing emphasis on price appreciation over dividends as the main form of return on investment. Thus, the importance of the D/P in determining stock returns remains a highly debated topic.
The D/P ratio is a popular valuation paradigm across the Dow Jones and the S&P market indexes. In particular, D/P of the Dow Jones Industrial Average has also been considered as an important indicator of the strength of the US stock market\(^5\). Historically, the Dow Jones dividend yield has fluctuated between 3.2% (during market highs, for example in 1929) and around 8.0% (during typical market lows). The highest ever Dow Jones D/P occurred in 1932 when it yielded over 15%, which was only a few years after the famous stock market collapse of 1929, when it yielded only 3.1% (Cohen, 2002). The ‘dogs of the Dow’ is a popular investment strategy which invests in the ten highest D/P Dow stocks at the beginning of each calendar year.

**Earnings to price (E/P)** is the inverse of the well-known P/E ratio. As of today, the E/P measure is the most widely used and recognised valuation ratio. According to Dechow et al (1998, p.133), as “a summary measure of a firm’s performance, earnings occupy a central position in accounting”. The E/P ratio has its imperfections, but it is nevertheless the most widely reported and used valuation tool by investment professionals and the investing public. This ratio shows how much investors are willing to pay per dollar of earnings. It is used to determine the attractiveness of the asset’s current performance and whether the current price level makes for a good buying opportunity. A low E/P suggests that investors expect a higher earnings growth in the future compared to companies with a higher E/P. A high E/P signifies that an investor needs to pay a low amount for each dollar of earnings made by the company, signalling that the stock may be undervalued and represents a potentially good investment; and vice-versa. An important problem that

\(^5\) D/P of the Dow Jones Industrial Average is obtained from the annual dividends of all 30 companies in the average divided by their cumulative stock price
arises with E/P is such that the numerator (earnings) is an accounting measure of earnings, susceptible to assumptions, interpretations and management manipulation. This implies that the quality of E/P is highly dependent on the quality of the underlying earnings number.

According to Bodie et al (2007, p.358), “one of the most enduring concepts for investment concerns is earnings to price”. As stated by Damodaran (2011), investors have long argued that stocks with a high E/P (or a low PE ratio) are more likely to be undervalued and earn abnormal returns. Studies that examine the relationship between E/P and returns tend to support the hypothesis that firms in the highest E/P niche earn considerably higher average returns than firms in the lowest E/P category (Basu, 1977 and 1983; Cook and Rozeff, 1984; Dreman, 1994; Goodman and Peavy, 1985 and 1986; Jacobs and Levy, 1988; Peavy and Goodman, 1982; Reinganum, 1981b). This relationship holds across international markets and does so regardless of the time frame studied. In fact, Basu (1977) studied this issue by ranking US shares by their E/P and comparing the results of the low E/P group with those of the high E/P group. The results of the above mentioned study indicate that stocks with a high E/P outperform the low E/P stocks. Furthermore, following risk adjustment, the high E/P shares are still superior performers (Basu, 1977 and 1983).

The E/P anomaly appears to offer investors a potential strategy for investing that could produce returns superior to those suggested by alternative valuation principles. Dreman (1994) recommends that investors select shares with a high E/P, arguing that firms with a high E/P may currently be unwanted but they almost always do well eventually if they have strong finances and healthy earnings ratios. As per Dreman (1994), for the period 1973-1993, covering a sample of 1200 companies,
stocks with a high E/P outperformed those with a low E/P. The group where E/P was the highest generated an annual return of 23% compared to an 11% return for the low E/P stocks (Dreman, 1994). However, Banz and Breen (1986) provide some evidence that the incremental returns accruing to high E/P are not significant.

Sales to price (S/P) is another stock valuation indicator similar to the E/P ratio. It measures the price of a company’s stock against its annual sales, instead of earnings. Like the E/P ratio, the S/P reflects how many times investors are paying for every dollar of a company’s sales. Since earnings are subject to accounting estimates and management manipulation, many investors consider a company’s revenue figure to be a more reliable ratio component in calculating a stock’s price multiple than the earnings figure. As some of the new economy stocks produced a number of companies without any earnings, sales can be a useful tool in approximating the relative worth of a company. But the new idea of valuing high tech companies by reference to ‘cash burn’ rather than more traditional measures showed itself to flawed during the dot-com crash.

S/P is a ratio for valuing a stock relative to its own past performance, other companies or the market itself. This measure can vary substantially across industries; therefore, it is useful mainly when comparing similar companies. For example, in a highly cyclical industry such as semiconductors, there are years when only a few companies produce any earnings. This does not mean semiconductor stocks are worthless. In this case, investors can use S/P instead of E/P to determine how much they are paying for a dollar of the company’s sales rather than a dollar of its earnings. Yet because S/P does not take debt or expenses into account, the ratio is somewhat limited in its connotations. In particular, companies with large corporate debt and
some that are possibly on the verge of bankruptcy can still show a high S/P. This is because their sales may not have suffered a drop while their share price has started to fall.

This is a traditional valuation metric that has gained prominence in the recent past. Notably, O’Shaughnessy (2005) refers to the S/P ratio as the king of the value factors and concludes that low price-to-sales ratios beat the market more than any other value ratio, and do so more consistently. In fact, Jacobs and Levy (1988) report that S/P experienced a fairly strong payoff and yielded excess returns in 1978-1986, averaging 17 basis points monthly. Further, from a sample of the NYSE and AMEX stocks over the 1976-1984 period, Senchack and Martin (1987) provide evidence that high S/P stocks exhibit both higher absolute returns compared to stocks with a lower S/P. Notably, the S/P valuation strategy has been put forward as a superior alternative to the well documented earnings to price valuation strategy. In this regard, the authors compare the performance of both strategies and argue that using a firm’s S/P as a valuation screening device is similar to using its earnings to price as there is a known accounting relationship between the two (Senchack and Martin, 1987, p.47).

The proponents of the S/P valuation strategy argue that it is superior to the E/P valuation screening method for several reasons. One of them is because sales is less often subjected to accounting discretion than reported earnings and, over time, appears to be more stable and predictable than earnings. The other reason is that S/P provides a meaningful relative valuation measure even when a firm is in financial distress and is generating a loss, in which case its E/P may be meaningless. Lastly, blindly following the E/P based valuation strategy can result in two investment errors. One is eliminating firms with low earnings that have a temporarily high E/P
because they are expected to turn around in the near future. The other possible outcome is purchasing cyclical stocks when their E/P is high but their profits are peaking during an economic growth period and selling stocks at a low E/P whose profits are bottoming during an economic downturn. To summarise, in comparing the performance of the high S/P portfolios with the high E/P portfolios, the authors conclude that the high S/P portfolios have outperformed the market, whereas the high E/P portfolios did not (Senchack and Martin, 1987).

To provide a summary of the discussion on the use and significance of the valuation multiples above, Table 1 below outlines the advantages and disadvantages associated with each fundamental ratio included in this study.
Table 1. Advantages and Disadvantages of Valuation Ratios

<table>
<thead>
<tr>
<th>Valuation ratio</th>
<th>Formula</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
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</table>
| Book value to price, or B/P | Book value per share / Share price | - Can be useful where assets are a core driver of earnings such as capital-intensive industries  
- Most widely used in valuing financial companies, such as banks, which rely on a large asset base to generate profits | - Book values for tangible assets are stated at historical cost, which is not a reliable indicator of economic value  
- Book value for tangible assets can be significantly impacted by differences in accounting policies |
| Cash flow to price, or C/P | Cash flow per share / Share price | - Cash earnings are a rough measure of cash flow  
- Unaffected by differences in accounting for depreciation | - Incomplete treatment of cash flow\(^6\)  
- Usually used as a supplement to other measures if accounting differences are material |

\(^6\) Statements of cash flows commonly show a great deal about an entity’s current cash receipts and payments. Yet a cash flow statement provides an incomplete basis for assessing prospects for future cash flows because it cannot show inter-period relationships. Many current cash receipts, especially from operations, stem from activities of earlier periods, and many current cash payments are intended or expected to result in future, not current, cash receipts. Statements of earnings and comprehensive income, especially if used in conjunction with statements of financial position, usually provide a better basis for assessing future cash flow prospects of an entity than do cash flow statements alone (FASB, 1987, pp.19-20).

In any accounting reporting period, there will be a mixture of complete and incomplete transactions. Transactions are complete when they have led to a final cash settlement and cause no profit measurement difficulties. Considerable problems arise, however, when dealing with incomplete transactions, where the profit or loss figure can only be estimated by means of the accruals concept. This is where revenues and costs are matched with one another so far as their relationship can be established or justifiably assumed and dealt with in the profit and loss account of the period to which they relate. The greater the volume of incomplete transactions, the greater is the degree of estimation, and accordingly the greater the risk for investors to have been misled if actual outcomes deviated from the estimates (CPA Australia, 2014, p.236).
### Table 1. Advantages and Disadvantages of Valuation Ratios (continued)

<table>
<thead>
<tr>
<th>Ratios</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
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<tbody>
<tr>
<td><strong>Dividends to price,</strong></td>
<td>Dividend per share / Share price</td>
<td>Useful for comparing cash returns with types of investments</td>
</tr>
<tr>
<td><strong>or D/P</strong></td>
<td></td>
<td>Can be used to establish a floor price for a stock</td>
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<tr>
<td><strong>Earnings to price,</strong></td>
<td>Earnings per share (EPS) / Share price</td>
<td>Most commonly used equity multiple</td>
</tr>
<tr>
<td><strong>or E/P</strong></td>
<td></td>
<td>Data availability is high</td>
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<td></td>
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<tr>
<td><strong>Sales to price,</strong></td>
<td>Sales per share / Share price</td>
<td>Easy to calculate</td>
</tr>
<tr>
<td><strong>or S/P</strong></td>
<td></td>
<td>Can be applied to loss making firms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less susceptible to accounting differences than other measures</td>
</tr>
</tbody>
</table>

Source: UBS (2001)
2.3. Information Advantage of Financial Analysts

In the past couple of decades, financial analysts’ forecasts have received increased attention in the finance and accounting literature (Givoly and Lakonishok, 1979). They have been widely used in empirical research to proxy for investors’ earnings expectations (Hughes and Ricks, 1987; McNichols, 1989). Other empirical research has focused on comparing analysts’ forecast accuracy to that of both time-series and publicly announced managerial forecasts (Brown and Rozell, 1978; Brown et al, 1987a; O’Brien, 1988). An implicit assumption underlying much of this research is that the forecasts publicly released by analysts reflect their private information in an unbiased manner.

Security analysts are a type of financial intermediary whose immediate concern is the valuation of assets. Thus, they are primarily investment advisors. Because of possible conflicts of interest between investors (principals) and corporate management (agents), analysts also have a stewardship role and may at times serve as corporate critics (De Bondt, 1991). Security analysts prepare detailed studies of individual stocks, make careful comparisons between companies (resulting in industry reports), and form expert opinions on their likely future earnings and investment performance. At the company level, the principal source of information for analysts is financial statement analysis. As a rule, they tend to access a wide array of information, including security prices, firm-specific financial and operating information, industry data, and macroeconomic factors. As the name itself suggests, value-added activity of the analyst is analysis, which encompasses the process through which analysts consider a company’s strategy, accounting policies, financial performance, future prospects for sales and earnings growth, and ultimately a
valuation. Based on the analysis, analysts draw conclusions in the form of earnings forecasts.

According to Abdel-khalik and Ajinkya (1982), security analysts are probably the most important group other than management that is likely to possess private information about the company. On the other hand, management knows what information security analysts want and need (Axelson, 1975). In that regard, Axelson (1975) reported that back in 1974 one company granted about one thousand interviews to financial analysts within one year. Further referring to an informational advantage held by financial analysts, Abdel-khalik and Ajinkya (1982, p.678) highlight that analyst forecast revisions appear to be “prospective in the sense that they contain information that is not deductible from other publicly available information”. Gonedes et al (1976) provide further empirical evidence about the information content of analysts’ earnings forecasts. In fact, few individual investors have the time or skills to determine the fair value of large publicly traded corporations (De Bondt, 1991). Naturally, investors would want to avoid costly mistakes but they also would like to receive a fair return on capital. Probably, social norms of prudence, investor anxiety, and anticipation of regret over flawed decisions contribute to the demand for external financial expertise (De Bondt, 1991; Shefrin and Statman, 1986).

The abundance of literature on financial analysts ultimately points to the difference between the historical academic perspective and investor interest in future events (O’Brien, 1985). The research question addressed by this study is motivated by a common academic use of analyst forecast data and that is being able to determine a proxy for the market expectation of a firm’s earnings at a given point in
time. Accurate measurement of earnings expectations is crucial for firm valuation, determining cost of capital and understanding the relationship between unanticipated earnings and stock price changes. Research on financial analysts has developed as a by-product of capital markets research focused on the correlation between accounting earnings and stock prices. In fact, a lot of studies on financial forecasting focus on examining the correlation between inputs (prices and financial statement information) and outputs (earnings forecasts and recommendations) (Brown et al, 1987b; Fried and Givoly, 1982). The two sources of expected earnings data that are generally used in studies of divergent earnings are analysts’ forecasts and time series models.

The interest in tests of market efficiency and value relevance of accounting earnings has prompted a significant amount of research on time-series modelling of earnings. In this respect, Fried and Givoly (1982) are often given credit as their research supports the conclusion that analysts are a better proxy for expected earnings than time-series models. On one hand, as noted by Brown et al (1987a), if analysts are efficient in any sense, it has to be the case that analysts’ forecasts are more accurate than time-series model forecasts, because analysts have both the timing and the information advantages. In this regard, Grossman and Stiglitz (1980) observe that market prices cannot fully reflect all available information; otherwise, information gatherers like security analysts would not be rewarded for their costly activities. One would assume that analysts can easily obtain a time-series model and incorporate that information into their overall information set (Bradshaw, 2011).

The rational expectations hypothesis suggests that market earnings expectations should be measured by the best available earnings forecasts (Brown and
Rozeff, 1978). Meanwhile, both basic economic theory and the equilibrium employment of analysts imply that being a higher cost factor than time series models, analysts must produce better forecasts than the time series approach (Brown and Rozeff, 1978). Since security analysts process substantially more data than the time series of past earnings, their earnings forecasts should be superior to time series forecasts and provide better measures of market earnings expectations. In addition, since analysts’ forecasts are more costly than time series forecasts, continued employment of analysts by profit-maximising firms implies that analysts’ forecasts must be superior to time series models (Brown and Rozeff, 1978). Aggregate analyst earnings forecasts have been found to be more accurate than forecasts from time-series models in numerous studies (Brown and Rozeff, 1978; Brown et al, 1987a; Fried and Givoly, 1982; Philbrick and Ricks, 1991). In that regard, Brown et al (1987a) agree with the rest of the literature but point out that even though analysts’ forecasts are more precise than time-series forecasts, the prediction errors are large in both cases. The latter presents an interesting matter to consider in more detail. In this chapter I aim to present a method allowing one to achieve a smaller prediction error than that derived from the widely available generic consensus measures.

2.4. The Concept of Income and EPS

According to Schallke (1962), the concept of income constitutes a controversial and complex part of accounting theory, being an area which has important implications for practice. It is an essential characteristic of our economy that results often do not accord with expectations. Any plan, no matter how well conceived, can be disrupted by unforeseen events and circumstances. Thus, plans are made and the economy moves on the basis of expectations, but actual results may
differ from the predicted ones (Schallke, 1962). As said by a well-known economist Adam Smith, it is expectations which are controlling, rather than results. From this follows the significance of *ex ante*, or expected income in the eyes of economists. One important feature is the fact that “*ex ante* calculations are not irrevocable as they can be revised and changed from time to time in order to conform to actual conditions” (Schallke, 1962, p.671).

An important facet of entrepreneurial ability is the ability to adjust expectations quickly and effectively as conditions change. In some industries expectations will necessarily be of a very tentative character, subject to radical change, where the electronics industry is a good example. Despite these exceptions, it would be fair to state that a fair degree of accuracy in expectations may be generally presumed (Schallke, 1962). Another characteristic is the evident uncertainty with expectations. Another feature that should be noted is that expectations can be to some extent self-realising. Business cycle theorists have repeatedly emphasised the importance of favourable psychology in an upswing and of unfavourable psychology in a downswing and depression (Schallke, 1962).

Inevitably, the subject of forecasting financial variables has received wide attention in the last few decades (Crichfield et al, 1978). In fact, continuing effort is being directed toward the improvement of accounting practices in order to present more meaningful financial statements (Axelson, 1975). Expected income is a valuable tool in predicting the direction of a firm, an industry, and taken collectively, the economy. In terms of its impact on capital markets, empirically the annual earnings number is the single most important piece of information that the firm releases (Brown et al, 1985). Similarly, according to Richards (1976), the most
common security valuation technique employed today involves an expected future earnings figure which is capitalised at an appropriate rate (multiplier) to provide an expected future price for a security. As said by Francis (1972), the true economic value of the firm depends on its earnings prospects, in light of anticipated economic conditions. There has been growing concern by both the regulators and the private investment community over the earnings forecasts which are the basis of these valuation models.

As mentioned above, for equity, the main determinant of value is future earnings power (De Bondt, 1991). According to Axelson (1975), the two numbers most used by equity investors today are earnings per share and the price-to-earnings ratio, which are essentially the inverse of each other. As Axelson (1975, p.42), further highlights, “trends in these two numbers are carefully analysed, and predictions of future trends often play a decisive role in investment decisions”. These numbers present important tools enabling one to quantify the evaluation of investment value (Axelson, 1975). In fact, the earnings per share figure serves as a common language for describing the securities of different companies (Axelson, 1975). For any given firm, “earnings per share is defined to be net income (revenues less expenses) divided by the average number of common shares in a given period” (Rodriguez, 2006, p.85). It seems that this figure is so widely followed that small changes in the trend of earnings can have an immediate and significant impact on the market value of securities.

The overwhelming mass of detail that ends up being published in annual reports is often so technical that it ultimately tends to confuse rather than clarify the company’s performance for individual investors (Axelson, 1975). Forecasts are
currently available from professional security analysts and from company management. In addition, recent growth in detailed disclosure has increased the interest in simplistic measures of investment value and, as a result, placed even greater reliance on such accounting measure of performance as EPS (Axelson, 1975). An extensive body of literature has examined the information content of earnings. In fact, Givoly and Lakonishok (1979) find that financial analysts forecast revisions convey or reflect information. Furthermore, the authors provide evidence to suggest that the information on revisions in forecasts of EPS is valuable to investors. According to Crichfield et al (1978, p.652), “an implied purpose of EPS forecasts provided by security analysts is to yield unbiased estimates of future earnings per share which would be useful for investors in assessing firms’ equilibrium values”.

### 2.5. Analysts, the Agency Problem and the Underlying Repercussions

Following the development and increasing accessibility of databases containing analysts’ EPS forecasts, many studies have analysed their quality. An implicit assumption underlying much of this research is that the forecasts publicly released by analysts reflect their private information in an unbiased manner. In contrast, numerous studies document that analysts’ forecasts of earnings, on average, exhibit overoptimism and end up being too high (Abarbanell and Bernard, 1992; Barefield and Comiskey, 1975; Easterwood and Nutt, 1999; Fried and Givoly, 1982; Lys and Sohn, 1990; McDonald, 1973; Stickel, 1990). A panel of previous researchers has documented that analyst forecasts are optimistically biased (Abarbanell, 1991; Butler and Lang, 1991; O’Brien, 1988; Philbrick and Ricks, 1991).

In a study of whether security analysts overreact, De Bondt and Thaler (1990) find that analysts’ forecasts are prone to be too optimistic and too extreme. The
authors conclude that analysts overreact to past earnings changes, resulting in forecasts that are overoptimistic. The authors provide evidence to suggest that analysts’ earnings forecasts are indeed consistent with ‘generalised overreaction’. Specifically, the authors show that earnings changes forecasted by analysts are significantly more extreme than actual realisations, and conclude that the forecasts seem too extreme to be considered rational (De Bondt and Thaler, 1990). Naturally, the optimism bias may simply reflect an economic incentive to encourage trading. Alternatively, the bias may be due to pressure from company management. Importantly, the overreaction bias is more severe for long-term forecasts (Graham, 1949). Further, in their investigation of earnings forecasts for 100 companies, Barefield and Comiskey (1975) conclude that forecasted earnings have exceeded actual earnings in 64% of the cases. The study by Jaggi and Jain (1998) shows that, on an overall basis, analyst forecasts for Hong Kong firms are generally biased towards overstatement.

Following Trueman (1994), an analyst’s compensation may be formally based on several factors, where the most fundamental one is the analyst’s perceived forecasting ability. However, research shows that there may be other factors affecting analysts’ remuneration and career status. As mentioned earlier, many empirical studies have found that analysts tend to issue optimistic forecasts. One explanation that has emerged in the extant literature outlining why analysts issue more optimistic forecasts follows the strategic bias model (Das et al, 2006; Francis and Philbrick, 1993; Lim, 2001; Mest and Plummer, 2003). The latter presumes that analysts have an incentive to issue favourable earnings estimates to maintain their relationship with management. In turn, sustaining a good relationship with corporate executives is critical for analysts competing to obtain access to certain information withheld by
management (Zhang et al, 2010). Importantly, De Bondt and Thaler (1990) interpret the optimism bias as an agency problem. Another explanation is that analysts’ compensation is partly based on the sales commissions they generate and that optimistic forecasts that are accompanied by buy recommendations result in a greater number of trades than pessimistic forecasts accompanied by hold/sell recommendations.

Importantly, I would like to acknowledge the apparently disparate conclusions in the literature whether analysts’ forecasts under- or overreact to earnings (Abarbanell and Bernard, 1992). In particular, studies involving earnings forecasts that are not consistent with the apparently persistent optimistic bias include Abarbanell (1991), Easterwood and Nutt (1999), Lys and Sohn (1990) as well as Theil (1966) who find that analyst forecasts underreact to information in issuing financial forecasts. Similarly, Brown and Rozeff (1978), Brown et al (1985 and 1987a), Fried and Givoly (1982) as well as O’Brien (1988) also find that analysts underestimate actual EPS. Notably, Theil (1966, p.14), states that “generally speaking, forecasters tend to underestimate changes more frequently than they overestimate them”.

Overall, there does not appear to be consensus in the financial literature on whether analysts over- or underreact to information. Thus, the conclusion follows that analysts tend to be fairly inefficient with respect to processing numerous pieces of information. Such evidence of inefficient analysts’ earnings forecasts by De Bondt and Thaler (1990) and Mendenhall (2004) raises an overall question of analysts’ forecast reliability.
2.6. Analysts’ Forecast Accuracy

Analyst forecasting accuracy is of importance not only to investors willing to invest in those stocks, but also to the underlying companies themselves. If the estimates for a particular company are not accurate, this would affect that stock’s liquidity, as not many investors would be willing to trade in such socks. Essentially, the association between security returns and analyst forecast revisions suggests that investors extract relevant information about upcoming earnings from analyst forecasts. Unsurprisingly, a vast majority of research on analysts is focused on their ability to forecast earnings (Clement and Tse, 2005; Mikhail et al, 1997). Existing research indicates that the most important trait valued by institutional investors is industry knowledge, which explains why most analysts specialise by industry. Clearly, analysts are valued for their ability to see individual companies within the context of the industry. As Mikhail et al (1997) highlight, individual analyst experience increases forecast accuracy. According to Clement and Tse (2005), the likelihood of analyst earnings forecasts increases with the analyst’s prior accuracy and experience, and declines with the number of industries the analyst follows.

An implicit assumption behind much of the empirical research involving security analyst earnings forecasts is such that these forecasts reflect the analysts’ private information in an unbiased manner. However, Trueman (1994) shows that this much desired assumption may not necessarily be valid. In this regard, Clement and Tse (2005) classify forecasts as bold if they are away from both the analyst’s own prior forecast and the consensus forecast or below both. The authors classify all other forecasts that move away from the analyst’s own prior forecast and toward the consensus as herding forecasts. The authors find that bold forecasts are on average
more accurate than herding forecasts, as bold forecasts incorporate analysts’ private information and are more informative to investors than herding forecasts. Herding happens when analysts revise their forecasts simply to be closer to the consensus forecast, or other analysts, or both and not because of new private information (Clement and Tse, 2005; Gleason and Lee, 2003). In fact, Givoly and Lakonishok (1979) reveal that revisions of various forecasters do generally move together. These results are shown to have interesting empirical implications. In related research, Trueman (1990) shows that, upon obtaining new information, analysts may also be reluctant to revise previously issued forecasts. This is because a forecast revision would signal the market that the analyst’s original information was inaccurate, which as a result may lower the perceived assessment of the analyst’s forecasting ability. This therefore goes to suggest that naively calculating a consensus analyst forecast by averaging individual analyst forecasts is inappropriate.

An interesting artefact in regard to herding is the persistent trending in forecast earnings revisions. Upward revisions tend to be followed by additional revisions in the same direction, and the same is true for downgrades. For example, when analysts first raise their forecasts for a stock, some investors will buy and the price will rise. When secondary analysts follow, there will be more buying and a further price rise. As stated by Jacobs and Levy (1989), this persistence of estimate revisions leads to persistence in market moves. The reasoning behind trending in forecast earnings revisions is addressed next.

First, due to credibility concerns, individual analysts tend to be averse to forecast reversals, especially when their current view differs from consensus. Suppose an analyst had been forecasting $2 of earnings per share, but now believes
the best estimate to be $1. Rather than admitting to a bad forecast, the analyst will be motivated to reduce the forecast in smaller increments. Second, analysts who suffer from conservatism do not adjust their earnings forecasts sufficiently in response to new information contained in earnings announcements. Third and important, analysts are more concerned about how accurate their forecast is relative to other analysts, rather than how close their individual forecast is to reality. Thus, revising their forecast to a more conservative number will ensure that all upside will be captured if the information is correct, without losing much credibility if the information is wrong.

Relating analysts’ tendency to herd to their experience, Hong et al (2000) find that more experienced analysts are less likely to herd. Similarly, research finds that analysts issuing bold forecasts are on average employed by large brokerages, issue more frequent forecasts, and have greater firm-specific and general experience (Clement, 1999; Hong and Kubik, 2003; Trueman, 1994). In contrast, analysts issuing herding forecasts tend to cover more companies and industries. Consistent with empirical evidence, Hong et al (2000), Scharfstein and Stein (1990) and Stickel (1990) find that experienced analysts are more likely to issue bold forecasts than their less experienced colleagues. In particular, Trueman (1994) proposes that herding declines with the analyst’s experience. This suggests that inexperienced analysts are less likely to provide extreme forecasts and tend to herd more frequently. In turn, investors view bold forecasts as more informative than the more generic herding forecasts.

As it became generally accepted that analysts have status of an important economic agent in the capital markets, academics became interested in a deeper
understanding of analysts’ forecasts and their underlying reliability. Forecasting company earnings is difficult but very important (De Bondt, 1991). Numerous studies examine the differences between actual and expected or divergent earnings (Barefield and Comiskey, 1975; Basi et al., 1976; Brown and Rozeff, 1978; Brown et al., 1987b; Crichfield et al., 1978; Doran, 2000; Fried and Givoly, 1982; Phibrick and Ricks, 1991). The study by Lui (1992) evaluates the ability of security analysts to forecast the EPS for firms in Hong Kong and concludes that analysts’ forecasts are significantly biased and inaccurate. The study by McDonald (1973) provides additional empirical information on the reliability of earnings predictions. Reliability was examined by comparing predicted earnings with actual earnings for the same period. Reliability in this study was based on the degree of agreement between predicted earnings and actual earnings. Therefore, reliability was not used by McDonald (1973) in the sense of declaring predicted earnings reliable or unreliable, but was used in the sense of the degree of closeness to being right.

Earnings forecasts by professionals are generally believed to be valuable information and their accuracy is a matter of concern to a wide range of market participants. The primary use of analyst earnings forecasts in academic work is to provide a proxy for the market expectation of a future earnings realisation (O’Brien 1985). Forecast aggregations, such as the mean or median, are often used for this purpose. These proxies, however, assume that analysts have identical forecasting abilities, so the identity of the individual analyst is ignored in defining the consensus. However, if some analysts produce consistently superior or inferior forecasts, then such knowledge can be used to improve the accuracy of the consensus measure. If analysts update at different times and do not differ in their forecasting ability, then under mild assumptions the most recent forecast available may be more meaningful.
However, if analysts differ systematically in forecasting ability, there will be a trade-off between the age of the forecast and the ability of the forecaster (O’Brien, 1985).

Existing research shows that forecast accuracy generally improves as the forecasting horizon decreases (Brown et al, 1985; O’Brien, 1988 and 1990). So if analyst forecasts are non-synchronous, then the more recent forecasts may incorporate more information and should be more accurate than their out-dated precedents (O’Brien 1985). If the older forecasts are simply irrelevant, then discarding them is appropriate (O’Brien, 1985). Thus, it would flow that the longer the forecast horizon, the greater the disagreement among security analysts in their earnings forecasts (Lui, 1992). This is reasonable because the more distant the future the more difficult it is to make accurate forecasts. Jaggi and Jain (1998) also show that analyst forecasts with shorter time horizons are more accurate than forecasts with longer time horizons. Another interesting factor possibly affecting the outcome of this research is the notion that forecast age varies in significance from sector to sector. Moreover, prior literature suggests that analysts’ forecasts become more accurate as the reporting date is approaching thus further pointing to the increasing forecast accuracy with time.
Chapter Three:

3. Theoretical Foundations

“It is the theory which decides what can be observed.”

– Albert Einstein

The primary function of financial markets is resource allocation. Stock markets possess the potential to be a capital resource allocator. The stock market acts as an intermediary between participants in the economy by providing channels to connect consumers and producers, savers and borrowers, managers and owners, buyers and sellers. Yet the fact that it possesses this potential does not always imply it can perform this function well (Ma, 2004). Optimally stock markets should source funds to the most productive investments as timely as possible. This encompasses informational efficiency, which refers to the speed and completeness with which relevant information is absorbed into asset prices (Groenewold et al, 2004). Stock prices and changes in price levels are considered as signals which encompass a reflection of the relevant information on a security or an asset. Informational efficiency is achieved as price levels adjust fully and instantaneously to any new available and relevant information. These prices convey information about the cost of capital which is essential for directing the flow of funds whilst intermediaries channel these funds between surplus and deficit units.

According to Kothari (2001, p.106), “empirical research is (or should be) informed by theory, since the interpretation of empirical analysis is impossible without theoretical guidance”. Like the pre-amble to this chapter by famous Einstein
who puts it, “it is the theory which decides what can be observed”. Similar to many other theories, financial theories are rather subjective. In other words, there are no proven laws in finance, but rather a set of coherent ideas attempting to explain how the market works. There is now increasing evidence to suggest that the market can be outperformed (Nocera, 2005). Over the past few decades, an increasing body of literature has reported equity return regularities, or anomalies, which seem to contradict the efficient market hypothesis (EMH), the capital asset pricing model (CAPM), and the arbitrage pricing theory (APT) (Fama, 1976; Connor and Korajczyk, 1988; Gultekin and Gultekin, 1987; Keim and Stambaugh, 1986; Lehmann and Modest, 1988; Reinganum, 1981a). Market efficiency as of today seems to be at the centre of the battle of standard finance theories described above versus behavioural finance (Statman, 1999). In this thesis, I present a discussion on whether the efficient market theory has fallen short in terms of explaining the stock market’s behaviour.

3.1. Efficient Market Hypothesis

The Efficient Market Hypothesis, or EMH, is closely related to the theory of perfect competition but is focused on the informational efficiency of markets. It is generally accepted in finance that healthy competition among investors will tend to create an efficient market, in which prices will promptly reflect any new information in an unbiased manner, thus making it difficult to yield consistently superior returns (Keim and Stambaugh, 1986). As Brealey et al (2008) further point out, all that market participants can rationally expect in an efficient market is a return just sufficient enough to reimburse them for the risk they take and the time value of money.
The introduction of the term ‘efficient market’ is originally attributed to Eugene Fama (1965). The stock market seemed to operate in a way where all information reflected in past prices was incorporated into the current price. In other words, the market efficiently processed the information contained in past prices. Fama (1965, p.56) defined an efficient market as “a market where there are large numbers of rational profit maximisers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants”. This definition appears to be very similar to that of a perfectly competitive market out of a microeconomics textbook, where sellers earn profits sufficient to stay in business but insufficient to attract competitors (Chuvakhin, 2013). Yet if one assumes that it applies in the stock market, then it would follow that any new information that becomes available to the market will be very quickly reflected in the prices. Otherwise, there will be opportunities for abnormal returns. According to Fama (1965, p.56), “in an efficient market, on the average, competition will cause the full effects of new information on intrinsic values to be reflected instantaneously in actual prices”. However, as more and more researchers tested the efficient market hypothesis, some rather controversial evidence began to emerge (Chuvakhin, 2013). A growing body of research indicated that profitable selection rules could be based on publicly available information. In particular, stocks with a low price-earnings ratio and high dividend yield outperformed the market (Chuvakhin, 2013). This in turn gives rise to the notion of market anomalies.

