Essays on Equity Valuation and Accounting Conservatism for Insurance Companies

A thesis submitted for the Degree of Doctor of Philosophy

By

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ABSTRACT

This thesis contributes to the literature in the finance and accounting field throughout its three empirical chapters. The first empirical chapter contributes to the literature on accounting conservatism in several ways; first, it investigates the accounting conservatism of US insurance companies using four measures, namely, non-operating accruals, skewness of earnings and cash flows, book to market ratio and asymmetric timeliness measures. Second, this paper compares these four measures in order to determine the association and differences between them. Finally, the level of accounting conservatism of the insurance companies is compared to that of a sample of commercial banks to check whether they have similar levels of accounting conservatism. The results of the first chapter suggest that the changes in accounting performance, as measured by return over assets, can be partly explained by accounting conservatism, since it is measured by the accumulation of non-operating accruals, skewness of operating cash flow and accruals, book to market ratio, adjusted book to market ratio and Basu's asymmetric measure. All of these four measures give robust evidence that insurance companies' accounts tended to be conservative for the whole sample period, and that the level of conservatism has risen over the years. More interestingly, a t-test for the differences in means suggests that accruals conservatism show on average a higher level of accounting conservatism than book value conservatism does. Finally, our results, based on a constant sample consist of 92 banks and 46 insurance companies whose data are available for all the sample years; they suggest that both insurance companies and banks have similar levels of accounting conservatism due to their similar reporting characteristics.

The second empirical chapter contributes to the existing literature on equity valuation in two ways. First, it confirms the importance of imposing linear information dynamics when predicting the equity values of insurance companies, because the restricted models result in fewer error metrics. Second, it highlights the role of the accruals components in the equity valuation of US insurance companies by demonstrating that the incorporation of accrual components in the residuals income valuation model suggested by Ohlson (1995) has smaller error metrics than those of aggregate net income. Our results are based on a sample of US insurance companies,

which consists of 718 firm-year observations over the period from 2001 to 2012. For instance, our results suggest that total accruals, changes in insurance reserve, changes in account receivables, and deferred acquisition costs have an incremental ability to predict equity market value over abnormal earnings and book values. Furthermore, the predictive ability of changes in insurance reserves is higher than the predictive ability of changes in account receivables and the change in deferred acquisition costs without imposing the LIM structures. However, when the LIM structure is imposed the predictive ability of changes in deferred acquisition costs is higher than the predictive ability of both changes in accounts receivable and changes in insurance reserves.

Our final empirical chapter contributes to the literature on accounting anomalies by investigating the value to price anomaly (V/P), where the fundamental value (V) is estimated using the residual income valuation model. Motivated by the findings of Hwang and Lee (2013), Fama and French (2015), and Fama and French (2016)**,** Chapter Four asks whether V/P strategies reflect the risks factor or whether this is better explained by market inefficiency, and whether Fama and French's five-factor model can explain the excess return of V/P. To answer the previous questions we use data from the merger of COMPUSTAT, CRSP, I/B/E/S for all the non-financial firms listed in AMEX, NYSE, and NASDAQ during the period from 1987 to 2015. Our findings suggest that the V/P ratio is positively correlated to future stock returns after controlling for several firm characteristics, which are known to be proxies of common risks. Our results indicate that the omission of risk factors is not likely to be an explanation of the V/P effect. To answer the second question, we compare the performances of different asset pricing models by calculating the GRS F-statistics. Our findings clearly indicate that the five-factor model of Fama and French performs better than either the CAPM or the traditional Fama and French three factor model. These results confirm that the excess returns of V/P strategy vary due to the differences in size, the B/M ratio, operating profit and betas across quintile portfolios. However, these factors cannot explain all the variation in excess returns; moreover, the stocks in the high V/P may be riskier than the stocks in the low V/P portfolios in certain other dimensions.

Dedicated to My Family

DECLARATION

I hereby declare that this thesis has not previously been accepted for any degree, award, or qualification by any other university or institution of academic learning, and is not concurrently submitted for any degree other than that of the PhD, being studied at Brunel University. I also certify that this thesis has been written by me and it is entirely the result of my own investigations except where otherwise identified by references and that I have not plagiarised another's work.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER TWO

CHAPTER THREE

CHAPTER FOUR

LIST OF FIGURES

CHAPTER TWO

CHAPTER ONE

Introduction

An underlying assumption of the conceptual framework in accounting is that the information enclosed in the general purpose financial statements can assist investors in estimating future earnings for a targeted entity, assessing its underlying risk, and eventually predicting its fundamental value, to be compared to the observed market prices. Thus, investors' main objective is to derive a fundamental valuation model that accurately predicts earnings or stock returns and, thus, assists them in identifying the mispriced stocks relative to their intrinsic values. The valuation model upon which most of the fundamental analysis techniques are based is the dividend discount model. According to this model, the fundamental value of any stock is the present value of the stock's future dividends (Gordon 1959; Miller and Modigliani, 1961). The dividend discount model provides a link between asset growth, future profitability and stock returns, but fails to detect their links with the accounting regime. However, the residual income valuation model, which is derived from the dividend discount model, links the fundamental value of a firm to observable financial statement variables by assuming a clean surplus relation (Edward and Bell, 1961; Peasnell, 1982; Ohlson, 1995). According to the residual income valuation model, the value of any firm is driven by its book value and its ability to generate a stream of future abnormal earnings. The residual income model (1995) has become the centre of the equity valuation literature for the last two decades. However, one drawback of this model is its failure to deal with distortions of the accounting regime such as accounting conservatism. Therefore, measuring accounting conservatism and understanding its link with and influence on fundamental valuation models attract the attention of academic researchers and practitioners (Ashton and Wang, 2013; Richardson et al, 2010). Another accounting convention, which has significant influence on the fundamental valuation literature, is the accrual convention. It is well known that the value relevance of earning components such as accruals is derived from their ability to predict future cash flow and earnings (Dechow, 1994; Sloan 1996; Ohlson 1999; Barth et al., 2001). Incorporating information about accruals components should generate better forecasts of future earnings and lead to a greater accuracy in stock valuations, since they have different valuation weights (Stark, 1997; Barth et al, 1999; Walker and Wang, 2003; Barth et al, 2005; Pope and Wang, 2005, Wang, 2005; Wang, 2013).

Since the ultimate objective of the fundamental analysis is to identify mispriced securities relative to their intrinsic value for investment purposes, several researchers have used the residual income valuation model to construct fundamental value to price (V/P) trading strategies (Frankel and Lee, 1998; Ali et al., 2003; Hwang and Lee, 2013). The writers suggest that the V/P ratio can be used to predict cross sectional abnormal returns for up to three years. They claim that the V/P trading strategy is more successful and leads to better abnormal returns than simple market-multiples do. Even though most researchers confirm the superior performance of V/P trading strategies over a period of three years, what accounts for the superior performance remains an open question (Hwang and Lee, 2013;Taylor and Xu, 2006; Xu, 2007).

Thus, providing empirical evidence about accounting conservatism, equity valuation, and value to price trading activities are the main contributions of this thesis. In other words, it contributes to the academic literature in the finance and accounting field on three interrelated topics. First, even though both accounting conservatism and the residual income valuation model have been intensively researched over the last two decades, there is very limited empirical evidence to indicate the successfulness of these models in the context of financial institutions in general and insurance companies in particular. Thus, the first empirical chapter is devoted to assessing and measuring the accounting conservatism of the US insurance companies, using four different measures, while the second chapter assesses the role of accruals components in predicting the equity value of the US insurance companies. In the third empirical chapter, we expand our sample to include all US non-financial listed companies in NASDAQ, AMSE, and NYEX and form V/P trading strategies using a residual income valuation model. We investigate the performance of V/P trading strategies and the reason behind their superior performance.

This thesis is organised in five chapters; the present chapter, then Chapter Two contributes to the existing literature of accounting conservatism in three different ways. First, it is the first paper that investigates the accounting conservatism of US insurance companies using four different measures, namely, the accumulating of non-operating accruals, the skewness of earnings and cash flows, the book to market ratio and the asymmetric timeliness of earnings. Second, the chapter investigates which one of these measures is most appropriate for gauging the accounting conservatism of insurance companies. Finally, the level of accounting conservatism of insurance companies is compared to that of a sample of commercial banks to assess whether they have similar levels of accounting conservatism. Our motivation in making this comparison is that both insurers and banks are subject to similar regulatory supervision and that the level of banks' conservatism has recently been investigated (Nichols et al. 2009, Lim et al. 2014 and Manganaris et al. 2015). Thus, the conservatism level of banks can be used as a benchmark to gauge the conservatism level of insurers.

Our findings show that the accounting performance of insurance companies as measured by the mean value of ROA has dropped more significantly than the contemporaneous mean value of CFO/A, which measures the underlying economic performance of insurance companies. These results suggest that changes in ROA can be explained in part by changes in accruals, and particularly by the non-operating component of total accruals which have accumulated negatively over time. Moreover, the paper shows that the ROA series is negatively skewed in most of the sample years, indicating the early and full recognition of unfavourable events (bad news) in the financial reports and the delayed and gradual recognition of favourable events (good news). The results for the book to market ratio and adjusted book to market ratio confirm that accumulated non-operating accruals cause the book value of assets to be downward biased, bringing a downward bias to the ratio to as well. The results of the asymmetric timeliness of earnings show that in most of the sample period the accounting earnings are more sensitive to bad news than to good. Further, the degree of association between accounting earnings and bad news becomes more significant and higher over time. Overall, the results for the four different measures of conservatism give evidence that insurance companies accounts tend to be conservative for the whole sample period, and the level of conservatism has increased over the years. Furthermore, the results based on a compound sample of banks and insurance companies indicate that both sectors have similar levels of accounting conservatism.

The purpose of **Chapter Three** is to assess whether disaggregating earnings into their components and imposing linear information dynamic structures (LIMs, hereafter), as suggested by Ohlson (1995), would help to predict the contemporaneous equity value for insurance companies more accurately. To achieve these objectives, six different linear information models were estimated to predict the equity value of insurance companies and to investigate which model could produce fewest equity value prediction errors. Two measures of prediction errors – absolute percentage errors (AE, hereafter) and squared percentage errors (SE, hereafter) – were created for each of these models both with and without imposing the LIM structure. To investigate which LIM model generates fewer prediction errors, we compared both the means and the medians of the AE and SE distributions using the t-test for the differences in the means and the Wilcoxon-z test for the differences in the median.

Our findings are based on a sample of US insurance companies that consists of 718 firm-year observations over the period from 2001 to 2012. Interestingly, our results suggest that imposing LIM structures results in fewer prediction errors for all six models. Furthermore, our results suggest that the models of Ohlson (1995) and Myers (1999) result in higher error metrics than do our suggested models for insurance companies. For instance, total accruals, changes in insurance reserves, changes in account receivables, and deferred acquisition costs have an incremental ability to predict equity market value over abnormal earnings and book values. Furthermore, the predictive ability of changes in insurance reserves is higher than the predictive ability of changes in account receivables and changes in deferred acquisition costs without imposing LIM structures. However, the predictive ability of changes in deferred acquisition costs is higher than the predictive ability of both changes in account receivables and changes in insurance reserves when LIM structures are imposed.

Chapter Four contributes to the finance literature in several ways. First, we calculate the fundamental value using both historical information and one-year analysts' forecasts as proposed by the original Ohlson model (1995). Second, it provides more empirical evidence for the mispricing/ risk explanatory argument for the V/P anomaly. Finally, it compares the performance of the CAPM, three-factor, and five-factor models. To investigate the risk explanation of the V/P strategies, we examine whether V/P are associated with several firm characteristics which are known to be proxies of common risk factors such as market beta, size, book to market ratio, return volatility, earnings variability, leverage, bankruptcy, and analyst coverage. Then we explore the relationship between the V/P ratio and future stock returns after controlling for the previous risk factors. If the coefficient of the V/P ratio is significantly greater than zero after controlling for previous risk factors, it indicates that the V/P captures additional risk factors beyond the controlled risk proxies. In other words, it indicates a V/P anomaly.

To investigate the ability of Fama and French's five-factor model to explain the excess return of the V/P strategy, we form V/P quintile portfolios by sorting all stocks in our sample into five portfolios, where portfolio one consists of firms with the lowest V/P ratio and portfolio five consists of firms with the highest V/P ratio. We assess the performance of the CAPM, the traditional three-factor model, and the five-factor model using the F- statistics of Gibbons et al., (1989), or GRS F-statistics, as they are known. The null hypothesis of the test proposes that the intercepts α_i are jointly equal to zero. In other words, if the intercept in regression of V/P quintile's excess returns against the asset-pricing model's factor returns does not differ significantly from zero, then the asset-pricing model should capture expected returns of the V/P. Otherwise, it indicates a V/P anomaly. To address the above objectives, we used data from the merger of COMPUSTAT, CRSP, I/B/E/S for all non-financial firms listed in AMEX, NYSE, and NASDAQ during the period from 1987 to 2015.

CHAPTER TWO

Measuring Accounting Conservatism for US Insurance Companies

2.1 Introduction

Accounting conservatism can be viewed as the acceptance of well-established and commonly used conventions, which lead to undervaluation of an entity's net income and assets in relation to their economic value (Givoly et al., 2007; Ruch and Taylor, 2015; Xie, 2015). However, there has been no agreement among practitioners and researchers about one authoritative definition of conservatism, which has resulted in several measures being developed to gauge its level (Basu, 1997; Givoly and Hayn, 2000; Givoly and Hayn, 2002; Ball and Shivakumar, 2005). More interestingly, due to its considerable influence in the preparation of firms' financial statements, accounting conservatism has attracted the attention of academic researchers over the last few decades (Sterling, 1970; Basu, 1997; Givoly and Hayn, 2000; Xie, 2015). This is evident from the increasing number of studies investigating its impact on financial statements (Ball and Shivakumar, 2005; Bandyopadhyay et al., 2010; Balachandran and Mohanram, 2011; Chen et al., 2014). However, accounting conservatism is still under-researched in financial institutions[1]; most of the existing accounting studies exclude financial institutions from the research sample, due to their unique characteristics and sector specific accounting standards. More interestingly, to the best of the authors' knowledge, no comprehensive study has investigated accounting conservatism in insurance firms.

Providing empirical evidence of the effect of accounting conservatism in the financial institution context in general and in insurance firms in particular is, however, of paramount importance for at least three reasons. First, insurance firms and other financial institutions have contributed very significantly to economic growth in most countries around the world, via their direct and indirect supplements to GDP and market capitalisation[2]. On the one hand, they contribute indirectly via

[1] A few studies investigate the impact of conservatism in banks (Nichols et al., 2009; Lim et al., 2014; Manganaris et al., 2015).

[2] As of January 2009, insurance companies accounted for 8% of the total market capitalization of the US stock market and 50% of the US financial institutions' market

their roles in providing and raising funds for capital growth, pooling risks, and providing protection for all the microeconomic entities in the economy (Damodaran, 2009). On the other, the added value from finance and insurance as a percentage of US GDP was 7.2% in 2013, of which 35% is provided by insurance activities alone (US Bureau of Economic Analysis, 2015).

Another vital function of insurance firms and other financial institutions is economic stability, which became increasingly clear after the financial crisis of 2008, when the US economy and major European economies reach standstill point after the dramatic collapses of several banks and insurance firms (Damodaran, 2009). However, in spite of the cardinal functions of insurance firms and other financial institutions, they have mostly been ignored by academic research in accounting, due to their sector-specific accounting standards and regulatory treatments (Acharya et al., 2009; Damodaran, 2009; Manganaris et al., 2015).

Second, the extraordinary volatility in the market value of insurance firms during and after the financial crisis of 2008 motivated academic researchers to investigate insurance companies' financial information and understand the implications of these for risk and equity valuation (Nissim, 2010). For instance, Nissim (2010, 2013a, b) suggest that the book value of equity and accounting income can be used to evaluate insurance companies. However, these accounting variables are mostly biased and could lead to inaccurate equity valuation because of accounting conservatism, among other factors. Thus, it is essential to understand and account for the impact of conservatism on equity valuation models (Feltham and Ohlson, 1995; Mayer, 1999; Barth et al., 1999; Barth et al., 2005; Beaver and Ryan, 2000; Ashton and Wang, 2008). Providing information about the levels and measures of the accounting conservatism in insurance companies is one of the objectives of this chapter. This information can be very useful for investors and other interested parties who wish to evaluate their investments in insurance companies more accurately and, thus make better-informed decisions.

Third, sector-specific accounting standards for insurance firms have been developed by the accounting profession in response to the unique features of these firms, such as the longer operating cycle and the financial nature of most of their assets and liabilities (Acharya et al., 2009; Damodaran, 2009). These sector-specific standards

capitalization (Damodaran, 2009).

have at least two implications to do with the measures used by accounting conservatism, namely, the book to market ratio and accruals based measures. First, in contrast to other firms, assets and liabilities in insurance companies are largely financial instruments, which are measured by the mark to market method. These assets are recorded in books at their market value. As a result, the book value of equity will be very close to the market value of equity. This feature leads us to expect that the book to market ratio will be less relevant to measuring the accounting conservatism of insurance companies. Second, insurance companies especially in life insurance, issue mostly long-term contracts, with an effective duration of more than one year or even a decade. Consequently, at the end of each year there will be great differences between the cash flows received and paid of those contracts and the corresponding accounting income that should be recognised for the accounting period. These differences are due to matching and accrual principles, which require the precise estimate of expenses and revenues, as well as the accrued insurance liabilities and receivables (Acharya et al., 2009). Accrual items usually tend to be very large in the insurers' accounts, for example, accrued insurance liabilities, which form the largest liability item in the balance sheet (Reichert, 2009). Therefore, we expect that accrual based measures will be very important in assessing accounting conservatism. Thus, this paper investigates different conservative measures in order to find which one is most suitable for insurance firms.

The previous arguments, which concern the importance of insurance companies in the global economy, their unique features and their sector-specific accounting standards, motivate us to investigate the level of accounting conservatism for a constant sample of 46 US publicly listed insurance companies with complete data for 21 years, spanning the period from 1992 to 2012.

This paper contributes to the existing literature of accounting conservatism in three ways. First, it is the first paper that investigates the accounting conservatism of US insurance companies using four different measures, namely, the accumulation of non-operating accruals, the skewness of earnings and cash flows, the book to market ratio and the asymmetric timeliness measures. Second, this paper investigates which one of those measures is most appropriate to gauging the accounting conservatism of insurance companies. Finally, the level of accounting conservatism of the insurance companies is compared to that of a sample of commercial banks, to discover whether they have a similar level of accounting conservatism. Our motivation in this comparison is that insurers and banks are subject to similar regulatory supervision and the conservatism level of bank sectors has recently investigated been (Nichols et al., 2009; Lim et al., 2014; Manganaris et al., 2015). Thus, the conservatism level of the banking sector can be used as a benchmark by which to gauge the conservatism level of insurers.

Our findings show that the accounting performance of insurance companies, as measured by the mean value of ROA, has dropped more significantly than the economic performance of insurance companies, as measured by the contemporaneous mean value of CFO/A. These results suggest that changes in ROA can be explained in part by changes in accruals, and particularly by the non-operating component of total accruals which accumulated negatively over time. Moreover, the paper shows that the ROA series is negatively skewed in most of the sample years, indicating the early and full recognition of unfavourable events (bad news) in the financial reports and the delayed and gradual recognition of favourable events (good news).

The results for the book to market ratio and adjusted book to market ratio confirm that the accumulated non-operating accruals cause the book value of assets to be biased downwards, causing the ratio to be biased downwards as well. The results of the asymmetric timeliness measure show that the accounting earnings are more sensitive to bad news than to good news in most of the sample period. Further, the degree of association between accounting earnings and bad news becomes more significant and higher over time. Overall, the results for the four different measures of conservatism give evidence that insurance companies' accounts tend to be conservative for the whole sample period, while the level of conservatism over the years rose. Similarly, the results, based on a compound sample of banks and insurance companies, indicate that the two sectors have similar levels of accounting conservatism.

Section 2 of the paper defines accounting conservatism and examines the different measures used to gauge its level. Section 3 describes the data used in the analysis. The methodology of the paper and practical results are presented in section 4. Finally, Section 5 concludes the paper.

2.2 Accounting conservatism

In spite of the absence of an authoritative definition of conservatism, practitioners and researchers agree that conservatism will lead to the undervaluation of the entity's net income and assets in relation to their economic value (Givoly et al., 2007; Ruch & Taylor, 2015; Xie 2015). However, The International Accounting Standard Board (IASB) defines slightly differently: as 'a degree of caution in the exercise of the judgments needed in making the estimates required under conditions of uncertainty, such that assets or incomes are not overstated and liabilities or expenses are not understated' (IASB 1989: para. 37). Another definition of conservatism, which has received considerable attention from researchers (such as Pope and Walker, 1999; Ball et al., 2000; Givoly and Hayn, 2000) is Basu's model (1997). According to Basu (1997), which deals with the effect of accounting conservatism on firms' income statement, conservatism is defined as the differential timeliness with which bad news and good news are reflected in firms' financial statements. Before Basu's model (1997), some researchers such as Feltham and Ohlson (1995), Penman and Zhang (2002) and Beaver and Ryan (2005) defined accounting conservatism from the balance sheet perspective as a general tendency which keeps the book value of net assets on average lower than the corresponding market value. Both of these definitions are ambiguous because they concentrate on the impact of conservatism on either the income statement or the balance sheet statement. In fact, conservatism may affect both statements simultaneously and it is very difficult in most situations to distinguish between its effect on the book value of assets and its effect on accounting earnings (Xie, 2015). More interestingly, Ball and Shivakumar (2005) differentiate between two types of conservatism, namely, conditional conservatism (news dependent or ex-post) and unconditional conservatism (news independent or ex-ante). Unconditional conservatism uses information which was known at the beginning of an asset's life, but it is independent of current news regarding increases and declines in the expected future cash flow. Some examples of unconditional conservatism are using historical accounting, using an accelerated depreciation policy rather than using other less conservative depreciation policies, and the immediate expenses of internally developed intangible assets rather than capitalising them at the inception and amortising them over their useful life. In contrast, conditional conservatism is news dependent which means that economic gains are recognised in a less timely fashion than economic losses. More specifically, when a company experiences adverse conditions, its book value is written down immediately to reflect this bad news. However, its book value is not written up immediately if the company experiences some good conditions. In other words, more verification is required of favourable conditions. Some examples of conditional conservatism are impairment accounting for assets and the lower of either cost or market value for inventories (Beaver and Rayan, 2005).

2.2.1 Measures of conservatism

Because of the absence of an authoritative definition of conservatism and the confusion among academics which surrounds this concept, several measures have been developed to gauge its level in financial statements. The most widely adopted measures of accounting conservatism are accruals based measures (Penman and Zhang, 2002; Garcia-Lara et al., 2007; Zhang, 2008; Hui et al., 2009; Jackson & Liu, 2010), cash flow based measures (Ball and Shivakumar, 2005; Chung and Wynn, 2008; Zhang, 2008; Ahmed and Duellman, 2013), book to market value measures (Beaver and Rayan, 2005; Ahmed and Duellman, 2007; Qiang, 2007; Beatty et al., 2008) and asymmetric-timeliness measures (Basu, 1995; Basu, 1997; Givoly and Hayn 2000; Khan and Watts, 2009). Each of these measures has some advantages and limitations missing from other measures. Thus, it is very important to understand them in great detail in order to choose the appropriate one. For example, cash flow measures and asymmetric timeliness measures are more appropriate to gauge news dependent conservatism (conditional conservatism), while accrual based measures and book to market ratio can be used to gauge overall conservatism (Xie, 2015). Furthermore, book to market ratio, cash flow based and accrual-based measures are firm specific measures. Thus, they may vary from one company to another, given that some companies may choose more conservative accounting policies, such as accelerated depreciation policies versus straight-line depreciation policies (Xie, 2015). More interestingly, these four measures of accounting conservatism are negatively interrelated (Givoly et al., 2007; Zhang, 2008) and any single measure is not sufficient to measure all the aspects of accounting conservatism (Givoly et al., 2007). The following four subsections discuss these measures, their advantages and disadvantages, and the type of conservatism that they measure.

2.2.1.1 Accrual based measures

Accruals – the difference between net income and cash flows – are perceived as temporary adjustments to cash flows in order to reflect the actual performance of an entity. Therefore, accruals are expected to diminish over time, and the cumulative net income before depreciation and amortization is anticipated to converge in the long term to cash flows from day to day operations. However, due to conservative accounting practice cumulative accruals are expected to accumulate negatively over time (Givoly and Hayn, 2000; Givoly and Hayn, 2002). The cumulative total accruals are widely used to gauge either conditional conservatism (Ahmad and Duellman, 2007; Garcia-Lara et al., 2007) or unconditional conservatism (Ahmad and Duellman, 2013). Additionally, some researchers such as Givoly and Hyan (2000, 2002) and Beatty et al., (2008) adopt non-operating accruals to measure overall conservatism. However, Zhang (2008) argues that non-operating accruals stem primarily from conditional conservatism, such as assets write-down and thus these should be used to gauge conditional conservatism rather than overall conservatism. Based on the same rationale, Qiang (2007) uses current accruals and depreciation to measure unconditional conservatism, since most current accruals items result mainly from unconditional conservatism, such as an accelerated depreciation policy. Nevertheless, the approach of measuring conditional and unconditional conservatism does not give accurate results, because some types of non-operating (operating) accrual may come from unconditional (conditional) conservatism. For instance, a policy of evaluating inventory according to whichever is the lower, cost or market value, is conditional conservatism but results in operating accruals. Another issue with the use of accruals based measures to assess conservatism is that they are affected by earning management practices, which distort their accuracy (Ahmad et al., 2002; Ahmad et al., 2007).

2.2.1.2 Cash flow based measures

Under conditional conservatism principles, good news such as economic gains is recognised gradually and on a cash basis while bad news such as economic losses is recorded immediately and entirely as negative accruals. Therefore, this asymmetric association between good news and bad news makes it possible to use cash flow as a measure of accounting conservatism.