The EMH is based on the two major underlying principles which give rise to various market anomalies. First, it assumes that all investors perceive all available information in precisely the same manner. The numerous methodologies for
analysing and valuing stocks therefore pose some problems for the validity of the EMH. If one investor looks for undervalued securities while another investor evaluates stocks on the basis of growth potential, these two investors are likely to reach different conclusion in regard to the stock’s fair market value. Therefore, one of the arguments against the EMH points out that since investors value stocks differently, it is impossible to ascertain what a stock should be worth. Second, under the EMH, equal information awareness would imply that no single investor would be able to generate larger returns than another with the same amount of invested funds. The reality of capital markets, however, shows evidence of a wide range of investment returns attained by a wide range of individual and institutional investors. This idea would naturally imply that the absolute best investment strategy is simply to place all investment funds into an index fund, which would increase or decrease according to the overall level of corporate profitability or losses. There are, however, many examples of investors who have managed to consistently outperform the market. Widely considered to be one of the most successful investors of the twentieth century, Warren Buffett is just one of them.

The EMH provides a testable framework for the study of informational efficiency (Fama, 1970). The framework is based on the classification of available information sets to participants. The EMH comes in three different forms: weak, semi-strong and strong. The weak form of the EMH requires that prices efficiently impound all the information in the past series of stock prices, which makes it impossible for market participants to make superior returns simply by following patterns in stock prices. Otherwise stated, stock price changes follow a random walk. The semi-strong form of the EMH suggests that prices are inclusive of all published information, thus making it impossible for market participants to earn consistently
superior returns only by relying on publicly available data. Finally, the strong form of the EMH suggests that if stock prices effectively reflect all available information, including data from private sources, then it is strong-form efficient. Brealey et al (2008) suggest that superior information is difficult to obtain because in the pursuit of it one market participant would have to compete with a large number of other investors. The best that a market participant can do in this case is to assume that securities are fairly priced (Brealey et al, 2008). The EMH stresses the informational efficiency of a market as opposed to the allocative efficiency and many markets have been found to exhibit weak-form informational efficiency (Viney, 2007).

Thus, the EMH is an investment theory which suggests that it is impossible to outperform the market because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information (Keim and Stambaugh, 1986). According to the EMH, stocks trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell overvalued stocks for inflated prices. As such, it should not be possible to outperform the overall market through expert stock selection or market timing, and that the only feasible way for an investor to obtain higher returns is by purchasing riskier investments. As highlighted earlier in the thesis, the EMH is a core part of finance theory stating that in an efficient market financial assets are priced in an unbiased manner and reflect all relevant information available at a given point in time. In his work, Ng (2010) concludes that the EMH is largely erroneous. To add to this discussion, it is worth highlighting the shortcomings of the EMH, in particular during a recession, as the principles of the EMH become inconsistent with the actual market conditions (Ng, 2010). The global financial crisis of 2008-2009 is a good example of such notion. When the EMH is not consistent with the actual market conditions, this
is known as the financial instability hypothesis (Ng, 2010) and is built upon the premise that financial systems are inherently unstable (Minsky, 1992).

Fama (1970) described an efficient market as one in which asset prices immediately and completely incorporate all relevant information. Furthermore, the famous economist outlined a set of conditions necessary for a perfectly efficient capital market. Firstly, in a perfectly efficient market there are no transaction costs in trading securities. Secondly, all available information is available to all market participants at no cost. Finally, all market participants agree on the implications of the available information for the current price and the distributions of future prices of each security (e.g. equivalent preference for profit maximisation and risk aversion). If these conditions hold, the current price of a security would fully reflect all available information. In practice, markets are not frictionless, not all information is freely available and not all investors agree on the implications of such information. Fama (1970) states that investors may express different views about the implications of information and that the role of expectations formation may play a part in the interaction between observed prices in the present and an investor’s belief about prices in the future. As Keynes (1936, p.156) famously described the role of expectations formation in financial markets:

“... professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preference of the competition as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he
"thinks likeliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view. It is not a case of choosing those which, to the best of one’s judgement, are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects average opinion to be...”

It appears that even though markets are not frictionless and the implications mentioned above exist, it does not necessarily imply that markets are inefficient, unless there are investors who can consistently make better evaluations of available information that are implicit in market prices.

Considering the above mentioned limitations and shortcomings of the EMH, it would be wise to conclude that the market can never be 100% efficient. For greater efficiency to occur, a number of criteria need to be met. First, there needs to be universal access to high-speed and advanced systems of pricing analysis. Second and third, there needs to be a universally accepted analysis system of pricing stocks and an absolute absence of human emotion in investment decision-making, thus crossing out behavioural finance. Putting these requirements into perspective, it is nevertheless hard to imagine any of these criteria of market efficiency to be met in the real world context of capital markets.

Although it is rather fashionable to criticise the EMH, its relevance may actually be starting to gain momentum. With the rise of computerised systems to analyse stock behaviour and that of entire corporations, the process of
investing as such is becoming increasingly automated as supported by mathematical models and/or fundamental analytical methods. Given the hi-tech power and speed, it is now possible to almost immediately process available information and promptly translate such analysis into an instantaneous trade execution. However, despite the increasing use of computers, decision-making is still done by human beings and is therefore subject to human error. Even at an institutional level, the use of analytical machines is anything but universal. While the success of stock market investing is mostly a function of investors’ skills and expertise, it remains an inherent part of human nature to engage in a continuous search for ways to achieve returns greater than the market averages.

Despite being a cornerstone of modern finance theory, the EMH is highly controversial and often disputed. The EMH advocates argue it is pointless searching for undervalued stocks or trying to predict trends in the market through either fundamental or technical analysis. While academics point to a large body of evidence supporting the EMH, a large amount of dissension also exists. For example, investors, such as Warren Buffett are known to have consistently beaten the market over long periods of time, which according to the EMH is impossible by definition. Also, the EMH critics point to events, such as the 1987 stock market crash when the market fell by 20% in a single day, as evidence that stock prices can seriously deviate from their intrinsic values. To conclude, it may therefore be put forward that if value investing strategies can generate excess returns at any particular point in time, the EMH would no longer be plausible.
3.2. Behavioural Finance

At the onset of 2008, as financial markets responded to the economic crisis fuelled by the collapse of subprime mortgage backed securities, it appeared that finance theories could not explain the vast fluctuations” in the market (Stefan, 2009). Progressively, “explanations of the random nature of the stock market emerged from the field of behavioural finance, citing panic and other investor sentiments as the key factors driving the irrational state of the market” (Stefan, 2009, p.1). Despite the emphasis on the EMH in finance, there seems to be increasing evidence of substantial anomalies in financial markets. These suggest that the underlying principles of rational behaviour underpinning the EMH may, in fact, be flawed. Some have therefore begun to look into other elements present in financial markets, including human behaviour. This has in turn prompted the development of what is now known as behavioural finance (Dargham, 2009). Behavioural finance challenges the efficient market’s perspective and focuses on how various market participants interpret and act upon information which is readily available to them. Notably, Kothari (2001, p.107) believes that “future successful capital markets researchers will also be well trained with a solid grounding in the behavioural theories of market inefficiency, which have begun to mushroom in finance and economics”.

Behavioural finance is a new emerging area that studies the irrational behaviour of various market participants. According to the behavioural economists, individuals do not function perfectly as the classical school tells us. Weber (2000) observes that behavioural finance closely combines individual behaviour and market phenomena and uses the knowledge taken from both the psychological field and
financial theory. Behavioural finance attempts to identify the behavioural biases commonly exhibited by market participants and also provides strategies to overcome them. Psychology may be of particular interest to financial economists because it is the basis of irrationality, which leads to the core of behavioural finance.

According to Arnold and Orthman (2011), behavioural finance is about the influence of psychology on the market participants and the subsequent effect thereof on the financial markets. The notion behind human behaviour driving the markets is not novel (Arnold and Orthman, 2011). Several classical economists, including Adam Smith, Irving Fisher and John Maynard Keynes have constantly emphasised the importance of psychological factors in human decision-making, and how these factors may change the analysis of economic issues (Pech and Milan, 2009). Since then studies appear to confirm the significance of the irrational human emotion – a phenomenon so widely observed in the markets today and which appears to be a key driver of the market. According to Sewell (2011), behavioural finance is the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets. The author notes that behavioural finance is of interest because it helps to explain why and how markets might be inefficient. Importantly, the behavioural finance literature falls into two primary areas: the identification of anomalies in the EMH that behavioural models may explain (De Bondt and Thaler, 1985), and the identification of individual investor behaviours or biases inconsistent with classical economic theories of rational behaviour (Odean, 1999). Consistent with the EMH view that anomalies are chance results, apparent overreaction to information is as common as underreaction (Sewell, 2011).
The topic of human reasoning is particularly noteworthy when discussing behaviour and rationality. In a series of co-authored publications, Kahneman and Tversky (1996) establish a cognitive basis for common human errors which arise from heuristics and biases as well as develop prospect theory. Cognitive bias is a tendency to think in certain ways that can lead to systematic deviations from a standard of rationality or good judgment, and is a phenomenon often studied in psychology and behavioural economics. Heuristics refers to experience-based techniques for problem solving, learning and discovery that lead to a solution that is not certain to be optimal. In a book called ‘Judgment under Uncertainty: Heuristics and Biases’, the authors explain that heuristic methods are used to speed up the process of finding a satisfactory solution via mental shortcuts to ease the cognitive load of making a decision particularly where the exhaustive search is impractical. Examples of this method include using a rule of thumb, an educated guess, an intuitive judgment, stereotyping, or common sense. Last but not least, the prospect theory was developed by Kahneman and Tversky (1979) as a psychologically more accurate description of decision making, comparing to the expected utility theory. It is a behavioural economic theory aiming to describe the way people choose between probabilistic alternatives that involve risk and where the probabilities of outcomes are known. The theory states that people make decisions based on the potential value of losses and gains rather than the final outcome, and that people evaluate these losses and gains using certain heuristics. The model is descriptive in the sense that it tries to model real-life choices rather than optimal decisions and in the initial formulation the term prospect originally referred to a lottery (Kahneman and Tversky, 1979).
Studies by Kahneman and Tversky (1979-2000) show that people use heuristics in making judgments under uncertainty. These heuristics often lead to systematic errors. Conjunction fallacy, base rate neglect and overconfidence are examples used to demonstrate a discrepancy between human intuitive reasoning and normative theories of probability. According to Charness et al (2010), conjunction fallacy occurs when two events that can occur together or separately are seen as more likely to occur together than separately. This usually happens when it is easier to imagine two events occurring in a combination than occurring alone. Next, as a well established concept in cognitive science, base rate neglect is the tendency for people to mistakenly judge the likelihood of a situation by not taking into account all relevant data (Barbey and Sloman, 2007). When presented with related base rate, or generic, information on one hand, and specific information (information only pertaining to a certain case) on the other hand, the mind would tend to ignore the former and focus on the latter. Lastly, the overconfidence effect is a bias in which someone’s subjective confidence in their judgements is reliably greater than their objective accuracy, especially when confidence is relatively high (Pallier et al, 2002).

Although most people see themselves as fairly rational decision makers, Tversky and Kahneman (1983) provide evidence to refute this belief and empirically show that people are irrational in a consistent and correlated manner. Irrationality is defined as reasoning, thinking, talking or acting without inclusion of rationality and is more specifically described as an action or opinion given through inadequate use of reason, emotional distress, or cognitive deficiency. The term is used, usually pejoratively, to describe thinking and actions that are, or appear to be,

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7 In psychology, base rate neglect is also known as base rate fallacy or base rate bias.
less useful, or more illogical than other more rational alternatives (Tversky and Kahneman, 1983). Some of the scientific reasons behind explaining why human beings tend to be irrational include but are not limited to the following: confirmation bias, gambler’s fallacy, neglecting probability, observational selection bias, status-quo bias, negativity bias, bandwagon effect, projection bias, and anchoring effect (MacCoun, 1998).

The first is the confirmation bias which postulates that people tend to exhibit a preferential mode of behaviour and agree with other individuals who support them and agree with them likewise. On the other hand, people tend to be put off by individuals and/or groups that make them feel uncomfortable or insecure about their views. This phenomenon is known in psychology as cognitive dissonance and is what ultimately leads to the confirmation bias, described as the unconscious act of favouring only those views that support our pre-existing opinions, while disregarding or dismissing those opinions that are in dissonance with our beliefs (Nickerson, 1998).

The second possible explanation behind human irrationality is known as the gambler’s fallacy. People tend to place a lot of weight on previous events under the belief that those past events would have an effect on future outcomes. The classic example in the context of capital markets is if while holding a stock the trader had been experiencing share price increase for five consecutive weeks, s/he would be more inclined to believe that the share price would continue to increase in the near future. In this scenario, human mind would be inclined to think that the odds must certainly be in the favour of a share price rise. However, we know that in reality the odds are still 50/50 because in statistics, the outcomes in different tosses are
statistically independent of each other and the probability of any future outcome is still 50%. This type of thinking is inherently connected to the concept of a positive expectation bias, which promotes a sense that at some stage one must get lucky and that good fortune must be on its way.

The third explanation driving human irrationality in people is human tendency to neglect probability, a phenomenon that in the context of capital markets can be linked to people’s inability to properly grasp a proper sense of peril and risk. This bias can be explained by looking into a car versus plane crash probability. Although most people do not see an issue with going for a drive in an automobile, many experience hesitation when it comes to getting on-board of a plane for a flight 10km above the sea level. This hesitancy is quite normal as in the eyes of a human being flying is a wholly unnatural and seemingly dangerous activity. However, statistically, there is a 1 in 84 chance of dying in a car accident versus a 1 in 5,000 chance of dying in a plane crash. Clearly, the probability of death in a car accident is considerably higher than that in an airplane crash. Yet knowing this information, human brain would not release us from the crystal clear logic that riding in a car is statistically more dangerous than flying on a plane. This example attempts to explain human inability to grasp a proper sense of risk and often leads people to overstate the risks of relatively harmless activities, while causing them to overrate the more dangerous ones.

The fourth explanation adding to our understanding of human irrationality is known as the observational selection bias. It refers to the effect of suddenly noticing things one did not notice earlier, causing one to believe that the frequency thereof has
risen. This type of a cognitive bias contributes to the feeling that the appearance of certain things or events may not possibly be a coincidence (even though it is).

Another plausible explanation behind human irrationality is the *status-quo bias*, a maxim that fuels our conservative tendencies. It is certainly true that in their vast majority, humans tend to be apprehensive of change. This fear often leads people to make choices that guarantee that things remain the same, or involve as little change as possible. The fallacy of this bias is the unwarranted assumption that another choice will be inferior or make things worse.

Tendency toward a *negativity bias* is another potent explanation behind human irrationality. Human beings are more likely to pay more attention to bad news. Social scientists theorise that under the spectrum of selective attention and given the choice, people perceive negative news as being more important and give it more credibility.

The *bandwagon effect* is the somewhat unconscious human tendency to go with the crowd under the good-old adage of ‘when in Rome, do as the Romans do’. This bias is inherent in the herding effect that both individual traders and financial analysts have shown to exhibit. Importantly, for the herding or grouping to take place, it does not have to be the case of a large crowd. The bandwagon effect is what often propagates behaviours and social norms to proliferate among groups of individuals regardless of the evidence or motives in support.

The *projection bias* (also known as a *false consensus bias*) is yet another significant explanation of the human irrationality hypothesis. Although there may not be any apparent justification supporting this predisposition, most people tend to assume that other people think just like them. This cognitive shortcoming often leads
one to assume that other people not only think like one but that they also agree with one, thus creating a sense of false consensus where in fact there may be none.

Last but not least in the list of phenomena adding to human irrationality is the anchoring effect (also known as the relativity trap). It describes the tendency to compare and contrast only a limited set of items while focusing on a certain item/value/number that in turn gets compared to everything else.

Further on the discussion of human irrationality above, Arnold and Orthman (2011) postulate that a contributor to emotional behaviour’ is short-termism as (especially when under pressure) humans tend to have an inherent preference for short-term activity and outcomes. For example, much of the behavioural finance literature is pointing to people having a tendency of being overconfident and overemphasising the importance of recent events. This can lead to analysts using present conditions and recent trends to make forecasts, even when they are unlikely to be normal. This would effectively result in inaccurate forecasts. Further, human liking for immediate gratification might mean that we prefer observing positive outcomes sooner rather than later, which may cause analysts and investors to track company performance in the smallest time segments practicable. This may, in turn, lead to an unrealistic extreme short-term overemphasis on performance, and as a result, market participants would be likely to make decisions based on a short-term fall or gain that is unlikely to endure in the longer term (Arnold and Orthman, 2011). As a result, irrational investors will lose money and incompetent analysts will lose their credibility and clientele, and as a result, eventually exit the market (Sewell, 2011).
Advocates of behavioural finance say that market inefficiencies are driven by human psychology. Clearly, it would be impractical to assume that humans are 100% rational 100% of the time. This is particularly evident through people’s attitude to risk and the way they assess probabilities. Psychologists have observed that when making risky decisions humans are particularly reluctant to incur losses. Not surprisingly, most investors and analysts do not hold a PhD in probability theory, neither can they with absolute certainty predict the future. Therefore, they may systematically make errors in assessing the probability of uncertain events. Psychologists have found that when judging possible future outcomes, individuals tend to look back at what happened in a few similar situations and, as a result, may place too much weight on a small number of recent events (Brealey et al, 2008). However, market participants of this sort seem to forget how little one can learn about the true market conditions purely on the basis of a short-term glimpse. The tendency to place too much emphasis on recent events, and therefore the underlying predisposition to overreact to recent news, could explain some of the most abrupt fluctuations in the market. In turn, behavioural finance may offer some reasonable explanation of some of the puzzles and anomalies surrounding the market. In fact, the advocates of behavioural finance suggest that these patterns of investor behaviour can explain why markets are not always efficient.

Kahneman and Riepe (1998) find that market deviations from the maxims of economic rationality are pervasive and systematic. So market participants tend to deviate from rationality. Further, according to Conlisk (1996, p.670), the concept of rationality in the context of capital markets is empirically very important because “there is a mountain of experiments in which people may display intransitivity, ignore relevant information or use irrelevant information”. In his book, Shiller (2000)
explains the irrational behaviours of market participants. Importantly, the book was published just before the most serious market collapse since the Great Depression, the dot.com bubble. Among a number of important factors, the author lists optimistic analyst forecasts as a factor contributing to the irrational exuberance of the most recent bull market from August 1987 to early 2000. Notably, Trammel (2006) argues that theories about rational behaviour are conspicuous targets for both practitioners and professors of finance.

Behavioural finance is a field of finance, which seeks to understand and explain systematic financial market implications resulting from psychological decision processes. According to Fromlet (2001), behavioural finance closely combines individual behaviour and market phenomena and uses knowledge from both the psychological field and financial theory. It is effectively a new paradigm of finance which seeks to supplement the modern theories of finance by introducing behavioural aspects to the decision making process. Behavioural finance assumes that the psychology of decision-making under uncertainty may lead to market inefficiency and market anomalies (Levy and Post, 2005). It focuses on the application of psychological and economic principles for the improvement of financial decision-making (Olsen, 1998). In fact, there have been a number of studies pointing to market anomalies that cannot be explained with the help of standard financial theory (Shiller, 1998). These anomalies suggest that the underlying principles of rational behaviour underlying the EMH are not entirely correct and that there is a need to also consider other models of human behaviour, as suggested by social sciences (Shiller, 1998).
Chuvakhin (2013) points to the unavoidable issue of investor heterogeneity explaining that investors are not identical. Even if investors have identical information available to them, they are likely to interpret and act upon it differently. One good example is investor tax status. Tax-exempt, tax-deferred, and taxable investors acting rationally will often choose different courses of action when presented with the same problem. Chuvakhin (2013) highlights that liquidity needs can also play a role. Hence, since the early 1980s, there has been a movement toward incorporating more behavioural theory into finance. The proponents of behavioural finance cite several key areas where the reality seems to be most at odds with the EMH. Some of these rather controversial topics are: excess volatility, dividend puzzle and the equity premium (Chuvakhin, 2013).

Excess volatility appears to generate price movements which seem to be much greater than an efficient market would otherwise allow (Chuvakhin, 2013). Therefore a related paradox relates to trading volume. If investors assume that all traders (including themselves) are rational, then every market participant might question what sort of information the seller has that the buyer does not, and vice versa. Working out precisely how little trading would take place under the EMH is a difficult (if not an impossible) exercise, because investors are faced with liquidity and rebalancing needs. Yet the proponents of behavioural finance hypothesise that a billion or so shares a day on one stock exchange alone is a little more than one should expect under the EMH scenario. The second notion put forward by Chuvakhin (2013) relates to the notion of dividends. As per Modigliani and Miller (1958), in a perfect capital market world where securities are fairly priced, where there are no tax consequences or transaction costs and where investment cash flows are independent of financing choices, investors would be indifferent between
dividends and capital gains. In the real world, however, due to the structure of most taxation systems, investors would generally prefer capital gains to dividends, while corporations would favour share buy-backs to dividends. At the same time, most large companies do pay dividends and history has shown that changes in stock price levels tend to be positively correlated with changes in the level of dividends. Existing literature marks dividends as another powerful source of signalling a company’s financial well-being to the market. The third concept that deserves attention, according to Chuvakhin (2013), is the equity premium. Historically, this gain has been much higher than what could be described by risk alone. Importantly, to the defence of the EMH, the equity premium implied in dividend yields tends to be significantly lower. It seems that future returns can at least partially be predicted on the basis of various historic measures such as price-earnings and price-to-book ratios, earnings surprises, dividend changes or share buy-backs (Chuvakhin, 2013).

Behavioural finance postulates that investors have cognitive biases, or that there is an imperfection in human perception of reality. Some of the most common cognitive biases in finance are: mental accounting, biased expectations, reference dependence and representativeness heuristic. Speaking of mental accounting, it seems as though most investors perceive a dividend dollar differently from a capital gains dollar (Chuvakhin, 2013). This could be because dividends are usually thought of as an addition to disposable income, while capital gains are not. Next, people tend to be overconfident in their predictions of the future, which gives rise to biased expectations. For example, if financial analysts were to think with an 80% confidence that a certain share price will rise, they would be right about 40% of the time. Having said this, “between 1973 and 1990, earnings forecast errors have been anywhere between 25% and 65% of actual earnings” (Chuvakhin, 2013, p.11).
Another important cognitive bias in finance is reference dependence, or an investor’s reference point. For example, if a certain stock was at some point trading for $25, then fell to $10 and finally recovered to $18, the investor’s tendency to increase holdings of this stock will depend on whether the prior purchase was made at $25 or $10. Last is the representativeness heuristic. In cognitive psychology this means that people tend to judge event A to be more probable than event B when A appears more representative than B. In finance, the most common instance of the representativeness heuristic is when investors mistake good companies for good stocks. The matter of the fact here is that “good companies are well-known and in most cases fairly valued; their stocks, therefore, may not have a significant upside potential” (Chuvakhin, 2013, p.11).

The importance of behavioural finance and its role in the real life decision making process appears self-evident (Chuvakhin, 2013). While behavioural finance on its own may fail in enhancing our chances of beating the market, it can help us understand the beliefs and motivations of market participants in general and improve our understanding of the functioning of capital markets. Yet the advanced proponents of behavioural finance recognise the limitations of this approach. According to Statman (1999), the term market efficiency has two meanings. One meaning is that investors cannot systematically beat the market and the other is that security prices are rational. Rational prices reflect only fundamental or utilitarian characteristics, such as risk, but not psychological or value-expressive characteristics, such as sentiment (Statman, 1999). Behavioural finance has shown, however, that value-expressive characteristics matter in both investor choices and asset prices. For that reason Statman (1999, p.18) argues that “the discipline of finance would do well to
accept the first meaning of market efficiency and reject the notion that security prices are rational”.

Overall, it appears that many stock market anomalies can be explained through either behavioural biases or institutional imperfections. In fact, Thaler (1999) suggests applying the behavioural model to institutional investing and corporate finance. As Statman (1999) notes, while individuals are considered to be ‘rational’ in standard finance, they are viewed as ‘ordinary’ in behavioural finance. From here it appears that rational people care about utilitarian characteristics, but not the value expressive ones, they are never confused by cognitive errors, have perfect self-control and are always averse to risk. On the other hand, ordinary people from behavioural finance are not known to submissively follow such cognitive trend. In this regard, Simon (1947) rejects the assumption made in classical theory that views the firm as a well-informed, rational and profit-maximising entrepreneur. Instead, the author replaces the notion of entrepreneur per se by a number of cooperating decision makers, whose capacities for rational actions are limited, both by the lack of knowledge about the total consequences of their decisions as well as by personal and social ties.

3.3. Modern Portfolio Theory

As a well-developed paradigm, Modern Portfolio Theory (MPT) is an important part of finance theory. It is a theory of investment which seeks to maximise portfolio expected returns for a given amount of portfolio risk, or equivalently minimise risk for a given level of expected return, by carefully choosing the weights of various assets. Although in practice MPT is widely used by the
financial industry, in recent years the basic assumptions of MPT have been widely challenged by the field of behavioural finance discussed above (Bodie et al, 2007).

As per Elton and Gruber (1997), one of the key issues facing an individual is how to allocate wealth among alternative assets. Further, Nobel prize winner Harry Markowitz (1952) subdivides the process of selecting a portfolio into two stages. “The first stage starts with observation and experience and ends with beliefs about the future performances of available securities, and the second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio” Markowitz (1952, p.77). Having the second stage as his major concern, the author considers two rules in his work. The first rule is that the investor does (or should) maximise discounted expected or anticipated returns. The second rule proposed by the author is that the investor does (or should) consider expected return a desirable thing and variance of return an undesirable thing. Markowitz (1952) rejects the first rule, both as a theory to explain and as a maxim to guide investment behaviour and proposes that the second rule has many valid points on the same scale, i.e. both as theory to explain and as a maxim to guide investment behaviour.

Markowitz (1952 and 1959) formulated portfolio problem as a choice of the mean and variance of a portfolio of assets. He provided evidence of the fundamental theorem of mean variance portfolio theory, namely holding constant variance, maximize expected return, and holding constant expected return to minimize variance. These two principles led to the formulation of an efficient frontier from which the investors could choose their preferred portfolios, depending on individual risk return preferences. Markowitz (1952) proposes that the investor should diversify his funds among all those securities which give maximum expected return. Yet the
portfolio with maximum expected return is not necessarily the one with minimum variance (Markowitz, 1952). In discussing portfolio evaluation, Elton and Gruber (1997) stress the need to be concerned with risk as well as return in examining performance.

MPT is based on the concept of diversification in investing, with the aim of selecting a portfolio of investment assets that collectively has lower risk than any individual asset on its own (Bodie et al, 2007). The important message of the theory was that assets could not be selected only on characteristics that were unique to the security. Rather, an investor had to consider how each security co-moved with all other securities. Furthermore, taking these co-movements into account resulted in an ability to construct a portfolio that had the same expected return and less risk than a portfolio constructed by ignoring the interactions between securities. Considering just the mean return and variance of return of a portfolio is, of course, a simplification relative to including additional moments that might more completely describe the distribution of returns of the portfolio.

Diversification is possible because different types of assets often change in value in opposite ways. More technically, the MPT models an asset’s return as a normally distributed function, defines risk as the standard deviation of return, and models a portfolio as a weighted combination of assets so that the return of a portfolio is the weighted combination of asset returns (Bodie et al, 2007). By combining different assets whose returns are not perfectly positively correlated, MPT seeks to reduce the total variance of the portfolio return by assuming that investors are rational and markets are efficient (Bodie et al, 2007). The fundamental concept behind MPT is that assets in an investment portfolio should not be selected
individually, each on their own merits. Rather, it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price. MPT is therefore a form of diversification. Under certain assumptions and for specific quantitative definitions of risk and return, MPT explains how to find the best possible diversification strategy.

As per the discussion above, diversification means reducing risk by investing in a variety of assets. If the asset values do not move up and down in perfect synchrony, a diversified portfolio will have less risk than the weighted average risk of its constituent assets, and often less risk than the least risky of its constituent. Therefore, a risk-averse investor will diversify to at least some extent, with more risk-averse investors diversifying more completely than less risk-averse investors. Since the mid-1970’s, it has also been argued that geographic diversification would generate superior risk-adjusted returns for large institutional investors by reducing overall portfolio risk while capturing some of the higher rates of return offered by the emerging markets of Asia and Latin America.

Diversification is one of two general techniques for reducing investment risk. The other is hedging. Diversification relies on the lack of a tight positive relationship among the asset returns, and works even when correlations are near zero or somewhat positive. Hedging relies on negative correlation among assets, or shorting assets with positive correlation. The simplest example of diversification is provided by the proverb “Don't put all your eggs in one basket”. Dropping the basket will break all the eggs. Placing each egg in a different basket is a form of diversification, the probability of any one basket being dropped notwithstanding. There is more risk
of losing one egg (assuming at least one basket has a higher probability of being dropped than the original basket), but less risk of losing all of them.

In finance, an example of an undiversified portfolio is to hold only one stock. This is risky; it is not unusual for a single stock to go down 50% in one year. It is much less common for a portfolio of 20 stocks to go down that much, especially if they are selected at random. By diversifying, one loses the chance of having invested solely in the single asset that comes out best, but one also avoids having invested solely in the asset that comes out worst. That is the role of diversification: it narrows the range of possible outcomes. If the stocks are selected from a variety of industries, company sizes and types (such as some growth stocks and some value stocks) it is still less likely.

Importantly, in this regard, Markowitz (1952) highlights that “the adequacy of diversification is not determined solely by the number of different securities held”. For example, a portfolio with fifty different energy stocks would not be considered as well diversified as a portfolio of the same size but with stocks from different industries: railroad, some public utility, mining, manufacturing, etc. The underlying explanation is that companies within the same industry are likely to be affected by the same sorts of idiosyncratic risk and are likely to do poorly at the same time than companies in dissimilar industries/sectors. Similarly in trying to reduce portfolio variance, it is not enough to simply invest in a large number of securities. What is more important is to avoid investing in securities that have high covariance and/or positive correlation. Investors should therefore diversify across industries/sectors because firms in different industries, especially industries with different economic characteristics, have lower covariance/correlation than firms within industry.
Originally developed in the 1950-70s, the MPT was considered an important advance in financial modelling. Since then, many theoretical and practical criticisms have been levelled against it. Recently we have seen growing evidence that investors are not economically rational and markets are not efficient (Koponen, 2003; Shleifer, 2000). Nevertheless, most business schools tend to emphasise the importance of the MPT, which has as its central tenet that the market is sufficiently efficient so that it cannot be beaten with any regularity (Nocera, 2005). Sensibly enough, the MPT stresses that diversification is the best way to spread the market risk. It also generally holds that because the market is efficient, those who outperform it are more likely to be lucky than skilled.

Despite the theoretical importance of MPT, its critics question whether it is an ideal investing strategy as its model of financial markets does not match the real world in many ways (Bodie et al, 2007). The MPT framework makes many assumptions about investors and markets. Some are explicit in the equations, such as the use of normal distributions to model returns, while others are implicit, such as the disregard of taxes and transaction costs. None of these assumptions is entirely true, and each of them compromises the MPT to some degree. Inevitably, the problem is that the mathematical models underpinning the MPT rely on numerous unrealistic principles. It is on these grounds that one may argue that the MPT does not realistically model the market. It is also true that diversification, which is the backbone of the MPT, in a way inclines portfolio managers to invest in stocks without analysing their fundamentals, solely for the benefit of eliminating the portfolio’s non-systematic risk.
3.4. Capital Asset Pricing Model

A primary valuation model derived from the EMH is the Capital Asset Pricing Model (CAPM) which has driven a lot of asset decisions and builds on the concept of investors constructing efficient portfolios (Reinganum, 1981). During the early 1960s, four economists – Lintner (1965a and b), Mossin (1966), Sharpe (1964) and Treynor (1961) – independently of one another and almost simultaneously developed essentially the same model for describing security returns. Building on the earlier work of Harry Markowitz on diversification and modern portfolio theory (MPT), the capital asset pricing model (CAPM), as it later became known, revolutionised the theory and practice of investments by simplifying the portfolio. Despite the availability of the more modern approaches to asset pricing and portfolio selection (such as the arbitrage pricing theory for example), the CAPM remains popular due to its simplicity. The model is used to determine a theoretically appropriate required rate of return for an asset, if the asset is to be added to an already well-diversified portfolio, given the asset’s non-diversifiable risk. The model takes into account the asset’s sensitivity to non-diversifiable risk (also known as systematic risk or market risk), 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. CAPM suggests that an investor’s cost of equity capital is determined by beta (Chong et al, 2013). An extension to the CAPM proposed by Chong et al (2012) is the dual-beta model which separates the downside beta from the upside beta.
CAPM describes the relationship between risk and expected return and is used in the pricing of risky securities. The general idea behind CAPM is that investors need to be compensated in two ways: time value of money and risk (Keim and Stambaugh, 1986). The time value of money is represented by the risk-free rate and compensates the investors for placing money in any investment over a period of time. The other factor is 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 from the asset to the market over a period of time and to the market premium. According to the CAPM, the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If the expected return does not meet or exceed the required return, then the investment should not be undertaken.