One of the most popular and commonly used cash flow measures is the skewness of a cash flow's time series. Under conditional conservatism, earnings' time series are expected to be more negatively skewed than cash flows' time series (Basu, 1997). Moreover, a greater difference indicates a higher level of accounting conservatism (Givoly and Hyan, 2000). Even though using cash based measures is simple and poses no problems which are inherited from other measures, cash flow measures pose two difficulties. First, cash flow is considered as a noisy measure of performance (Dechow, 1994). Second, the existing cash flow measures concentrate on operating cash flow and operating earnings and ignore non-operating components, even though the latter are affected by conditional conservatism (Xie, 2015).

2.2.1.3 Book to market ratio

The basic principle which governs the book to market measure of conservatism originates in the work of Feltham and Ohlson (1995). They suggest that the accounting measure of performance is not neutral, as Ohlson (1995) had proposed. If it is, it is biased due to accounting practices, particularly accounting conservatism. In other words, conservatism practices cause the book value of equity to differ persistently from the market value of equity. Thus, Feltham and Ohlson (1995), Mayer (1999) and Barth et al. (2005) suggest that the book value of equity can be used as a measure of conservatism in the equity valuation models.

The book to market ratio or its inverse is adopted by academic researchers to measure overall conservatism (Givoly and Hyan, 2000; Givoly and Hyan, 2002; Roychowdhury and Wattas, 2007; Beatty et al., 2008). Even though this raw ratio can be easily implemented, it fails to distinguish between conditional and unconditional conservatism and both of them lead to the undervaluation of book value. The timing of the undervaluation is the only difference between these two types of conservatism.

2.2.1.4 Asymmetric timeliness measures

The asymmetric (differential) timeliness model has received much attention since its introduction in 1995. According to Basu (1995), accounting conservatism is measured by the extent to which bad news is reflected more promptly in accounting earnings than good news is. Basu (1995) defines a period as a bad news period (good news period) if the sign of the firm's stock return is negative (positive) in this period. Due to conservative accounting practices, it is expected that the earnings-return association will be higher during bad news periods than during good news periods (Givoly et al. 2007). Thus, Basu (1997) investigates this asymmetric timeliness of earnings by using a piecewise model in which accounting earnings on stock returns are regressed, as described by Equation 2-1

$$NI_{i,t} = \beta_0 + \beta_1 DR_{i,t} + \beta_2 R_{i,t} + \beta_3 DR_{i,t} \times R_{i,t} + \epsilon_{i,t} \qquad \text{Equation 2-1}$$

where NI_t is the deflated net income per share when the deflator is the stock price at the start of period t, R_t is the stock return for year t, and DR_t as dummy variable takes the value 1 when R_t is negative and 0 otherwise. The purpose of deflating the dependent variable is to control for heteroscedasticity. To further control for heteroscedasticity, Basu (1997) used White's process to estimate his model. The coefficient β_3 represents the differential timeliness in recognising good and bad news in income statements.

Basu's model (1997) is considered the principal measure for gauging conditional conservatism. For instance, since 1997 at least 19 published articles have used it for this purpose (Xie, 2015). However, in spite of its popularity, the validity of Basu's model to measure conditional conservatism is widely questioned, due to the numerous biases that it introduces (Givoly et al., 2007; Ettredge et al., 2012). For example, Dietrich et al. (2007) and Givoly et al. (2007) argue that the asymmetric timeliness of earnings may be driven by the biases in scaled earnings and/or scaled stock returns or may be due to the differences in the variance between positive and negative returns rather than the asymmetric association of earnings. Furthermore, the validity of the model is affected by the efficiency of stock markets.

2.3 Sample and descriptive analysis

The sample in the present paper consists of all the US listed insurance firms whose accounting data are available in the Bloomberg records over the period from 1987 to 2012. The monthly return data of these firms are collected from the Center for Research in Security Prices (CRSP) files. The merger of two datasets resulted in

1990 firm-year observations. To mitigate the effect of outliers on the results, for each variable and for every year, the topmost and the bottommost 1% of data were winsorised. In order to ensure that the results were not affected by adding more companies to the sample, most of the tests reported were based on a constant sample spanning the period from 1992 to 2012. For a firm to be included in the constant sample, it had to have non-missing values for all the variables over the whole sample period. These criteria result in a constant sample of 46 US listed insurance companies and 966 firm-year observations.

The accounting variables used in the paper are net income, cash flow from operation, basic earnings per share before extraordinary items, total assets, total liabilities, other non-cash adjustment of working capital, beginning of year share price, and the number of outstanding shares. The monthly return data were compounded annually to three months after the end of the fiscal year, to ensure that the market response to the previous year's earnings was mitigated.

2.4 Research design and results

2.4.1 Measuring accounting conservatism

2.4.1.1 Time series properties of earnings and cash flows

Before measuring the level of accounting conservatism, we started by analysing the changes in the accounting profitability of insurance companies. The reason for this analysis was to determine whether these changes are driven by real economic changes or merely a result of changes in accounting policies and practice such as conservatism. If these changes were economically driven, then we would expect that a similar pattern would be found in the cash flows of these companies.

The patterns of profitability of the US Insurance companies are presented in Table 2-1 for the full sample and in Table 2-2 for the constant sample. Based on the full sample results, the percentage of firms reporting losses increased noticeably from 4.65% during the 1989-1992 to 7.63% during 1997-2001 and to around 13.67% in 2010-2013. The accounting profitability is defined as the percentage of net income to total assets (ROA, hereafter). The results in Table 2-1 show that ROA has steadily declined from a mean of around 0.039 in the early sample year to approximately below 0.020 in 2013. This decline in the profitability measures can be attributed in part to the increasing number of firms included in the full sample over the year. Yet a similar result is found based on the constant sample, which consists of 46 insurance firms. The ROA in 2013 declined by around 50% to reach a level just under 2.5%in comparison with 4.2% in the early years. These results may be affected by selection biases, because the constant sample contains only the survivor insurance companies whose data are available in the Bloomberg datasets from 1993-2013. However, the companies included in the constant sample are more likely to be very successful and financially strong companies ,as indicated by their inclusion on Bloomberg records in the early years of the sample and their survival till the end of the sample period. Thus, this survivorship problem could be expected to work against our results of increasing frequency in the losses reported or declining in the ROA ratio. In order to ensure that our results are not driven by this survivor bias, we replicated the analysis using two samples. The first sample included only the companies which were present in the Bloomberg records in 1993, while the other sample consisted of firms which were present in the Bloomberg records in 2013. The results based on these two samples, not reported, are very similar to those of the constant sample, which confirms that our findings are not distorted by survivor bias.

Table 2-1Frequency of losses and net income to total assets, ROA, full sample over the period 1988-2012

Year	No. Of firms	Freq. losses (%)	ROA Mean	ROA Median	Sub period	Freq. losses (%)	ROA Mean	ROA Median
1989	19	0	0.039	0.028				
1990	19	0	0.036	0.027				
1991	21	4.76	0.03	0.024				
1992	21	4.76	0.033	0.026	1989-1992	4.65	0.032	0.024
1993	22	9.09	0.029	0.023				
1994	23	8.7	0.03	0.023				
1995	22	4.55	0.026	0.019				
1996	29	0	0.032	0.027	1993-1996	4.07	0.029	0.022
1997	33	3.03	0.029	0.021				
1998	34	0	0.038	0.024				
1999	37	0	0.04	0.026				
2000	56	7.14	0.025	0.022				
2001	66	4.55	0.025	0.016	1997-2001	7.63	0.028	0.018
2002	69	18.84	0.022	0.012				
2003	77	9.09	0.025	0.015				
2004	81	7.41	0.037	0.025				
2005	82	3.66	0.037	0.028	2002-2005	6.1	0.033	0.024
2006	94	4.26	0.033	0.026				
2007	95	2.11	0.043	0.04				
2008	97	10.31	0.027	0.035				
2009	99	39.39	-0.0001	0.007	2006-2009	16.99	0.024	0.026
2010	99	16.16	0.026	0.022				
2011	100	8.00	0.022	0.026				
2012	100	22.00	0.009	0.01				
2013	100	11.00	0.02	0.018	2010-2013	13.67	0.017	0.017

Table 2-2 Frequency of losses and net income to total assets, ROA, constant sample over the period 1993-2012

Year	No. Of firms	Freq. losses (%)	ROA		Sub-period	Freq. losses (%)	ROA	
			Mean	Median			Mean	Median
1993	46	2.17	0.042	0.027				
1994	46	8.7	0.026	0.023				
1995	46	4.35	0.033	0.03				
1996	46	4.35	0.032	0.027	1993-1996	4.89	0.034	0.027
1997	46	4.35	0.037	0.031				
1998	46	6.52	0.028	0.023				
1999	46	15.22	0.017	0.018				
2000	46	10.87	0.017	0.015				
2001	46	23.91	0.013	0.011	1997-2001	12.17	0.023	0.018
2002	46	6.52	0.016	0.012				
2003	46	10.87	0.027	0.022				
2004	46	4.35	0.028	0.025				
2005	46	6.52	0.013	0.015	2002-2005	7.07	0.021	0.018
2006	46	0	0.031	0.031				
2007	46	4.35	0.03	0.032				
2008	46	47.83	0.002	0.001				
2009	46	17.39	0.021	0.019	2006-2009	17.39	0.021	0.021
2010	46	0	0.021	0.017				
2011	46	17.39	0.01	0.009				
2012	46	6.52	0.02	0.015				
2013	46	0	0.025	0.024	2010-2013	5.98	0.018	0.016

To determine whether the deterioration in the accounting profitability of insurance companies is economically driven or is just a result of accounting practices such as conservatism, we present in Table 2-3 the changes in cash flow from operation to total assets ratio (CFO/A, hereafter) over the period 1993-2013 for the constant sample. It is clear that the ratio of CFO/A declined from around a mean of 0.073 in 1993 to 0.031 in 2000. Then it rose again to reach a level of around 0.065 in 2005. Afterwards, it started a steady decline, becoming 0.028 in 2012. In 2013, the ratio climbed again upward to reach 0.042. Thus, the CFO to assets ratio was characterised by a downward followed by an upward movement. Further, most of the downward trend in the ratio concentrates around the financial crises of 2000 and 2007. These upward and downward movements in the CFO to assets ratio reflect changes in economic performance for insurance companies. However, changes in CFO/A ratio cannot explain all the changes in the profitability ratio found in Tables 2-1 and 2-2. Thus, our findings strongly suggest that changes in ROA ratio do not merely reflect changes in the underlying cash flows but instead result from a change in the relationship between earnings and cash flows, in other words, a change in accounting accruals.

Table 2-3 Cash flow from operation-to-total assets, CFOA, constant sample over the period 1993-2012

Year	No. Of firms	Freq. Of Negative cases (%)	CFOA		Sub-period	Freq. Of Negative cases (%)	CFOA	
			Mean	Median			Mean	Median
1993	46	6.52	0.073	0.059				
1994	46	4.35	0.058	0.051				
1995	46	6.52	0.066	0.059				
1996	46	2.17	0.057	0.047	1993-1996	4.89	0.063	0.052
1997	46	4.35	0.051	0.046				
1998	46	10.87	0.036	0.031				
1999	46	10.87	0.032	0.031				
2000	46	19.57	0.031	0.031				
2001	46	6.52	0.044	0.038	1997-2001	10.43	0.039	0.036
2002	46	0	0.059	0.05				
2003	46	2.17	0.075	0.073				
2004	46	2.17	0.065	0.057				
2005	46	4.35	0.065	0.051	2002-2005	2.17	0.066	0.056
2006	46	4.35	0.047	0.04				
2007	46	4.35	0.05	0.04				
2008	46	15.22	0.032	0.029				
2009	46	10.87	0.034	0.032	2006-2009	8.7	0.041	0.038
2010	46	13.04	0.028	0.025				
2011	46	15.22	0.03	0.024				
2012	46	8.7	0.028	0.029				
2013	46	0	0.042	0.037	2010-2013	9.24	0.029	0.029

2.4.1.2 The accumulation of non-operating accruals

As mentioned above, total accruals and non-operating accruals have been widely used as a measure of the general level of accounting conservatism (Givoly and Hayn, 2000; Givoly and Hyan, 2002; Ahmad and Duellman, 2007; Garcia-Lara et al., 2007). The current paper defines total accruals as net income before depreciation and amortisations minus operating cash flows, while non-operating accruals[3] are defined as the difference between total accruals and operating accruals, where the latter are defined as in Equation 4-2.

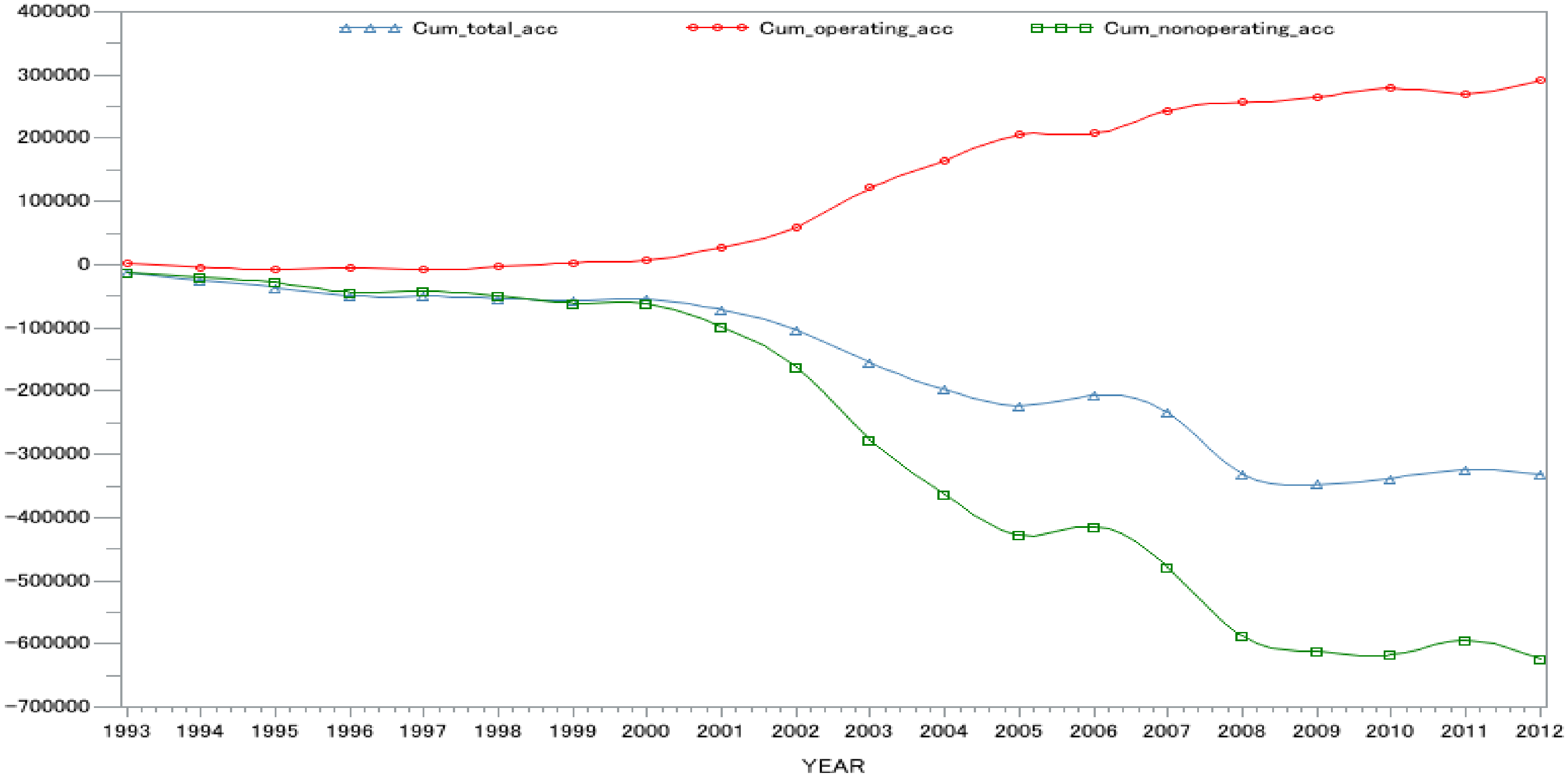
$$
\begin{aligned}
&Operating\ accruals \\
&= \Delta Accounting\ Receivables + \Delta\ Deferred\ Acquisition\ Costs \\
&+ \Delta\ Prepaid\ Expenses - \Delta\ Operating\ Insurance\ Reserve \\
&- \Delta\ Taxes\ Payable
\end{aligned}
$$

Equation 2-2

Graph 2-1 shows the accumulation of total accruals, operating accruals, and non-operating accruals for the constant sample over the period from 1993-2013. If the accounting numbers are neutral and not biased by accounting practices such as conservatism, then we expect that accruals will represent the temporary adjustment of cash flows and diminish over time, otherwise conservatism in practice will cause accruals to accumulate negatively over time. The blue line of Graph 1 demonstrates that the aggregate total accruals before depreciation and amortization for the entire constant sample do not cancel out. Instead, they accumulate negatively over time, which confirms that accounting is not neutral, as suggested by Ohlson (1995). In contrast, operating accruals – as illustrated by the red line – aggregate positively over time, which accommodates the growth of the operations of the sample firms. The accumulation of operating accruals is relatively slow before 2003, but it accelerates afterwards to reach a level of approximately $291 billion by the end of 2013.The accumulation of non-operating accruals over time is traced by the green line. It shows that non-operating accruals items aggregate evenly negatively in the early years of the sample period to reach a sum of less than $98 billion by the end of 2003.

[3] Some examples of non-operating accruals are net gain (loss) on sales of investment and other long lived assets, assets write-down and impairment, the effect of changes in estimates, and restructuring charges.

Figure 2-1 Cumulative accruals by types, 1993-2013 (constant sample of 46 insurance companies)



Total Accruals before Depreciation (CUM_TOTAL_ACC) = Net Income + Depreciation − Cash Flow from Operation
Operating Accruals (Cum_Operating_acc) = Change of Accounts Receivables + Change of Deffered Aquesition Costs
+ Change of Prepaid Expenses − Change of Operating Insurance Reserve − Change of Taxes Payable
Nonoperating Accruals (Cum_nonoperating_acc) = total accruals before depreciation − Operating accruals

Afterwards, the accumulation of non-operating items increased rapidly to a sizeable negative total of approximately $624 billion in 2013. More interestingly, the accumulation of non-operating accruals of insurance companies is substantially large and represents more than 30% of the total assets of the sample firm as of the end of 2013. This findings of negative accumulation of total accruals and non-operating accruals are in line with previous research which suggests that accounting conservatism is not only a dominant practice but also that its use is growing over time (Givoly and Hyan, 2000; Givoly and Hyan, 2002).

2.4.1.3 Cash flow measure of conservatism

The skewness of a cash flow time series is one of the most popular and commonly used measures of cash flow in the accounting literature. Under conditional conservatism principles, earnings' time series are expected to be more negatively skewed than cash flows' time series (Basu, 1997). The greater the difference of skewness between cash flows and earnings, the higher the level of accounting conservatism (Givoly and Hyan, 2000).

Figure 2-2 exhibits the changes in both the CFO/A and the ROA skewness of the constant sample over the period from 1993-2013. For this purpose, skewness was calculated as $E[(x-\mu)^3/\sigma^3]$ where μ and σ are the mathematical mean and standard deviation respectively of either the ROA or the CFO/A series. Skewness measures were calculated for each firm, based on a time series consisting of five years' rolling subsamples where the values are centred for this year. In other words, for each firm the ROA skewness for 1995 was based on a subsample from 1993 to 1997, the ROA examples of skewness for 1996 were based on a subsample from 1994 to 1998, and so on. The values shown on the graph for each year, are the average values of all the skewness of all the firms being calculated for that year.

The blue line of Figure 2-2 illustrates that the earnings series is negatively skewed over most of the years of the constant sample. More interestingly, the degree of skewness of earning series has increased steadily over time. In contrast, the red line in Figure 2-2 indicates that the skewness of CFO/A series is positively skewed in most of the sample years. Thus, the positive skewness of the CFO/A series and the negative skewness of ROA series confirm that the accounting reporting regime of insurance companies is characterised by conservative practice. More importantly, the level of conservatism increased over the sample year as the ROA skewness became more negatively skewed over time.

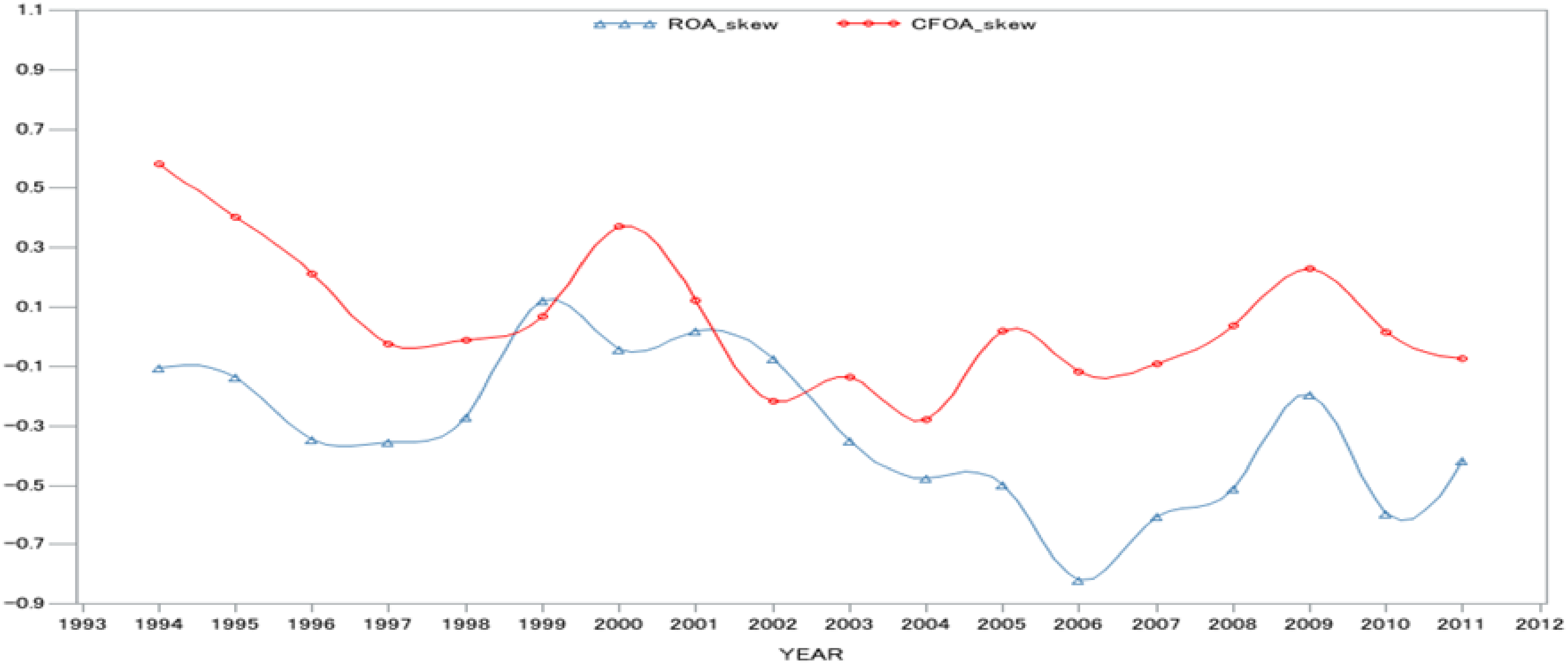
2.4.1.4 Book to market ratio conservatism

Another measure that can be used to gauge the level of accounting conservatism in insurance companies is the market value to book value of equity (Feltham and Ohlson, 1995; Stober, 1996; Ohlson and Zhang, 1998; Myers, 1999). The lower the book to market ratio and the earnings multiples are, the less conservative are the financial accounts of the firm.

The blue line in Figure 2-3 represents the changes in the book to market ratio for the constant sample over the period from 1993 to 2013. The ratio, which was lower than unity during the period from 1993-2007 indicates that the accounting is conservative. However, the ratio increased to more than unity during the period from 2008 to 2012 and rose again to reach a level of 1.20 in 2013. The high ratio during the second period can be explained by the financial crises which caused the market value of most companies to be lower than their book values at the time.