An important part of the diversification discussion revolves around risks. The CAPM introduces the concepts of diversifiable risk\(^8\) and non-diversifiable risk\(^9\). Diversifiable or unsystematic risk is company specific and affects a very specific group of securities or an individual security and can be reduced through appropriate diversification. An example of a diversifiable risk would be a sudden strike by company employees. On the other hand, non-diversifiable or systematic risk is a form of risk inherent to the entire market or entire market segment or industry. Interest rates, recession and wars all represent sources of systematic risk because they affect the entire market and

\(^8\) Diversifiable risk is also called non-systematic risk, idiosyncratic risk, residual risk, unique risk or security-specific risk

\(^9\) Non-diversifiable risk is also called systematic risk or market risk
cannot be circumvented with the help of diversification. Non-diversifiable risk affects a broad range of securities and can only be mitigated via the use of hedging strategies. Thus if an investor buys all the stocks in the S&P 500, they are exposed only to movements in that index. But if an investor buys only one stock in the S&P 500, they are then exposed both to index movements and movements in the stock based on its underlying company. The first risk is a form of non-diversifiable risk because it exists regardless of how many S&P 500 stocks are bought. The second risk is a form of diversifiable risk because it can be reduced by diversifying across a range of stocks. The CAPM argues that investors should only be compensated for non-diversifiable risk. Yet importantly, even a portfolio of well-diversified assets cannot escape all inherent risks.

Thus, the CAPM is a model for pricing an individual security or portfolio. According to Brealey et al (2014, p.196), “the model’s message is both startling and simple – in a competitive market, the expected risk premium varies in direct proportion to risk, denoted by beta”. If this is true, then “all investments must plot along the sloping line, known as the security market line (SML)” (Brealey et al, 2014). The SML therefore displays the expected rate of return of an individual security as a function of systematic, non-diversifiable risk (its beta). The SML essentially shows how the market ought to price individual securities in relation to their security risk class and allows calculating the reward-to-risk ratio for any security in relation to that of the overall market. Therefore, when the expected rate of return for any security is deflated by its beta coefficient, the reward-to-risk ratio for any individual
security in the market is equal to the market reward-to-risk ratio. The market reward-to-risk ratio is effectively the market risk premium.

The CAPM returns the asset-appropriate required return or discount rate, being the rate at which future cash flows produced by the asset should be discounted given that asset’s relative riskiness. Betas exceeding one signify more than average riskiness and betas below one indicate lower than average riskiness. Thus, while more risky stocks will have a higher beta and will be discounted at a higher rate, less sensitive stocks will have lower betas and be discounted at a lower rate. Given the accepted concave utility function, the CAPM is consistent with the intuition outlined earlier in that investors should require a higher return for holding a more risky asset. Since beta reflects asset-specific sensitivity to non-diversifiable or market risk, the market as a whole, by definition, has a beta of one. Stock market indices are frequently used as local proxies for the market. In that case they by definition have a beta of one. An investor in a large, diversified portfolio would therefore expect performance in line with the market.

As outlined above, the risk of a portfolio comprises non-diversifiable or systematic risk and diversifiable or non-systematic risk which is also known as idiosyncratic risk. Systematic risk refers to the risk common to all securities, or market risk, while non-systematic risk is the risk associated with individual assets. Non-systematic risk can be diversified away to smaller levels by including a greater number of assets in the portfolio. However, the same is not possible for systematic risk within one market. Depending on the market, a portfolio of approximately 30-40 different securities in developed markets will
render the portfolio sufficiently diversified such that risk exposure is limited to systematic risk only. In developing markets a larger number is required, due to the higher asset volatilities and lower market liquidity. It would therefore follow that rational investors should not take on any diversifiable risk, as only non-diversifiable risks are rewarded within the scope of the CAPM. Therefore, the required return on an asset or the return that compensates for the risk taken, must be linked to its riskiness in a portfolio context. Hence the beta of the portfolio is the defining factor in rewarding the systematic exposure taken by an investor. In the CAPM context, portfolio risk is represented by higher variance i.e. less predictability.

Importantly, the CAPM is founded on a number of assumptions according to which investors are assumed to be rational and risk-averse utility maximisers. They are assumed to be price takers, deal with securities that are all highly divisible into small parcels and be broadly diversified across a range of investments. Investors can lend and borrow unlimited amounts under the risk-free rate of interest and be able to trade without transaction or taxation costs. Lastly, the CAPM assumes that all information is simultaneously available to all investors. Naturally, there has been a voluminous critique attempting to question the usefulness of the CAPM and it has been put under the empirical microscope. Some of the main issues with the application of CAPM include the following:

First, the CAPM assumes that the variance of returns is an adequate measurement of risk. This would be implied by the assumption that returns are normally distributed, which may not always be the case. Indeed risk in
financial investments is not variance in itself, rather it is the probability of losing: it is asymmetric in nature.

Second is the homogeneous expectations assumption, whereby the CAPM assumes that all active and potential shareholders have access to the same information at the same time and agree about the risk and expected return on all assets. This touches upon the tenets of the EMH discussed earlier on in the chapter.

Third, the CAPM assumes that the probability beliefs of active and potential shareholders match the true distribution of returns. A different possibility is that shareholder expectations are biased, causing market prices to be informationally inefficient as cited in the field of behavioral finance, which uses psychological assumptions to provide alternatives to the CAPM.

Fourth, the CAPM 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 (Black et al, 1972). What follows from this is that either the EMH holds but the CAPM is wrong, or the CAPM holds but the EMH is wrong.

Fifth, the CAPM assumes that given a certain expected return, investors prefer lower risk to higher risk and conversely given a certain level of risk will prefer higher returns to lower ones. It does not take into account investors who will agree to receive lower returns for higher risk.

Sixth, the CAPM assumes zero taxes and zero transaction costs, which does not reflect the true market situation. The CAPM assumes trading is
costless yet in reality many investments involve significant transaction costs. Then the CAPM also goes to assume that investment trading is tax-free and returns are not affected by taxes. However, this assumption can be argued to be false because many investment transactions are subject to capital gains taxes, thus adding transaction costs and reducing expected returns for investors. In addition, in the real world different types of returns (dividends versus capital gains, taxable versus tax deferred) are taxed differently, thus causing investors to choose portfolios with tax favoured assets. Finally, different investors (individuals versus funds) are taxed differently.

Seventh, the market portfolio consists of all assets in all markets, where each asset is weighted by its market capitalisation. This assumes three things for shareholders: one is no preference between markets and assets; two is that shareholders choose assets solely as a function of their risk-return profile; and three is that all assets are assumed to be infinitely divisible as to the amount which may be held or transacted. Eight, in theory, the market portfolio should include all types of assets that are held by anyone as an investment. In practice, such market portfolio is unobservable and people usually substitute a stock index as a proxy for the true market portfolio. Unfortunately, it has been shown that this substitution is not innocuous and can lead to false inferences as to the validity of the CAPM, and it has been said that due to the unobservability of the true market portfolio, the CAPM might not be empirically testable (Roll, 1977).

Lastly for the application and implications of the CAPM, empirical tests by Fama and French (1992 and 1993) provide evidence of such market
anomalies as the size and value effect that cannot be explained by the CAPM. The notion of the value effect is a vital building block of this thesis and shall be further discussed in the Chapter 3.

3.5. Arbitrage Pricing Theory

Originally proposed by the economist Ross (1976), the arbitrage pricing theory (APT) is a general theory of asset pricing that holds that the expected return of a financial asset can be modelled as a linear function of various macro-economic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient. According to Ross (1976, p.341), “the arbitrage model was proposed as an alternative to the mean variance capital asset pricing model which has become the major analytic tool for explaining some of the phenomena observed in capital markets for risky assets”.

The APT and CAPM are the two leading theories on asset pricing. Notably, one of the important assumptions and requirements for both CAPM and APT is perfect competition in the market. Yet the APT differs from the CAPM in that it is less restraining in its assumptions. It allows for an explanatory (as opposed to statistical) model of asset returns. The APT assumes that each investor will hold a unique portfolio with its own particular range of betas, as opposed to the notion of a ‘one size fits all’ market portfolio as in the case of the CAPM. In some ways, the CAPM can be considered a special case of the APT in that the securities market line represents a single-factor model of the asset price, where beta is exposed to changes in value of the market. Additionally, the APT can be seen as a supply-side model since its beta coefficients reflect the sensitivity of the underlying asset to economic factors. Thus, factor shocks would cause structural changes in assets’ expected
returns, or in the case of stocks, in firms’ profitability. On the other side, the CAPM is considered a demand-side model. Its results, although similar to those of the APT, arise from a maximisation problem of each investor’s utility function, and from the resulting market equilibrium (investors are considered to be the so-called ‘consumers’ of the assets).

Being a core element of the APT, arbitrage is the practice of taking positive expected return from overvalued or undervalued securities in the inefficient market without any incremental risk and zero additional investments. While in the CAPM context, investors are mainly concerned about mean return and variance and only hold traded assets, under the APT scenario, arbitrage consists of trading in two assets with at least one being mispriced. The arbitrageur then sells the asset which is relatively overpriced and uses the proceeds to buy one which is relatively underpriced. The APT proposes that an asset is mispriced if its current price deviates from the price predicted by the model. The asset price today should equal the sum of all future cash flows discounted at the APT rate, where the expected return of the asset is a linear function of various factors, and sensitivity to changes in each factor is represented by a factor-specific beta coefficient.

A correctly priced asset may be in fact a synthetic asset, or a portfolio consisting of other correctly priced assets. This portfolio has the same exposure to the macroeconomic factors as the mispriced asset. The arbitrageur creates the portfolio by identifying a number of correctly priced assets and then weighting the assets such that portfolio beta per factor is the same as for the mispriced asset. When the investor holds a long position in the asset and a short position in the portfolio (or vice versa), they have created a position which has a positive expected return (the
difference between asset return and portfolio return) and which has a net-zero exposure to any macroeconomic factor and is therefore risk free (other than for firm specific risk). The arbitrageur is therefore in a position to make a risk-free profit.

As with the CAPM, the factor-specific betas are found via a linear regression of historical security returns on the factor in question. However, unlike the CAPM, the APT does not itself reveal the identity of its priced factors as the number and nature of these factors is likely to change over time and across economies. As a result, this issue is essentially empirical in nature. Chen et al (1986) identified surprises in the following macro-economic factors to be significant in explaining security returns: inflation, GNP as indicated by an industrial production index, investor confidence due to changes in default premium in corporate bonds, and yield curve shifts. As a practical matter, indices or spot or futures market prices may be used in place of macro-economic factors, which are reported at low frequency (e.g. monthly) and often with significant estimation errors. More direct indices that might be used are: short term interest rates, the difference in long-term and short-term interest rates, a diversified stock index such as the S&P 500 or NYSE composite index, oil and gold prices, currency exchange rates.

To summarise, this chapter has reviewed some of the most central theoretical foundations in finance: the efficient market hypothesis (EMH), behavioural finance (BF), modern portfolio theory (MPT), capital asset pricing model (CAPM), and the arbitrage pricing theory (APT). As established earlier in the thesis, since there are no proven laws in finance, these are a set of coherent ideas attempting to explain how the market works. Further in the dissertation, I present a discussion on whether the
efficient market theory has fallen short in terms of explaining the stock market’s behaviour.
Chapter Four:

4. The Determinants of Value Investing in some Pan-Asian Markets: a Cross Country Approach

“Study the past if you would define the future.”

– Confucius

4.1. Introduction

This chapter examines the performance of value investing strategies in a number of countries in the Asian region. In this study, I investigate the relative merits of some financial variables that have been proposed as explanatory factors for future stock returns. The study involves a comprehensive analysis of five accounting factors calculated using information in quarterly company reports covering 2001-2010 across more than a thousand stocks. I adopt long-short equity strategies allowing investors to benefit from both undervalued and overvalued securities. I first rank a sample of investable stocks using their fundamentals to price ratios from highest to lowest. The present study develops a portfolio model under the practical conditions that a market-neutral strategy entails by buying undervalued (short portfolio) and selling overvalued stocks (long portfolio).

Value investing strategies exhibit varying patterns of returns in different economies. The one fact that has held constant over time is that Japan is the only market where value investing strategies consistently generated positive portfolio returns. On the other hand, value investing has not been a successful strategy in Australia. The quantitative model presented in the chapter relies on the quality of information presented in the financial statements. Errors and/or misspecification in
these numbers (i.e. when an item is misstated by a company) are sometimes impossible to prevent and are not under the control of the researcher. The study provides a valuable indication as to which fundamental valuation factors and which countries are likely to be a suitable and robust fit for value investing strategies. In view of its practical features, the analysis should be of interest to practitioners for assisting their long-short investment decisions. In contrast to scholarly work on value investing in Europe and the US, not much attention in prior studies is paid to the success of value investing strategies across the Asian markets. This study makes a contribution to the existing body of literature by examining the performance of value investing strategies over time using a cross country approach. It provides useful insights about valuation to investors and corporations and objects to find whether (a) the accounting variables included in the study are value relevant, (b) earnings-to-price is more value relevant than other valuation measures, and (c) these variables are more value relevant in one sector than in the other. Consistent with previous studies, it is expected for this study that these variables will be value relevant although some may be more reliable indicators of company’s performance than others.

Investors with limited abilities or time to undertake a sophisticated analysis of individual securities often rely on fundamental data as evidence of corporate historical performance. The study is based on the value investment style as it is believed to be the most established and well-known approach to quantitative investing (Fama and French, 2007). According to Sorensen and Thum (1992), most investment managers use some type of valuation criteria as part of their stock selection process. Thus, the underlying proposition of this thesis is that investors tend to buy companies with particular characteristics, where these characteristics are
fundamental accounting factors, such as earnings to price, for example. The idea is to compare the fundamental assessment of the stock’s value to its current stock price, and then to purchase stocks when the discrepancy between the assessment and the stock price is compelling. The popularity of value techniques owes a great deal to prior studies which have numerously documented the long-run abnormal returns generated by value investing (Sorensen and Thum, 1992). In fact, a large number of researchers demonstrate the benefits of value investing (Ambachtsheer and Farrell, 1979; Basu, 1977; Bauman et al, 1998; Black, 1973; Capaul et al, 1993; Estep et al, 1983; Fama and French, 2012). According to Qian et al (2009, p.42), “depending on market conditions, standalone value strategies, such as buying value stocks, are capable of generating abnormal returns”.

The ultimate question the study attempts to address is whether country classification is helpful in explaining factor returns. I attempt to address the age-old dilemma of whether it is better to be a master of all trades or a king of one investing field. Research shows that using a single valuation metric across an entire country is an approach that no longer works for quantitative investors (Burgess, 2002). Inevitably, countries and their underlying market contexts are inherently different from one another, as explained by their unique economy, regulations as well as cultural and social values.

Alternatively, this chapter argues that the stock selection model can be improved by utilising unique valuation factors for each country. I test which factors appear superior and thus act as indicators of value in each economy. Qian et al (2009) put forward that value investing is a cornerstone in stock selection using various measures of yield. In this study I present a multi-dimensional analysis of five
Pan-Asian countries (Australia, Hong Kong, Japan, South Korea and Taiwan). According to Fama and French (2012), this region accounts for 22.7% of global market capitalisation and Japan, Hong Kong and Australia are the three largest capital markets in the region. The five fundamental factors incorporated into the design of the study are: book value to price (B/P), earnings to price (E/P), cash flow to price (C/P), dividends to price (D/P), and sales to price (S/P). The accounting meaning behind these valuation factors will be discussed in the section of the chapter on The Framework for Constructing a Value Portfolio. \textbf{Figure 1} below presents the constituents of the multi-dimensional framework adopted in this study.

\textbf{Figure 1.} \textbf{Multi-Dimensional Framework Adopted in the Study: Country-Sector-Factor Break-down}
Covering a ten-year time frame, this chapter is aimed at providing insight into the underlying fundamental factors which determine value by studying the historical performance of the selected stocks from 2001 to 2010. The aim of this study is to build a hypothetical model that seeks to explain which factors appear to be the best indicators of value in each country and whether the relationship holds across countries. Among the most crucial research objectives is to identify the factors necessary to construct an efficient portfolio that would result in superior returns on investment.

A part of the research motivation driving this study is to understand the principles behind the valuation of companies. This topic has always been a point of interest in the financial investing field and the vast array of conflicting results among previous research findings (see the Literature Review section) further contributes to the popularity of research on value investing among both capital market participants and academics. Furthermore, it highlights the need for quality research that attempts to produce consistent findings.

Second, it is very important to investigate the role of different fundamental accounting factors as indicators of performance in different GICS\textsuperscript{10} sectors. As mentioned previously, research suggests that a uniform value factor does not apply equally well to all sectors of the market as valuation in different sectors is likely to be driven by different value metrics (Burgess, 2002). For example, E/P is most commonly used in high growth sectors, such as IT and Telecommunications, and would lose its meaning to some degree in slower growth sectors such as Utilities. On the other hand, B/P is likely to work well in the valuation of companies that have a

\textsuperscript{10} GICS stands for the Global Industry Classification Standard
lot of fixed and tangible assets such as property, plant and equipment (Industrials and Materials), oil reserves (Energy) or financial assets such as loans (Financials). However, this value metric does not seem to be an appropriate indicator of value for companies whose majority of assets are intangible, such as Health Care and IT, for example. This, as a result, might render some value metrics more relevant than others in the context of specific sectors. It goes without saying that understanding how various accounting measures are constructed is crucial when adopting a value investment style.

Third, this thesis seeks to make a contribution to the body of knowledge on the efficient market hypothesis. The EMH is an investment theory which states that it is impossible to outperform the market because stock market efficiency causes existing share prices to always incorporate and reflect all relevant publicly available information. If this is so then why do people engage in fundamental analysis based upon publicly available information in an attempt to beat the market? According to the EMH, stocks always trade at their fair value on efficient stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices using publicly available information. If those assumptions hold, then it should be impossible to outperform the market through expert stock selection or market timing across a range of markets, and that the only way an investor can obtain higher returns is by purchasing riskier investments or having access to private information. The underlying investment philosophy adopted in this study is fundamentally based on the view that pricing inefficiencies do exist, and that a disciplined process that focuses on valuation and catalyst identification can exploit those inefficiencies on a consistent basis. Thus, in this piece of research I indirectly examine the semi-strong form of market efficiency, which suggests that because
prices are inclusive of all published information, it should be impossible for market participants to earn consistently superior returns just by relying on publicly available data (Brealey et al, 2008; Viney, 2007). Importantly, this has numerous implications for the study of factors determining share price discoverability and the effectiveness of value investing as such.

This chapter examines Pan-Asian regional portfolio returns, with three goals. The first is to tell a detailed story of the success or failure of value investing in five countries. Most prior work on the topic focuses on the performance of value investing in the US and Europe. Examples include Capaul et al (1993) covering some European countries, the US and Japan; while Basu (1977 and 1983), Senchack and Martin (1987) and Senser (2011) cover the US traded stocks only. In particular, there is little evidence in prior studies of the success of value investing strategies across the Australasian markets. Notably, Fama and French (2012) evaluate portfolio performance of value and growth stocks in 23 developed countries across North America, Europe, Japan and Pan Asia. Their sample, however, lacks South Korea and Taiwan. My main contribution to the existing body of literature is primarily of a geographical scope by examining the performance of value investing strategies in Australia, Hong Kong, Japan, South Korea and Taiwan. This study, therefore, attempts to make a significant contribution to the existing body of financial and accounting literature by examining the performance of value investing strategies using a cross country approach, as well as providing useful guidelines to corporations subject to valuation and their related stakeholders.

The second goal is to include a broader range of accounting fundamentals. In their numerous academic papers, Fama and French provide empirical evidence
documenting the relationship between returns and such variables as: book to market ratio (B/M), earnings to price (E/P), dividends to price (D/P) and cash flow to price (C/P). I wish to add to their discussion by including the relationship between sales to price (S/P) and returns, as well as the relationship between book to price (B/P) and returns. In this regard, Barbee et al (1996) note that S/P ratio has a greater explanatory power for stock returns than the B/M variable.

The third goal is to provide a detailed story of the success of value investing on a sector by sector basis. To my best knowledge, not much academic research effort has been placed upon analysing the tenets of value investing on a sector specific basis. Most of the literature relating to sector specific value investing is based on interviews with money managers, which does not incorporate an in-depth analysis and theoretical underpinning of the findings presented. Furthermore, the majority of industry publications are aimed at attracting investors and thus tend to be quite limited in discussing the scope of their findings, which are generally not backed up by empirical results. This study, therefore, attempts to make a significant contribution to the existing body of financial and accounting literature by examining the performance of value investing strategies via a comprehensive multi-dimensional framework covering country, sector and factor analysis, as well as to provide useful guidelines to corporations under valuation, money managers and individual investors.

4.2. Data and Methodology

With the focus of the thesis being on investigating the performance of value investing strategies using quantitative data analysis techniques, a combination of empirical studies and statistical analysis is implemented as the principal
methodologies for conducting this research. These methodologies can interrogate the finance and economic theories and the data underlying the concept of value investing and the efficient market hypothesis discussed earlier. Importantly for the implications of the research findings, the scientific method is the building element of this study which attempts to provide a discussion on whether the valuation strategies based on fundamental accounting factors are capable of generating abnormal returns in five Pan-Asian countries. Consistent with some of the research findings, this thesis argues that a stock selection model can be improved by using different valuation factors for each sector and country.

The fundamental company data to be considered in this study is extracted from Thomson Reuters with historical performance figures covering 2001-2010. The study covers a sample of Asian and Australian stocks, embracing over a thousand enterprises in all years except for 2001. I do not provide a detailed description of the stocks included in the study as they vary from year to year. Table 2 below indicates how many stocks were evaluated in each country for portfolio formation in each financial year. Singapore is excluded from the analysis due to the small number of stocks.
Table 2. Number of Firms per Country

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Hong Kong</th>
<th>Japan</th>
<th>South Korea</th>
<th>Taiwan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>141</td>
<td>138</td>
<td>485</td>
<td>81</td>
<td>118</td>
<td>963</td>
</tr>
<tr>
<td>2002</td>
<td>154</td>
<td>149</td>
<td>493</td>
<td>90</td>
<td>143</td>
<td>1027</td>
</tr>
<tr>
<td>2003</td>
<td>144</td>
<td>154</td>
<td>486</td>
<td>98</td>
<td>150</td>
<td>1031</td>
</tr>
<tr>
<td>2004</td>
<td>173</td>
<td>171</td>
<td>496</td>
<td>105</td>
<td>168</td>
<td>1113</td>
</tr>
<tr>
<td>2005</td>
<td>180</td>
<td>186</td>
<td>496</td>
<td>125</td>
<td>174</td>
<td>1161</td>
</tr>
<tr>
<td>2006</td>
<td>180</td>
<td>189</td>
<td>496</td>
<td>131</td>
<td>173</td>
<td>1167</td>
</tr>
<tr>
<td>2007</td>
<td>209</td>
<td>193</td>
<td>489</td>
<td>141</td>
<td>192</td>
<td>1223</td>
</tr>
<tr>
<td>2008</td>
<td>205</td>
<td>182</td>
<td>484</td>
<td>139</td>
<td>217</td>
<td>1227</td>
</tr>
<tr>
<td>2009</td>
<td>164</td>
<td>190</td>
<td>483</td>
<td>128</td>
<td>187</td>
<td>1152</td>
</tr>
<tr>
<td>2010</td>
<td>166</td>
<td>221</td>
<td>435</td>
<td>111</td>
<td>168</td>
<td>1100</td>
</tr>
<tr>
<td>Average</td>
<td>171</td>
<td>177</td>
<td>484</td>
<td>115</td>
<td>169</td>
<td>1116</td>
</tr>
</tbody>
</table>

As the table above illustrates, the largest number of stocks is listed in Japan (484), followed by Hong Kong (177), Australia (171), Taiwan (169), and South Korea (115). This means that nearly half (43.37%) of the companies in the testing sample belong to Japan, 15.86% to Hong Kong, 15.32% to Australia, 15.14% to Taiwan, and 10.30% to South Korea.

When testing past performance results, I account for survivorship bias by using the actual membership of the index throughout the time frame considered in the study. Survivorship bias is mentioned in a study by Pinfold et al (2001) and is the tendency for failed companies to be excluded from the sample because they no longer exist. It may cause the results of the study to skew higher because only companies which have been successful enough to survive until the end of the period would be included (Elton et al, 1996). For example, a selection of stocks today will include only those that are successful at present. Losing companies cease to exist, merge with or get acquired by other firms to hide poor performance. Avoiding the survivorship bias therefore provides an important advantage as it allows the sample
to incorporate stocks with varying financial performance and thus make the results more relevant to the real world market conditions.

The sectors to be considered in the study are categorised using the GICS (Global Industry Classification Standard) methodology, which is industry taxonomy developed by MSCI\(^{11}\) and S&P\(^{12}\). The GICS structure consists of 10 sectors, 24 industry groups, 68 industries and 154 sub-industries into which S&P has categorised all major publicly traded companies. The ten GICS sectors along with their composite industry groups are further described in Appendix B. According to ASX (2011), GICS is widely accepted among investment researchers and portfolio managers as one of the most commonly used industry classifications in the world. Essentially, the study incorporates six GICS sectors: Materials, Industrials, Consumer Discretionary, Consumer Staples, Financials and IT. The other four GICS sectors: Energy, Utilities, Health Care and Telecommunications do not have enough stocks to produce statistically meaningful results and thus are not included into the data analysis.

The focus of the chapter is on investigating the performance of value investing strategies using quantitative data analysis techniques. This study attempts to provide a discussion of whether valuation strategies based on fundamental accounting factors are capable of generating abnormal returns in four Asian countries and Australia. Consistent with the research findings, this chapter argues that a stock selection model can be improved by using different valuation factors for each country. The

\(^{11}\) MSCI stands for Morgan Stanley Capital International, which is a US-based provider of equity, fixed income, and hedge fund stock market indexes, and equity portfolio analysis tools.

\(^{12}\) S&P refers to Standard & Poor’s Financial Services and is an American financial services company that specialises in publishing financial research and performing analysis on stocks and bonds. It is also known for its stock market indices.
methodology used is based on that employed by Fama and French (1992) and Pinfold et al (2001). Importantly, the methodological perspective adopted in this chapter is twofold and incorporates two analytical methodologies: first, empirical and statistical analyses of trends in the ability of various accounting ratios to serve as reliable indicators of the firm’s value over the period of 2001-2010; and second, a survey of the theoretical and empirical literature, notably on the performance of a number value investing strategies and their role in constructing a valuation portfolio.

All the stocks included in the research satisfy two important criteria: size and liquidity. The benchmark for the size criterion is company market capitalisation of USD500 million. The liquidity benchmark is a 30 day average daily turnover of USD2.5 million. For a stock to enter a sample of stocks it must meet both filters. In this way I ensure that the valuation strategies on companies is tested with a high level of trading activity. Large and liquid stocks can be sold rapidly, with minimal loss of value and at any time within market hours. The essential characteristic of such stocks is a large number of ready and willing buyers and sellers. It is particularly important for the effectiveness of the testing strategy to be able to get in and out of positions on a regular basis. This means that most of the sample firms are large and account for the majority of a market’s invested wealth, so these companies provide a good description of the market’s performance (Fama and French, 1998).

With the exception of Japan, the study considers stocks that report on an annual basis. This means that the numerator with the relevant fundamental value (book value, cash flow, dividends, earnings, sales) remains unchanged for one year and obtains a new value at the beginning of the next financial year. To provide a better understanding of this concept, let’s take B/P for example. For a given financial
(in this case, one year) the numerator or book value will remain the same for 365 days and get updated when the next financial period reports are issued. Such methodology applies to Australia, Hong Kong, South Korea and Taiwan. In the case of Japan, however, a semi-annual frequency of reporting applies as the annual figures are missing from the Reuters database. This suggests that the numerator (book value, cash flow, dividends, earnings, sales) stays the same for half a year, or 182 days, and obtains a new value at the beginning of the next half of the year. Yet in both cases, regardless of the frequency of reporting, the denominator, being price per share tends to change on a daily basis. The composition of the sample long-short portfolios therefore fluctuates on a daily basis unless share price remains unchanged.

As given by Reuters (2013), book value or total common equity is a measure used by owners of common shares in a firm to determine the level of safety after all debts are paid accordingly. The earnings figure is calculated as income (loss) before extraordinary items. Cash flow is the total amount of cash a company generates from its operations and is calculated as: net income + depreciation and amortisation + other non-cash adjustments + changes in non-cash working capital. The effect of changes in non-cash working capital on cash from operations can be either positive or negative. Decrease in non-monetary current assets or increase in current liabilities has the effect of increasing cash from operations and is therefore a positive; and if the opposite were true, then the effect would be negative. In regard to dividends, for companies in Japan, this field includes the sum of regular and special cash dividends. For all other jurisdictions, namely Australia, Hong Kong, South Korea and Taiwan, this field is based only on the regular cash dividends and excludes special cash dividends (Reuters, 2013).
The model contains a ranking approach to filter out any undesirable securities under consideration. For the period 2001-2010, stocks are daily ranked from highest to lowest by the respective fundamental factor to determine the breakpoints. The data are then allocated to five equally sized portfolios based on the breakpoints. I then subdivide the given sample of stocks into fifths or quintiles. Thus, each quintile is an equal-sized data subset that contains 20% of the stocks. After identifying two sets of securities for portfolio consideration, the first set consists of \( n \) undervalued securities for purchase, and the second set consists of \( n \) overvalued securities for sale (Kwan, 1999).

Next I buy/long 20% of the stocks with the highest valuation ratios (i.e. the top quintile) and I sell/short 20% of stocks with the lowest valuation ratios (i.e. the bottom quintile). At the end of each trading day I end up with two separate portfolios: short and long. The long-short equity strategies adopted in the chapter allow investors to benefit potentially from both undervalued and overvalued securities (Kwan, 1999). The present study develops a portfolio model under the practical conditions that a market-neutral strategy entails. In view of its practical features, the analysis should be of interest to practitioners for assisting their long-short investment decisions.

The returns that I report in the study are net portfolio returns obtained through the combined long and short trading. Effectively, it is the spread in returns between long and short positions, or a residual return. If positive, this variable is also known as value premium (Fama and French, 1998). Importantly, the net portfolio returns presented in this study cannot be compared to those of the market. This is because the market consists of only the long positions, whereas this portfolio entails both the
long and the short positions. As explained in Jacobs and Levy (1993), the portfolio residual return from long-short investing is potentially greater than what is achievable from long-only investing. This is because long-short investing allows profits to be made from both undervalued and overvalued securities, not just from undervalued securities alone (Jacobs and Levy, 1993).

In this study, I conduct a statistical analysis of historical data to determine whether employing a given accounting factor, such as selecting stocks with a high dividend to price for example, would result in abnormal returns over time. Regression has been used as the main tool for conducting the data analysis. Specifically, the study relies on a series of simple linear regressions, since it involves one dependent variable – returns, and one independent variable at a time – book to price, cash flow to price, dividends to price, earnings to price or sales to price. As pointed out by Berenson (2010), in statistics, a simple linear regression is the least squares estimator of a linear regression model with a single explanatory variable. The relationship between each individual X (independent variable) and Y (dependent variable) is described by a linear function, and changes in Y are assumed to be caused by changes in X. The general purpose of a simple regression is to investigate the relationship between an independent, or a predicting variable, and a dependent, or criterion variable (StatSoft, 2014). Generally, a simple regression allows a researcher to ask (and hopefully answer) a broad question on whether variable X is a reliable predictor of variable Y (StatSoft, 2014).

Further, on the regression discussion, essentially what we have here is per country data for ten financial years from 2001 to 2010 inclusively, where for each financial year the number of companies may vary, as I am trying to avoid the
survivorship bias. We therefore essentially have an element of time series data (across financial years) and an element of cross-sectional data (across accounting ratios, companies and countries). What we ultimately want to explore is the strength of the relationship between each individual ‘accounting fundamental to price’ ratio (independent variable) and returns (dependent variable) over these ten years in each country. So we will be regressing returns against, for example, book to price for stocks in Australia between 2001 and 2010. In line with Gujarati and Porter (2009), I adopt a pooled, or combined, regression method which aggregates the time-series and the cross-sectional data. Effectively, in a pooled regression, all observations are combined across time into a common regression disregarding the possible differences in the two financial periods. Pooled regression is part of the family of regression models.

According to Podesta (2000, p.5), “until recently, the space and the time domains have rarely been combined in comparative research”. Yet the new quantitative methods stress the sensitivity to both time and space. Providing an extensive literature review in his paper, the author proposes that pooled time series cross-sectional analysis is imperative when examining these two crucial dimensions simultaneously. It is therefore not surprising that in the last two decades “an accumulating body of research has used this statistical technique to test hypotheses and pooled analysis has eventually become central in quantitative studies” (Podesta, 2000, p.8).

This chapter considers which fundamental accounting factors are likely to be indicative of abnormal returns. The results of the study are presented and discussed in the latter parts of the chapter. The resultant information is to be incorporated into a
robust and dynamic model that indicates which countries and factors appear to be a fruitful niche for value investing strategies.