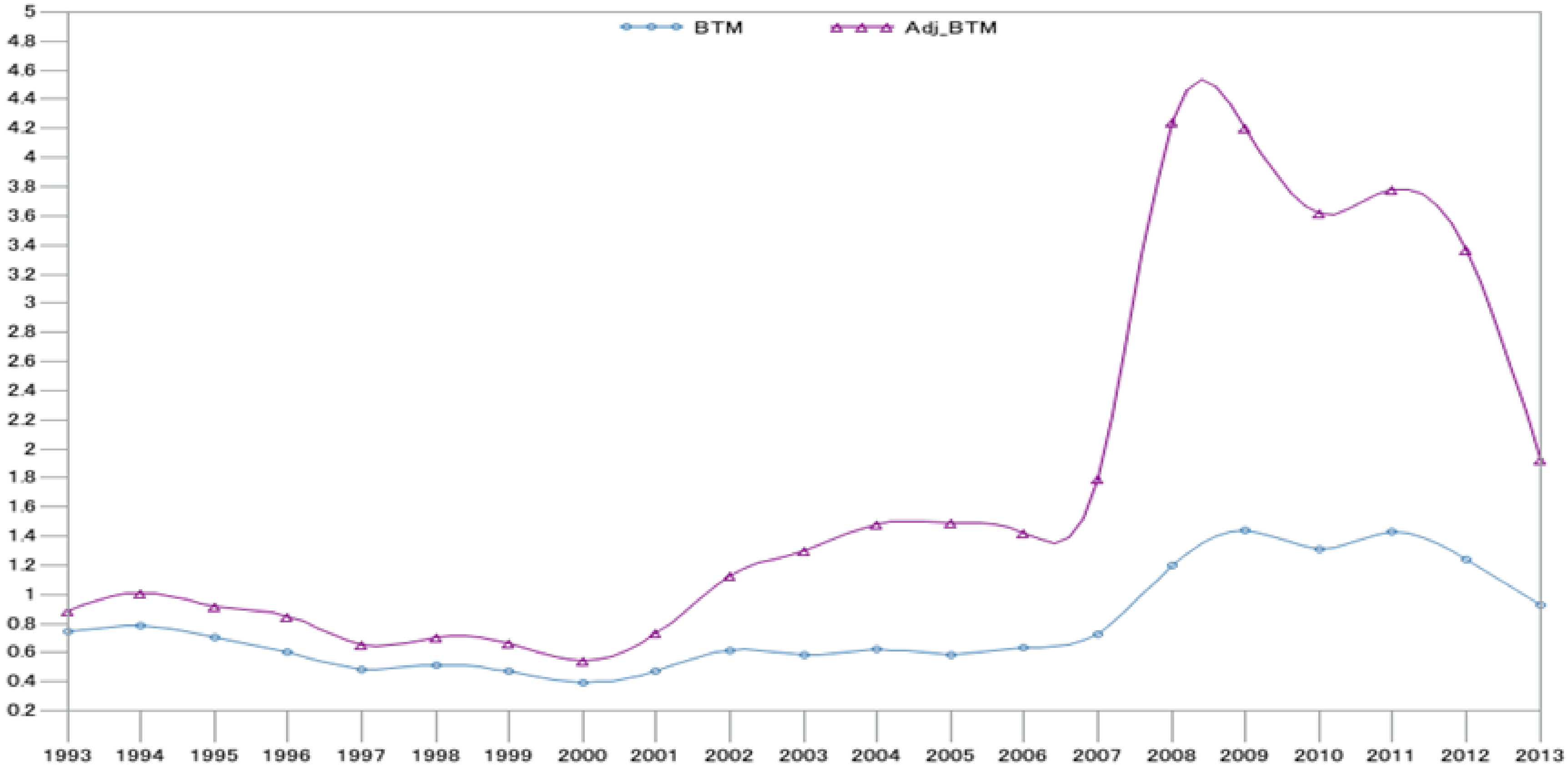
The book to market ratio was re-estimated for a situation in which there was no accumulation of negative non-operating accruals. Thus the adjusted book value was measured by adding the accumulated non-operating accruals to the firm’s book value as reported at the end of each year. The purpose of calculating the adjusted M/B ratio was to further investigate how far the book to market ratio was associated with accounting conservatism. The purple line in Figure 2-3 shows that the adjusted book to market ratio was much higher than the unadjusted one (blue line) in all the sample years. This indicates that accumulated non-operating accruals cause book value to be biased downwards, causing in turn a downward bias to the book to market ratio (Feltham and Ohlson, 1995).

Figure 2-2 Skewness measure of ROA and CFO/Assets, 1993-2013 (constant sample of 46 insurance companies)



Skewness is defined as $Y = E[(x-\mu)^3/\sigma^3]$ where μ and σ are the mean and standard deviation of the x distribution. Value shown for each year is the average sample value of the skewness measure computed for each firm. The skewness measure for each firm in any given year is based on the time series consisting of five consecutive observations centred on that year.

Figure 2-3 Market to book ratio, 1993-2013 (constant sample of 46 insurance companies)



* The market to book ratio is the aggregate market value of all firms in the constant sample divided by their aggregate book value at year end.
** The adjusted market to book ratio reflects adding back the accumulated non-operating accruals in the numerator.

2.4.1.5 Basu's asymmetric timeliness measures

Since its introduction in 1995, Basu's asymmetric timeliness model has attracted the attention of researchers. According to Basu (1995), accounting conservatism is measured by the extent to which bad news is reflected more promptly in accounting earnings than is good news. Basu (1997) investigates this asymmetric timeliness of earnings by using a piecewise model and regressing accounting earnings on stock returns as described by Equation 2-3.

$$NI_{i,t} = \beta_0 + \beta_1 DR_{i,t} + \beta_2 R_{i,t} + \beta_3 \, DR_{i,t} \times R_{i,t} + \epsilon_{i,t} \qquad \text{Equation 2-3}$$

where $NI_{i,t}$ is the deflated net income per share when the deflator is the stock price at the start of period t, $R_{i,t}$ is the stock return for year t, and $DR_{i,t}$ is a dummy variable which takes the value of 1 when $R_{i,t}$ is negative and 0 otherwise. The purpose of deflating the dependent variable is to control for heteroscedasticity. For the purposes of this paper, we estimated the Equation 2-3 as panel data with a time fixed effect.

Many measures can be driven from the results of Equation 2-3 to assess the level of conservatism. First, the parameter β_3 measures the incremental response to bad news in comparison to good news. The β_3 coefficient is also known as the asymmetric timeliness measure (AT, hereafter). The higher the value of β_3, the higher the degree of conservatism. So we expect the value of β_3 to be positive and to increase over time. Second, the ratio of $(\beta_2 + \beta_3)/\beta_2$ is calculated to measure the sensitivity of accounting earnings to bad news in relation to their sensitivity to good news. If the accounting regime is conservative, then this ratio is expected to be higher than one. The third ratio that can be driven from the Basu model is the ratio of the goodness of fit (R^2) in bad news periods to the goodness of fit (R^2) in good news periods. A ratio higher than one is expected if the accounting is conservative. The last measure can be developed from the model is the average downward bias in earnings to price ratio due to conservatism. The downward bias, calculated as $(1/k - \beta_2)R_{Good}P_{Good} - (\beta_2 + \beta_3 - 1/k)R_{Bad}P_{Bad}$ where R_{Good} (R_{Bad}), is the mean return over a good news (bad news) period, P_{Good} (P_{Bad}) is the relative frequency of good-news (bad-news) periods, and $1/k$ is the risk factor which is estimated by the intercept of the regression.

Table 2-4 The differential earning return association in good and bad news periods:
Results by sub-period for regression (1): $\mathrm{EPS_{it}}/\mathrm{P_{i,t-1}} = \beta_0 + \beta_1 \mathrm{RD_{i,t}} + \beta_2 \mathrm{RE_{i,t}} + \beta_3 \mathrm{RE_{i,t}}.\mathrm{RD_{i,t}} + \varepsilon_{it}$

Sub-period	N	β_0	β_1	β_2	β_3	Adj R^2	$\frac{(b_2+b_3)}{b_3}$	$\frac{R^2_{Bad}}{R^2_{Good}}$	Bias
Overall period	1990	0.074**	0.031**	-0.032	0.408**	0.104	11.63	45.07	1.327
1989-1992	153	0.106**	-0.013	-0.014	0.421*	0.054	29.22	58.69	1.621
1993-1996	238	0.076**	0.019	0.0259	0.105	0.019	5.05	3.87	2.673
1997-2001	294	0.041**	0.022	0.056*	-0.008	0.015	0.85	0.58	1.611
2002-2005	338	0.051**	-0.006	0.006	0.0301	0.006	5.73	22.5	2.459
2006-2009	435	0.058**	0.049*	0.041	0.737**	0.345	19.03	85	1.016
2010-2013	467	0.096**	0.002	-0.153*	0.460**	0.075	1.99	2.52	0.691

EPS_{it} is the earnings per share of firm i in fiscal year t; $P_{i,t-1}$ is the price per share at the beginning of the fiscal year; R_{it} is the return of firm i from nine months before fiscal year end t to three months after fiscal year end t; DR_{it} is a dummy variable that is equal to 1 if R_{it} is negative and zero otherwise; total bias is measured as $(1/k - \beta_1)R_{Good}P_{Good} - (\beta_1 + \beta_2 - 1/k)R_{Bad}P_{Bad}$ where R_{Good} (R_{Bad}) is the mean return over a good news (bad news) period; P_{Good} (P_{Bad}) is the relative frequency of good-news (bad-news) periods and $1/k$ is the risk factor which is estimated by the intercept of the regression. "**" and "*" are indications of significance at 1% and 5% respectively.

Table 2-4 reports the results of the earning-return association based on 1990 company-year observations. The results, based on the whole sample, show that the asymmetric timeliness parameter β_3 is significantly positive with a value of 0.408, which means that the bad news is reflected in the earnings faster than the good news is. These results confirm that the accounting is biased by conservatism. The results based on sub-period samples show that the parameters are significant for 3 out of 6 periods. The parameter on the 1989-1992 is significant with a positive value of 0.421. Afterwards, it becomes insignificant over the 1993-1996, 1997-2001, and 2002-2005 sub-periods. Finally, the asymmetric timeliness is significantly positive over the 2006-2009 and 2010-2013 sub-periods with values of 0.737 and 0.460 respectively. Parameter β_3 is insignificant in the earlier sub-periods but it becomes more significant in the last two.

The $(\beta_2 + \beta_3)/\beta_2$ ratio measures the sensitivity of accounting earnings to bad news in relation to their sensitivity to good news. If the accounting is conservative, we expect that the sensitivity to bad news (the numerator) should be higher than the sensitivity to good news (the denominator) and the ratio should be higher than one. The $(\beta_2 + \beta_3)/\beta_2$ column in Table 2-4 shows that the ratio is positive for the whole sample with a value of 11.63. Furthermore this ratio is higher than one for all sub-periods except 1997-2000, where the value of this ratio is 0.84.

The third ratio which can be driven from Basu's model is the ratio of the goodness of fit (R^2) in the bad news period to the goodness of fit (R^2) in the good news period. If the earning return correlation in the bad news periods is higher than the correlation in the good news period, then the accounting will be conservative. The column R^2_{Bad} / R^2_{Good} of Table 2-4 shows that the ratio is more than one for the whole sample with a value of 45.01. Further, the value of the ratio is more than unity in all sub-periods except one, 1997-2000. These results confirm that the accounting is conservative for most of the period from 1989-2012. Last, conservative accounting causes firm earnings to be biased downwards because bad news is recognised in the financial reports faster than good news is. Finally, the measure of total bias is higher than 0 for both the whole sample and for the sub-periods considered, indicating a high degree of accounting conservatism.

2.4.2 Comparing between different measures of conservatism

This section addresses the second objective of the paper by comparing the four measures of accounting conservatism to determine whether they have the same ability to assess the level of conservatism of insurance firms. To this end, accrual conservatism (CSV_{Acc}), book value conservatism (CSV_{BV}), cash flow conservatism (CSV_{Skew}) and Basu's asymmetric timeliness conservatism (CSV_{AT}) were calculated as shown in Equation 3. Each of those four ratios was estimated using the constant sample data on a yearly basis. For instance, to calculate CSV_{AT}, we estimated β_0, β_1 using a cross-sectional Basu regression.

$$CSV_{Acc} = \frac{accumulated\ nonoperating\ accruals}{accumulated\ total\ accruals}$$

$$CSV_{Skew} = \frac{ROA_{skew}}{CFO/A_{skew}}$$

$$CSV_{BV} = \frac{BV}{MV}$$

$$CSV_{AT} = \frac{\beta_0 + \beta_1}{\beta_0} \qquad \text{Equation 2-4}$$

Panel A of Table 2-5 provides the mean and median of CSV_{Acc}, CSV_{BV}, CSV_{Skew} and CSV_{AT} along with the t-statistics of the paired t-test for the differences in means over the diagonal and z-score of the paired Wilcoxon sign rank test for the differences in the medians under the diagonal. It is clear that CSV_{Acc} is significantly greater than CSV_{BV}. The mean values for CSV_{Acc} and CSV_{BV} are 1.458 and 0.778, respectively, and the corresponding t-statistics is 8.078. These results are consistent with our expectation that accruals would result in a higher level of accounting conservatism, due to their large size in the insurance firms' accounts. Moreover, the lower mean value of book value conservatism is largely attributed to the fact that assets in insurance firms are, to a great extent, valued at market value, which causes the book value and market value of insurers to be close to each other. Interestingly, there are no other significant differences in mean values among all the other measures of conservatism.

Table 2-5 comparing between different measures of accounting conservatism

Panel A: t-test of mean (median) differences across conservatism measures.

	CSV_{Acc}	CSV_{Skew}	CSV_{BV}	CSV_{AT}
CSV_{Acc}	-	0.587	8.07**	0.185
CSV_{Skew}	0.724	-	-0.362	-0.627
CSV_{BV}	4.01**	-0.121	-	-0.33
CSV_{AT}	0.469	-0.322	-0.261	-

Panel B: Pearson and Spearman correlation matrix

	CSV_{Acc}	CSV_{Skew}	CSV_{BV}	CSV_{AT}
CSV_{Acc}	-	-0.38	0.526*	0.294
CSV_{Skew}	0.051	-	-0.39	0.10
CSV_{BV}	0.37	-0.32	-	0.068
CSV_{AT}	0.43	0.16	-0.06	-

CSV_{Acc} : accrual conservatism, which is calculated as the ratio of non-operating accruals to total accruals; CSV_{Skew}: is cash flow conservatism which is calculated as the ratio of ROA skewness to CFO/A skewness; CSV_{BV}: is book value conservatism which is calculated as the aggregate book value to aggregate market value of equity; and CSV_{AT}: is Basu's asymmetric timeliness conservatism, which is estimated as the ratio of $(\beta_0 + \beta_1)/\beta_0$using Equation 1. Each of these four measures is calculated annually, using all available data of the constant sample.

The value over the diagonal in panel A is the t-statistics of the paired t-test for the differences in means, with equal variance assumed, while the values under the diagonal are the z-scores of the paired Wilcoxon sign rank test for the differences in medians.

Panel B gives the Pearson (Spearman) correlation matrixes between CSV_{Acc}, CSV_{BV}, CSV_{Skew} and CSV_{AT} over (under) the diagonal.

** and * designate significance at 5% and 10% respectively

Panel B of Table 2-5 presents the Pearson (Spearman) correlation matrixes between CSV_{Acc}, CSV_{BV}, CSV_{Skew} and CSV_{AT} over (under) the diagonal. The only two measures which positively significantly correlate with each other are CSV_{Acc} and CSV_{BV}. This finding confirms that both measures gauge the overall conservatism, as suggested by earlier researchers (Xie, 2015). In contrast, CSV_{Skew} and CSV_{AT} are positively correlated with each other. Even though the correlation is not statistically significant, the positive sign is consistent with previous studies that suggest that both of them measure conditional conservatism (Xie, 2015).

2.4.3 Robustness tests

In order to achieve the last objective of this paper, the level of the accounting conservatism of the insurance companies is compared to that of a sample of commercial banks to ascertain whether they have a similar level of accounting conservatism. As mentioned above, the motivation in making this comparison is that the level of conservatism in the bank sector has recently been investigated (Nichols et al., 2009; Lim et al., 2014; Manganaris et al., 2015), while insurers and banks are both subject to similar regulatory supervision. Thus, we collected data for a sample of banks from 1993 to 2013 and estimated the regression in Equation 2-4 based on 5638 firm-year observations (1905 insurance-year observations and 3733 bank-year observations)

$$\mathrm{EPS_{it}}/\mathrm{P_{i,t-1}} = \beta_0 + \beta_1 \mathrm{DR_{it}} + \beta_2 \mathrm{RE_{it}} + \beta_3 \mathrm{RE_{it}}.\mathrm{DR_{it}} + \mathrm{Sector}_{\mathrm{it}} * (\beta_0 + \mathrm{B}_1 \mathrm{DR_{it}} + \beta_2 \mathrm{RE_{it}} + \beta_3 \mathrm{RE_{it}}.\mathrm{DR_{it}}) + \varepsilon_{\mathrm{it}}$$

Equation 2-5

$\mathrm{EPS_{it}}$ in Equation 2-4 stands for the basic earnings per share including extraordinary items of firm i for fiscal year t. $\mathrm{P_{i,t-1}}$ is the price per share at the beginning of the fiscal year t for firm i. $\mathrm{RE_{it}}$ is the return of firm i over the 12-month period starting 9 months before the end of fiscal year t. $\mathrm{RD_{it}}$ is a dummy variable with a value of one when $\mathrm{RE_{it}}$ has a negative value (period of economic loss) and a value of zero when $\mathrm{RE_{it}}$ has a positive value (period of economic profit). $Sector_{it}$ is a dummy variable with a value of one when the firm is classified as an insurance company and zero otherwise.

In the previous regression, the coefficient of stock returns, β_2, measures the sensitivity of accounting earning to positive stock returns (good news). The coefficient β_3 measures the incremental sensitivity of accounting earning to negative stock returns (bad news). The coefficient of $\mathrm{Sector}_{\mathrm{it}} * \beta_2$ measures the incremental sensitivity in recognising good news as gains in insurance companies in comparison with banks. The positive (negative) coefficient means that the association between accounting earnings and good news is higher (lower) in the insurance companies (in the banks). The coefficient of $\mathrm{Sector}_{\mathrm{it}} * \beta_3$ measures the difference in accounting conservatism between insurance companies and banks. If $Sector_{it} * \beta_3$ is positively significant (negatively significant), then more (less) conservatism is being used in insurance companies than in banks.

The results in Table 2-5 show that the association between good news and accounting earnings for the whole sample is negatively significant with a coefficient of -0.294. Yet the incremental change in the association between good news and accounting earnings for insurance companies in relation to banks is 0.257, which is significant with a t-value of 3.09, indicating a stronger association between good news and accounting earnings in insurance companies than in banks.

The incremental response to negative news (the conservatism measure) is positively significant with a value of 1.149 for the whole sample. Furthermore, the table shows that the incremental changes in accounting conservatism for the insurance companies in comparison with banks as measured by $Sector_{it} * \beta_2$ is -0.739 with a t-value of -4.83, indicating that accounting in insurance companies is less conservative than it is in banks.

These results may be affected by being derived from a combined sample which has a higher number of bank-year observations than those of insurers. Thus, to rule out such a possibility, we re-estimated the model in Equation 4 using a constant sample consisting of the 92 banks and 46 insurance companies whose data are available for all the sample years. The parameter $Sector_{it} * \beta_2$ became insignificant with a value of -0.26. This finding confirms that our previous results were affected by the differences in the number of observations between two sample subsectors. More importantly, it is found that insurance and banks have similar levels of accounting conservatism because they have similar reporting characteristics; for example, most of their assets are financial ones.

Table 2-6 asymmetric timeliness of accounting conservatism across banks and insurance firm

$$\boldsymbol{EPS_{it}}/\boldsymbol{P_{i,t-1}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1\, DR_{it}} + \boldsymbol{\beta_2 RE_{it}} + \boldsymbol{\beta_3\, RE_{it}.DR_{it}} + \boldsymbol{Sector}_{\ it}(\boldsymbol{\beta_0} + \boldsymbol{\beta_1\, DR_{it}} + \boldsymbol{\beta_2 RE_{it}} + \boldsymbol{\beta_3\, RE_{it}.DR_{it}}) + \boldsymbol{\varepsilon}_{\ it}$$

	β_0	β_1	β_2	β_3	Sector* β_0	Sector* β_1	Sector* β_2	Sector* β_3
Parameter	0.143	0.014	-0.294	1.149	-0.073	0.013	0.257	0.739
t-value	18.99	1.19	-3.92	8.04	-5.19	0.60	3.09	4.83
Adj-R^2	0.044							

EPS_{it} is the earnings per share of firm i in fiscal year t; $P_{i;t-1}$ is the price per share at the beginning of the fiscal year; R_{it} is the return of firm i from nine months before fiscal year end t to three months after fiscal year end t; DR_{it} is a dummy variable that is equal to 1 if R_{it} is negative and zero otherwise; and $Sector_{\ it}$ is a dummy variable has a value of one when the firm is classified as an insurance company and zero otherwise.

2.5 Conclusion

This paper provides evidence of accounting conservatism for insurance companies using the four most common measures, namely, the accumulating of non-operating accruals, skewness of earnings and cash flows, book to market ratio, and Basu's asymmetric timeliness. The results in this paper are mostly based on a constant sample of 46 insurance companies with non-missing data over 21 years, from 1993-2013.

First, this paper investigates the changes in the time series prosperity of both the accounting performance of insurance companies as measured by ROA and their underlying economic performance as measured by CFO/A. Our results showed that the mean value of ROA dropped more significantly than the contemporaneous mean value of CFO/A, suggesting that the changes in ROA can be explained in part by changes in accruals, and particularly by the non-operating component of total accruals which have accumulated negatively over time. Moreover, the paper shows that the ROA series is more negatively skewed than is CFO/A over most of the sample years, indicating early and full recognition of unfavourable events (bad news) in the financial reports and delayed and gradual recognition of favourable events (good news). Similarly, the results for the book to market ratio and adjusted book to market ratio confirm that the accumulated non-operating accruals cause the book value of assets to be biased downwards, causing the ratio to be biased downwards. However, the results of Basu's asymmetric measure show that in most of the sample years accounting earnings are more sensitive to bad news than to good news. Further, the degree of the association between accounting earnings and bad news becomes more significant and higher over time. In summary, the results for the four different measures of conservatism thus provide evidence that insurance companies' accounts tend to be conservative for the whole sample period, and the level of conservatism increases over time. These findings are in line with the agency theory and in constancy with the rational behaviour (Watts, 2003).

Second, the paper examined the correlation and differences in mean and median among the four measures of accounting conservatism, to determine whether they had similar ability to gauge the level of accounting conservatism. The findings suggest that both book value conservatism and accrual conservatism are positively correlated.

Thus, in congruence with the previous literature (Xie, 2015), both measures can be used to gauge the overall level of conservatism. More interestingly, a t-test for the differences in means suggests that accruals conservatism shows on average a higher level of accounting conservatism than book value conservatism does. These results are consistent with our expectation that accrual based measures, like the book to market ratio measure, will be very important in gauging conservatism, since both of them are affected by the unique features of insurance companies and sector-specific accounting treatments.

Finally, the level of accounting conservatism of the insurance companies is compared to that of a sample of commercial banks to ascertain whether they have a similar level of accounting conservatism. Our results, based on a constant sample, consists of 92 banks and 46 insurance companies whose data are available for all the sample years, suggest that insurance companies and banks have similar levels of accounting conservatism because they have similar reporting characteristics; for example, most of their assets are financial ones.

CHAPTER THREE

The Role of Accruals in Equity Valuation for Insurance Companies

3.1 Introduction

In the last few years, the interest in evaluating insurance companies has been growing due to their significant role in the global economy (Damodaran, 2009; Nissim, 2010). For instance, at the beginning of 2008, insurance firms' market capitalisation was approximately 8% of the US stock market (Damodaran, 2009). Furthermore, the financial crisis of 2008 and the subsequent collapse of many banks and insurance firms gave us better understanding of the interdependence of the entire economy and its relationship with the health of the financial sector and the insurance companies which pool risks and provide protection to other sectors (Damodaran, 2009). During the same period, the insurance industry experienced extraordinary volatility characterised by significant fluctuation in market valuations and an enhanced role for financial reporting, which drew attention to the importance of understanding financial information and its implications for insurers' risk and value (Nissim, 2010). One of the most popular models, which has been widely used by both academics and practitioners to predict the equity value of any firm, is the Ohlson model (1995), known as the residual income model.

According to the Ohlson model (1995), the value of any firm is driven by its book value and its ability to generate abnormal earnings. The Ohlson model (1995) has not only been the centre of the equity valuation literature for the last two decades, but has also been developed in many ways. For example, Barth et al. (1999, 2002 and 2005) demonstrated that disaggregating earnings into cash flow and accruals and into the major component of accruals would increase the accuracy of the model's prediction, especially when it is applied at the industry level. Barth et al. (2005) found that imposing linear information dynamics (LIM, hereafter), as suggested by Ohlson (1995) and Feltham and Ohlson (1995, 1996), would improve the predictive accuracy of their models at the pooled level but not at the industry level. Barth et al. (2005)

excluded financial institutions from their study sample because it has different types of accruals that are accounted for in a different way from those of other industries.

Furthermore, to the authors' best knowledge, very few papers focus on the equity valuation for insurance companies, due to their special features. However, none of the papers highlights the role of accruals components, despite their large size, in evaluating insurance companies. For instance, Reichert (2009) confirms that accrued insurance liabilities usually represent the largest liability item on an insurance company's balance sheet.

The purpose of this paper is to assess whether disaggregating earnings into their components and imposing LIM structures assists us in predicting more accurately the contemporaneous equity value for insurance companies. To this end, we compared six different linear information models which are estimated to predict the equity value of insurance companies, to find which of them most reduced the number of errors in predicting equity value. Two measures of prediction errors – absolute percentage errors (AE, hereafter) and squared percentage errors (SE, hereafter) – were created for each of those models, both with and without imposing the LIM structure. To investigate which LIM model generates fewest prediction errors, we compared both the means and the medians of the AE and SE distributions using a t-test for the differences in the means and the Wilcoxon-z test for the differences in the median.

Our results are based on a sample of US insurance companies that consists of 718 firm-year observations over the period from 2001 to 2012. Our results suggest that imposing LIM structures results in fewer prediction errors for all six models. Furthermore, our results suggest that the models of Ohlson (1995) and Myers (1999) result in higher error metrics than our suggested models for insurance companies do. For instance, our results suggest that total accruals, changes in insurance reserves, changes in account receivables and deferred acquisition costs have an incremental ability to predict equity market value over the abnormal earnings and book values. Furthermore, the predictive ability of changes in insurance reserves is higher than the predictive ability of changes in account receivables and changes in deferred acquisition costs, without imposing LIM structures. However, when LIM structures are imposed, the predictive ability of changes in deferred acquisition costs is higher than the predictive ability of both changes in account receivables and changes in insurance reserves.

The remainder of this paper is organised as follows. Section 2 summarises the accounting regime used in the US for the insurance industry. Section 3 examines the appropriate literature on equity valuation models. Section 4 describes the methodology and the models used for equity valuation. Section 5 describes the data used in the analysis. Section 6 presents the results and discusses them. The last section presents the conclusions and offers suggestions for future research.