4.3. Results

4.3.1. Regression

To evaluate the relevance of fundamental valuation factors in selecting stocks in the context of five Pan-Asian markets, this study examines the quantitative field of security analysis. I compare the latter to the risk-free rate, which is a one month interbank lending rate for each country respectively. The ten year average risk-free rates are: 5.2% for Australia, 1.6% for Hong Kong, 0.2% for Japan, 3.6% for South Korea and 1.3% for Taiwan. One way to comment on the differences in the risk-free rates reported above would be to think of it as an opportunity cost. Accordingly, the risk-free rate is the rate that investors would earn, if they choose not to take the risky investments available to them in the market (stocks, corporate bonds, real estate, business ventures etc.). Another way to think about the risk-free rate is by viewing it as a reflection of what people expect in the overall economy for the foreseeable future. This is where the risk-free rate is the sum of two market expectations: an expectation of inflation for the future and an expectation of real growth\(^\text{13}\) (Damodaran, 2011).

Viewed through these lenses, it is quite clear that a very low risk-free rate is not generally compatible with a vibrant high growth economy. With relatively high growth and low inflation, it then makes sense why Australia has got the highest risk-free rate (5.2%) in the sample of countries under examination. Notably, the biggest factor driving down a country’s risk-free rate been the increasing pessimism about its

\(^{13}\) Risk-free rate = Expected inflation + Expected real growth
economic health, pushing down both expected real growth and expected inflation (Damodaran, 2011). This in turn explains why Japan’s risk-free rate is the lowest in the region (0.2%). As mentioned later in the thesis, the Japanese economy has gone through two decades of stagnation and is known to stagnate at the bottom of the world pyramid (Hirano, 2011).

My methodology of examining the information content of various income statement and balance sheet items is based on cross-sectional regressions of share price on the value measures. The following sections discuss the findings of the study as reported in average portfolio returns. Following on from the methodology section, this study is based on a series of five distinct regression models as depicted in the equations set out below. The regression analysis was conducted in SAS software, using the ordinary least squares (OLS) method where \( p\text{-value} < 10\% \) level of significance would indicate a significant result. Confidence level of 90% has been chosen as it takes into account the variability in the data as well as the probability to estimate a range of values that captures the population parameter rather than relying on one point estimate.

\[
\begin{align*}
\text{Returns}_t &= \alpha + \beta_1 \text{(Book value to Price)}_t + e_t \\
\text{Returns}_t &= \alpha + \beta_1 \text{(Cash flow to Price)}_t + e_t \\
\text{Returns}_t &= \alpha + \beta_1 \text{(Dividends to Price)}_t + e_t \\
\text{Returns}_t &= \alpha + \beta_1 \text{(Earnings to Price)}_t + e_t \\
\text{Returns}_t &= \alpha + \beta_1 \text{(Sales to Price)}_t + e_t
\end{align*}
\]

where

\( H_0 \): there is no relationship between returns and historical valuation proxies

\( H_1 \): there is a relationship between returns and historical valuation proxies
When running regressions for time-series, it is important to keep in mind that a problem of autocorrelation or serial correlation may arise. It occurs when successive observations of the dependent variable $Y$ are not independent of each other. So in this case if we are examining the E/P ratio, for example, and it appears to be particularly high in one period, it is most probably likely to be high in the next period as well. Therefore, the residuals tend to be correlated among themselves (autocorrelated) rather than independent. According to Gujarati and Porter (2009), the most popular method for identifying serial correlation is the Durbin-Watson $d$ statistic. A significant advantage of the $d$ statistic is that it is based on the estimated residuals, which are routinely computed in the regression analysis (Gujarati and Porter, 2009). However, having conducted the regression analysis, the problem of autocorrelation has not been detected, as reported by the Durbin-Watson $d$ statistic.

4.3.1.1. By Country

A significant relationship between accounting based valuation multiples and future stock returns has also been highlighted in various international markets. When portfolios are formed, value premiums are positive in all countries except for Australia. Portfolio returns and their statistical significance generated under the various valuation approaches in each country are summarised in Table 3 and Figure 2 below. Table 4 is a summary of the regression results. Importantly for the interpretation of the results, I use semi-annual reporting figures for Japan due to annual data being unavailable. The data covering the rest of the countries is of the annual reporting frequency.

<table>
<thead>
<tr>
<th>Table 3. Average Portfolio Returns per Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
</tr>
</tbody>
</table>

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As the table above illustrates, B/P and C/P have the largest impact on future stock returns in Japan, South Korea and Taiwan at a 99% confidence level. Notably, a 90% confidence level, C/P also affects returns in Australia and Hong. D/P has a strong influence on share market returns in Japan at a 99% confidence level, and in Hong Kong, South Korea and Taiwan at a 95% confidence level. Importantly, E/P is not shown to have any statistical impact on future stock returns in any of the five markets studied. Finally, S/P has a strong influence on share market returns in all countries at a 99% confidence level.

Figure 2. Average Portfolio Returns per Country
Table 4. Regression Results

<table>
<thead>
<tr>
<th>Fundamental factor</th>
<th>Number of observations</th>
<th>R-square</th>
<th>Coefficient</th>
<th>t-value</th>
<th>p-value</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B/P</td>
<td>282</td>
<td>0.0000</td>
<td>0.0000</td>
<td>-0.09</td>
<td>0.9311</td>
<td></td>
</tr>
<tr>
<td>C/P</td>
<td>292</td>
<td>0.0096</td>
<td>0.1293</td>
<td>1.67</td>
<td>0.0950</td>
<td>*</td>
</tr>
<tr>
<td>D/P</td>
<td>286</td>
<td>0.0008</td>
<td>-0.1399</td>
<td>-0.48</td>
<td>0.6284</td>
<td></td>
</tr>
<tr>
<td>E/P</td>
<td>292</td>
<td>0.0011</td>
<td>0.0012</td>
<td>0.56</td>
<td>0.5730</td>
<td></td>
</tr>
<tr>
<td>S/P</td>
<td>266</td>
<td>0.0376</td>
<td>0.0373</td>
<td>3.21</td>
<td>0.0015</td>
<td>***</td>
</tr>
<tr>
<td><strong>Hong Kong</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B/P</td>
<td>459</td>
<td>0.0057</td>
<td>0.0107</td>
<td>1.62</td>
<td>0.1053</td>
<td></td>
</tr>
<tr>
<td>C/P</td>
<td>498</td>
<td>0.0060</td>
<td>0.3271</td>
<td>1.73</td>
<td>0.0850</td>
<td>*</td>
</tr>
<tr>
<td>D/P</td>
<td>534</td>
<td>0.0100</td>
<td>1.5941</td>
<td>2.32</td>
<td>0.0209</td>
<td>**</td>
</tr>
<tr>
<td>E/P</td>
<td>518</td>
<td>0.0036</td>
<td>0.2566</td>
<td>1.36</td>
<td>0.1735</td>
<td></td>
</tr>
<tr>
<td>S/P</td>
<td>538</td>
<td>0.0406</td>
<td>0.0749</td>
<td>4.76</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B/P</td>
<td>4220</td>
<td>0.0116</td>
<td>0.0190</td>
<td>7.03</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td>C/P</td>
<td>4320</td>
<td>0.0032</td>
<td>0.0024</td>
<td>3.72</td>
<td>0.0002</td>
<td>***</td>
</tr>
<tr>
<td>D/P</td>
<td>3620</td>
<td>0.0050</td>
<td>1.3429</td>
<td>4.27</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td>E/P</td>
<td>4270</td>
<td>0.0000</td>
<td>0.0077</td>
<td>0.35</td>
<td>0.7261</td>
<td></td>
</tr>
<tr>
<td>S/P</td>
<td>4268</td>
<td>0.0146</td>
<td>0.0130</td>
<td>7.96</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td><strong>South Korea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B/P</td>
<td>788</td>
<td>0.0357</td>
<td>0.0480</td>
<td>5.40</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td>C/P</td>
<td>794</td>
<td>0.0087</td>
<td>0.1135</td>
<td>2.64</td>
<td>0.0084</td>
<td>***</td>
</tr>
<tr>
<td>D/P</td>
<td>812</td>
<td>0.0068</td>
<td>0.7244</td>
<td>2.36</td>
<td>0.0185</td>
<td>**</td>
</tr>
<tr>
<td>E/P</td>
<td>814</td>
<td>0.0004</td>
<td>0.0023</td>
<td>0.56</td>
<td>0.5774</td>
<td></td>
</tr>
<tr>
<td>S/P</td>
<td>792</td>
<td>0.0395</td>
<td>0.0246</td>
<td>5.70</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td><strong>Taiwan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B/P</td>
<td>724</td>
<td>0.1189</td>
<td>0.2174</td>
<td>9.87</td>
<td>0.0000</td>
<td>***</td>
</tr>
<tr>
<td>C/P</td>
<td>726</td>
<td>0.0218</td>
<td>0.1839</td>
<td>4.01</td>
<td>0.0001</td>
<td>***</td>
</tr>
<tr>
<td>D/P</td>
<td>502</td>
<td>0.0103</td>
<td>0.8264</td>
<td>2.28</td>
<td>0.0229</td>
<td>**</td>
</tr>
<tr>
<td>E/P</td>
<td>726</td>
<td>0.0006</td>
<td>0.0141</td>
<td>0.66</td>
<td>0.5085</td>
<td></td>
</tr>
<tr>
<td>S/P</td>
<td>712</td>
<td>0.0629</td>
<td>0.1102</td>
<td>6.91</td>
<td>0.0000</td>
<td>***</td>
</tr>
</tbody>
</table>

Table 4 provides a more detailed explanation of the regression results presented in Table 3 earlier. In addition to reporting the statistical significance of each fundamental factor, it includes data on the number of observations, R-square, coefficient, t-value, and p-value. Notably, R-square is zero for the B/P variable in Australia and E/P variable in Japan, which means that these two fundamental accounting factors explain none of the variability in returns.
Table 5. Average Portfolio Returns across Pan Asia

<table>
<thead>
<tr>
<th>Sector</th>
<th>Value factor</th>
<th>Australia</th>
<th>Hong Kong</th>
<th>Japan</th>
<th>South Korea</th>
<th>Taiwan</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Book to price</td>
<td>-5.6%</td>
<td>-7.1%</td>
<td>17.3%</td>
<td>14.3%</td>
<td>7.8%</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Cash flow to price</td>
<td>-6.6%</td>
<td>7.5%</td>
<td>13.4%</td>
<td>18.2%</td>
<td>10.5%</td>
<td>8.6%</td>
</tr>
<tr>
<td></td>
<td>Dividends to price</td>
<td>-5.0%</td>
<td>-6.6%</td>
<td>7.9%</td>
<td>1.8%</td>
<td>11.5%</td>
<td>1.9%</td>
</tr>
<tr>
<td></td>
<td>Earnings to price</td>
<td>-3.5%</td>
<td>-3.6%</td>
<td>-0.3%</td>
<td>3.2%</td>
<td>-0.9%</td>
<td>-1.0%</td>
</tr>
<tr>
<td></td>
<td>Sales to price</td>
<td>-9.6%</td>
<td>-8.5%</td>
<td>12.5%</td>
<td>14.6%</td>
<td>-7.9%</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>-6.1%</td>
<td>-3.7%</td>
<td>10.2%</td>
<td>10.4%</td>
<td>4.2%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Book to price</td>
<td>1.5%</td>
<td>15.0%</td>
<td>14.8%</td>
<td>15.7%</td>
<td>6.8%</td>
<td>10.8%</td>
</tr>
<tr>
<td></td>
<td>Cash flow to price</td>
<td>11.9%</td>
<td>20.4%</td>
<td>14.7%</td>
<td>11.5%</td>
<td>2.2%</td>
<td>12.1%</td>
</tr>
<tr>
<td></td>
<td>Dividends to price</td>
<td>2.8%</td>
<td>11.7%</td>
<td>12.0%</td>
<td>22.3%</td>
<td>4.5%</td>
<td>10.7%</td>
</tr>
<tr>
<td></td>
<td>Earnings to price</td>
<td>4.2%</td>
<td>18.0%</td>
<td>0.8%</td>
<td>12.8%</td>
<td>1.4%</td>
<td>7.4%</td>
</tr>
<tr>
<td></td>
<td>Sales to price</td>
<td>5.7%</td>
<td>10.4%</td>
<td>10.0%</td>
<td>18.7%</td>
<td>7.2%</td>
<td>10.4%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>5.2%</td>
<td>15.1%</td>
<td>10.5%</td>
<td>16.2%</td>
<td>4.4%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Consumer Discretionary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Book to price</td>
<td>-12.3%</td>
<td>-11.1%</td>
<td>18.0%</td>
<td>1.8%</td>
<td>2.0%</td>
<td>-0.3%</td>
</tr>
<tr>
<td></td>
<td>Cash flow to price</td>
<td>2.8%</td>
<td>9.8%</td>
<td>22.2%</td>
<td>8.4%</td>
<td>0.4%</td>
<td>8.7%</td>
</tr>
<tr>
<td></td>
<td>Dividends to price</td>
<td>-4.8%</td>
<td>-4.1%</td>
<td>17.8%</td>
<td>5.2%</td>
<td>-6.6%</td>
<td>1.5%</td>
</tr>
<tr>
<td></td>
<td>Earnings to price</td>
<td>-4.3%</td>
<td>4.7%</td>
<td>7.8%</td>
<td>3.2%</td>
<td>4.4%</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>Sales to price</td>
<td>9.8%</td>
<td>10.0%</td>
<td>9.4%</td>
<td>3.4%</td>
<td>3.5%</td>
<td>7.2%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>-1.8%</td>
<td>1.9%</td>
<td>15.0%</td>
<td>4.4%</td>
<td>0.7%</td>
<td>4.1%</td>
</tr>
</tbody>
</table>
Table 5.  
**Average Portfolio Returns across Pan Asia (continued)**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Value factor</th>
<th>Australia</th>
<th>Hong Kong</th>
<th>Japan</th>
<th>South Korea</th>
<th>Taiwan</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumer Staples</strong></td>
<td>Book to price</td>
<td>-11.0%</td>
<td>0.4%</td>
<td>16.0%</td>
<td>-1.9%</td>
<td>-</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>Cash flow to price</td>
<td>5.4%</td>
<td>8.6%</td>
<td>10.7%</td>
<td>-1.0%</td>
<td>-</td>
<td>5.9%</td>
</tr>
<tr>
<td></td>
<td>Dividends to price</td>
<td>-2.1%</td>
<td>19.7%</td>
<td>15.2%</td>
<td>-1.0%</td>
<td>-</td>
<td>8.0%</td>
</tr>
<tr>
<td></td>
<td>Earnings to price</td>
<td>-10.5%</td>
<td>12.4%</td>
<td>7.1%</td>
<td>1.0%</td>
<td>-</td>
<td>2.5%</td>
</tr>
<tr>
<td></td>
<td>Sales to price</td>
<td>-5.7%</td>
<td>7.3%</td>
<td>5.1%</td>
<td>-3.3%</td>
<td>-</td>
<td>0.8%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>-4.8%</td>
<td>9.7%</td>
<td>10.8%</td>
<td>-1.2%</td>
<td>-</td>
<td>3.6%</td>
</tr>
<tr>
<td><strong>Financials</strong></td>
<td>Book to price</td>
<td>-6.9%</td>
<td>2.4%</td>
<td>7.1%</td>
<td>19.9%</td>
<td>12.3%</td>
<td>7.0%</td>
</tr>
<tr>
<td></td>
<td>Cash flow to price</td>
<td>-0.6%</td>
<td>-2.1%</td>
<td>-0.2%</td>
<td>-2.4%</td>
<td>-7.8%</td>
<td>-2.6%</td>
</tr>
<tr>
<td></td>
<td>Dividends to price</td>
<td>-10.5%</td>
<td>5.6%</td>
<td>0.8%</td>
<td>11.2%</td>
<td>5.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td></td>
<td>Earnings to price</td>
<td>-6.2%</td>
<td>-5.3%</td>
<td>-5.2%</td>
<td>3.3%</td>
<td>9.4%</td>
<td>-0.8%</td>
</tr>
<tr>
<td></td>
<td>Sales to price</td>
<td>6.3%</td>
<td>9.1%</td>
<td>5.0%</td>
<td>-1.5%</td>
<td>1.6%</td>
<td>4.1%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>-3.6%</td>
<td>1.9%</td>
<td>1.5%</td>
<td>6.1%</td>
<td>4.2%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>IT</strong></td>
<td>Book to price</td>
<td>-</td>
<td>-16.0%</td>
<td>16.0%</td>
<td>-17.8%</td>
<td>-9.4%</td>
<td>-6.8%</td>
</tr>
<tr>
<td></td>
<td>Cash flow to price</td>
<td>-</td>
<td>-1.2%</td>
<td>10.2%</td>
<td>6.0%</td>
<td>4.6%</td>
<td>4.9%</td>
</tr>
<tr>
<td></td>
<td>Dividends to price</td>
<td>-</td>
<td>-3.8%</td>
<td>14.9%</td>
<td>-11.8%</td>
<td>3.4%</td>
<td>0.7%</td>
</tr>
<tr>
<td></td>
<td>Earnings to price</td>
<td>-</td>
<td>-4.1%</td>
<td>8.2%</td>
<td>-4.1%</td>
<td>4.7%</td>
<td>1.2%</td>
</tr>
<tr>
<td></td>
<td>Sales to price</td>
<td>-</td>
<td>-10.9%</td>
<td>8.2%</td>
<td>-4.8%</td>
<td>0.7%</td>
<td>-1.7%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>-</td>
<td>-7.2%</td>
<td>11.5%</td>
<td>-6.5%</td>
<td>0.8%</td>
<td>-0.4%</td>
</tr>
</tbody>
</table>
The table above shows that as per individual valuation factor, the most reliable proxy for returns in the Pan-Asian region is C/P (6.3%), followed by D/P (4.2%), S/P (3.5%), B/P (2.8%) and E/P (2.1%). Comparatively, on a sector basis, the largest average portfolio returns across Pan Asia can be found in the Industrial sector (10.3%), followed by Consumer Discretionary (4.1%), Consumer Staples (3.6%), Materials (3.0%), Financials (2.0%). Analysis shows that investments in the IT sector (-0.4%) are likely to result in a loss to shareholders. On a country basis, value investing generates the highest stock returns in Japan (9.9%), followed by South Korea (4.9%), Hong Kong (3.0%) and Taiwan (2.9%). Notably, in Australia (-2.2%) stock picking strategies based on value investing techniques are likely to result in a loss to shareholders.

**Australia.** With relatively high growth, low inflation and a focus on services, Australia ranks as the eighteenth largest national economy measured by purchasing power parity PPP, and the thirteenth largest measured by the US$ value of GDP (IMF, 2011)$^{15}$. The Australian stock market is the eleventh largest market in the world based on market capitalisation (ASX, 2011). Being Australia’s largest sector, *Financials* is a large and widely diversified market niche, and accounts for about a quarter of the country’s economy. The second largest sector in the Australian economy is *Materials* which takes up about 18% of the Australian financial market with a heavy focus on Metals and Mining (92% of Materials). Third is the *Industrial* sector which covers about 15% of the Australian market with an equal focus on both production and services. The fourth largest sector in Australia is *Consumer Discretionary* (13%) which is heavily service based, with services accounting for 83% of the total production activity. Amongst the smaller sectors in the Australian economy is *Consumer Staples*, which constitutes only 7% of the overall economic activity in the Australian domestic market. Notably, as the *IT* sector accounts for only 2% of trading in Australia, this sector has been excluded from the analysis in this market.

$^{15}$PPP stands for gross domestic product based on purchasing-power-parity valuation of country GDP.
As shown in Tables 3 and 4 as well as Figure 2 above, the results of the study indicate that overall value investing strategies do not seem to generate fruitful returns in Australia with a total negative return of -2.2%. The results indicate that the biggest losses delivered by value investing strategies would stem from valuation techniques based on B/P (-6.9%), followed by E/P (-4.1%) and D/P (-3.9%). Positive returns achieved by valuation strategies based on C/P (2.6%*) and S/P (1.3%***) are below the average risk-free rate of return of 5.2%. Notably for Australia, the regression results for C/P (*) and S/P (***) only are statistically significant. As portfolio returns based on value investing under all five accounting factors in Australia are below returns expected from investing at the risk free-rate, I conclude that the Australian market appears to be an unsuitable fit for value investing strategies.

Additionally, Table 5 above shows a detailed picture of the performance of value investing strategies or factors in each sector and country. From here it follows that the only sector of the six studied which has produced positive returns in Australia is the Industrial sector (5.2%). According to the ASX (2013), this sector includes companies whose businesses are dominated by one of the following activities: the manufacture and distribution of capital goods, including aerospace and defence, construction, engineering and building products, electrical equipment and industrial machinery; the provision of commercial services and supplies; or the provision of transportation services, including airlines, couriers, marine, road and rail and transportation infrastructure.

Keeping in mind that Financials is the largest sector in Australia’s economy, an important implication for value investing in the context of the Australian trading universe is that, being rich in natural resources, this market is also largely driven by
the Material sector. Included in this sector is a wide range of commodity-related manufacturing industries with companies that manufacture chemicals, construction materials, glass, paper, forest products, containers and packaging, as well as metals, minerals and mining companies, including iron and steel producers. Value investing strategies in the Material sector deliver an average return of -6.1%.

Another significant constituent of the Australian economy is the Financial sector with an average return of -3.6%. With Materials and Financials being the two largest Australian sectors that together comprise 43% of the Australian economy, they both generate negative returns in value investing. This explains why value investing strategies do not generate profitable portfolio returns for Australia. Also, an important assumption here is the fact that there are not enough stocks in the Australian IT sector, and thus no conclusion can be made as to the performance of value investing strategies in this segment of the economy.

**Hong Kong.** The national economy of Hong Kong is ranked number 35 in the world as measured by PPP, and the fortieth largest measured by the US$ value of GDP (IMF, 2011). As one of the world’s leading international financial centres, the Hong Kong stock market is the sixth largest market in the world based on market cap (HKSE, 2011). Analogous to the Australian market, the Financial sector constitutes the majority of Hong Kong economic activity (28%), with a large concentration in Real Estate (62% of Financials). The second largest sector in Hong Kong is Consumer Discretionary which delivers about 19% of the country’s output and places an equal emphasis on both production and services, followed closely by and the Industrial sector (18%) in which production accounts for 62% of output compared to services. Amongst the smaller sectors in Hong Kong are: Materials
(8%) with a 50% stake in Metals and Mining; IT (7%) in which 80% of activity is hardware production; and Consumer Staples (6%).

From 2001 to 2010 value investing strategies in Hong Kong have on average generated a 3.0% return which is above the 1.6% risk-free rate. The application of value investing strategies in the Hong Kong market therefore delivers higher returns than simply keeping money at the bank. Unlike the Australian market, value investing strategies deliver better results for Hong Kong with valuation based on C/P resulting in a 7.2%* return, E/P (3.7%), D/P (3.8%**) and S/P (2.9%***). Similar to the Australian market, valuation based on B/P as an indicator of performance delivers a negative return of -2.7% for Hong Kong. Thus, for this market, four out of five value investing strategies would be successful. Notably for Hong Kong, the regression results for B/P and E/P come back as not statistically significant.

However, under a more detailed examination, value investing in Hong Kong presents a mixed picture. It produces rewarding returns in Industrials (15.1%) and Consumer Staples (9.7%). However, Consumer Discretionary (1.9%) and Financials (1.9%) yield a fairly dubious result, generating both positive and negative returns depending on the value factor applied.

**Japan.** Known as a country of advanced technological prowess, Japan is the world’s third largest economy after the US and China, as measured by the US$ value of GDP, and fourth based on PPP (IMF, 2011). Despite this, however, the Japanese economy is known to “stagnate at the bottom of the pyramid in the world, as caused by an arrest in growth for the past twenty years” (Hirano, 2011, p.1). Japan has not fully recovered from the Heisei recession, which began in 1991 and consisted of price deflation and largely stagnant GDP (Hirano, 2011). The Japanese economy
comprises 21% of Industrials, making it the biggest composite sector in the Japanese market. Importantly, for the implications of these research findings, 68% of output in this sector comes from production and the remainder is derived from services. The second largest sector in the Japanese market is Consumer Discretionary which constitutes 19% of stocks and is equally service- and production-based, followed by Financials (17%) where banks take up half of the sector. The IT sector accounts for 13% of the Japanese universe of stocks where about two-thirds of the output is hardware and only one-third is software and services. Lastly, the Material sector accounts for 12% of the economic activity in Hong Kong where chemicals account for half of the output produced by the sector.

The absence of economic growth in the last two decades explains why value investing strategies have been consistently delivering positive returns in Japan. Accounting for about 43% of the Pan Asian portfolio, Japan is the only Pan Asian market where value investing keeps consistently generating positive portfolio returns that are above the risk-free rate of 0.2%, by producing an overall return of 9.9%. The application of all five value factors considered in this study generated outstanding returns for Japan, with B/P producing an incredible 14.9%*** return, followed by C/P (11.8%***), D/P (11.4%***), E/P (3.1%) and S/P (8.4%***). These results are consistent with Chan et al (1991) who also document a strong value premium in Japan. Notably for Japan, the regression results for E/P come back as statistically insignificant.

The only exception in this market is the Financial sector, which constitutes about 17% of the Japanese economy. In this sector, value investing strategies on average result in 1.5% return to investors. Considering that the risk-free rate is 0.2%,
it is still not a bad result. Importantly, as the Financial sector is a diversified GICS sector, and considering my earlier proposition that value works best in a homogenous set of stocks as they are more comparable, it is perhaps more sensible to break this sector further down into industry groups or even industries to obtain more meaningful results.

**South Korea.** The South Korean economy ranks as the twelfth largest in the world measured by PPP and fifteenth when ranked by the US$ value of GDP, identifying it as one of the G-20 major economies. It is a high-income developed country, with an emerging economy (IMF, 2011). In terms of sector composition, **Industrials** (27%) is the greatest sector in the South Korean universe of stocks. Notably, the **Industrial** sector in South Korea is heavily production based (87%). The next biggest sector in South Korea is **Materials** (21%) with a 50% stake in Chemicals. The position of the third largest sectors in the South Korean universe of stocks is shared by both **Consumer Discretionary** (13%), which again is heavily production based (77%); and **Financials** (13%) with one-third proportion of the sector pertaining to Banks (35%). Amongst the smaller sectors in South Korea is **Consumer Staples** (9%) and **IT** (8%) where hardware manufacturing comprises an astonishing 93%.

Overall value investing strategies tend to reward investors with a stake in the South Korean stocks producing 4.9% return overall, which is above the 3.6% risk-free rate. Notably, a valuation approach based on C/P would result in a 6.8%*** return, followed by B/P (5.3%***), D/P (4.6%**) and S/P (4.5%***). It is only E/P (3.2%) that would produce returns below the 3.6% risk-free rate. However, it is worth mentioning here that the regression results generated by utilising the E/P ratio
as a valuation tool are statistically insignificant. Importantly, in South Korea, value investing works well in three sectors. The first one is Materials, which produces an overall return of 10.4%. Then in the Consumer Discretionary sector (which again is heavily production based with the automotive industry group being one of South Korean major growth segments), value investing strategies generate an overall return of 4.4%. The South Korean Industrial sector (also heavily production based), which has been the principal stimulus to the country’s economic development, seems to be a good fit for value investing strategies by generating an enticing 16.2% return. Importantly, value investing tactics produce negative returns for the Consumer Staples (-1.2%) sector, and lastly the back-testing outcome seems rather fragmented for both the Financials (6.1%) and the IT sectors (-6.5%). All in all, in South Korea, value investing strategies seem to have been a successful investing paradigm in 2000-2010.

Taiwan. According to IMF (2011), the Taiwanese economy ranks as the nineteenth largest in the world when measured by the US$ value of GDP, and twenty-fourth based on PPP. With the prospect of continued relocation of labour intensive industries offshore and their subsequent replacement with more capital- and technology-intensive industries, there is a strong indication that Taiwan’s future development will rely on further transformation to a high technology-driven and service-oriented economy (Qfinance, 2011). Also, as pinpointed by Qfinance (2011), small and medium-sized businesses make up a large proportion of businesses in Taiwan, unlike in neighbouring Japan and South Korea. In terms of sector composition, the IT sector, which is almost exclusively hardware oriented (97%), makes up a remarkable 43% of the stocks in the Taiwanese universe. The second largest sector in Taiwan is Financials (18%) with a stake in Banks being 40%. The
third largest sector in Taiwan is Materials (13%) where (just like in South Korea and Japan) Chemicals account for 50% of the total output. Next, Consumer Discretionary and Industrials account for 12% and 10% of the Taiwanese stocks. Importantly, in Consumer Discretionary, production takes up 82% of the output, while in the Industrial sector production accounts for two-thirds of the sector activity. Lastly, Consumer Staples in Taiwan is a fairly small sector accounting for only 2% of the country’s economy. Taking into account the limited number of stocks in Consumer Staples, this sector has been excluded from the analysis of the Taiwanese stocks.

According to Ko et al (2014), unlike the U.S. and most developed countries, Taiwan stock market has been widely documented to have no value premium. This finding is rather interesting as the results of the study show that on average value investing strategies result in a 2.9% return for the Taiwanese market, which is almost the same as for South Korea. Although on average Taiwan seems to be an acceptable fit for value investing tactics, the returns generated in this market are lower than those in other countries covered in the study. Strategies based on B/P (3.9%***), E/P (3.8%), D/P (3.7%**) and C/P (2.0%***) seem to have delivered very similar results for the Taiwanese market in 2000-2010, all above the risk-free rate of 1.3%. The exception was S/P (1.0%***) which falling under the 1.3% risk-free rate is an unsuitable valuation paradigm. Notably for Taiwan, the regression results for E/P are not statistically significant.

In the Taiwanese universe of stocks, a value investing approach only produces consistent excess returns in the Industrial sector (4.4%). However, its performance in the Materials (4.2%) may also be deemed as satisfactory in predicting abnormal returns on investment. Remarkably, in both the Consumer Discretionary (0.7%) and
the Financials (4.2%) sectors, value investing generates positive returns for three of the six value metrics studied. There are not enough stocks in the Taiwanese Consumer Staples sector (which constitutes only 2% of the country’s economy) and thus it has been excluded from the analysis. Finally, value investing strategies in the Taiwanese IT sector, which comprises 43% of the country’s economy, result in an overall 0.8% return to investors.

4.3.1.2. By Sector

According to Figure 3 and Table 6 below, on average among some of the most fruitful sectors for the execution of value investing strategies were: Industrials (10.3%), Consumer Staples (3.6%) and Materials (3.0%).

<table>
<thead>
<tr>
<th>Sector</th>
<th>Australia</th>
<th>Hong Kong</th>
<th>Japan</th>
<th>South Korea</th>
<th>Taiwan</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer discretionary</td>
<td>-1.8%</td>
<td>1.9%</td>
<td>15.0%</td>
<td>4.4%</td>
<td>0.7%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Consumer staples</td>
<td>-4.8%</td>
<td>9.7%</td>
<td>10.8%</td>
<td>-1.2%</td>
<td>-</td>
<td>3.6%</td>
</tr>
<tr>
<td>Financials</td>
<td>-3.6%</td>
<td>1.9%</td>
<td>1.5%</td>
<td>6.1%</td>
<td>4.2%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Industrials</td>
<td>5.2%</td>
<td>15.1%</td>
<td>10.5%</td>
<td>16.2%</td>
<td>4.4%</td>
<td>10.3%</td>
</tr>
<tr>
<td>IT</td>
<td>-</td>
<td>-7.2%</td>
<td>11.5%</td>
<td>-6.5%</td>
<td>0.8%</td>
<td>-0.4%</td>
</tr>
<tr>
<td>Materials</td>
<td>-6.1%</td>
<td>-3.7%</td>
<td>10.2%</td>
<td>10.4%</td>
<td>4.2%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Average</td>
<td>-2.2%</td>
<td>3.0%</td>
<td>9.9%</td>
<td>4.9%</td>
<td>2.9%</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

As the table above demonstrates, comparatively, on a sector basis, the largest average portfolio returns across Pan Asia can be found in the Industrial sector (10.3%), followed by Consumer Discretionary (4.1%), Consumer Staples (3.6%), Materials (3.0%), Financials (2.0%). Analysis shows that investments in the IT sector (-0.4%) are likely to result in a loss to shareholders. On a country basis, value investing generates the highest stock returns in Japan (9.9%), followed by South Korea (4.9%), Hong Kong (3.0%) and Taiwan (2.9%). Notably, in Australia (-2.2%) stock picking strategies based on value investing techniques are likely to result in a loss to shareholders.
Figure 3.  Average Portfolio Returns per Sector

Materials. In particular, in the Material sector, a value investing approach showed good results for the Japanese (10.2%) and South Korean (10.4%) markets.

Industrials. In this sector, value investing produced average abnormal portfolio returns of 10.3%. Since the Industrial sector is greater than many other sectors in terms of trading volume, market capitalisation, share price, net income and book values, it is expected that the value relevance of such accounting measures as book value, cash flow, earnings, dividends and sales in this sector will be greater than that in other sectors (Shamki and Rahman, 2011). On a country basis, value investing techniques in the Industrial sector yielded healthy average portfolio returns in the South Korean (16.2%), Hong Kong (15.1%), Japanese (10.5%) and Taiwanese (4.4%) markets.

Consumer Staples. Then, for the Consumer Staples sector value factors seem to work well as valuation proxies mainly in Japan (10.8%) and Hong Kong (9.7%).
**Consumer Discretionary.** In the *Consumer Discretionary* sector, value investing generated superior returns for the Japanese (15.0%) market.

**IT.** Finally, value investing strategies in the *IT* sector would only yield positive returns for the Japanese market (11.5%) alone.

On the other hand, for all the five markets covered in the study, value investing tactics did not seem to be an appropriate valuation proxy for the *Financial* sector (2.0%), which is a much diversified GICS sector. This therefore goes to support the proposition put forward earlier in the thesis that value works best in an homogenous set of stocks. Notably, among the other sectors where value strategies performed quite poorly was *IT* (-0.4%). Among the worst underperformers was *Materials* in both Australia (-6.1%) and Hong Kong (-3.7%). While in the *Consumer Discretionary* sector, a value investing approach failed to deliver adequate returns in Australia (-1.8%) and Taiwan (0.7%). Lastly, when adopted in the *Consumer Staples* sector, value investing strategies produced poor returns in Australia (-4.8%) and South Korea (-1.2%).

Although the results allow one to generate some overall conclusions in terms of the performance of value investing, the above discussion illustrates that it is quite difficult to draw inferences as to the performance of value metrics in a particular sector without referring to the country in which they operate and its underlying context. This preliminary observation goes to suggest that in the context of value investing, sector and country relevance go hand-in-hand.
4.3.1.3. By Factor

In the following section the effectiveness of the accounting based valuation factors is evaluated depending on their ability to assist value strategies in producing positive portfolio returns in excess of the average cross-country risk-free rate of 2.4%. **Figure 4** highlights some of the most robust valuation metrics examined in this study in terms of their role as valuation proxies. I also dedicate a section to outlining some of the least suitable fundamental factors for value investing strategies. I conclude that on average, of the five valuation factors studied, four allow generating portfolio returns above the cross-country risk-free rate and only E/P proving unsuitable for value investing.

**Figure 4. Average Portfolio Returns by Factor**
**Book value to price.** Penman et al (2007) and Jensen et al (1997) document that enterprise B/P ratio is positively related to returns. As is evident from the analysis, B/P produced exceptional returns for Japan (14.9%***). This same finding is reported by Aggarwal et al (1992) who report a significant B/P effect in Japan such that Japanese equities with high B/P ratios earn greater returns than those with low B/P ratios. This valuation ratio also generated higher than the risk-free rate of return for South Korea (5.3%***) and Taiwan (3.9%***). On the other hand, B/P is not a suitable valuation tool in Australia (-6.9%) and Hong Kong (-2.7%).

As a balance sheet measure presented in company’s statement of financial position, the B/P ratio is generally a helpful measure in the valuation of companies that have a large number of tangible assets.\(^{16}\) This ratio indicates how the market values company assets by assigning value to the net assets of a company based on an assessment of their ability to generate earnings. According to Aggarwal et al (1992, p.591), “there are a number of reasons that B/P ratio can be expected to be a useful indicator of the extent of security undervaluation and thus be a basis for investment strategy”. In particular, many tax related benefits depend on book values (Aggarwal et al, 1992). Plus, the B/P ratio may be a useful indicator of market overreaction and companies with a high B/P have proven as more attractive takeover targets (Bartley and Boardman, 1986). It is suggested that the B/P ratio is a more effective tool for the relative valuation among stocks than E/P because earnings tend to be more subjected to accounting procedures than book values (Aggarwal et al, 1992). Given the computational problems, relative instability of reported earnings and the information content of the B/P ratio, the latter offers a valuation measure which

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\(^{16}\) Tangible assets have a physical form and include both fixed assets (machinery, buildings, land) and current assets (inventory).
could be used as a basis of a superior investment strategy (Aggarwal et al, 1992). However, B/P is not suitable for companies that have a large quantity of intangible assets\(^{17}\). It is for this reason that book value to price loses any significant meaning when comparing companies of different types.

On a sector basis, according to the research findings, value investing strategies based on B/P worked well for *Industrials* (10.8%), *Financials* (7.0%) and *Materials* (5.3%). They nevertheless produced negative returns for *Consumer Discretionary* (-0.3%) and *IT* (-6.8%). The result in the *Consumer Staples* (0.9%) sector was unsatisfactory as well with portfolio returns averaging almost zero. Comparatively on a country basis, B/P value investing strategies delivered a 5.3% return in South Korea but had little success in Taiwan (3.9%). Notably, Hong Kong (-2.7%) and Australia (-6.9%) are particularly unfavourable value investing environments for this fundamental factor. The effectiveness of this variable in predicting returns is therefore rather dubious.

This study shows that in the *Material* sector valuation based on this metric produces exceptionally good returns for both Japan (17.3%) and South Korea (14.3%). In addition, a valuation approach relying on B/P generated favourable investment outcomes for Hong Kong (15%), Japan (14.8%) and South Korea (15.7%) in the *Industrial* sector. When placed in the trading context of the *Consumer Discretionary* sector, B/P based valuation strategies resulted in an 18% return for Japan only. Similarly, in the *Consumer Staples* sector, B/P valuation tactics yielded a 16% return for Japan. In *Financials*, the B/P valuation method worked exceptionally

\(^{17}\) Intangible assets are non-physical in existence and include patents, trademarks, copyrights, goodwill and brand recognition.
well for South Korea (19.9%) and also showed a strong investment outcome for Taiwan (12.3%). Finally, in the IT sector, valuation strategies underpinning B/P generated a positive investment outcome for Japan only (16%).

At the same time investors are strongly discouraged from investing based on B/P as a value investing technique in the Consumer Discretionary sector in Australia and Hong Kong, where it would result in a -12.3% and -11.1% losses, respectively. B/P should also be avoided as a valuation strategy when investing in the Consumer Staples sector in Australia (-11%). Another particularly unfavourable investing arena for this value metric is the IT sector covering such markets as Hong Kong (-16%), South Korea (-17.8%) and Taiwan (-9.4%).

Cash flow to price. Modern finance theory argues that the value of a firm depends on its stream of future cash flows. According to the findings of this study, on average it is C/P that is the most suitable fundamental factor for value investing across a sample of Pan-Asian countries covered in the study (cross-country average is 6.1%). The literature has numerously shown a positive relationship between stock returns and C/P (Chan et al, 1993; Bauman et al, 1998; Desai et al, 2004; Hirshleifer et al, 2004; Lakonishok et al, 1994; Pincus et al, 2007). Valuation based on C/P has generated positive returns in all the five countries studied: Australia (2.6%*), Hong Kong (7.2%*), Japan (11.8%***), South Korea (6.8%***), and Taiwan (2.0%***).

Many consider this valuation measure to be one of the most important fundamental factors in measuring the quality of earnings, cash flow and overall health of a company. This ratio assigns value to cash flows that a company generates in excess of cash flows which have been committed to either company growth or shareholder distributions (or both). As with most ratios, the higher the C/P, the more
attractive the investment, as an investor is paying less for a claim on cash generated by the business. Cash flow is particularly important as it gives an indication of the company’s potential to pay dividends, buy back shares, make acquisitions, and deal with unexpected problems without affecting the long-term health of the company. C/P gives an investor a sense of the company’s ability to finance its own growth independent of capital markets.

Notwithstanding with the ever existing popularity of earnings as a measure of firm’s value, two reasons have been advanced to explain the superiority of cash flow over earnings in explaining the firm’s financial performance. First, managers may manipulate earnings to maximise their bonus awards (Healy, 1985) or to side step restrictive debt covenant violations. As set out by Adelegan (2003, p.35), “the fact that accrual components of earnings can be manipulated makes the cash flow component a more reliable indicator of corporate performance than the accrual component”. In addition, cash flows are a more direct measure of liquidity, and liquidity is likely to be a contributing factor in setting dividend policy. Therefore, cash flow is expected to be more useful than earnings in measuring corporate performance (Adelegan, 2003).

On a sector basis C/P generated abnormal returns for Materials (8.6%), Industrials (12.1%), Consumer Discretionary (8.7%), Consumer Staples (5.9%), and IT (4.9%). The only exception is the Financial sector with a negative return of -2.6%. This can be attributed to the sector-specific nature of the Financial sector in which C/P is not a suitable valuation metric. As outlined by Damodaran (2009), valuing financial service firms has always been difficult. The problems with valuing this kind of businesses come from stem from two main characteristics. The first is
that the cash flows to a financial service firm cannot be easily estimated, since items like capital expenditures, working capital and debt are not clearly defined (Damodaran, 2009). The second characteristic pertaining to the financial service firms is that most of them operate under a regulatory framework that governs how they are capitalised, where they invest and how fast they can grow and any changes in the regulatory environment can create large shifts in value (Damodaran, 2009).

Comparatively, on a country basis, value investing based on C/P results in healthy portfolio returns for Japan (11.8%), Hong Kong (7.2%), South Korea (6.8%) and Australia (2.6%). In contrast, valuation based on this fundamental factor in Taiwan does not seem to generate portfolio returns above the country’s average risk-free rate.

Further, a close look at the Material sector reveals that value investing strategies relying upon C/P yielded positive returns for Japan (13.4%), South Korea (18.2%), Taiwan (10.5%) and India (19.2%). In the Industrial sector, value investing tactics based on C/P seemed to work well for Australia (11.9%), Hong Kong (20.4%), Japan (14.7%) and South Korea (11.5%). In the Consumer Discretionary sector, C/P based valuation approach generated excess returns for Hong Kong (9.8%) and Japan (22.2%), while in the Consumer Staples sector, it yielded a healthy investment outcome for Japan (10.7%). Similarly, in the IT sector, C/P based valuation strategies produced fruitful returns for Japan (10.2%).

**Dividends to price.** Dividends is a flow variable, as represented on the company’s income statement, or the statement of financial performance. On average across the five countries studied, D/P (cross-country average 3.9%) is the next best valuation factor after cash flow to price. According to the study, a valuation approach
relying on D/P produces positive portfolio returns in excess of the risk-free rate for all markets expect Australia where portfolio returns are negative: Hong Kong (3.8%**), Japan (11.4%***), South Korea (4.6%***), Taiwan (3.7%***). On a similar note, Goyal and Welch (2003) and Wu and Hu (2012) provide convincing evidence that D/P ratios were ever useful for the predictability of stock returns. The ability of the D/P ratio to predict returns is also noted before by Campbell and Shiller (1988), Shiller (1984) and Flood et al (1986). According to Fama and French (1988, p.15), “the intuition of the hypothesis that D/P is capable of forecasting returns is that stock prices are low relative to dividends when discount rates and expected returns are high, and vice versa, so that D/P captures variation in expected returns”.

It has been proposed that the decision between paying dividend and retaining earnings as a source of further investment has been taken seriously by both investors and management, and has been the subject of considerable research and scrutiny by equity analysts and economists (Adelegan, 2003). Interestingly, Amidu (2007) notes that one of the primary reasons for companies to pay dividends may be that companies that do so are perceived as being relatively honest and less subjected to accounting manipulation. Amidu (2007, p.105) puts forward the following argument: “Embrace stocks that pay healthy dividends. A bird in the hand is better than two in the bush. Healthy dividends also indicate that companies are generating real earnings rather than cooking the books”.

D/P is a popular measure for valuing companies that do not have stable earnings but provide consistent dividends (Farsio et al, 2004). In particular, firms whose earnings fluctuate throughout the business cycle and yet pay consistent dividends may be well-suited to this metric. In such cases, D/P may provide a more
meaningful measure of company value than E/P, where earnings swing dramatically over the business cycle. Dividends are perceived as ‘a less contaminated’ accounting measure because they reflect both the company’s legal capacity to generate earnings and its economic capacity to produce cash flows.

As the study shows, on average across sectors, D/P based valuation strategies performed well for *Industrials* (10.7%) and *Consumer Staples* (8.0%). Comparatively, on a country basis, a valuation approach relying on D/P mainly produced excess returns for Japan (11.4%) only. Valuation based on this factor generated excess returns for Taiwan (11.5%) in the *Material* sector. This study demonstrates that in the *Industrial* sector, D/P based valuation tactics worked exceptionally well, generating superior returns for Hong Kong (11.7%), Japan (12%) and South Korea (22.3%). While in the *Consumer Discretionary* sector, valuation strategy underpinning D/P showed remarkable results for Japan, yielding a 17.8% return. Similarly, for the *Consumer Staples* sector, D/P resulted in some outstanding results generating a 19.7% return for Hong Kong and a 15.2% return for Japan. In the *Financial* sector, a D/P based valuation method produced an 11.2% return for South Korea. Lastly, in the *IT* sector, the performance results based on valuation underpinning this fundamental factor stood out in Japan (14.9%). However, investors are strongly discouraged from investing based on D/P as a value investing technique in the *Financial* sector in Australia (-10.5%), and in the *IT* sector in South Korea (-11.8%).

**Earnings to price.** Earnings is a flow variable, as represented on the company’s income statement, or the statement of financial performance. Although Basu (1977) and Chan et al (1993) show that stocks with a high E/P have a return
higher than the average, the current study shows that reliance on the E/P ratio resulted in relatively poor returns for all the Pan-Asian countries studied. Even in Japan, the most successful value investing domain, the E/P based valuation strategies generated returns (3.1%) below the risk-free rate (4%) and were not statistically significant. The regression results report that the relationship between E/P and stock returns is not statistically significant in all the five markets studied.

The results of the study presented in this thesis are particularly interesting considering the notion that E/P is perhaps the most widely used accounting figure in the financial community. For that reason alone, it could be a meaningful starting point in determining the relative worth of a company. E/P is most appropriate in the valuation of companies that have relatively steady earnings. Such companies are generally characterised by stable prices and demand, or highly variable costs. However, E/P is of no use for companies with no earnings. The last limitation of this valuation factor is that earnings may lose meaning when comparing companies in different countries.

As further explained by Trejo-Pech et al (2012), investors that are very oriented towards firms yielding high earnings, might fail to realise that earnings are not always accompanied by strong levels of cash flows. The empirical evidence reviewed casts doubt on the usefulness of both the E/P ratio for explaining stock returns (Barbee et al, 1996). Similar to the results presented in this thesis, Barbee et al (1996) and Lev (1989) also find earnings based variables of limited value in forecasting stock returns. In his survey of twenty years of earnings potential, Lev (1989) concludes that extensive empirical findings portray a consistent but somewhat bleak picture in which earnings provide a very modest contribution to the prediction
of stock returns. Similarly, Reinganum (1989b) and Fama and French (2012) show that the E/P ratio does not have a significant explanatory power for stock returns. Existing findings showing that E/P as a valuation ratio has limited value for forecasting stock returns is rather non-surprising (Barbee et al, 1996). This is largely because currently reported earnings are subject to transitory influences that diminish their reliability as an indicator of a company’s long-term earnings potential. These influences include management and/or accounting manipulation and greater cyclical variability of earnings vs sales (Barbee et al, 1996).

On a sector basis, on average E/P based valuation strategies generated excess returns for Industrials (7.4%) only, and on a country basis the performance of this value metric has been a relatively poor valuation strategy for all the six Pan Asian countries studied. In particular, according to this study, E/P based valuation tactics resulted in an 18% excess return for Hong Kong and 12.8% for South Korea in the Industrial sector. When used as a valuation proxy in Consumer Staples, E/P acted as a good indicator of performance and yielded a 12.4% return for Hong Kong, while in Financials it only produced significantly positive returns for Taiwan (9.4%). However, it is also important to note that E/P based valuation strategies should be strongly avoided when investing in the Consumer Staples sector in Australia (-10.5%).

Sales to price. Sales is a flow variable, as represented on the company’s income statement, or the statement of financial performance. S/P based valuation strategies have produced positive portfolio returns for Hong Kong (2.9%***), Japan (8.4%***), and South Korea (4.5%***). In contrast, valuation based on this fundamental factor in Australia (1.3%***), and Taiwan (1.0%***), does not seem to
generate portfolio returns above the countries’ average risk-free rates. Historically, Barbee (1989), Barbee et al (1996), Mukherji et al (1997) and Mohanram (2005) have documented the existence of a positive and statistically significant relationship between S/P and stock returns. This traditional valuation factor has gained prominence in the recent past, as some of the ‘new economy’ stocks produce sales but no earnings. Without earnings, revenue projection can be a useful but somewhat dangerous tool in approximating the relative worth of a company. The idea behind S/P is that with rapidly growing sales, earnings will at some point follow.

One benefit of this accounting based valuation metric is that sales are not as easily manipulated as earnings. In addition, S/P is particularly useful in the valuation of ‘under-earners’ or companies without any visible earnings, such as early stage companies, or firms with high fixed costs. In this case, S/P may be a more stable and more meaningful measure of comparison than E/P. One reason S/P may have greater explanatory power for stock returns than E/P is that a company’s annual sales may be a more reliable indicator of the firm’s long-term profit potential than its reported earnings. Earnings are more unstable than sales and can be affected to a greater extent by temporary occurrences (e.g. a high level of expenditures for product development, current cyclical conditions in the industry and short-term pricing policies). An additional advantage of S/P is that, unlike E/P, it does not have negative values for some firms, which can be difficult to interpret. Mohanram (2005) suggested that relatively high S/P may indicate that the stocks are unpopular with investors, thereby providing buying opportunities. Stocks with high S/P are likely to earn high returns if (1) the management implements strategies to generate greater profits from the relatively higher level of sales and (2) the stock becomes more popular with investors because of these financial improvements.
Taking into account the relationship between stock returns and the five accounting based ratios described above, one can conclude that the most reliable valuation measure is C/P (6.1%), followed by D/P (3.9%) and S/P (3.6%). This finding is phenomenal as the three ratios essentially founded on cash flow, dividends and sales – are empirical flow financial variables that are least subjected to accounting distortions and manipulations, whether deliberate or as a result of differing accounting policies and techniques. The finding that the B/P ratio (2.9%), as a balance sheet metric, is less reliable as a valuation platform is rather unsurprising considering that this is a point-in-time measure of a firm’s financial position that is subject to the accountant’s discretion. Similarly, I find it rather obvious that the E/P ratio (1.9%) is ranked as the least reliable valuation approach of the five accounting based ratios studied in this dissertation. As discussed in the literature review section, earnings are often manipulated to enhance the company’s financial position. Unless followed by empirical signals such as dividends and/or cash flows, earnings may not represent a true and fair picture of the company’s financial well-being. In other words, when analysing a company’s financial report, one can track the substance behind cash flow, dividends and sales (thus they are empirical measures of the company’s financial performance), whereas earnings and book value are accounting creations that, if different methodology is applied, can be presented in a myriad of other different ways.

To summarise, the existing study indicates that on a country basis, the number one value investing arena is Japan with an average portfolio return across the ten years of almost 10%, followed by South Korea with about a 5% return. Interestingly, Hong Kong (3.0 %) and Taiwan (2.9%) share the third place, while Australia ranks last (-1.8%). On a sector basis, Industrials (10.3%) was an absolute winner for value
investing. Other sectors did not perform as well but the ones delivering portfolio returns above the risk-free rate were *Consumer Discretionary* (4.1%) and *Consumer Staples* (3.6%). In terms of the effectiveness of value strategies based on the fundamental accounting factors, C/P (6.1%) ranks as the number one valuation measure, followed by D/P (3.9%), S/P (3.6%) and B/P (2.9%). Notably, this study shows that E/P (1.9%) is the least reliable valuation measure as it ranks last amongst the five valuation factors studied.

On a final note, this study indicates that the number one investing arena is the *Industrial* sector in South Korea based on the D/P valuation method, producing a 22.3%. It is followed by *Consumer Discretionary* in Japan based on the C/P valuation factor, yielding a 22.2% return on investment over a ten-year horizon. On the other hand, the poorest fit for value investing strategies is *IT* in South Korea that would result in a -17.8% loss, followed by the *IT* sector but in Hong Kong would leave investors with a colossal -16% loss.

Although the relationship between stock returns and accounting based fundamental ratios exists, and some ratios seem to have a greater ability to explain stock returns than others, this argument remains unclear. In an efficient market, the stock price should reflect all public information, so that stock returns should not be significantly correlated with historical fundamentals. The existence of a significant relationship between some of these ratios and stock returns, as evidenced by the literature and the results of the exiting study, however, shows how share price may not fully incorporate publicly available information. *Chan et al (1993)* propose that one of the possible explanations for the differences in the predictive ability of the
various ratios may lie in the different accounting methods used\textsuperscript{18}. In addition, keeping in mind the fact that some indicators have historically been more popular than others (such as E/P, for example), it is logical to expect that the information contained in E/P would be more embedded in stock returns than that embedded in other ratios included in this study. This dissertation provides supporting evidence to suggest that the E/P is not a reliable valuation factor.

4.3.2. Correlation

In this study, the relative merits of some financial variables that have been proposed as explanatory factors for future stock returns have been investigated. As mentioned above, a range of simple regressions, as opposed to a multiple regression model, have been used to test the relationship between the five different accounting ratios and returns. The reasoning behind using a simple and not a multiple regression model is provided in the next few paragraphs below and is related to the issue of multicollinearity.

In statistics, correlation is the degree of association between the two variables. Consequently, \textit{coefficient of correlation} is a measure of the degree of association between the two variables (Gujarati and Porter, 2009). The most commonly used techniques for investigating the relationship between two quantitative variables are correlation and linear regression (Bewick et al, 2003). Correlation quantifies the strength of the linear relationship between a pair of variables, whereas regression expresses the relationship in the form of an equation (Bewick et al, 2003). The problem of multicollinearity arises when independent variables $X$ – book value, cash

\textsuperscript{18} for example, the effect of depreciation and amortisation on book value (but this does not apply to cash flow)
flow, dividends, earnings and/or sales – are highly correlated. Then it is not possible to separate the effects of these variables on the dependent variable $Y$ – returns. The slope coefficient estimates will tend to be unreliable, and often are not significantly different from zero. The following discussion focuses on the calculation and interpretation of the sample product moment correlation coefficient denoted by $r$. The higher the $r$, the greater the correlation between the two variables observed. **Table 7** below shows the correlation coefficients for the ten pairs of fundamental accounting based measures of corporate performance.
Table 7. The Correlation Matrix of Independent Variables

<table>
<thead>
<tr>
<th></th>
<th>Variable</th>
<th>Book value</th>
<th>Cash flow</th>
<th>Dividends</th>
<th>Earnings</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td>Book value</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cash flow</td>
<td>0.7886</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dividends</td>
<td>0.9057</td>
<td>0.8644</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>0.8426</td>
<td>0.8666</td>
<td>0.9148</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>0.6833</td>
<td>0.6748</td>
<td>0.7282</td>
<td>0.6434</td>
<td>1.000</td>
</tr>
<tr>
<td><strong>Hong Kong</strong></td>
<td>Book value</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cash flow</td>
<td>0.3618</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dividends</td>
<td>0.8624</td>
<td>0.5137</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>0.8512</td>
<td>0.3197</td>
<td>0.8888</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>0.8911</td>
<td>0.3206</td>
<td>0.8424</td>
<td>0.8391</td>
<td>1.000</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>Book value</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cash flow</td>
<td>0.0333</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dividends</td>
<td>0.1081</td>
<td>0.2867</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>0.0842</td>
<td>0.1261</td>
<td>0.6043</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>0.1159</td>
<td>0.2571</td>
<td>0.6581</td>
<td>0.5200</td>
<td>1.000</td>
</tr>
<tr>
<td><strong>South Korea</strong></td>
<td>Book value</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cash flow</td>
<td>0.7535</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dividends</td>
<td>0.5601</td>
<td>0.5407</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>0.7741</td>
<td>0.8343</td>
<td>0.5778</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>0.8266</td>
<td>0.7589</td>
<td>0.5051</td>
<td>0.7479</td>
<td>1.000</td>
</tr>
<tr>
<td><strong>Taiwan</strong></td>
<td>Book value</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cash flow</td>
<td>0.8301</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dividends</td>
<td>0.5818</td>
<td>0.6053</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>0.7426</td>
<td>0.7419</td>
<td>0.6349</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales</td>
<td>0.6062</td>
<td>0.5619</td>
<td>0.4274</td>
<td>0.5341</td>
<td>1.000</td>
</tr>
</tbody>
</table>
As the table above shows, in Australia, positive correlation of greater than 60% is observed between each of the possible pair combinations of the five variables studied. In Hong Kong, there is positive correlation of greater than 80% between the majority of pairs of independent variables, with the exception of a number of combinations of cash flow with other variables, namely with book value (36.18%), dividends (51.37%), earnings (31.97%) and sales (32.06%). In Japan, however, the only positive correlation of greater than 60% can be noted between dividends and earnings (60.43%), as well as dividends and sales (65.81%). In South Korea, there is positive correlation of greater than 70% between the majority of pairs of independent variables with the exception of a number of combinations of dividends with other variables, namely with book value (56.01%), cash flow (54.07%), earnings (57.78%), and sales (50.51%). Lastly, in Taiwan, there is positive correlation of greater than 60% between the majority of pairs of independent variables with the exception of a number of combinations of sales with other variables, namely with cash flow (56.19%), dividends (42.74%) and earnings (53.41%). The correlation between book value and dividends in Taiwan also shows a level of correlation of less than 60% (58.18%).

As Table 7 above shows, for Australia, positive correlation is observed between each of the five variables studied. Similarly, correlation results for Hong Kong, South Korea and Taiwan also suggest that there is positive level of correlation between the majority of pairs of independent variables. It is only Japan where the independent variables do not seem to be correlated, with dividends-sales and dividends-earnings being the only two pairs that are. Stemming from this correlation outcome, it appears that one should be rather careful in terms of reliability if all five independent variables were to be included in one multiple regression, so as not to distort the results and the underlying data analysis. The underlying notion of these relationships is further discussed below.

It is worth noting here that the relationship between variables from the balance sheet (i.e. book value), income statement (i.e. earnings, dividends and sales) and the statement of cash flows (i.e. cash flow) is a phenomenon that is empirically not very transparent. That is because, as mentioned earlier in the thesis, book value is a point-in-time or static variable, whereas other variables, notably cash flow, earnings, dividends, and sales – are flow variables. Therefore, when one attempts to relate
book value to cash flow, earnings, dividends or sales, it essentially comes down to the ‘comparing apples and oranges’ idiom. Ideally, one would find it easier to compare either a pair of static (or balance sheet) variables or a pair of flow (or income statement) variables. That is, however, not to suggest that there is no relationship between book value and the income statement variables. As the literature and the empirical results of this study indicate, this relationship can definitely be observed. Below, I discuss the notion and implications of this phenomenon by summarising the results from the correlation matrix in Table 7.

**Book value and cash flow.** The correlation matrix in Table 7 shows a positive correlation between book value and cash flow in Australia (0.7886), South Korea (0.7535), and Taiwan (0.8301). Similarly, Davis (2001) also provides evidence whereby book value is highly correlated with cash flow.

**Book value and dividends.** The correlation matrix in Table 7 shows a positive correlation between book value and dividends in Australia (0.9057), Hong Kong (0.8624), South Korea (0.5601), and Taiwan (0.5818).

**Book value and earnings.** The correlation matrix in Table 7 shows a positive correlation between book value and earnings in Australia (0.8426), Hong Kong (0.8512), South Korea (0.7741), and Taiwan (0.7426). In this regard, the study by Saidi and Ghaderi (2007) shows that book value and accounting profit (typically expressed as earnings) are related. Likewise, Davis (2001) also provides evidence whereby book value is highly correlated with earnings.

**Book value and sales.** The correlation matrix in Table 7 shows a positive correlation between book value and sales in Australia (0.6833), Hong Kong (0.8911),
South Korea (0.8266) and Taiwan (0.6062). In this regard, Davis (2001) provides evidence whereby book value is highly correlated with sales.

Cash flow and dividends. The correlation matrix in Table 7 shows a positive correlation between cash flow and dividends in Australia (0.8644), Hong Kong (0.5137), South Korea (0.5407), and Taiwan (0.6053). The association between earnings and dividend changes has been established for the past four decades (Adelegan, 2003). Lintner’s (1956) ground-breaking study on dividend payment modelling argued that the main determinants of changes in dividend are current earnings and preceding dividend level. Further “drawing from traditional finance theory, as outlined in Jensen (1986) and Charitou and Vafeas (1998), Adelegan (2003) goes on to hypothesise that the relationship between cash flows and dividend changes depends on each firm’s growth opportunities. Adelegan (2003) further suggests that a firm’s payout policy is dependent on the cash availability. It therefore appears that an organisation’s decision to reduce, increase or maintain dividend partially reflects its liquidity position (Adelegan, 2003). The driving proposition is such that cash flows should be significant in setting dividend policy both as a performance and as a liquidity measure.

To further highlight the significance of the relationship between dividends and cash flow, it should be noted that dividends can be paid out of existing funds or alternatively the firm may resort to borrowing money in order to pay dividends. Adelegan (2003) further proposes that cash flows are a more important predictor of dividend changes when firms are highly leveraged. A firm’s ability to alter its dividend policy may depend on its liquidity position. When there is adequate liquidity, a firm can set its dividend policy according to its performance. However,
when cash flows are inadequate, the ability of the firm to change its dividend policy is constrained. A highly levered firm will therefore be expected to change its dividend policy in line with its liquidity position coupled with its performance (Adelegan, 2003).

Cash flow and earnings. It is important to note here that while both are known to be important summary measures of firm performance, earnings are produced under the accrual basis of accounting, whereas cash flow is recorded when received. The results of the study, as evident from the correlation matrix in Table 7, point to a positive correlation between cash flow and earnings in Australia (0.8666), South Korea (0.8343), and Taiwan (0.7419). In this regard, Nissim (2010) proposes that cash flow is positively related to future earnings. Similarly, Dechow (1994) notes that changes in earnings and changes in cash from operations have a high positive correlation with each other. Habib (2011, p.104) notes that “earnings and cash flows would not have been relevant had the accounting system produced a book value number exactly the same as the market value number”. However, given the accounting conservatism, current accounting rules allow market values to deviate considerably from book values, thus enabling other accounting variables to play an informational role (Penman and Yehuda, 2009).

Having said that there exists an empirical relationship between cash flow and earnings. On the other hand, it nevertheless also holds that in business profit does not necessarily equal cash flow. It would therefore be unwise to assume that making profit increases cash flow by the same amount. The cash flow of the business can be considerably higher than the underlying bottom-line earnings, or considerably lower. In particular, cash flow can be negative when the business is earning a profit; and
vice-versa, cash flow can also be positive when the business is making a loss. This is because cash flow statements provide an incomplete basis for assessing prospects for future cash flows for they cannot show inter-period relationships. Many current cash receipts, especially from operations, stem from activities of earlier periods, and many current cash payments are intended or expected to result in future, not current, cash receipts. Statements of earnings and comprehensive income, especially if used in conjunction with statements of financial position, usually provide a better basis for assessing future cash flow prospects of an entity than do cash flow statements alone (FASB, 1987, pp.19-20).

In any accounting reporting period, there will be a mixture of complete and incomplete transactions. Transactions are complete when they have led to a final cash settlement and cause no profit measurement difficulties. Considerable problems arise, however, when dealing with incomplete transactions, where the profit or loss figure can only be estimated by means of the accruals concept. This is where revenues and costs are matched with one another so far as their relationship can be established or justifiably assumed and dealt with in the profit and loss account of the period to which they relate. The greater the volume of incomplete transactions, the greater is the degree of estimation, and accordingly the greater the risk for investors to have been misled if actual outcomes deviated from the estimates (CPA Australia, 2014, p.236).

*Cash flow and sales.* The correlation matrix in Table 7 shows a positive correlation between cash flow and sales in Australia (0.6748), South Korea (0.7589) and Taiwan (0.5619). Notably, in Hong Kong (0.3206) and Japan (0.2571), the correlation between these two accounting measures is rather weak. Although
Dechow et al (1998) report a positive correlation between changes in earnings and cash flows, they also note that the relation between sales and cash flow from sales is not one-to-one because sales can be made on credit. Thus the credit terms for purchases may cause a difference between earnings and cash flows. Another interesting point made by Dechow et al (1998) is because earnings contain large non-cash expenses like depreciation and amortisation, one would expect operating cash flow per share to somewhat exceed earnings per share. Temporal differences exist both ways so this statement does not hold in all cases.

**Dividends and earnings.** The correlation matrix in Table 7 shows a positive correlation between dividends and earnings in Australia (0.9148), Hong Kong (0.8888), Japan (0.6043), South Korea (0.5778) and Taiwan (0.6349). According to Gordon (1959), among the events which will lead to an increase in a corporation’s dividend are: successful trading on its equity, increase in its return on investment, and selling additional common stock when the rate of profit the corporation can earn is above the rate at which its stock is selling. However, as noted by Gordon (1959, p.101), “there is no doubt that the most important and predictable cause of growth in a corporation’s dividend is retained earnings”. Similarly, Lawson (1996) obtained empirical evidence to show that dividend policies are based on accrual earnings. In this regard, Maio (2012) notes that correlation between dividends and earnings shows that these two variables are positively correlated but that this correlation is far from perfect (0.70).

The original proposition expressed by Modigliani and Miller (1958) back in the late 1950’s had already suggested that dividends and earnings were correlated. Howatt et al (2009) also conclude that positive changes in dividends are associated
with positive future changes in earnings per share. A study by Zhou and Ruland (2006) reveals that high dividend payout firms tend to experience strong future earnings. Amidu (2007, p.106) also proposes that dividends are paid by companies that grow earnings over a longer period of time. The findings of another study done by Arnott and Asness (2003) also indicate that future earnings growth is associated with a high dividend payout. Thus, an increase in dividends may be the result of good performance in previous periods which may continue into the future. This supports the view of a positive causal relationship between current dividends and future earnings.