3.2 Accounting regime for insurance companies in the US

The accounting regime for insurance companies must reflect the business operating cycle of the insurance companies and their unique features. The operating cycle in insurance companies tends to be longer than those in many other industries (Nissim, 2010). For example, some types of long-term insurance policy are usually issued with an effective life of several decades. Thus, a policy's premiums received over many years, and also its related benefits, may take many years before they are determined and paid to policyholders. Furthermore, the issuance of insurance policies is a costly process, due to agents' commissions and other expenses related to evaluating the risks pertaining to an individual policyholder. As a consequence of these unique features of the business, special accounting standards such as FAS 60, FAS 97, FAS 113 and FAS 163 have been developed by the financial accounting standard board in the US to take account of insurance policies, (Acharya et al., 2009). These standards result in considerable differences between the cash flow and accounting income for any given year. Such differences result from accruals accounting, which requires an accurate estimate of expenses and revenues for the current accounting period, as well as accrued insurance liabilities and receivables for future accounting periods.

The major revenue items for insurance companies are the premiums received from policyholders and the income received on investment assets, such as interest, dividends and investment gains. The accrual items related to insurance premiums are the account receivables, which represent the premium earned but not yet received, and prepaid premiums, which represent the amount received but not yet earned. The accrual items related to investment income are unrealized gains and losses on investments and other investment income receivables, such as the interest receivable on bonds and dividends announced.

The major expense items for insurance companies are the claims and benefits payable to policyholders and the expenses incurred by insurance companies in issuing and acquiring insurance policies. The accrual items related to claim and benefit expenses are claims accrued and reported during the year, claims that have accrued but have not yet been reported, and insurance reserves that are formed to cover other insurance liabilities, since some of these claims and benefits take longer to estimate accurately and report to the insurance companies. Further accrual items that are related to the issuance of insurance policies are deferred acquisition costs, which represent the expenses incurred by a firm to acquire a policy. These expenses are originally capitalised as assets on the balance sheet and are then amortised over the estimated life of the insurance policies in relation to the premium inflow (Mulford et al., 2010).

To sum up, the accrual components represent very important features of the accounting standard in the insurance business. Thus, they represent valuable information for readers of financial statements and hence are the most likely to be priced by the market.

3.3 Equity valuation of insurance companies using accounting information

One of the main objectives of any accounting regime is to provide value relevant information to the readers of financial statements to help them to assess firms' value when determining their investment plans. In assessing firms' value, they may take various approaches to assess the equity value, such as a discounted dividend approach, discounted cash flow approach or discounted earnings approach. These approaches yield equivalent firm value when the contemporaneous payoffs are predicted as infinite. However, over a shorter horizon, the discounted earnings approach, which is based on generally accepted accounting principles, results in the fewest prediction errors of all (Penman and Sougiannis, 1998; Francis et al., 2000; Courteau et al., 2001).

The most popular accounting-based approach used to predict firms' value is the residual income model (RIM, hereafter) developed by Edwards and Bell (1961), Peasnell (1982), and Ohlson (1995). According to the RIM model, or the Ohlson model (1995) as it is known in the literature, the value of any firm can be expressed as a function of its current year book value plus the future stream of residual earnings. Ohlson (1995) not only derived the equation to measure the market value of any company but also suggested that future abnormal earnings follow an autoregressive linear dynamic. According to Ohlson's dynamic, the abnormal earnings in the period t+1 are a linear function of the abnormal earnings of the current period and other information (v) that reflects information other than accounting information[4]. Ohlson (1995) and Feltham and Ohlson (1995) confirm that when linear information dynamics are combined with a clean surplus relation, all value-relevant information will be captured by current or previous period earnings and book values. Similarly, Dechow et al. (1999) and Myers (1999) emphasise that the key contribution of Ohlson model stems from its linear information dynamics[5]. However, Myers (1999) argues that ad hoc modifications of linear information dynamics may violate the internal consistency of the model, such as the modifications in Frankel and Lee (1998) and Dechow et al. (1999). More recently, Barth et al. (1999, 2002, and 2005) has found that imposing linear information dynamics will result in smaller prediction errors. However, contrary to all this empirical evidence and to the fact that linear information dynamics are an essential part of the Ohlson model (1995), many recent papers, when they assess the usefulness of the Ohlson model in predicting firms' equity values, have used the model without imposing linear information dynamics as if it were equivalent to the model of 1995 (Horton, 2007; Nissim, 2013a).

Furthermore, Ohlson's first linear information dynamic states that future abnormal earnings are fully predictable. However, the accounting theory suggests that non-recurring earning items (transitory items) are unpredictable because current transitory earnings do not affect the next period's transitory earnings. Thus, in forecasting future abnormal earnings transitory earnings are irrelevant and play no informational role in predicting a firm's equity value. To overcome this problem, Ohlson (1999) split total earnings into core and transitory components and found that core earnings, end-of-period book value and start-of-period book value summarise all the relevant

[4] Ohlson (1995) claimed that the other information variable (v) follows an autoregressive process.

[5] The empirical applications of the RIM, ignoring the linear information dynamics, led to valuation models that were similar to those emerging from the discounted dividend approach, which capitalizes current or forecast earnings (Kothari and Zimmerman, 1995; Dechow et al., 1999).

accounting information. Therefore, eliminating the transitory earnings components from net income is acceptable and justifiable for equity valuation purposes and has been widely used in many empirical studies (Barth et al., 1999; Myers, 1999; Ohlson, 1999).

Similarly, Barth et al. (1999) extended Ohlson's (1999) framework by modelling accruals and cash flows to determine whether they have an incremental ability over that of current abnormal earnings to forecast future abnormal earnings and to predict a firm's equity value[6]. They found that the model becomes more informative when accruals and cash flows are combined with abnormal earnings and book value. More interestingly, Barth et al. (2002, 2005) expanded their previous work by modelling four major accruals components, namely, change in account receivables, change in inventories, change in account payables and depreciation, and found that different accruals components have different abilities to forecast future abnormal earnings, and that including them in the Ohlson model would reduce the number of errors in predicting equity value. Barth et al. (2005) estimated their model by industry and found that estimation errors by industry are smaller than pooled estimation errors. The reason behind this is that different industries have different mixes of accruals items. For instance, depreciation represents a large percentage of total accruals in manufacturing, while it tends to be very small in services. Similarly, change in inventory is the major accruals item in retailers but it does not exist in financial institutions. Thus, the ability to forecast and the persistence of a particular accrual item will differ across industries. Barth et al. (2005) excluded financial institutions from their sample because they have unique features and are governed by different accounting standards. Thus, they have different accruals items from those of other industries. The paper by Barth et al. (2005) is not the only one that takes financial institutions out of the sample; this is the norm in most equity valuation studies. However, in the last few years, there has been growing interest in evaluating financial institutions, due to the significance of their role. It is no exaggeration to say that advances in the global economy would not be possible without the development of financial service operations. Moreover, the financial crisis of 2008 and the uncertainty

[6] Bowen et al. (1987), Bernard and Stober (1989), Sloan (1996) and Barth et al. (1998) documented that current earnings, cash flows and accruals have an incremental informational role in predicting future earnings and are priced by the market.

governing insurers' operations afterwards gave us a better understanding of the reliance of the entire economy on the health of the financial sector and insurance companies, which pool risks and provide protection for other sectors (Damodaran, 2009; Nissim, 2010). These developments have encouraged many academics to evaluate insurance companies. For instance, Beaver and McNichols (2001) find that the equity value of property and casualty insurers reflects information contained in earnings, cash flows and accruals, and the development of loss reserves. Horton (2007) investigates the usefulness of the Ohlson model (1995) when applied to a life insurance sample. The results suggest that the Ohlson model (1995) can weakly explain the equity value of life insurance companies. More recently, Nissim (2010 and 2013a) has claimed that the Ohlson model can provide a good estimate of equity value for insurance companies. In his papers, as noted above (see p.34) he advocates the use of book value, whereas Horton (2007) and Nissim (2013a) fail to take account of LIM structures and disaggregation.

To overcome the limitations of these three papers, the present study investigates the roles of book value, abnormal earnings, total accruals and major accrual components in forecasting future abnormal earnings and predicting equity value for US insurance companies. In our prediction we use the framework proposed by Ohlson (1995 and 1999) and Barth et al. (1999, 2002 and 2005). The major accrual components that will be addressed in the analysis are changes in deferred acquisition costs (ΔDAC), changes in account receivables (ΔAR) and changes in insurance reserves (ΔINR).

3.4 Methodology

In this paper, six different linear information models are used to estimate the equity value of insurance companies and to investigate which model can minimise prediction errors. The first linear information model (LIM1) is based on the Ohlson (1995) model, which states that the market equity value is a function of the book value, abnormal earnings and other information. LIM1 consists of three equations, as expressed in Equation 3-1. The first two equations (1a) and (1b) are forecasting equations, while the third (1c) is the valuation equation implied by the linear information dynamics of the forecasting equations.

LIM1: Ohlson model 1995:

$$NI^a_{it} = \omega_{10} + \omega_{11} NI^a_{it-1} + \omega_{12} v_{it-1} + \varepsilon_{1,it} \qquad (1\alpha)$$

$$v_{it} = \omega_{20} + w_{22} v_{it-1} + \varepsilon_{2,it} \qquad (1b)$$

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI^a_{it} + \alpha_2 v_{it} + u_{it} \qquad (1c)$$

$$\alpha_0 = \frac{\omega_{10}}{[(1+r) - \omega_{11}] * r}$$

$$\alpha_1 = \frac{\omega_{11}}{[(1+r) - \omega_{11}]}$$

$$\alpha_2 = \frac{\omega_{12}(1+r)}{[(1+r) - \omega_{11}][(1+r) - \omega_{22}]}$$

Equation 3-1

where MVE_{it} is the market value of equity; BV_{it} is the book value; NI^a_{it} is abnormal earnings which are defined as the difference between earnings and normal returns on previous year book value BV_{it-1}; $\varepsilon_{1;it}$; $\varepsilon_{2;it}$ and u_{it} are i.i.d normal error terms; and v_{it} is other information calculated as the difference between the actual MVE_{it-1} and $\overline{MVE_{\imath t-1}}$ where the latter is the fitted value of MVE_{it-1} based on a version of Equation (1c) which does not include v_t. Additionally, α_1 is the abnormal earnings' valuation coefficient and α_2 is the other information's valuation coefficient. Feltham and Ohlson (1995) and Ohlson (1995) show that both of these coefficients are nonlinear functions of ω_{11} and ω_{22} and the discount rate r. For the purpose of this paper, different discount rates (r) are used to calculate abnormal income (NI^a_{it}). First, we use a range of discount rates from 8% to 16%. Second, we use CAPM and Fama and French's three-factor model to calculate the discount rate taking a five-year rolling basis (see Table A1 for details). Our main results are reported using a discount rate of 13%[7].

The second linear information model (LIM2) is based on Feltham and Ohlson (1999), which claims that accounting conservatism results in a systematic understatement in operating assets. Therefore, one impact of conservative accounting is a reduction in normal earnings. The writers suggest that book value captures conservatism in accounting. Myers (1999) adopts the Feltham and Ohlson model but he does not

[7] 13% was chosen as a discount rate because Nissim (2013a) claims that it is an appropriate discount rate for insurance companies.

differentiated between operating and financial assets nor between financial and operating earnings, due to the difficulties involved. In this study, LIM2 is similar to Myers' model because the main activity and assets of insurance companies are financial. LIM2 consists of two forecasting equations and one valuation equation, as shown in Equation 3-2.

LIM2: Book Value effect of Conservatism

$NI^a_{it} = \omega_{10} + \omega_{11}NI^a_{it-1} + \omega_{12}BV_{it-1} + \varepsilon_{1,it}$ (2a)

$BV_{it} = \omega_{20} + w_{22}BV_{it-1} + \varepsilon_{2,it}$ (2b)

$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI^a_{it} + \alpha_2 BV_{it} + u_{it}$ (2c)

where

α_0, $\alpha_1$and α_2 are the same as those of LIM1

Equation 3-2

Both LIM1 and LIM2 suggest that all earnings components have the same valuation weights. However, many empirical studies indicate that different earnings components have different relevance in valuation (Barth et al., 1992; Dechow, 1994; Dechow et al., 1998; Dechow et al., 1999; Dechow et al., 2002; Sloan, 1996). Thus, Ohlson (1999) suggests a linear information model that differentiates between core and transitory earnings components. Barth et al. (1999) finds that Ohlson's transitory linear information model can be applied to several earnings components, such as total accruals and cash flow.

The following four linear information models, LIM3 through LIM6, use the framework used by Barth et al. (1999) to detect the incremental ability of different earnings components over that of the abnormal earning and book value in providing equity value with its explanatory power. The purposes of LIM3, LIM4, LIM5 and LIM6 are respectively to measure the extent to which total accruals (ACC_{it}), change in insurance reserve (ΔINR_{it}), change in account receivables (ΔAR_{it}) and change in deferred acquisition cost (ΔDAC_{it}) help to forecast their own future value and provide the explanatory power of equity value incremental to abnormal earnings and equity book value. Each of these LIMs consists of three forecasting equations (a, b and c) and one valuation equation (d), which is implied by the information dynamics of the forecasting equations.