Arnott and Asness (2003) expand their views by providing two possible reasons for the existence of a positive relationship between earnings and dividends. First, the authors suggest that the positive relationship between current dividend payout and future earnings growth is based on the free cash flow theory. Low dividend resulting in low growth may be as a result of suboptimal investment and less than ideal projects by managers with excess free cash flows at their disposal. This is prominent for firms with limited growth opportunities or a tendency towards overinvestment. Paying substantial dividends, which in turn would require managers to raise funds from issuance of shares or involve new debt, may subject management to more scrutiny, reduce conflicts of interest and thus curtail suboptimal investment (Arnott and Asness, 2003). This is based on the assumption that suboptimal investment lays the foundation for poor earnings growth in the future, whereas discipline and a minimisation of conflicts will enhance growth of future earnings through carefully chosen projects. Therefore, paying dividends to reduce the free cash flows enhances the performance of a company since managers will have less
cash on hand, thus potentially leading to the circumvention of suboptimal investments.

Another explanation by Arnott and Asness (2003) for the positive relationship between dividends and growth in future earnings is that managers are reluctant to cut dividends. A high payout ratio indicates management’s confidence in the stability and growth of future earnings. A low payout ratio suggests that management is not confident of the stability of earnings or sustainability of earnings growth (Arnott and Asness, 2003). Managers therefore pay low dividends to avoid dividend cuts in case earnings fall.

However, Farsio et al (2004) argue that no significant relationship between dividends and earnings holds in the long run and studies that support this relationship are based on short periods, therefore misleading investors. The authors propose three scenarios that would render the long-term relationship of dividends and future earnings insignificant. First, they point out that an increase in dividends may lead to a decline in funds that are to be reinvested by the firm. Firms that pay high dividends without considering investment needs may therefore experience lower future earnings (Farsio et al, 2004). This therefore points to the negative relationship between dividend payout and future earnings. Second, an increase in dividends in one financial period may be the result of the management’s policy to keep investors satisfied and prevent them from selling the stock at times when future earnings are expected to decline or current losses are expected to carry on (Farsio et al, 2004). This would be a case of rising dividends followed by declining earnings.

Dividends and sales. The correlation matrix in Table 7 shows a positive correlation between dividends and sales in Australia (0.7282), Hong Kong (0.8424),

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Japan (0.6581), and South Korea (0.5051). Although it is fairly straightforward when browsing through the company’s income statement to understand how sales and earnings are related to each other, it is rather difficult to say the same thing about the relationship between sales and dividends. Dividends appear right under earnings and the decision rule of how dividends are allocated is far from clear. A study by Amidu (2007) revealed a positive and significant relationship between growth in sales and dividend policy.

**Earnings and sales.** The correlation matrix in Table 7 shows a positive correlation between earnings and sales in all the five countries studied: Australia (0.6434), Hong Kong (0.8391), Japan (0.5200), South Korea (0.7479), and Taiwan (0.5341). This finding is not surprising as, according to Hester (2011), one of the main determinants of profit margins is growth in revenue. Browsing through an income statement it is evident that in order to arrive at the earnings figure a range of expenses (including cost of goods sold, selling, general and administrative expenses, depreciation, amortisation, and interest expense) need to be subtracted from the total revenue figure. Historically, year-by-year changes in sales have shown a strong correlation with changes in profit margins (Hester, 2011). This relationship is plausible because a large part of company expenses tends to be fixed for a certain period of time, especially contractual obligations relating to labour and supplies (Hester, 2011). Therefore, in the short-term, revenue growth often falls straight to the bottom line thus showing an increase in earnings.

### 4.4. Robustness Tests

To test the robustness of the current research findings, I conducted some further testing. The first round of tests aims to support the results of the study using Sharpe
ratios, while the second test attempts to validate my initial results using the Information Coefficient. As shown in Table 8 below, both the Sharpe ratio and the IC tests support the reliability of the results presented earlier in the thesis. As a proxy for the risk-adjusted performance of stocks, the *Sharpe ratio* measures the excess return or risk premium per unit of deviation in an investment asset or a trading strategy. The *information coefficient (IC)* is a form of correlation that measures the relationship between the predicted and actual portfolio stock returns, based on an underlying accounting factor. A higher IC metric signals a stronger predictive power of the valuation factor in question. A negative IC suggests that once an investor buys the stock, its share price is likely, resulting in a loss to the investor.

In discussing portfolio evaluation, Elton and Gruber (1997) stress the need to be concerned with risk as well as return in examining performance. It was not long after Markowitz’s (1952) ground-breaking contribution that techniques were developed and applied for evaluating performance based on risk and return. Such studies employed a variety of performance evaluation techniques adjusting for risk. These include the Sharpe ratio (Sharpe, 1964), the Treynor ratio (Treynor, 1965), Jensen’s (1968 and 1969) alpha, as well as the use of randomly generated passive portfolios of the same risk as in Friend et al (1970).
<table>
<thead>
<tr>
<th></th>
<th>Book value to price, B/P</th>
<th>Cash flow to price, C/P</th>
<th>Dividends to price, D/P</th>
<th>Earnings to price, E/P</th>
<th>Sales to price, S/P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns</td>
<td>-6.9%</td>
<td>2.6%*</td>
<td>-3.9%</td>
<td>-4.1%</td>
<td>1.3%***</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-0.35</td>
<td>0.05</td>
<td>-0.23</td>
<td>-0.26</td>
<td>-0.01</td>
</tr>
<tr>
<td>Information Coefficient</td>
<td>-1.6%</td>
<td>3.4%</td>
<td>1.0%</td>
<td>0.8%</td>
<td>2.8%</td>
</tr>
<tr>
<td><strong>Hong Kong</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns</td>
<td>-2.7%</td>
<td>7.2%*</td>
<td>3.8%**</td>
<td>3.7%</td>
<td>2.9%***</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>-0.12</td>
<td>0.25</td>
<td>0.09</td>
<td>0.10</td>
<td>0.11</td>
</tr>
<tr>
<td>Information Coefficient</td>
<td>-0.5%</td>
<td>3.4%</td>
<td>2.8%</td>
<td>3.1%</td>
<td>1.0%</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns</td>
<td>14.9%***</td>
<td>11.8%***</td>
<td>11.4%***</td>
<td>3.1%</td>
<td>8.4%***</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.71</td>
<td>0.54</td>
<td>0.54</td>
<td>0.01</td>
<td>0.33</td>
</tr>
<tr>
<td>Information Coefficient</td>
<td>6.1%</td>
<td>4.5%</td>
<td>4.7%</td>
<td>2.5%</td>
<td>4.2%</td>
</tr>
<tr>
<td><strong>South Korea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns</td>
<td>5.3%***</td>
<td>6.8%***</td>
<td>4.6%**</td>
<td>3.2%</td>
<td>4.5%***</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.15</td>
<td>0.22</td>
<td>0.13</td>
<td>0.11</td>
<td>0.13</td>
</tr>
<tr>
<td>Information Coefficient</td>
<td>2.4%</td>
<td>2.4%</td>
<td>3.0%</td>
<td>4.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td><strong>Taiwan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returns</td>
<td>3.9%***</td>
<td>2.0%***</td>
<td>3.7%**</td>
<td>3.8%</td>
<td>1.0%***</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.09</td>
<td>-0.03</td>
<td>0.10</td>
<td>0.12</td>
<td>-0.06</td>
</tr>
<tr>
<td>Information Coefficient</td>
<td>0.3%</td>
<td>2.1%</td>
<td>4.1%</td>
<td>3.2%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

The table above reports stock returns along with the two robustness metrics: the Sharpe ratio and the information coefficient (IC). While stock returns have been discussed in Table 3, 5 and 6, the latter two types of tests require further explanation. The tests involving the Sharpe ratio and the information coefficient examine whether the abnormal portfolio returns provide investors with sufficient compensation for risk.

As a proxy for the risk-adjusted performance of stocks, the **Sharpe ratio** shows whether a portfolio returns are due to smart investment decisions or a result of excess risk. In **Australia**, only C/P (2.6%*) and S/P (1.3%***) affect future stock returns. The Sharpe ratio is positive for C/P (0.05), thus confirming its ability to provide...
investors with sufficient compensation for risk. However, for S/P the Sharpe ratio is negative (-0.01), which undermines its investment appeal and suggests that a risk-free asset would perform better than the security or portfolio being analysed. In Hong Kong, only C/P (7.2%), D/P (3.8%**) and S/P (2.9***) affect future stock returns. The Sharpe ratio is positive for all these valuation factors: C/P (0.25), D/P (0.09) and S/P (0.11) and therefore confirms their ability in providing investors with sufficient compensation for risk. In Japan, with the exception of E/P, all other valuation factors examined affect future stock returns, namely B/P (14.9%,***), C/P (11.8%***), D/P (11.4%*** and S/P (8.4%***). Since the Sharpe ratio is positive and significantly different from zero for all these valuation factors: B/P (0.71), C/P (0.54), D/P (0.54) and S/P (0.33), it therefore confirms their ability in providing investors with not only high abnormal returns but also with sufficient compensation for risk. In South Korea, with the exception of E/P, all other valuation factors examined affect future stock returns, namely B/P (5.3%,***), C/P (6.8%,***), D/P (4.6%*** and S/P (4.5%***). Since the Sharpe ratio is positive for all these valuation factors: B/P (0.15), C/P (0.22), D/P (0.13) and S/P (0.13), it therefore confirms their ability in providing investors with not only high abnormal returns but also with sufficient compensation for risk. In Taiwan, with the exception of E/P, all other valuation factors examined affect future stock returns, namely B/P (3.9%,***), C/P (2.0***), D/P (3.7%*** and S/P (1.0%***). The Sharpe ratio is positive for B/P (0.09) and D/P (0.10), thus confirming their ability to provide investors with sufficient compensation for risk. However, the Sharpe ratio is negative for C/P (-0.03) and S/P (-0.06), which undermines their investment appeal and suggests that a risk-free asset would perform better than the security or portfolio being analysed.

The information coefficient (IC) is a form of correlation that measures the relationship between the predicted and actual portfolio stock returns, based on an underlying accounting factor. In Australia, where only C/P (2.6%*) and S/P (1.3%*** affect future stock returns, the IC factor is positive and is 3.4% for C/P and 2.8% for S/P. In Hong Kong, where only C/P (7.2%), D/P (3.8%**) and S/P (2.9***) affect future stock returns, the IC factor is positive and is 3.4% for C/P, 2.8% for D/P and 1.0% for S/P. In Japan, where with the exception of E/P all other valuation factors examined affect future stock returns, namely B/P (14.9%***), C/P (11.8%***), D/P (11.4%*** and S/P (8.4%***), the IC factor is both positive and is significantly different from zero for B/P (6.1%), C/P (4.5%), D/P (4.7%) and S/P (4.2%). In South Korea, where with the exception of E/P all other valuation factors examined affect future stock returns, namely B/P (5.3%,***), C/P (6.8%***), D/P (4.6%*** and S/P (4.5%***), the IC factor is positive and is 2.4% for both B/P and C/P, and 3.0% for both D/P and S/P. In Taiwan, where with the exception of E/P, all other valuation factors examined affect future stock returns, namely B/P (3.9%***), C/P (2.0***), D/P (3.7%*** and S/P (1.0%***), the IC factor is positive and is 2.1% for C/P and 4.1% for D/P. Notably, for B/P and S/P, the IC factor is not significantly different from zero and is 0.3% for B/P and 0.1% for S/P, pointing to a low forecasting reliability of these two fundamental factors.
Following Fama and French (1998), the study goes to examine whether the value premium can be viewed as compensation for risk. Sharpe ratio is used as a proxy for the risk-adjusted performance of stocks. The ratio measures the excess return or risk premium per unit of deviation in an investment asset or a trading strategy. The Sharpe ratio characterises how well the return of an asset compensates the investor for the risk taken and indicates whether portfolio returns are due to smart investment decisions or a result of excessive risk. This measurement is particularly useful because it may only be a good investment if higher returns do not come with additional risk. Generally it follows that a greater Sharpe ratio is indicative of a better risk-adjusted performance. When comparing two assets, the one with a higher Sharpe ratio provides a better return for the same risk, or equivalently, the same return for lower risk. A negative Sharpe ratio indicates that a risk-free asset would perform better than the security or portfolio being analysed.

The other type of a robustness test adopted in this study is based on the IC (information coefficient). The IC is a rank correlation score that measures the relationship between the predicted and actual portfolio returns on stocks based on an underlying accounting factor. The IC is a performance measure used for evaluating the forecasting reliability of a specific fundamental factor. It is expressed in percentage terms. Effectively, the higher the IC, the better the predictive power of the factor being studied. A negative IC means that a buy signal which instigates a purchase is wrong because once an investor buys the stock, it is likely to fall in price thus subjecting an investor to a loss. Therefore, the larger the negative IC is, the more consistently wrong the given strategy is, meaning that a given valuation measure is an unsuitable valuation proxy.
4.5. Discussion

The aim of this study was to collect evidence on whether value investing is capable of producing abnormal portfolio returns in excess of the applicable risk-free rate. Five valuation factors were tested across five countries in the Pan-Asian region. I analysed ten years of historical data for more than a thousand companies. Historical corporate data was statistically tested to determine whether ranking stocks based on a given valuation factor to reach a buy or a sell decision resulted in abnormal portfolio returns over time. The result is a dynamic picture that indicates which fundamental valuation factors and which countries are likely to be a suitable and robust fit for value investing strategies.

This data intensive approach to investment analysis yields interesting results. During 2001-2010, certain value investing proxies have consistently outperformed the market as denoted by the underlying risk-free rate, while others have underperformed. The predictive patterns of various valuation measures across the five countries covered in this chapter indicate that value investing strategies exhibit varying patterns of portfolio returns in different economies. The one country where fundamental analysis has held constant over time is Japan, where value investing strategies consistently generated positive returns. The only exceptional case in Japan is the Financial sector, where value investing delivers mostly negative returns to investors. This is possibly because the Financial sector is a rather diversified GICS sector and should not studied as a whole but rather fragmented into its constituent industries (i.e. real estate, diversified financials, banks, and insurance). In South Korea, value investing is a wise approach to follow in Materials, Industrials and Consumer Discretionary. Importantly, the results of the study also indicate that
overall value investing strategies do not seem to have generated fruitful returns in Australia, with the only sector of the six studied producing positive returns being the Industrial sector. Hong Kong and Taiwan in total present a rather varied picture with value investing approach resulting in both positive and negative returns.

Among some of the most fruitful sectors for value investing were Materials, Industrials and Consumer Staples. In the Material sector, value investing strategies showed good results for the Japanese and the South Korean markets. Next, in the Industrial sector, value investing method produced abnormal returns in the universe of stocks covering Hong Kong, Japan, South Korea and Taiwan. Then, in Consumer Discretionary the value investing approach generated abnormal returns for the Japanese and South Korean markets. Lastly, valuation based strategies seem to work well for the Consumer Staples sector, mainly in Hong Kong and Japan; whereas in the IT sector, value investing tactics would only yield positive returns for the Japanese market alone. On the other hand, the value investing approach did not seem to work consistently well for the Financial sector, which is the most widely diversified GICS sector – the phenomenon highlighted earlier in the thesis. Notably, among the sectors where value metrics as indicators of value performed especially poorly was: Materials in both Australia and Hong Kong, Consumer Discretionary in Australia, Consumer Staples in both Australia and South Korea, Financials in Australia, and IT in Hong Kong.

The fundamental factors providing profitable valuation strategies are cash flow to price, dividend to price and sales to price. Overall, the results of the study indicate that it is difficult to say which accounting measures are robust indicators of value without referring to the country-specific context. The effectiveness of a particular
value investing strategy depends largely on the choice of country. This preliminary observation goes to suggest that in the context of value investing sector and country relevance go hand-in-hand. Crucially, value investing as a concept usually works because different value metrics are proposed in different sectors.

To summarise on the predictive patterns of various value metrics across six GICS sectors in five Pan Asian countries over a ten-year time horizon covered in the chapter, one can conclude that value investing strategies exhibit varying patterns of returns in different countries and sectors. The one fact that has held its meaning over time is that Japan is the only market where value investing strategies keep consistently generating positive returns.

This selection is not something that is set-and-forget but rather a strategy that needs to be reviewed periodically. An important implication for the results produced from this study is that the findings obtained are highly dependent on the movements of the tested period. Essentially, in analysing historical data one assumes that what happens in the past is likely to happen in the future. However, company fundamental factors change on an annual, semi-annual or even a quarterly basis. This allows us to pinpoint to the likelihood of the results presented in this thesis being somewhat different, if the study were to be replicated in a few years time. I do acknowledge that this assumption can cause potential risks for the investment strategy. As one may frequently hear in the world of finance, past performance does not necessarily guarantee future returns. Therefore, I would like to acknowledge that the nature and predictive ability of the aforementioned value metrics is dynamic and therefore subject to change over time and across economies. Thus, portfolio evaluation of managed portfolios should be a continuing process. Second, the quantitative model
presented in the thesis relies on the quality of information presented in the financial statements. Errors and/or misspecification in these numbers (i.e. when an item is misstated by a company) are sometimes impossible to prevent and are not under the control of the researcher. Third, as running a value portfolio is only part of the investment model, none of the aforementioned value investing techniques should be considered in isolation. It is thus important to investigate how well various fundamental value metrics predict value under different earnings regimes and macroeconomic conditions.

Finally, it is worth highlighting that the information provided in this study is not intended to provide buy or sell recommendations. The ideas presented in this thesis are not indicative of future returns. The goal of this thesis is to make a contribution to the rather conflicted field of value investing. In this regard, it is important to highlight that even in today’s investment world of computers and databases, precise universally agreed upon methods of portfolio valuation remain a rather elusive goal.

Given the dynamic nature of markets, it is important to emphasise that the results from this study are not something that is set-and-forget, but rather a hypothesis that needs to be reviewed periodically. An important implication here is that the findings obtained are highly dependent on the choice of the tested period. In analysing historical data one often assumes that what happens in the past is likely to happen in the future. However, past performance does not necessarily guarantee future returns. Moreover, company fundamental figures change on an annual, semi-annual or even a quarterly basis. Therefore, I would like to acknowledge that the nature and predictive ability of the aforementioned valuation factors is dynamic and
likely to change over time and across economies. Second, the quantitative model presented in the thesis relies on the quality of information presented in the financial statements. Errors and/or misspecification in these numbers (i.e. when an item is misstated by a company) are sometimes impossible to prevent and are not under the control of the researcher. Third, as different valuation factors tell a story of their own, none of the aforementioned value investing techniques should be considered in isolation. It is important to investigate how well various fundamental valuation factors measure value under different earnings regimes and macroeconomic conditions.

Part of a future research direction would be to study a more diversified set of accounting factors and test their ability to act as indicators of value. Among measures that could be placed under the research microscope could be: tax yield, NPV yield, and operating free cash flow yield etc. In addition, a future research agenda might place a greater focus on the more qualitative aspects of the value investing process. One way to do so is to place emphasis on company-specific catalysts, such as management expertise and performance, restructuring, new products, problem-fixing situations and pricing flexibility. In addition to stock-specific catalysts, there can also be thematic catalysts, which are based on either macroeconomic or general industry conditions. It is important to point out that simply because a stock is undervalued does not mean it will be a good investment in the future. Thus, a combination of company micro accounting variables with the more macroeconomic factors may serve as a powerful valuation platform for estimating a company’s worth.
Chapter Five:

5. The Study of Analyst Forecasts of Company EPS in the Pan-Asian Region: Improving the Accuracy of Analysts’ Consensus Estimates

“It is always wise to look ahead, but difficult to look further than you can see.”

– Winston Churchill

5.1. Introduction

Accountants are interested in the production and use of financial information. Consequently, a large number of accounting and finance studies are concerned whether sophisticated users of financial data understand such information and how they apply this knowledge (Bradshaw, 2011). Traditionally, analysts use fundamental analysis as an integral part of conducting financial analysis and evaluation of the market environment. The underlying hypothesis of this study is the basis of fundamental stock analysis reflecting a proposition that investors tend to buy companies with particular characteristics, where these characteristics are fundamental accounting factors, such as earnings per share, or EPS. Analysts obtain information by studying public records and filings by the company. Financial analysts also collect information by participating in public conference calls and asking direct questions to the company management as well as through small group or one-on-one meetings with senior members of management teams.

The inevitable role of financial analysts is to assist their employers and/or clients in making successful investment decisions. In doing so analysts evaluate company financial statements and assess commodity prices, sales, costs, expenses,
and tax rates in order to determine a company’s fair value along with its projected future earnings. They also provide a range of financial ratios calculated from the data obtained from the financial statements that helps clients to evaluate the bottom line of the company. Usually, as stated by Dunn and Nathan (2005), financial analysts generally specialise by sector or industry, which allows them to more closely follow recent trends in business practices, products, as well as industry competition. It is crucial that analysts keep abreast of new regulations or policies that may affect the industry, as well as monitor the economy to determine its effect on earnings.

Research interest in analysts is great as a deeper understanding of analysts’ behaviour is of interest to both academics concerned with a working framework that describes capital markets and practitioners who operate in these markets. Investors with limited abilities or time to analyse individual securities tend to rely on analysts’ reports. Finally, regulators are interested in the flow of information that facilitates functional and liquid markets, and analysts are critical to this flow of information (Bradshaw, 2011). The initial reason investors began examining analysts’ earnings forecasts was to gauge their usefulness as a surrogate for time-series forecasts in the studies on capital market efficiency. Today financial analysts are inherently perceived as an interesting economic agent in their own right (Bradshaw, 2011).

Typically, earnings revision models are formed by a simple average of all analyst estimates and are known to be a well-known strategy based on sell-side analyst forecasts. Importantly, the aim of this chapter is to incorporate sophisticated statistical methods in order to extract additional information from detailed analyst forecasts as they are updated. The earnings revision signal adopted in this chapter attempts to delve deeper into the detailed analyst forecasts to detect early changes in
the consensus by combining a time weighted earnings signal (TWES) which favours more recent revisions. Importantly, earnings revisions are an effective signal due to the trending nature of analyst revisions. Analysts are likely to revise in steps in order to reduce reputation risk. A change in the consensus earnings estimate will generally lead to a share price rise or fall as the market digests the information. This in turn leads other analysts in the market to re-evaluate their estimates and herd towards the new consensus. Earnings revisions are an attempt to detect when this trend is underway. This chapter attempts to pre-empt the earnings revision signal and detect these changes earlier. I therefore take advantage of the existing behavioural biases in the earnings revision signal. The hypothesis is such that older earnings estimates contain less information than the more recent earnings estimates. Otherwise, when following a mean or median approach, analyst earnings estimates which have not changed for some time still contribute the same weight towards the consensus as more recent earnings estimates.

The remainder of the chapter is organised as follows. The next section describes the data and methodology used in the empirical tests. Then I report the results of the study and draw some of the tentative conclusions as to the effectiveness of the alternative consensus methodology in forecasting EPS. Further, I present robustness tests to support the results reported earlier in the chapter. Finally, some of the concluding remarks and possible future research directions are offered in the last section of the chapter.
5.2. Data and Methodology

5.2.1. Data

The data used in this study uses primary earnings per share (EPS) before extraordinary items, and where necessary, these EPS figures have been adjusted for stock splits and dividends. To calculate basic EPS, company’s net income is divided by the number of shares outstanding\textsuperscript{19}. I empirically test which one of the following consensus estimates is the closest predictor of company actual EPS figures: mean, median, or the time weighted consensus. The purpose of this chapter is to determine whether time weighted consensus estimates offer a more effective method for predicting company actual EPS figures than simple mean or median. The study aims to construct a more comprehensive earnings forecast signal using analyst earnings forecasts that have been weighted based on the timeliness of updates. Aimed at extracting valuable information from timely analyst forecasts, the time weighted earnings signal (TWES) methodology allows extracting valuable information from analysts who possess some unique insights about the market and issue their updates more frequently. One would expect the time signal to reflect a more realistic representation of analyst estimate changes and thus be more effective in predicting the companies’ reported EPS than the mean and median. The underlying base for the chapter is that not all analysts think the same and given exposure to the same kind of information, they may issue forecasts that are significantly different from each other. This chapter covers six Pan-Asian countries, including Australia, Hong Kong, India, Singapore, South Korea and Taiwan. The focus of the study is on quantitative data analysis techniques. Accordingly, a combination of empirical studies and statistical

\textsuperscript{19} currently available for trading
analysis tools will be implemented as the principal methodologies for conducting this research.

In pursuit of the most effective consensus estimates, I use longitudinal time series daily individual analyst reports for twelve financial years covering 2000 to 2011. I am concerned with the performance of security analysts over a relatively long period of time. This differs from most published studies of analyst forecasts which deal with a smaller number of years\textsuperscript{20}.

The original dataset for each country comprises the following number of companies: Australia – 871; Hong Kong – 901; India – 933; Singapore – 528; South Korea – 941; Taiwan – 1026. The resulting total set of 5200 companies constitutes the data sample used in the analysis. The number of forecasts per company varies considerably and, in general, is a positive function of the size and investment interest \cite{Barefield and Comiskey, 1975}. This study covers six Pan-Asian countries: Australia, Singapore, Taiwan, Hong Kong, India and South Korea. I believe this diverse range of countries provides a good testing ground of the more advanced EPS forecast signal. The data for the purpose of this research come from the Thompson Reuters database. The testing sample of companies is limited to stocks covered by a minimum of three analysts. It is assumed that updates by at least three analysts are required to form a consensus. Table 9 provides descriptive statistics on the average number of analysts denoted by mean and median number of analysts per company for each country from 2000 to 2011.

\textsuperscript{20} for example, the study by Barefield and Comiskey (1975) which extends over a six-year period and Allen et al (1997) which covers three years.
Table 9. Average Number of Analysts per Company

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Number of analysts per company</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Australia</td>
<td>609</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>634</td>
</tr>
<tr>
<td>India</td>
<td>607</td>
</tr>
<tr>
<td>Singapore</td>
<td>323</td>
</tr>
<tr>
<td>South Korea</td>
<td>587</td>
</tr>
<tr>
<td>Taiwan</td>
<td>585</td>
</tr>
<tr>
<td>Average</td>
<td>558</td>
</tr>
</tbody>
</table>

As Table 9 above illustrates, Taiwan seems to have the smallest average number of analysts covering one company (mean = 7.53; median = 5). Remarkably, Hong Kong, while being the biggest market by market capitalisation, has the largest average number of analyst coverage per company (mean = 11.45; median = 9) and therefore seems to be most widely followed by financial analysts among the six countries studied.

5.2.2. Methodology

Analysts provide various forecast estimates for listed companies. One would expect that these estimates will differ as each analyst holds differing outlooks and assumptions about the company. These individual forecasts are often aggregated to form a market consensus for each company. It is important to understand that consensus estimates can be quite powerful when speaking of their impact on the market fluctuations so that even small deviations can influence the share price. In particular, if the actual figures reported by the company exceed its analysts’ consensus estimates, then the stock is usually rewarded with an increase in the price. This is because either the stock is likely to be doing exceptionally well in terms of its financial performance or the financial analysts did not get their figures right. The
reverse is also true which is why getting the consensus estimates right is of paramount importance.

In fact, with so many investors closely following consensus numbers, the difference between actual and consensus earnings is perhaps the single most important factor driving share price performance in the short term (AAII, 2013). As discussed earlier in the dissertation, for better or for worse, the investment community largely relies on EPS as a key measure of corporate performance. Stocks are evaluated via a twofold angle: first is based on their ability to show earnings growth from one financial period to another; and second, is based on the resemblance of their actual reported earnings figures to consensus EPS earnings estimate.

Traditional earnings revision models measure changes in the equal weighted average consensus of analyst estimates over time. Thus, the standard earnings consensus is formed from an equally weighted consensus of all the latest analyst estimates, typically those based on the mean or median. However, not all estimates are equal. To improve on the standard earnings revision models based on analysis of mean/median forecasts, I adjust the individual analyst estimates to form the time weighted earnings signal (TWES) by placing a greater weighting on the more recent forecasts. With the aim of extracting extra information from the analyst forecasts, this measure aims to enhance the reliability of analyst consensus estimates of company EPS.

To achieve the proposed research objectives, the study includes two analytical methodologies: first, the empirical and statistical analyses of the accuracy of analyst earnings forecasting trends as well as the effectiveness of the different methodologies over the period of 2000-2011; and second, a survey of the theoretical and empirical
literature covering the quality of analyst forecasts and their underlying ability to predict company EPS. The methodology used in this chapter is structured so as to improve the reliability of analyst consensus estimates for users and is consistent with the hypothesis that revisions in financial analysts’ forecasts have information content to investors. This piece of research embraces positivist methodology and uses a range of quantitative method.

Increased interest in corporate earnings forecasts has encouraged the flow of forecast information from a variety of sources. A primary problem encountered in the use of this information is determining who among the forecasters is a better performer. In situations where multiple forecasts are available for a given corporation, investors have a choice of strategies. One such strategy would be to use the mean of all available forecasts. At the other extreme, investors would try to determine which of the forecasts is most reliable and only use that one. The purpose of this chapter is to detect which one of the following techniques – mean, median, or time weighted – consensus estimate offers the most reliable method for predicting company actual EPS figures.

One would expect the time signal to reflect a more realistic representation of analyst estimate changes and thus be more effective in predicting company reported EPS than the mean and median based consensus. Considering that FE is a forecast error, the two hypotheses are described below. They postulate that time weighted consensus estimates are a more robust alternative to mean and median consensus figures.

(1) \( H_0: \ FE_{\text{Time weighted}} = FE_{\text{Mean}} \)

\( H_1: \ FE_{\text{Time weighted}} > FE_{\text{Mean}} \)
\( H_0 : \) FE Time weighted = FE Median

\( H_1 : \) FE Time weighted > FE Median

The focus of the study is on quantitative data analysis techniques. The chapter investigates the field of security analysis where the main emphasis is on the quantifiable aspects of the stock screening process while attempting to minimise the importance of the more qualitative factors of corporate performance. Accordingly, a combination of empirical studies and statistical analysis will be implemented as the principal methodologies for conducting this research.

Effectively, this chapter builds on research on the time and directional signal in six Pan-Asian developed and emerging countries covering Australia, Hong Kong, India, Singapore, South Korea and Taiwan. The study presents an analysis of the six Pan-Asian markets across eleven sectors: Basic Materials, Capital Goods, Cyclical and Non-Cyclical\(^{21}\), Energy, Financials, Health, Services, Information Technology (IT), Transport, and Utilities. Table 10 provides sector composition by the number of companies per country. The sectors considered in this study are categorised using the Thomson Reuters methodology known as the Reuters Business Sector Schema (RBSS). Notably, RBSS is a classification system designed to track and display the primary business of a corporation and grouping highly related products and services into a single industry category. Appendix B elaborates on the sector classification by industry to provide a better understanding of the range of companies belonging to each sector. The follow-on approach to testing on a sector basis is to examine whether investors can obtain abnormal returns by following these recommendations

\(^{21}\) The difference between the cyclical and the non-cyclical sector is that the cyclical sector is oriented at the luxury goods such as designer clothing and jewellery, whereas the non-cyclical sector mainly represents necessity items such as toothpaste, shampoo and dish detergent.
Table 10. Sector Composition by the Number of Companies per Country (as per original dataset)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Australia</th>
<th>Hong Kong</th>
<th>India</th>
<th>Singapore</th>
<th>South Korea</th>
<th>Taiwan</th>
<th>Average</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Materials</td>
<td>139</td>
<td>91</td>
<td>154</td>
<td>58</td>
<td>136</td>
<td>105</td>
<td>114</td>
<td>683</td>
</tr>
<tr>
<td>Capital Goods</td>
<td>78</td>
<td>120</td>
<td>178</td>
<td>70</td>
<td>105</td>
<td>68</td>
<td>103</td>
<td>619</td>
</tr>
<tr>
<td>Cyclical</td>
<td>20</td>
<td>115</td>
<td>103</td>
<td>41</td>
<td>112</td>
<td>107</td>
<td>83</td>
<td>498</td>
</tr>
<tr>
<td>Energy</td>
<td>68</td>
<td>32</td>
<td>29</td>
<td>26</td>
<td>12</td>
<td>2</td>
<td>28</td>
<td>169</td>
</tr>
<tr>
<td>Financials</td>
<td>97</td>
<td>49</td>
<td>79</td>
<td>24</td>
<td>68</td>
<td>64</td>
<td>64</td>
<td>381</td>
</tr>
<tr>
<td>Health</td>
<td>45</td>
<td>38</td>
<td>62</td>
<td>17</td>
<td>50</td>
<td>25</td>
<td>40</td>
<td>237</td>
</tr>
<tr>
<td>Non-Cyclical</td>
<td>45</td>
<td>55</td>
<td>67</td>
<td>49</td>
<td>51</td>
<td>29</td>
<td>49</td>
<td>296</td>
</tr>
<tr>
<td>Services</td>
<td>283</td>
<td>226</td>
<td>103</td>
<td>115</td>
<td>100</td>
<td>78</td>
<td>151</td>
<td>905</td>
</tr>
<tr>
<td>Information Technology</td>
<td>59</td>
<td>115</td>
<td>110</td>
<td>79</td>
<td>275</td>
<td>521</td>
<td>193</td>
<td>1159</td>
</tr>
<tr>
<td>Transport</td>
<td>19</td>
<td>37</td>
<td>21</td>
<td>44</td>
<td>22</td>
<td>22</td>
<td>28</td>
<td>165</td>
</tr>
<tr>
<td>Utilities</td>
<td>18</td>
<td>23</td>
<td>27</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td>88</td>
</tr>
<tr>
<td>Average</td>
<td>79</td>
<td>82</td>
<td>85</td>
<td>48</td>
<td>86</td>
<td>93</td>
<td>79</td>
<td>473</td>
</tr>
<tr>
<td>Total</td>
<td>871</td>
<td>901</td>
<td>933</td>
<td>528</td>
<td>941</td>
<td>1026</td>
<td>867</td>
<td>5200</td>
</tr>
</tbody>
</table>

The table above provides an overview of the number of stocks in each of the 11 sectors for each of the 6 countries examined in the study. On a country basis, in total across all sectors, Taiwan has the largest number of stocks (1026) or 19.7%; followed by South Korea (941) or 18.1%; India (933) or 17.9%; Hong Kong (901) or 17.3%; Australia (871) or 16.8%; and Singapore (528) or 10.2%. In aggregate, on a sector basis, Information Technology (1159) stocks take up the largest percentage, making it 22.3% of the total. This is followed by Services (905) or 17.4%; Basic Materials (683) or 13.1%; Capital Goods (619) or 11.9%; the Cyclical sector (498) or 9.6%; Financials (381) or 7.3%; the Non-Cyclical sector (296) or 5.7%; Health (237) or 4.6%. The smallest three sectors are: Energy (169) or 3.3%; Transport (165) or 3.2%; and Utilities (88) or 1.7%. Together, the three largest sectors, namely Information Technology (22.3%), Services (17.4%) and Basic Materials (13.1%) alone make up more than half (52.8%) of the stocks included in the study.
as sectors are known to have the ability to add value to, or control risk in, a global portfolio (Baca et al, 2000). Furthermore, Rodriguez (2006) puts forward that macroeconomic factors may have different implications for different sectors, thus offering further evidence to support this study at the sector-level. For example, “earnings in highly consumer demand-driven sectors, like consumer durables (belonging to the Non-Cyclical sector) may be far more sensitive to economic conditions” (Rodriguez, 2006, p.90).

Within the 5,200 firms in the data set, there is large variation in the number of firms characterising each of the 11 sector groups (see column 1 in Table 10). There are on average 79 firms per sector; however, the Utilities sector is represented by 15 firms on average, while the Information Technology (IT) and Services sectors offer the largest representation with 193 and 159 firms, respectively.

The study focuses on the more comprehensive earnings forecast signal using analyst earnings forecasts to detect early changes in analysts’ revisions. Aimed at extracting valuable information from timely analyst forecasts, the time signal methodology allows delving deeper into the analyst forecasts to detect early changes in the consensus signal and produce a robust time weighted earnings estimate. In particular, the study examines the effectiveness of analyst earnings forecasts that have been weighted based on time priority of 100 days. Spanning over twelve years from 2000 to 2011, Table 11 and Figure 5 show the mean and median average time (stated as the number of days) that an average analyst takes to update their EPS forecast estimate. With the mean across the six countries being 81 days and median 73 days, and considering that one would expect some latitude for earnings updates by analysts, I believe that adopting the 100 day ‘cut-off’ benchmark is a reasonable
Table 11.  Average Number of Days it Takes an Analyst to Update a Forecast on a Country Basis (Mean and Median)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>75.1</td>
<td>72.4</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>92.0</td>
<td>100.7</td>
</tr>
<tr>
<td>India</td>
<td>88.6</td>
<td>100.9</td>
</tr>
<tr>
<td>Singapore</td>
<td>83.8</td>
<td>89.6</td>
</tr>
<tr>
<td>South Korea</td>
<td>68.3</td>
<td>83.2</td>
</tr>
<tr>
<td>Taiwan</td>
<td>76.9</td>
<td>74.3</td>
</tr>
<tr>
<td>Average</td>
<td>80.8</td>
<td>86.9</td>
</tr>
</tbody>
</table>

Changes in predicted EPS are most frequently reported by analysts in South Korea (mean is 68 days), while it takes about 75 days on average for analysts in Australia to update their forecasts, 77 days in Taiwan, 84 days in Singapore, 89 days in India and 92 days in Hong Kong. The results for Hong Kong are rather interesting as Hong Kong is the largest market and seems to be most widely covered by analysts in comparison to the other five countries with the average number of analysts per company reaching 11 (mean).
The graph shows that on average analysts covering the Australian and South Korean stocks seem to take the smallest amount of time to update their forecasts, as opposed to their colleagues in other Pan-Asian countries.

assumption in this study. Therefore, analyst forecast revisions issued more than 100 days prior to the release of the actual company EPS figures will be considered to be outdated and will have to be excluded from the analysis. This is done in order to achieve greater accuracy in predicting actual earnings reported by the company.

Importantly, there is a decline in the number of days it takes an analyst to update their forecast, when moving from the first half of observations to the second in most countries except for Australia and Taiwan where there is little difference between the two sample periods. A possible explanation for analysts that do take less time in updating their EPS forecasts in the second half of observations could include the following factors: technological advances, increased media coverage and greater data availability.
To expand on the above, I follow Rodriguez (2006) who proposes that changes in underlying macroeconomic factors can have different effects on different sectors. According to Rodriguez (2006, p.147), analysts are more likely to update predictions for more capital intensive, highly regulated, consumer demand driven or highly leveraged sectors. In fact, if macroeconomic information were of any importance, we would expect analysts to rely more on macroeconomic environment factors for such sectors as: Basic Materials, Cyclical, Energy and Information Technology. Taken together, this might point to the likelihood of analysts’ sensitivity to new information not being uniform across sectors (Rodriguez, 2006). Table 12 and Figure 6 below show the average time analysts take to update their EPS forecast estimates on a sector basis across the six countries included in the study.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Materials</td>
<td>85.0</td>
<td>90.3</td>
<td>82.6</td>
</tr>
<tr>
<td>Capital Goods</td>
<td>88.5</td>
<td>95.0</td>
<td>87.6</td>
</tr>
<tr>
<td>Cyclical</td>
<td>84.6</td>
<td>92.7</td>
<td>83.0</td>
</tr>
<tr>
<td>Energy</td>
<td>79.7</td>
<td>88.0</td>
<td>81.0</td>
</tr>
<tr>
<td>Financials</td>
<td>91.1</td>
<td>94.7</td>
<td>88.7</td>
</tr>
<tr>
<td>Health</td>
<td>90.9</td>
<td>99.2</td>
<td>88.6</td>
</tr>
<tr>
<td>Non-Cyclical</td>
<td>89.1</td>
<td>94.5</td>
<td>88.9</td>
</tr>
<tr>
<td>Services</td>
<td>90.0</td>
<td>94.9</td>
<td>89.9</td>
</tr>
<tr>
<td>Information Technology</td>
<td>81.2</td>
<td>91.8</td>
<td>80.1</td>
</tr>
<tr>
<td>Transport</td>
<td>89.9</td>
<td>93.1</td>
<td>87.9</td>
</tr>
<tr>
<td>Utilities</td>
<td>95.1</td>
<td>104.8</td>
<td>92.9</td>
</tr>
<tr>
<td>Average</td>
<td>87.7</td>
<td>94.4</td>
<td>86.5</td>
</tr>
</tbody>
</table>
The table above shows that in the ‘first half’ of the time frame examined, from 2000 to 2005, analysts take the least amount of time to update their forecasts in the following three sectors: Energy (88.0 days), Basic Materials (90.3 days) and Information Technology (91.8 days). In contrast, analysts take their time and are the slowest in issuing updates for the following three sectors: Utilities (104.8 days), Health (99.2 days) and Capital Goods (95 days).

Comparatively, in the ‘second half’ of the observations, from 2006 to 2011, analysts take the least amount of time to update their forecasts in the following three sectors: Information Technology (80.1 days), Energy (81.0 days) and Basic Materials (82.6 days). On the other hand, they are the slowest in issuing updates for the following three sectors: Utilities (92.9 days), Services (89.9 days) and the Non-Cyclical sector (88.9 days).

It is interesting to note that in the ‘second half’ of the study period, it takes analysts less time to issue new forecasts for their ‘more time efficient’ sectors than it did in the ‘first half’ of the research time frame. For example for the Energy sector, the number of days dropped from 88.0 days to 80.1 days. So in the ‘second half’, analysts needed 8 less days to update their forecasts in this sector. The same observation can be made about the Basic Materials and the Information Technology sector. For the former, the number of days it takes an average analyst to issue a new update declined from 90.3 days to 82.6 days; while for the latter sector, the drop was from 91.8 days in the ‘first half’ to 80.1 days in the ‘second half’. So in the ‘second half’, analysts needed 8 less days to update their forecasts in Basic Materials sector and 9 less days in the Information Technology sector. Importantly, the declining trend can also be observed with the ‘less time efficient’ sectors.

To provide a general overview, ‘overall’ from 2000 to 2011, analysts take the least amount of time to update their forecasts in the following three sectors: Energy (79.7 days), Information Technology (81.2 days) and the Cyclical sector (84.6 days). On the other hand, they are the slowest in issuing updates for the following three sectors: Utilities (95.1 days), Financials (91.1 days) and Health (90.9 days).
The graph shows that on average analysts covering the stocks in such sectors as Energy (80 days), Information Technology (81 days), Cyclical and Basic Materials (85 days) appear to revise their forecasts on a more frequent basis than in other sectors. Evidently, analysts take the longest time in Utilities to issue a new forecast (95 days). It therefore takes analysts in Utilities on average two weeks longer to issue a revised EPS forecast than it does their colleague covering the Energy sector.

Importantly, the findings above seem to support the proposition by Rodriguez (2006) who also is of the opinion that analysts appear more timely with their updates in the more capital intensive, highly regulated, consumer demand driven or highly leveraged sectors. The study shows that across the six countries included in the study the top four sectors are: Energy, Information Technology (IT), Cyclical and Basic Materials.

The Energy sector includes companies involved in the exploration and development of oil or gas reserves, oil and gas drilling, or integrated power firms. Performance in the sector is largely driven by the supply and demand for worldwide energy. Energy producers tend to perform well in times of high oil and gas prices,
but happen to have lower earnings when the price and/or value of energy drops. Furthermore, this sector is sensitive to political events, which are known to have historically driven changes in the price of oil.

The Information Technology sector comprises a group of stocks relating to the research, development and/or distribution of technologically based goods and services. More than anything, technology companies are associated with innovation and invention. This sector is characterised by considerable capital expenditures on R&D on one hand and a steady stream of progress and innovative new products and services on the other. In the modern economy there is virtually no sector that technology does not touch and that does not rely upon the IT sector to improve quality, productivity or profitability. This sector is also notable for its high level of competition and rapid obsolescence cycles. Equipped with constant drive to adapt and supersede competitors with new and exciting products and, IT companies are constantly in the limelight of financial analysts. This rapid cycle of obsolescence means that winners and losers in technology may not necessarily maintain those positions for long.

The Cyclical sector embraces companies that rely heavily on the business cycle, economic conditions and consumer demand. The performance of this sector is highly related to the state of the economy as it represents goods considered more to be luxuries than necessities. Examples of such merchandise could be: footwear, clothing, jewellery as well as furniture, tools and appliances, audio and video equipment, and recreational products. Evidently, during a recession, consumers have less disposable income to spend on cyclical goods; and vice-versa, when the
economy is booming causing retail and leisure spending to rise, the sales of these goods increase accordingly.

The Basic Materials sector incorporates a group of companies involved with the discovery, development and processing of raw materials. This sector is sensitive to changes in the business cycle and because the sector supplies materials for construction, it largely depends on a strong economy. This sector is also sensitive to general supply and demand fluctuations because the price of raw materials, such as gold or other metals, is largely demand driven. The Basic Materials sector is generally defined by buyers’ decisions to purchase primarily based on price. Since the sector mainly offers homogeneous products, buyers look for the best deal at the lowest price. This means that Basic Materials companies are largely ‘price takers’ in the sense that they have to accept prices set by the market. All in all, this sector is deeply cyclical and a close eye on the macroeconomic situation is crucial when issuing forecasts here. Importantly, government action and legislation may also influence the demand for such commodities. In addition, regulation may also have an impact on sector wide cost structures such as mining permits, royalties, subsidies. Companies belonging to the Basic Materials sector are often capital intensive due to substantial investment in plant efficiency and acquisition of mineral deposits. In particular, various operational problems may have a significant impact on the future earnings potential of Basic Materials companies. Explosions, labour disruptions, geological failures, release of hazardous materials, and natural disasters are all events that can create financial hardships. Exchange rates are also material to the functioning of this sector as most commodities are denominated in US dollars (Collins, 2013).
The opposite end of the story is the *Utilities* sector where analysts are the slowest in issuing updates to their EPS forecasts (95 days). This sector encompasses those companies considered to be electric, gas or water utilities, or companies that operate as distributors of power. This sector is known for offering fairly limited consumer choice and operating in a fairly steady market environment where consumer demand remains rather stable. Utilities such as water, electricity and gas are all essential services that play a vital role in economic and social development of every country. Governments are therefore ultimately responsible for ensuring reliable universal access to service under regulatory frameworks (*International Labour Organisation, 2013*). However, there is plenty of evidence out there to suggest that the Utilities sector may undergo significant restructuring in the forthcoming years. The reasoning behind could be market forces, which impact the landscape of utilities around the world and may require the transformation of the *Utilities* sector (*Santos, 2009*). Some of these factors include: environment technical advances and disruptive technologies, growth in renewable energy, adoption of smart meters and the surge to find alternative energy supplies (*Santos, 2009*). Another important factor is regulatory push for more competition, new entrants and higher customer expectations (*Santos, 2009*).

The *Utilities* sector is now starting to see the changing role of a customer as demonstrated by their increasing desire to take up an active a role in energy management and conservation (*Santos, 2009*). Utilities customers are now requesting better service, more information and higher efficiency aimed at creating conditions for reducing costs and the CO₂ footprint on the environment (*Santos, 2009*). As a matter of fact, electricity generation is one of the largest producers of emissions, which further pushes the need for clean energy (*Santos, 2009*). Altogether these
components add to a surge for a new utilities market structure, which might mean that the environment in which the sector operates may no longer be as stable. In relation to the current study, this might suggest that financial analysts will be under pressure to issue forecasts for this sector on a more regular basis in the future.

5.2.3. Methods

In constructing the time weighted earnings signal (TWES), the idea is to place more weight on the more recent earnings estimates. As discussed in the literature review section, the rationale for adopting the time weighting method in the study is such that the most recent revisions are more reflective of where the market sees the stocks. For different reasons, not all analysts are as timely in updating their forecasts. Time weighting may also act as a data cleaning exercise for stocks where the analyst has left their brokerage firm or dropped coverage. One would assume that the average time between analysts updating their estimates varies throughout the year and can be different depending on the size of the company and its geographical location. In constructing the time weighted EPS signal, the weights of analyst forecasts are based on the amount of time that has passed since the analyst last changed their forecasts, thus adopting a rolling time window approach. The graph in Figure 7 is an illustration of this process.
Figure 7. Rolling Time Weighted Consensus Signal with the Application of a Linear Weighting Scale

Weight

A linear time ramp going back 100 days is used. For example, if an analyst revised today, their EPS forecast receives a weight of one; if an analyst last revision was 100 days ago, they receive zero weight; if analyst revised 50 days ago, they receive half weight etc. Appendix C provides more insight into how the time weighted measures are calculated. Further, Figure 8 provides a brief illustration of the difference between a simple and rolling window methodology.
Figure 8. Simple versus Rolling Window Periodic Sampling

Source: Trace Agent (2010)

Forecasting is one useful means for estimating the values of important variables under uncertainty. A forecast, or prediction, is simply a statement about an unknown event and typically, as appears in this chapter, they are future events. In the present study, we are concerned with security analyst predictions of EPS figures for major corporations. There is likely to be some sample bias due to the limited coverage of firms by companies providing forecast data. This bias is toward a greater coverage of large and somewhat more mature firms that likely have had a number of analysts covering them. For this reason, any conclusions obtained from this research apply strictly only to the sample firms covered in the chapter. Extrapolation to larger populations should be made with care. This study will evaluate the accuracy of these
forecasts as compared to predictions from alternative statistical models in terms of the magnitude of the forecast error.

As mentioned earlier in the chapter, the time period selected for this study is for years 2000 through to 2011. Although this selection is somewhat arbitrary, this time frame exhibits differing economic conditions, which aids in making the results of the study more generalisable. As part of data requirements, only companies covered by at least three analysts are included in the study. Importantly, a similar parameter is adopted by Lui (1992). Thus, the analysis begins from the date when there are at least three analysts until the day when the company announces its end of financial year results.

The accuracy of forecasts in this study is examined by using the forecast error measures to reflect the difference between forecast and actual values of EPS. To measure the accuracy of forecasts on an average basis, the absolute forecast error measure is used, which is deflated by an absolute amount of actual values. Therefore, the forecast error is defined as the absolute value of the percentage difference between actual and forecasted earnings, such that:

\[ FE_{ak} = \left| \frac{(F_{cons} - A)}{A} \right| \]

where \(A\) is the actual EPS, and \(F_{cons}\) is the EPS consensus forecast.

To account for the effect that some of the extreme observations would have on the summary statistics, I adjust the data for outliers. Accordingly, observations with absolute forecast errors above 100% are removed from the analysis. Similarly, in discussing the research design of their study, Jaggi and Jain (1998) and Foster (1986)
argue that firms with forecast errors over 200% should be dropped from further analysis.

Importantly, standard statistical tools invariably require the successive elements in any summation to be independent. This assumption, however, is unrealistic, if the forecast errors are measured in terms of levels of EPS. As the level of EPS increases in absolute magnitude, we should likewise expect analysts’ forecast errors to increase in absolute magnitude. In a cross-sectional sense, performance measures, which evaluate differences between the levels of forecast EPS, and the levels of actual EPS would be biased against firms with high absolute levels of EPS and biased in favour of firms with low absolute levels of EPS.

This would make empirical results based upon such measures difficult to interpret. Thus, to avoid asymmetry problems, I chose to work in terms of percentage changes in EPS. If one does not use absolute values for both the numerator and the denominator, then the use of this measurement scheme produces a positive number for overpredictions and a negative number for underpredictions. This can be seen in McDonald (1973) who refers to the forecast error as the ‘relative prediction error’, defined as $FE_{%} = \frac{(A – F)}{F}$.

It would be useful to note that while I report the absolute forecast error as $FE_{a} = \frac{|F - A|}{|A|}$, Barefield and Comiskey (1975) for example, define their forecast error as $FE_{b} = \frac{|F - A|}{F}$. The authors note that “the mean absolute error measure implicitly assumes an indifference to the error direction” (Barefield and Comiskey, 1975, p.243). Moreover, the loss associated with the error is proportional to its size. The use of a mean squared error would be consistent with a loss function which increases more than proportionately with the error’s magnitude. Since little is known
about the nature of the loss function associated with earnings forecast errors, the mean absolute error measure has been selected due to its simplicity and also to its use in previous studies of earnings forecast errors.

According to Doran (2000), divergent earnings are those that differ from expected. Divergent earnings (DE) is the *undeflated* measure where $DE = A - F$, and $DE_{\%}$ is divergent earnings *deflated* by the absolute value of the EPS forecast, where $DE_{\%} = (A - F) / F$ (Doran, 2000). Studies that scrutinise divergent earnings (or forecast error) commonly employ the methodology of deflating divergent earnings measures (Bowen et al, 1992; Brown and Kim, 1991; Doran, 1995). This indicates that the common practice of deflating earnings data is necessary. As explained above, I believe that the need to use deflated and absolute values in determining the forecast error across a large sample of companies with varying levels of EPS cannot be underrated.

The ultimate question the study attempts to address is whether the alternative consensus methodology is superior to the usual mean and median scenario so widely adopted in the financial industry. Results are presented by country as well as on a sector basis and by financial year. Evidently, the six countries incorporated into the study are inherently different from one another, as explained by their individual economy, history, as well as cultural and social values. According to Tadesse and Kwok (2005, p.1), “countries differ in the way their financial activities are organised”. It is important here to draw the link between the choice of countries and the concept of behavioural finance discussed earlier in the dissertation. Statman (2008) describes behavioural finance as a collection of perceptions and behaviour of people facing financial choices. In particular, behavioural finance helps to describe
the effect of those choices on individuals, the companies they work in and markets they operate in; it then offers prescriptions for better choices. According to Statman (2008, p.38), “behavioural finance has made important contributions to the field of investing by focusing on the cognitive and emotional aspects of the investment decision-making process”. The author emphasises that although it is tempting to say that people are the same everywhere, the collective set of common experiences that people of the same culture share will influence their cognitive and emotional approach to investing (Statman, 2008). The paper discusses the many cultural differences that may influence investor behaviour and how these differences may influence the functioning of capital markets in which they operate.

In further exploring the similarities and differences among individuals of various countries, Statman (2008) concludes finds that propensities for risk and maximisation tend to vary by country. The author explains that people are affected by their cultures and experiences. Societies in different countries are often placed within different cultures that affect their associated perceptions, expectations, cognition and emotions (Statman, 2008). In this regard, Guiso et al (2006, p.23) define culture as “those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation”.

Another difference among cultures occurs between those that have a Confucian cultural core with a strong group emphasis and those that are more individualistic, such as Australia, ties among individuals are loose and people are expected to look after themselves and their immediate families. In contrast, in collectivistic societies, as would be true for the majority of Asian countries, most individuals are integrated into strong cohesive groups. Such a collectivistic group provides its members a
safety net that is limited or absent in individualistic countries (Statman, 2008). In describing their so-called *cushion hypothesis*, Hsee and Weber (1999) theorise that people are generally more willing to take risk in collectivistic societies than in individualistic societies because they know that the in-group will provide a cushion if they fail. That cushion is, however, not as readily available in individualistic societies.

To conclude, culture does matter and it is persistent (Statman, 2008). Undoubtedly, an awareness of the culture that describes a country in question and/or a geographic region it belongs to is important. That insight will allow a researcher to get a better grasp of the contextual implications of the study such as this one. Certainly, cultures vary and culture matters.

Given the combination of the developed and emerging markets analysed in the study, I believe that the more detailed classification by sector and year adds value. Undoubtedly, each sector has differences in terms of its customer base, market share among firms, industry-wide growth, competition, regulation and business cycles. Learning about the different results on a sector basis as well as analysing year-by-year variations in the countries’ economic cycles would provide the reader with a deeper understanding of the results obtained from the study.

5.3. Results

In this section I examine whether the time weighted consensus estimates provide a more accurate and sophisticated alternative to the mean and median consensus estimates. Reflecting on the methodology section, technically, there is a scale problem in measuring analysts’ forecast errors when using the data measured in its level form. This problem can persist across firms with differing levels of
earnings and over time. So a firm with the same total earnings as another but half as many shares outstanding will have its EPS that is twice as large. To adjust for differences in the magnitude of EPS and forecast errors across firms, it is necessary to use a deflator, such as dividing the forecast error by the actual value, which allows assuming that errors in forecasting EPS are relatively standardised across firms.

In applying the parameters described in the methodology section, by including only stocks covered by at least three analysts and removing the outliers whose absolute percentage error exceeds 100%, I find that the number of companies decreases by 44% – from a total of 5200 in the original dataset to 2897 in the final dataset. Figure 9 shows the number of firms composing the subpopulation for each country as per original and final datasets, with the largest sample size belonging to Taiwan and the smallest to Singapore.

**Figure 9. Dataset Composition by the Number of Companies per Country**
In testing for normal distribution, it is important to note that in the context of larger samples involving 50 or more observations, the \( t \)-distribution is approximately normal. To further strengthen the results of the study, I test the statistical significance of the differences using the paired \( t \)-test method. The results obtained tend to support the assumption that the data considered in the study are normally distributed. As the \( t \)-statistic in all cases is greater than 2, I can conclude that there is a statistically significant difference between the variables observed.

Using a linear time ramp going back 100 days and placing greater weight on the more recent analysts’ EPS forecast estimates, Table 13 and Figure 10 indicate that on average the 100 day time weighted consensus measure (from now on referred to as the 100 day TWES) is superior to the analysis based on either statistical median or mean. Overall, across the countries studied, the 100 day TWES ranks as the number one consensus approach (average FE=23.0%), followed by the median (average FE=23.5%), and the mean (average FE=24.3%) which ranks as the least accurate technique for calculating consensus. The exception is Singapore where it is the median that is a more reliable measure of consensus than the 100 day TWES.
Table 13. Time Weighted Consensus Results by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of companies</th>
<th>Mean</th>
<th>Median</th>
<th>100 day TWES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>562</td>
<td>19.7%</td>
<td>19.2%</td>
<td>19.1%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>549</td>
<td>24.6%</td>
<td>23.8%</td>
<td>23.6%</td>
</tr>
<tr>
<td>India</td>
<td>531</td>
<td>22.3%</td>
<td>21.6%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Singapore</td>
<td>283</td>
<td>24.3%</td>
<td>23.4%</td>
<td>23.6%</td>
</tr>
<tr>
<td>South Korea</td>
<td>486</td>
<td>28.5%</td>
<td>27.8%</td>
<td>26.8%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>486</td>
<td>26.3%</td>
<td>25.1%</td>
<td>23.8%</td>
</tr>
<tr>
<td>Average</td>
<td>483</td>
<td>24.3%</td>
<td>23.5%</td>
<td>23.0%</td>
</tr>
</tbody>
</table>

On a per country basis, the results of the study show that the 100 day TWES helps to achieve the most precise EPS forecast consensus in Australia (FE=19.1%), followed by India (FE=21.2%), Hong Kong (FE=23.6%), and Taiwan (FE=23.8%). Importantly, the 100 day TWES appears to be the least accurate method for South Korea (FE=26.8%). In comparison to the mean and median results, the 100 day TWES produces the lowest forecast errors in all six Pan-Asian countries covered in the study except for Singapore, where median is a better consensus method.

Figure 10. Time Weighted Consensus Results by Country
It has been established that the economic environment in which a firm operates is one of the key factors influencing the financial analysts’ updates (Rodriguez, 2006). Thus, accounting for macroeconomic information is likely to enhance the understanding of the average financial analyst’s forecasting pattern (Rodriguez, 2006). More so, the magnitude of forecast errors made by financial analysts can largely be attributed to the level of market transparency, which tends to vary widely across markets. Market transparency and efficiency is what essentially describes the working context in which financial analysts operate and make their forecasts. It is interesting that comparing across time most Pan-Asian countries have registered progress and most of the region has pushed forward in terms of market transparency in recent years. Some of the possible explanations for this improvement could include greater availability of market data, more financial analysts and positive changes in the regulatory processes.

As a mature economy in the Pan-Asian region, Australia is considered to be one of the world’s most transparent markets, as per the Corruption Perceptions Index prepared by Transparency International (2013). The Index scores 177 countries and territories on a scale from 0 (highly corrupt) to 100 (very clean,) in which Australia’s standing is relatively promising (81/100; world rank = 9) (Transparency International, 2013). This could explain why the current study attributes the lowest forecast errors for this country (FE = 19.1%). The other two mature economies in the region Hong Kong (75/100; world rank = 15) and Singapore

25 The Corruption Perceptions Index serves as an indicator of the abuse of power, secret dealings, including stolen assets, money laundering and bribery; all of which continue to ravage markets and disturb societies around the world.
(86/100; world rank = 5) also rank relatively high on transparency and seem to be on a par with most Western European countries (Transparency International, 2013). As a developed capitalist economy adopting rather conservative and stable financial policies, Taiwan ranks next (61/100; world rank = 36) after Hong Kong in terms of its market transparency and level of corruption (Transparency International, 2013). Despite the relatively high levels of economic development, South Korea still shows quite low levels of market transparency (55/100; world rank = 46), as reported by Transparency International (2013). This trend can be seen in the findings of this study indicating the largest EPS forecast errors for the South Korean market (FE = 26.8%). Lastly, India (36/100; world rank = 94) is an important emerging economic giant of the region with a significant level of corruption and hindered market transparency (Transparency International, 2013). It therefore comes as a surprise that the results of the study place Indian financial analysts only second (FE = 21.2%) after their Australian colleagues in terms of the magnitude of the forecast error generated when predicting company EPS. Such results might point to the possibility of information leakage and arbitrage prevalent in the Indian market.

Overall across six countries, as shown in Table 14 and Figure 11, on a sector basis, the 100 day TWES (average FE=23.2%) acts as the closest predictor of company EPS in all eleven sectors, followed by median (average FE=23.8%) and mean (average FE=24.5%). A more detailed sector break-down on a per country basis reveals that the 100 day TWES is unequivocally ranked as the most reliable consensus methodology across all six countries in such sectors as Basic Materials, Cyclical, Information Technology (IT) and Utilities. It is important to draw attention to the relatively low number of stocks in Utilities, thus somewhat limiting the generalisability of results for this sector.
<table>
<thead>
<tr>
<th>Sector</th>
<th>Number of companies</th>
<th>Mean</th>
<th>Median</th>
<th>100 day TWES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Materials</td>
<td>337</td>
<td>27.1%</td>
<td>26.4%</td>
<td>25.3%</td>
</tr>
<tr>
<td>Capital Goods</td>
<td>332</td>
<td>24.2%</td>
<td>23.7%</td>
<td>22.9%</td>
</tr>
<tr>
<td>Cyclical</td>
<td>235</td>
<td>24.9%</td>
<td>24.0%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Energy</td>
<td>101</td>
<td>26.4%</td>
<td>25.8%</td>
<td>25.2%</td>
</tr>
<tr>
<td>Financials</td>
<td>245</td>
<td>22.3%</td>
<td>21.6%</td>
<td>21.5%</td>
</tr>
<tr>
<td>Health</td>
<td>117</td>
<td>21.5%</td>
<td>20.6%</td>
<td>20.3%</td>
</tr>
<tr>
<td>Non-Cyclical</td>
<td>174</td>
<td>22.7%</td>
<td>22.3%</td>
<td>21.7%</td>
</tr>
<tr>
<td>Services</td>
<td>563</td>
<td>23.6%</td>
<td>22.9%</td>
<td>22.4%</td>
</tr>
<tr>
<td>Information Technology</td>
<td>606</td>
<td>25.9%</td>
<td>24.7%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Transport</td>
<td>121</td>
<td>27.0%</td>
<td>26.2%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Utilities</td>
<td>66</td>
<td>23.7%</td>
<td>23.3%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Average</td>
<td>263</td>
<td>24.5%</td>
<td>23.8%</td>
<td>23.2%</td>
</tr>
</tbody>
</table>

The table above provides evidence to suggest that the time weighted methodology results in the lowest forecasting error (FE) and is therefore a superior consensus approach in forecasting company earnings per share in all 11 sectors in comparison to the mean and median alternatives. Financials is the only sector where, although slightly more reliable, the 100 day TWES forecasting error (FE=21.5%) is not significantly different from the forecasting error generated by the median (FE=21.6%) consensus methodology.
5.4. Robustness Tests

To strengthen the research results, a number of additional tests are performed. The aim is to make sure that the time weighted methodology is superior to simple benchmarks such as mean or median regardless of the chosen cut-off age of the estimate. To add to the 100 day benchmark established throughout the study, I also ran tests where the maximum age of the estimate is 50 and 150 days. Such tests support the earlier proposition that the time weighted methodology is in fact more informative about the actual EPS than the simple arithmetic benchmarks. Interestingly, the statistical differences between the 50, 100 and 150 day results are insignificant and lead us to the same conclusion, i.e. that overall the 100 day TWES is a more reliable measure of forecast consensus than the mean and median.

In addition to testing the liner model with the time ramp going back 100 days, a number of exponential models were tested. The robustness tests based on the
exponential models tend to support the superiority of the time weighted approach over the mean and median method but do not result in lower forecast errors. I thus conclude that using the linear time weighted consensus model allows the achievement of a more precise consensus overall than that derived from the exponential time weighted consensus models.

Interestingly, Clement and Tse (2005) find that analysts have difficulty forecasting earnings for firms that are currently reporting losses. To further strengthen the validity of the results, I examine the potential effects of some of the major economic turmoils of the twenty-first century, such as the GFC of 2008-2009 and the dot.com bubble of 2000-2001, on the forecasting accuracy and the magnitude of the forecast error. Not surprisingly, the results of the study show that in 2000-2001 as well as 2008-2009 financial years, the percentage forecast error was higher than in any other year. This finding tends to support the proposition of Clement and Tse (2005) that analysts find it harder to predict earnings for companies that are experiencing financial difficulties and possibly going into losses. Table 15 and Figure 12 below point to the particulars of these findings. A valuable conclusion for this study is that despite the variations in the size of the forecast error and taking account of the different economic regimes around, the 100 day TWES (average FE=23.1%) continues to provide robust consensus methodology, and in fact outperforms the median (average FE=23.4%) and mean (average FE=24.3%) throughout the twelve-year period considered in the study. Notably, in 2000-2001 (average FE=26.3% and 26.4%, accordingly) and 2008-2009 (average FE=25.3% and 25.4%, respectively), the percentage forecast error was higher than in the other years.
As the table above shows, the average percentage forecast error declined from 26.3% in 2000 to 23.1% in 2011, marking an overall drop of 3.2 percentage points over the 12-year period examined in the study. This improvement from 2000 through to 2011 can be attributed to changes in communication technology leading to more timely and accurate exchange of information and thus smaller forecast errors. The results of the study show that the lowest FE (19.6%) was noted in 2005, while the largest FE (26.4%) was noted in 2004 (26.4%).

**Figure 12.** Time Weighted Consensus Results by Financial Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of companies</th>
<th>Mean</th>
<th>Median</th>
<th>100 day TWES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>111</td>
<td>27.5%</td>
<td>26.7%</td>
<td><strong>26.3%</strong></td>
</tr>
<tr>
<td>2001</td>
<td>97</td>
<td>28.3%</td>
<td>26.7%</td>
<td><strong>26.4%</strong></td>
</tr>
<tr>
<td>2002</td>
<td>95</td>
<td>24.2%</td>
<td>23.1%</td>
<td>23.2%</td>
</tr>
<tr>
<td>2003</td>
<td>107</td>
<td>23.6%</td>
<td>22.8%</td>
<td>21.7%</td>
</tr>
<tr>
<td>2004</td>
<td>126</td>
<td>21.2%</td>
<td>20.8%</td>
<td>20.3%</td>
</tr>
<tr>
<td>2005</td>
<td>156</td>
<td>20.6%</td>
<td>20.0%</td>
<td>19.6%</td>
</tr>
<tr>
<td>2006</td>
<td>199</td>
<td>22.1%</td>
<td>21.6%</td>
<td>21.1%</td>
</tr>
<tr>
<td>2007</td>
<td>254</td>
<td>22.3%</td>
<td>21.8%</td>
<td>21.4%</td>
</tr>
<tr>
<td>2008</td>
<td>244</td>
<td>27.0%</td>
<td>26.0%</td>
<td><strong>25.3%</strong></td>
</tr>
<tr>
<td>2009</td>
<td>233</td>
<td>26.7%</td>
<td>25.8%</td>
<td><strong>25.4%</strong></td>
</tr>
<tr>
<td>2010</td>
<td>257</td>
<td>23.8%</td>
<td>23.0%</td>
<td>23.0%</td>
</tr>
<tr>
<td>2011</td>
<td>140</td>
<td>23.8%</td>
<td>23.0%</td>
<td>23.2%</td>
</tr>
<tr>
<td>Average</td>
<td>168</td>
<td>24.3%</td>
<td>23.4%</td>
<td>23.1%</td>
</tr>
</tbody>
</table>
One may notice slight differences in average forecast error results in Tables 13, 14 and 15. These variations occur because we compare samples with a different number of stocks in each category, as evident from Table 16.

### Table 16. Comparing Samples with a Different Number of Stocks

<table>
<thead>
<tr>
<th>Sample</th>
<th>Average number of companies</th>
<th>Mean</th>
<th>Median</th>
<th>100 day TWES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>483</td>
<td>24.3%</td>
<td>23.5%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Sector</td>
<td>263</td>
<td>24.5%</td>
<td>23.8%</td>
<td>23.2%</td>
</tr>
<tr>
<td>Year</td>
<td>168</td>
<td>24.3%</td>
<td>23.4%</td>
<td>23.1%</td>
</tr>
</tbody>
</table>

The table above explains that the average figures for the mean, median and the 100 day TWES results may vary depending on the type of stock aggregation used. For example, when calculating consensus figures, if we group the companies by country the average FE=23.0%; if by sector, then the average FE=23.2%; if by financial year, then the average FE=23.1%. It is important to note here that while these differences are insignificant and span a few decimal points only, they exist and the reader should be aware of this small discrepancy.

It has been well documented in the finance literature that in times of economic downturns when EPS tends to be negative, analyst forecast errors may be larger than under the business-as-usual scenario. Continuing from the previous findings, it is crucial to ensure that the time weighted methodology remains a more reliable alternative to the mean and median methods at times when EPS is negative. I therefore conduct additional testing.

Table 17 and Figure 13 provide some empirical evidence to suggest two things when EPS is negative. First, the time weighted methodology keeps being the more reliable alternative to the mean and median methods. The second finding is that analyst forecast errors are significantly larger when earnings are negative. In fact, in times of significant economic hardship, the 100 day TWES forecast error is
Table 17. Time Weighted Consensus Results when EPS is Negative

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of companies</th>
<th>Consensus measure</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original dataset</td>
<td>Outliers</td>
<td>Positive EPS</td>
<td>Negative EPS</td>
<td>Mean</td>
</tr>
<tr>
<td>Australia</td>
<td>871</td>
<td>178</td>
<td>562</td>
<td>131</td>
<td>47.1%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>901</td>
<td>283</td>
<td>549</td>
<td>69</td>
<td>56.1%</td>
</tr>
<tr>
<td>India</td>
<td>933</td>
<td>363</td>
<td>531</td>
<td>39</td>
<td>52.3%</td>
</tr>
<tr>
<td>Singapore</td>
<td>528</td>
<td>209</td>
<td>283</td>
<td>36</td>
<td>50.9%</td>
</tr>
<tr>
<td>South Korea</td>
<td>941</td>
<td>343</td>
<td>486</td>
<td>112</td>
<td>62.9%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1026</td>
<td>462</td>
<td>486</td>
<td>78</td>
<td>54.4%</td>
</tr>
<tr>
<td>Total/Average</td>
<td>5200</td>
<td>1838</td>
<td>2897</td>
<td>465</td>
<td>54.0%</td>
</tr>
</tbody>
</table>

The table above is a numerical illustration that analyst forecast errors tend to be considerably larger when EPS in negative. That usually happens when the firm is subjected to financial distress or to economy wide shocks. At times like these, due to the high level of uncertainty present, it becomes particularly difficult for the financial analysts to issue reliable forecasts of company earnings. When the reported EPS is negative, the 100 day TWES methodology provides earnings estimates that are significantly more accurate than those derived from the mean and median alternatives. On average across the six countries included in the study, the forecast error for the 100 day TWES methodology (FE=47.3%) is 6.7 percentage points lower than the forecast error for the median (52.0%) methodology, and 4.7 percentage points lower that the forecast error for the mean (FE=54.0%) methodology.
Figure 13. Time Weighted Consensus Results when EPS is Negative

The 100-day rolling time weighted (FE=47.3%) methodology keeps being the more reliable alternative to the mean (FE=54.0%) and median (FE=54.0%) methods when reported EPS is negative. In addition, the forecast errors are significantly larger under the scenario of negative corporate earnings, considerably lower than the forecast error derived from the mean or median. This difference is particularly pronounced in the Asian countries but not in Australia.

The robustness tests performed provide evidence in favour of the superiority of the time weighted consensus method over the mean and the median consensus alternatives. This outcome holds true across most sectors and financial years, as well as during times of economic downturns, such as the GFC or the dot.com bubble, for example. This provides support for the results presented earlier in the thesis.

5.5. Discussion

Security analysts play an important role in capital markets. As information intermediaries, they provide quantitative outputs for investors in the form of earnings forecasts. Believed to be the proxy of rational expectations, analysts’ forecasts of
firms’ earnings and the related forecast errors are issues widely discussed in the finance and accounting literature. By underlining the critical role of estimated earnings in stock valuation, research suggests that analyst earnings forecast revisions convey significant information to the market. In fact, earnings forecast accuracy is described by the *Institutional Investor* and the *Wall Street Journal* as the determining quality of top-ranked analysts. Importantly, as highlighted by Schipper (1991), an accurate earnings forecast is not merely an end in itself but a tool to gauge the investment potential of a company’s stock.

Importantly, the timeliness of the forecasts and forecast accuracy are an interesting trade-off faced by analysts who issue forecasts. They need to choose between either promptly releasing forecasts with respect to new information or waiting in order to produce more accurate forecasts at some point in the future by obtaining additional information. In this chapter I examine the analysts forecast error, defined as the difference between actual and forecast earnings. I compare whether – in measuring the forecast error – the rolling *time weighted* consensus methodology based on a 100-day rolling time window is superior to the *mean* and *median* consensus approach.

As the results of the study demonstrate, across the Pan-Asian sampling region, the time weighted consensus signal seems to be a more accurate and reliable measure in forecasting company EPS. This result is true across sectors as well as throughout different time periods and varying economic conditions. It may therefore be concluded that the time weighted forecast EPS signal tends to exhibit some valuable predictive properties in Pan-Asia. Such evidence is consistent with my earlier proposition that naively calculating analyst forecast consensus by averaging
individual analyst forecasts is inappropriate. Not all analysts are the same; in fact they are characterised by a varying level of skills, experience, coverage and frequency of updates. Thus, proposing a more sophisticated technique for calculating EPS consensus estimates is crucial.

As the topic of analysts’ forecasts is rather vast and dynamic, it undoubtedly deserves further, perhaps broader and deeper investigation. A number of possible future research directions that could focus on a variety of issues related to earnings forecasts are outlined below. As noted by Barefield and Comiskey (1975), little research effort has been directed to either the nature or the role of analysts’ forecasts of EPS, although such forecasts seem to be a key element in the formulation of investment decisions. Although based on this study, the time weighting approach seems to be an effective proxy for conviction in analysts’ views, other analyst variables could also be explored and may include the following.

First, it would be meaningful to construct consensus made up of the most active forecasters, or those who issue the greatest number of revisions. The most active forecasters are likely to specialise in particular stocks and be the first to respond to new information. Such analysts tend to closely follow companies under their charge and thus have the necessary knowledge and expertise in issuing more reliable forecasts on a frequent basis. The current 100-day rolling time weighted approach rewards the active forecasters by assigning them high weighting as determined by how ‘fresh’ their estimate is. However, this method does not discriminate between analysts based on the number of revisions.

Second, it would also be useful to investigate forecast accuracy by industry or sector, thus further grouping the stocks. It may be the case that different industries
and sectors pose different forecasting problems for analysts. There may be significant differences in forecast errors for different industries and even for different firms within the same industry. This proposition is further supported by the fact that some analysts focus their attention solely on specific industries and only release forecasts for firms within those industries. As one would reasonably expect, such in-depth specialisation would allow analysts to focus on narrow areas so as to release more timely and accurate forecasts.

Third, it would be rewarding to study the relationship between broker/analyst celebrity status and the underlying forecast accuracy. Bonner et al (2007, p.482) define a celebrity as “a famous or well-publicised person, known for being well-known in addition to his performance-related qualities”. The authors further note that the celebrity status of analysts is important because celebrity analysts are superior performers (Bonner et al, 2007). Yet the term ‘celebrity status’ could refer to a number of things. It could be associated with the familiarity of the analyst’s name, the quantity of media coverage analysts receive in major financial databases, such as Thompson Reuters or Bloomberg, or prestige based on survey rankings. The quantity of media coverage analysts receive can be used as an empirical proxy for celebrity since prior work has contended that there is a strong association between media coverage and celebrity status (Rein et al, 1997).

Fourth, taking into account the analysts’ historical forecast accuracy could also generate meaningful implications for deriving a robust consensus measure for forecasting EPS. This branch could examine whether users of consensus analysts’ earnings forecasts can exploit information in the nature of analysts’ historical forecast accuracy and firms’ earnings predictability in order to increase (reduce) the
probability of relying on a consensus forecast which correctly (incorrectly) predicts the forthcoming annual earnings change.

Fifth, although somewhat linked to the celebrity status discussion above, examining the forecast error by large brokers/analysts over that of the small brokers/analysts could produce important inferences for effective consensus construction. The underlying assumption for the study would be tentative on the hypothesis that larger brokers are likely to employ more experienced and qualified analysts, have more resources and therefore greater access to information.

Another interesting research path could be weighing the number of stocks covered by the analyst or the level of industry experience thereof against forecast accuracy, or studying the magnitude of the revision.
Chapter Six:

“Science is not about making predictions or performing experiments. Science is about explaining.”

– Bill Gaede

6. Discussion and Concluding Remarks

Shareholders, investors, and lenders have an obvious interest in the value of a firm as well as the production and use of financial information. Accordingly, a great deal of finance and accounting studies are concerned with whether sophisticated users of financial data understand such information, how they process and apply this knowledge and how it ultimately impacts upon the functioning of capital markets. A significant volume of published research in leading academic accounting journals examines the relation between financial statement information and capital markets, referred to as capital markets research. The principal sources of demand for capital markets research in accounting are fundamental analysis and valuation, tests of market efficiency, and the role of accounting numbers in contracts and the political process. The aim of this thesis has been to indirectly contribute to the existing empirical research on the relation between financial statements and capital markets by reporting on the statistical relationship between fundamental data, financial analyst modelling and stock market returns.

The capital markets research topics of current interest to researchers include tests of market efficiency with respect to accounting information, fundamental analysis, and value relevance of financial reporting and analyst forecasts. Research
interest in the role of fundamental accounting factors is voluminous as a deeper understanding of valuation principles is of interest to both academics concerned with a working framework that describes capital markets and practitioners who operate in this context. Evidence from research on these topics is likely to be helpful in capital market investment decisions, accounting standard setting, and corporate financial disclosure decisions.

The underlying theme of this dissertation is the informational efficiency of the Pan-Asian stock markets. Studies of the efficient market hypothesis (EMH), although not always explicitly stated, refer to the informational efficiency of markets. These studies can be traced back as far as the early 1990’s. As defined by Fama (1970), an efficient market is one where prices fully reflect available information. Financial analysts have persistently investigated whether securities are fairly priced. A myriad of methodologies have been used by both practitioners and researchers to identify under and overpriced securities. The importance of the EMH studies of stock markets lies within the crucial role stock markets play in sustaining the health of the economy by providing risk capital and in so doing promoting growth and development.

Conflicting results in studies on market efficiency in the financial and accounting literature have fuelled accounting researchers’ interest in fundamental analysis, valuation, and tests of market efficiency (Kothari, 2001). This has altogether created an entirely new area of research, examining the nature of stock-price performance. In this thesis, I have offered some reflections on market efficiency and the role of accounting and finance research in the price discovery process. The degree to which markets are efficient affects the demand for accounting research in investment decisions, regulatory standard setting, performance
evaluation, and corporate disclosure decisions. As Kothari (2001, p.107) observed, “the mounting evidence of apparent market inefficiency documented in the financial and accounting literature has fuelled accounting researchers’ interest in fundamental analysis, valuation and tests of market efficiency”.

This evidence is changing both the research focus and the practical implications in the capital markets domain. As outlined by Lee (2001), the degree to which markets are efficient affects the demand for accounting research in investment decisions, regulatory standard setting decisions, performance evaluation, and corporate disclosure decisions. The author highlights significant problems associated with a naive view of market efficiency in which price is assumed to equal fundamental value, and refers to it as being an inadequate conceptual starting point for future market-related research. Notably, Lee (2001, p.236) speaks of the concept of market efficiency as “an over simplification that fails to capture the richness of market pricing dynamics and the process of price discovery”. In reality, “market prices do not adjust to fundamental value instantly by fiat” (Lee, 2001, p.236). Instead, “price convergence toward fundamental value is better characterised as a process, which requires time and effort, and is only achieved at substantial cost to society” (Lee, 2001, p.236). The author concludes that instead of finding aspects of the evidence against market efficiency disturbing, one should find them liberating.

Aiming to draw a link between the past and the future of the capital market doctrine, this thesis adopts a two-dimensional perspective: backward- and forward-looking. The value investing chapter embraces a backward-looking methodological perspective where I present evidence on how investing based on publicly available historical accounting information can deliver positive returns in excess of the risk-
free rate in some Pan-Asian countries. The analysts chapter, on the other hand, adopts a forward-looking methodological perspective where I present a study of analyst forecasts of company EPS, develop a new approach to using analyst forecasts and examine how relying on forecasts by financial analysts can aid investors in realising positive returns in the future.

For the value investing study, I analysed ten years of accounting data and tested five valuation factors in five Pan-Asian countries: Australia, Hong Kong, Japan, South Korea and Taiwan. The valuation factors under review in this study are: book to price, earnings to price, dividends to price, cash flow to price and sales to price ratios. Historical corporate data has been tested to determine the strength of the relationship between a given valuation factor and stock returns. The findings of the study point to the strongest relationship between stock returns and the cash flow to price ratio, while the weakest is for earnings to price ratio and stock returns. The methodology of examining the information content of various income statement and balance sheet items is based on cross-sectional regressions of stock returns on the value measures. The result is a dynamic picture that indicates which fundamental valuation factors and which countries are likely to be a suitable and robust fit for value investing strategies.

The examination of various valuation measures across the five countries indicates that value investing strategies exhibit varying patterns of portfolio returns in different economies. The one country where fundamental analysis has held constant over time is Japan in which value investing strategies consistently generated positive returns. The results of the study also indicate that overall value investing strategies do not seem to have generated healthy returns in Australia. However, on a
sector basis, Materials, Industrials and Consumer Staples are some of the most fruitful sectors for value investing. The fundamental factors providing profitable valuation strategies are: cash flow to price, dividend to price and sales to price. Despite being the most popular measure, the relationship between earnings to price and stock returns seems to be rather weak and not statistically significant.

This thesis lays foundation for understanding market efficiency implications in the context of value investing. Rewards from fundamental analysis, as reported in the value investing chapter, appear to somewhat weaken the precarious semi-strong concept of an efficient market by documenting the apparent statistical relationship between some accounting ratios and stock returns. The semi-strong concept of an efficient market proposes that share prices reflect the publicly available financial information. If that indeed were the case, investors in the countries examined would not be able to generate positive and significantly different from zero returns. Having said this, I do not conclude that the EMH should be dismissed. Instead, I present evidence to suggest that capital markets in the Pan-Asian countries covered in this thesis may not feature the semi-strong form of market efficiency.

Clearly, the hypothesis of market efficiency has opened the doors for positive capital markets research across the finance and accounting disciplines. Yet it remains a hypothesis or a proposed explanation for a phenomenon of market operations or behaviour which is yet to be fully tested. Importantly, a hypothesis can never be confirmed or entirely disproven because any disproof can be dealt with by subsidiary hypotheses. As Ball and Brown (1968) put it, capital market efficiency provides justification for selecting the behaviour of security prices as an operational test of usefulness of information in financial statements.
It is undoubtedly true that financial analysts play a vital role in capital markets. As information intermediaries, they provide quantitative information for investors in the form of earnings forecasts. Believed to be the proxy of rational expectations, analyst forecasts of firms’ earnings and the related forecast errors are issues widely discussed in the finance and accounting literature. Considering the critical role of EPS estimates in stock valuation, research suggests that analyst earnings forecast revisions convey significant information to the market. In fact, earnings forecast accuracy has been described in many leading financial journals as the determining quality of top-ranked analysts. As highlighted by Schipper (1991), an accurate earnings forecast is not merely an end in itself but a tool to gauge the investment potential of a company’s stock.

Importantly, forecast timeliness and accuracy involve an inevitable trade-off faced by analysts as they eventually have to choose between either: promptly releasing forecasts with respect to new information, or waiting until some point in the future to release more accurate forecasts after obtaining additional information. In this thesis, I examined the analyst forecast error, defined as the difference between actual and forecast earnings. In measuring the forecast error, I compare whether the time weighted consensus methodology based on a 100-day rolling time window is superior to the alternatively simple mean and median consensus approach which is often used by brokerage houses and investment firms to forecast corporate earnings.

As the results of the study demonstrate, across the Pan-Asian region, the time weighted consensus signal seems to be a more accurate and reliable measure in forecasting company EPS than the alternative methods. This result holds across the
sectors as well as in the different time periods and varying economic conditions. I therefore conclude that in the Pan-Asian, the rolling time weighted methodology for forecasting EPS exhibits valuable predictive properties. Such evidence is consistent with my earlier proposition that naively calculating analyst forecast consensus by averaging individual analyst forecasts is likely to be inferior. This is because analysts experience, coverage and frequency of updates are not homogenous. Thus, in proposing a more sophisticated technique for calculating EPS consensus estimates this thesis has developed a tool for minimising the forecasting error between earnings figures as predicted by financial analysts and those reported by companies at the end of the financial period.
7. Appendices

Appendix A. IFRS Adoption by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Is IFRS required or permitted for listed companies?</th>
<th>Version of IFRS</th>
<th>IFRS conversion plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Required for consolidated financial statements. There is no longer a requirement to prepare separate standalone financial statements for the parent entity.</td>
<td>IFRS as adopted locally. Australian accounting standards for for-profit entities are consistent with IFRS, with the exception of some additional disclosure requirements. Australian accounting standards have specific provisions added for not-for-profit and public sector entities which may not always be compliant with IFRS.</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Permitted for consolidated and standalone financial statements. Companies incorporated in HK are required to prepare financial statements under local GAAP (Hong Kong Financial Reporting Standards, or HKFRS). While HKFRS have been converged with IFRS, differences remain primarily in respect of transitional provisions.</td>
<td>IFRS as published by the IASB.</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Country</td>
<td>Is IFRS required or permitted for listed companies?</td>
<td>Version of IFRS</td>
<td>IFRS conversion plans</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
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</tr>
<tr>
<td>India</td>
<td>Listed companies with subsidiaries have a choice of presenting their consolidated financial results either according to Indian GAAP or IFRS. Yet most companies seem to prepare their financial statements according to Indian GAAP. This is subject to change once India upgrades Indian GAAP and/or continues its convergence to IFRS.</td>
<td>IFRS as published by the IASB.</td>
<td>In 2010, the Ministry of Corporate Affairs (MCA) of India in January announced a multi-phase plan for transition beginning in 2011 to the new Converged Indian Accounting Standards. This milestone is marked India’s attempt to converge to IFRS, which has carve outs that distinguish it from IFRS, and is now known as “Ind AS”).</td>
</tr>
<tr>
<td>Japan</td>
<td>Listed companies which meet certain requirements are permitted to use IFRS for consolidated financial statements ending on or after 31 March, 2010, as per Regulations for Consolidated Financial Statements revised by the Financial Services Agency (FSA) of Japan in late 2009.</td>
<td>IFRS as designated by the FSA. The FSA will designate those IFRSs published by the IASB which are have been approved and issued through fair and reasonable due process and are expected to be considered as being fair and appropriate financial reporting standards from the viewpoint of investor protection and market integrity.</td>
<td>In June 2011, the Accounting Standards Board of Japan (ASBJ) and the IASB announced their achievements in reducing the differences in specific items between Japanese GAAP and IFRS. The ASBJ will continue its efforts to converge with IFRSs.</td>
</tr>
<tr>
<td>Country</td>
<td>Is IFRS required or permitted for listed companies?</td>
<td>Version of IFRS</td>
<td>IFRS conversion plans</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Singapore</td>
<td>FRS is permitted if (i) the company is also listed on a non-Singapore stock exchange and that exchange requires IFRS financial statements; or (ii) exemption is granted by the Authority. Other listed companies are required to apply IFRS as adopted locally (Singapore FRS).</td>
<td>IFRS as adopted locally. All IFRS are considered by the Accounting Standards Council (ASC) and most are issued as Financial Reporting Standards (SFRS). SFRSs are largely aligned to IFRS except for where appropriate taking into account local circumstances.</td>
<td>The timeline for full convergence will depend on the progress of several key projects undertaken by the IASB. IFRS for SMEs is permitted from 2011 for companies that meet any two of the following criteria: (1) revenue of less than $10 million (2) assets of less than $10 million (3) less than 50 employees</td>
</tr>
<tr>
<td>South Korea</td>
<td>Adoption of IFRS is required for all listed companies and certain unlisted financial institutions from 2011. Early adoption of IFRS, with exception of financial institutions, has been permitted from 2009.</td>
<td>IFRS as published by the IASB and translated to Korean language word-for-word.</td>
<td>From 2011, full adoption of IFRS is mandatory for all listed companies and certain financial institutions. From 2009, voluntary adoption has been permitted for listed and non-listed companies.</td>
</tr>
<tr>
<td>Taiwan</td>
<td>All listed and OTC companies will be required to adopt T-IFRS in 2013 and after.</td>
<td>T-IFRS is the 2010 version of IFRS issued by IASB as endorsed by the local regulator.</td>
<td>All listed and OTC companies adopted IFRS in 2013. All other public companies will be required to adopt IFRS in 2015. The local standard setting body has not announced any adoption or convergence plans to IFRS for SMEs.</td>
</tr>
</tbody>
</table>

Source: PwC (2013)
### Appendix B. Industry Classification by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Materials</strong></td>
<td>Chemical Manufacturing  &lt;br&gt; Chemicals (Plastics and Rubber)  &lt;br&gt; Containers and Packaging  &lt;br&gt; Fabricated Plastic and Rubber  &lt;br&gt; Forestry and Wood Products  &lt;br&gt; Gold and Silver  &lt;br&gt; Iron and Steel  &lt;br&gt; Metal Mining  &lt;br&gt; Non-Metallic Mining  &lt;br&gt; Paper and Paper Products  &lt;br&gt; Miscellaneous Fabricated Products</td>
</tr>
<tr>
<td><strong>Capital Goods</strong></td>
<td>Aerospace and Defence  &lt;br&gt; Construction (Supplies and Fixtures)  &lt;br&gt; Construction and Agricultural Machinery  &lt;br&gt; Construction (Raw Materials)  &lt;br&gt; Construction Services  &lt;br&gt; Mobile Homes and RVs  &lt;br&gt; Miscellaneous Capital Goods</td>
</tr>
<tr>
<td><strong>Cyclical</strong></td>
<td>Apparel and Accessories  &lt;br&gt; Tools and Appliances  &lt;br&gt; Audio and Video Equipment  &lt;br&gt; Auto and Truck Manufacturers  &lt;br&gt; Auto and Truck Parts  &lt;br&gt; Footwear  &lt;br&gt; Furniture and Fixtures  &lt;br&gt; Jewellery and Silverware  &lt;br&gt; Photography  &lt;br&gt; Recreational Products  &lt;br&gt; Non-Apparel Textiles  &lt;br&gt; Tires</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>Coal  &lt;br&gt; Oil and Gas (Integrated)  &lt;br&gt; Oil and Gas Operations  &lt;br&gt; Oil Well Services and Equipment</td>
</tr>
<tr>
<td>Financials</td>
<td>Consumer Financial Services</td>
</tr>
<tr>
<td></td>
<td>Insurance (Accident and Health, Life, Property and Casualty, Miscellaneous)</td>
</tr>
<tr>
<td></td>
<td>Investment Services</td>
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<tr>
<td></td>
<td>Miscellaneous Financial Services</td>
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<tr>
<td></td>
<td>Money Centre Banks</td>
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<tr>
<td></td>
<td>Regional Banks</td>
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<tr>
<td></td>
<td>S&amp;Ls/Savings Banks</td>
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<tr>
<td>Health</td>
<td>Biotechnology and Drugs</td>
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<tr>
<td></td>
<td>Healthcare Facilities</td>
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<tr>
<td></td>
<td>Major Drugs</td>
</tr>
<tr>
<td></td>
<td>Medical Equipment and Supplies</td>
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<tr>
<td>Information Technology (IT)</td>
<td>Communications Equipment</td>
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<tr>
<td></td>
<td>Computer Hardware</td>
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<tr>
<td></td>
<td>Computer Networks</td>
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<tr>
<td></td>
<td>Computer Peripherals</td>
</tr>
<tr>
<td></td>
<td>Computer Services</td>
</tr>
<tr>
<td></td>
<td>Computer Storage Devices</td>
</tr>
<tr>
<td></td>
<td>Electronic Instruments and Controls</td>
</tr>
<tr>
<td></td>
<td>Office Equipment</td>
</tr>
<tr>
<td></td>
<td>Scientific and Technical Instruments</td>
</tr>
<tr>
<td></td>
<td>Semiconductors</td>
</tr>
<tr>
<td></td>
<td>Software and Programming</td>
</tr>
<tr>
<td>Non-Cyclical</td>
<td>Beverages (Alcoholic and Non-alcoholic)</td>
</tr>
<tr>
<td></td>
<td>Crops</td>
</tr>
<tr>
<td></td>
<td>Fish and Livestock</td>
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<tr>
<td></td>
<td>Food Processing</td>
</tr>
<tr>
<td></td>
<td>Office Supplies</td>
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<tr>
<td></td>
<td>Personal and Household Products</td>
</tr>
<tr>
<td></td>
<td>Tobacco</td>
</tr>
<tr>
<td>Services</td>
<td>Advertising</td>
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<tr>
<td></td>
<td>Broadcasting and Cable TV</td>
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<tr>
<td></td>
<td>Business Services</td>
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<tr>
<td></td>
<td>Casinos and Gaming</td>
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<tr>
<td></td>
<td>Communications Services</td>
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<tr>
<td></td>
<td>Hotels and Motels</td>
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<tr>
<td></td>
<td>Motion Pictures</td>
</tr>
<tr>
<td></td>
<td>Personal Services</td>
</tr>
<tr>
<td>Category</td>
<td>Subcategories</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>Printing and Publishing</td>
<td>Printing Services</td>
</tr>
<tr>
<td></td>
<td>Real Estate Operations</td>
</tr>
<tr>
<td></td>
<td>Recreational Activities</td>
</tr>
<tr>
<td></td>
<td>Rental and Leasing</td>
</tr>
<tr>
<td></td>
<td>Restaurants</td>
</tr>
<tr>
<td></td>
<td>Retail (Apparel, Catalogue and Mail Order, Department and Discount, Drugs, Grocery, Specialty, Technology)</td>
</tr>
<tr>
<td></td>
<td>Schools</td>
</tr>
<tr>
<td></td>
<td>Security Systems and Services</td>
</tr>
<tr>
<td></td>
<td>Waste Management Services</td>
</tr>
<tr>
<td>Transport</td>
<td>Air Courier</td>
</tr>
<tr>
<td></td>
<td>Airline, Miscellaneous Transportation</td>
</tr>
<tr>
<td></td>
<td>Railroads</td>
</tr>
<tr>
<td></td>
<td>Trucking</td>
</tr>
<tr>
<td></td>
<td>Water Transportation</td>
</tr>
<tr>
<td>Utilities</td>
<td>Electric Utilities</td>
</tr>
<tr>
<td></td>
<td>Natural Gas Utilities</td>
</tr>
<tr>
<td></td>
<td>Water Utilities</td>
</tr>
</tbody>
</table>

Source: ASX (2013)
Appendix C. Calculating the Time Weighted Consensus Estimate

The time weighted estimate is calculated by multiplying the individual analyst estimate on the day by its respective weight. The older the estimate, the smaller its allocated weight.

For example, if the last estimate by analyst A was $3.48 and was issued 56 days ago, then the weight assigned to this estimate = \((100 - 56) / 100 = 0.44\).

The time weighted estimate for this day is obtained by multiplying an EPS estimate of $3.48 by its weight 0.44, which returns $1.53.

Thus, in obtaining the consensus figure for the day, the 56 day old measure will be given less priority than a measure that is, for example, only 4 days old.

In an attempt to avoid confusion, we provide the following scenario as an example.

<table>
<thead>
<tr>
<th>Analyst</th>
<th>Estimate</th>
<th>Age of Estimate</th>
<th>Weight of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst A</td>
<td>$3.48</td>
<td>56 days old</td>
<td>0.44</td>
</tr>
<tr>
<td>Analyst B</td>
<td>$3.45</td>
<td>4 days old</td>
<td>0.96</td>
</tr>
<tr>
<td>Analyst C</td>
<td>$4.02</td>
<td>22 days old</td>
<td>0.78</td>
</tr>
<tr>
<td>Analyst D</td>
<td>$4.15</td>
<td>103 days old</td>
<td>0</td>
</tr>
</tbody>
</table>

As mentioned earlier, any analyst forecast that is more than 100 days old shall be considered too old, assigned the value of zero and is eliminated from the consensus calculation. Therefore, under a given scenario, the time weighted consensus figure for a given day is calculated in the following way:

Step 1: Calculate the time weighted estimate for each analyst on the day

<table>
<thead>
<tr>
<th>Analyst</th>
<th>Estimate</th>
<th>Weight of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst B</td>
<td>$3.48 \times 0.44</td>
<td>$1.53</td>
</tr>
<tr>
<td>Analyst B</td>
<td>$3.45 \times 0.96</td>
<td>$3.31</td>
</tr>
<tr>
<td>Analyst C</td>
<td>$4.02 \times 0.78</td>
<td>$3.14</td>
</tr>
<tr>
<td>Analyst D</td>
<td>$4.15 \times 0</td>
<td>$0</td>
</tr>
</tbody>
</table>

Step 2: Calculate the sum of the time weighted estimates for all analysts on the day

\[1.53 + 3.31 + 3.14 + 0 = 7.98\]
Step 3: Calculate the sum of weights of all analysts on the day

$$0.44 + 0.96 + 0.78 + 0 = 2.18$$

Step 4: Calculate the time weighted consensus figure on the day

$$\frac{7.98}{2.18} = 3.66$$
8. References


26 PSR stands for a price-to-sales ratio
27 PER refers to a price-to-earnings ratio