LIM3: Incremental effect of Accrual (ACC):

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}ACC_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it} \quad (3a)$$

$$ACC_{it} = \omega_{20} + \omega_{22}ACC_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it} \quad (3b)$$

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it} \quad (3c)$$

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 ACC_{it} + \alpha_3 BV_{it} + u_{it} \quad (3d)$$

where α_0, α_1, α_2 are the same as LIM1 and α_3 is calculated as:

$$\alpha_3 = \frac{(1+r)[\omega_{12}\omega_{23} + (1+r)\omega_{13} - \omega_{13}\omega_{22}]}{[(1+r) - \omega_{11}][(1+r) - \omega_{22}][(1+r)\omega_{33}]}$$

Equation 3-3

LIM4: Incremental effect of changes in Insurance Reserve (ΔINR):

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}\Delta INR_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it} \quad (4a)$$

$$\Delta INR_{it} = \omega_{20} + \omega_{22}\Delta INR_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it} \quad (4b)$$

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it} \quad (4c)$$

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 \Delta INR_{it} + \alpha_3 BV_{it} + u_{it} \quad (4d)$$

Equation 3-4

LIM5: Incremental effect of change of account receivable (ΔAR):

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}\Delta AR_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it} \quad (5a)$$

$$\Delta AR_{it} = \omega_{20} + \omega_{22}\Delta AR_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it} \quad (5b)$$

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it} \quad (5c)$$

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 \Delta AR_{it} + \alpha_3 BV_{it} + u_{it} \quad (5d)$$

Equation 3-5

LIM6: Incremental effect of deferred acquisition cost (ΔDAC):

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}\Delta DAC_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it} \quad (6a)$$

$$\Delta DAC_{it} = \omega_{20} + \omega_{22}\Delta DAC_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it} \quad (6b)$$

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it} \quad (6c)$$

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 \Delta DAC_{it} + \alpha_3 BV_{it} + u_{it} \quad (6d)$$

Equation 3-6

The equity market value of each firm was contemporaneously predicted using jack-knife sampling procedures. i.e., the predicted market equity value of firm i in year t was generated contemporaneously using all firm-year data except those of firm i of the prediction year t. This prediction was generated using the valuation equation (MVE equation) only when the LIM structure was not imposed. However, it was generated using forecasting and valuation equations together and restricting the parameters in the valuation equation to be a function of the forecasting equations defined in the linear information dynamics when the LIM structure is imposed. As the data of firm i in year t are not used to estimate the equation parameters, it is thus an out-of-sample prediction. Furthermore, seemingly unrelated regression (SUR) is used when estimating each system of equations. This allows the errors of the forecasting equations to be correlated with those of the valuation equation. Thus, the parameter estimates reflect the interdependence among errors.

Second, two measures of prediction errors, namely, AEs and SEs, are calculated for each LIM both with and without imposing the LIM structure, using the following formulas.

$$\mathrm{AE} = \mathrm{ABS}(\mathrm{MVE}_{\mathrm{it}} - \mathrm{Predicted\ MVE}_{\mathrm{it}})/\mathrm{MVE}_{\mathrm{it}}$$

$$\mathrm{SE} = [(\mathrm{MVE}_{\mathrm{it}} - \mathrm{Predicted\ MVE}_{\mathrm{it}})/\mathrm{MVE}_{\mathrm{it}}]^2$$

Finally, to investigate whether imposing the LIM constraint is useful for predicting equity value more accurately, the out-of-sample equity value prediction errors within each LIM were compared. Moreover, to investigate which LIM produces the fewest prediction errors, the sample equity value prediction errors across the LIMs were compared again. To assess the differences in prediction metrics statistically, the means and medians of the AE and SE distributions were compared using a t-test for the differences in the means and a Wilcoxon-z test for the differences in the medians.

3.5 Data and descriptive statistics

The data for this paper were collected from the fundamental analysis record in the Bloomberg Database. The study’s sample consists of all the insurance companies that operated in the US in the period from 2000 to 2012. To mitigate the effect of small companies, we restricted our sample to include only companies that had total assets of at least USD 1 million. Moreover, to mitigate the effects of outliers, for every year of the data and for every variable, the topmost and bottommost percentiles of the data were winsorised. Furthermore, to facilitate comparison across LIMs, the paper's sample was restricted to firms that had full data for estimating all the LIMs' forecasting and valuation equations. These criteria allowed a final sample of 91 firms with non-missing data and 718 firm-year observations. All the variables used to estimate LIMs are expressed in millions of dollars and are measured as of the end of the fiscal year.

This paper defines abnormal earnings $\mathrm{NI}_{\mathrm{it}}^{\mathrm{a}}$ as the difference between net income before extraordinary items, $\mathrm{NI}_{\mathrm{it}}$, and normal returns on previous-year book value $\mathrm{BV}_{\mathrm{it}-1}$. The definition of net income as net income before extraordinary items violates the assumption of CSR as defined in Ohlson (1995). However, it is consistent with previous studies (Barth et al., 1995; Dechow et al., 1999; Myers, 1999), which claim that using this measure of earnings eliminates the effect of large transitory one-time items. Thus, violating Ohlson's CSR is acceptable and justifiable (Ohlson 1999) and has little effect on the accuracy of the findings (Hand and Landsman 2005). Furthermore, in calculating the abnormal earning, the normal rate of return is set to be equal to 13%, which is the discount rate suggested by Nissim (2013a) for US insurance companies.

The other variables used in the paper are defined as follows. Total accruals, ACC, are the difference between net income before extraordinary items and cash flow from operations. ΔINR, ΔAR, and ΔDAC are , respectively, the changes from year to year in total insurance reserves, in total account receivables, and in deferred acquisition costs, as they appear in the balance sheet. Book values (BV) are the difference between total assets and total liabilities. Market values are calculated using the number of outstanding shares at the end of the period multiplied by the price of shares at the end of the fiscal year. Other information, v, is calculated as the difference between the actual $\mathrm{MVE}_{\mathrm{it}-1}$ and the fitted value of $\mathrm{MVE}_{\mathrm{it}-1}$ based on a version of the Ohlson model that does not include v_{t}.

Table 3-1 Descriptive statistics for 718 firm-year observations, 2001-2012

Panel A: Distributional statistics (in millions of dollars)

Variable		Mean	Median	Std. Dev.
Market value of equity	MVE	4079.23	1783.405	6081.4
Book value of equity	BV	3456.92	1695.1	4880.2
Abnormal earnings	NI^a	-113.98	-19.7555	497.7
Total accruals	ACC	-342.80	-122.308	716.51
Change in insurance reserve	ΔINR	395.7	109.309	1317.8
Change in account receivables	ΔAR	56.048	16.9005	652.71
Change in deferred acquisition costs	ΔDAC	1.031	1.9505	223.24
Other information	V	-525.26	-408.481	2871.6
ACC/BV		-9.91%	-7.22%	14.68%
ΔINR/BV		11.45%	6.45%	27.00%
ΔAR/BV		1.62%	1.00%	13.37%
ΔDAC/BV		0.03%	0.12%	4.57%

Panel B: Pearson (Spearman) correlations above (under) the diagonal.

	MVE	BV	NI^a	ACC	ΔINR	ΔAR	ΔDAC	V
MVE		0.86**	0.16**	-0.36**	0.087**	-0.09**	-0.021	0.12**
BV	0.93**		-0.13**	-0.41**	-0.03	-0.14**	-0.18**	-0.31**
NI^a	0.03	-0.14**		0.52**	-0.15**	-0.18**	0.21**	0.51**
ACC	-0.52**	-0.54**	0.23**		-0.36**	-0.07*	0.065*	0.099**
ΔINR	0.21**	0.21**	-0.07**	-0.52**		0.61**	0.36**	0.054
ΔAR	0.04	0.04	-0.04	-0.16**	0.58**		0.167**	0.052
ΔDAC	0.12**	0.05	0.13**	-0.16**	0.40**	0.20**		0.27**
V	0.04	-0.18**	0.53**	0.03	0.03	-0.01	0.16**	

- MVE and BV are the firm's market value and book value at the fiscal year end. Abnormal earnings are calculated as $NI_{it}^{a} = NI_{it} - r.BV_{it-1}$ where NI is the net income before extraordinary items and discontinued operations and r=13% for insurance companies. Total accrual, ACC, is the difference between NI and the cash flow from operations. ΔINR, ΔAR, and ΔDAC are the changes from year to year in total insurance reserves, total account receivables, deferred acquisition costs, respectively, as they appear in the balance sheet. Other information, v, is calculated as the difference between the actual $\mathrm{MVE}_{\mathrm{it-1}}$ and the fitted value of $\mathrm{MVE}_{\mathrm{it-1}}$ based on a version of the Ohlson model which does not include v_{t}.
- **, *, designates significance at 10% and 5%, respectively.

Table 3-1 presents the descriptive statistics of these variables for 718 firm-year observations. In panel A of the table, the mean, median, and standard deviations of the variables are presented. For instance, the mean values of ACC/BV, $\Delta\text{INR}/\text{BV}$, $\Delta\text{AR}/BV$ and $\Delta\text{DAC}/BV$ are respectively -9.91%, 11.45%, 1.62%, and 0.03%. It is clear that accrual items represent approximately 10% of the book values, thus, confirming the importance of accruals items in equity valuations. In panel B of Table 3-1, a Pearson (Spearman) correlations matrix is presented over (under) the diagonal.

3.6 Results and discussion

3.6.1 LIM estimation results

Tables 3-2 to 3-7 present the regression summary statistics for the models LIM 1-LIM 6. Every table presents the results for both the forecasting and valuation equations. On the left-hand side, the regression results are listed without imposing restrictions, while on the right-hand side, the results are reported with the restrictions imposed. We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations. The reported results are not based on the jack-knifing procedures because we wanted to facilitate comparisons with earlier research (Barth et al., 1999).

The findings related to LIM1 in Table 3-2 are consistent with prior research (Barth et al., 1999; Dechow et al., 1999). The valuation coefficients on abnormal earnings and other information, α_1 and α_2, are significantly positive. For instance, without imposing LIM2, the valuation coefficients (and t-statistics) for α_1 and α_2 are 1.581 and 0.657 (9.25 and 22.07), respectively. The corresponding values when the LIM structure is imposed are 0.962 and 0.661 (9.96 and 25.86), respectively.

Turning to LIM2, the findings in Table 3-3 are consistent with existing empirical evidence (Barth et al., 1999; Dechow et al., 1999). The valuation coefficients (t-statistics) on abnormal earnings and book value, α_1 and α_2, are significantly positive. For instance, the valuation coefficients for α_1 and α_2 without imposing the LIM2 are 3.95 and 1.145 (21.03 and 7.49). Similarly when the LIM structure is imposed, the valuation coefficients are 3.624 and 1.13 (21.23 and 7.21), respectively.

The results for LIM3 are shown in Table 3-4, and are consistent with previous research (Barth et al. 1999). The estimated coefficients on abnormal earnings and book value are positively significant. However, the incremental valuation coefficient of the total accruals, α_2, is negatively significant. For instance, without imposing the LIM, the valuation coefficients (t-statistics) for α_1, α_2, and α_3 are 5.06, -1.68, and 1.06 (25.24, -11.1 and 3.03), respectively, while their values when the LIM structure is imposed are 4.97, -1.77 and 1.07 (25.93, -13.61 and 4.35), respectively. The valuation coefficient of total accruals, α_2, differs from the coefficients on abnormal earnings, α_1, which suggests that disaggregating earnings into cash flow and total accruals can improve the predictive accuracy of the equity value.

Tables 3-5, 3-6 and 3-7, respectively, show the incremental effect of insurance reserve, account receivables and deferred acquisition costs beside abnormal earnings and book value. The findings in Table 3-5 show that the valuation coefficient for changes in insurance reserves is positively significant. The valuation coefficient (the corresponding t-statistics) of changes in insurance reserves are 0.524 (7.66) without imposing the LIM structure, while their corresponding values are 0.371 (7.58) when the LIM structure is imposed. Looking at LIM5, the incremental coefficient for the change in account receivables is positively significant. Furthermore, for LIM6 we find that the incremental coefficient for deferred acquisition costs is value relevant. For example, the coefficient (t-statistics) on ΔDAC, α_2, is 2.43 (5.74) without imposing the LIM and 1.385 (5.57) when the LIM structure is imposed. The positive signs of the ΔINR, ΔAR, and ΔDAC parameters, α_2, indicate that issuing new insurance contacts would enhance the future income of insurance firms. Thus, the market prices it positively.

Table 3-2 LIM1, Ohlson model 1995, regression statistics for a sample of 718 firm-year observations, 2001-2012

$$NI^a_{it} = \omega_{10} + \omega_{11}NI^a_{it-1} + w_{12}v_{it-1} + \varepsilon_{1,it}$$

	Without LIM Structure			With LIM Structure		
	ω_{11}	ω_{12}	R^2	ω_{11}	ω_{12}	R^2
Coefficient	0.284***	0.06***	26.70%	0.594***	0.07***	14.97%
t-statistics	(8.61)	(9.54)		(19.55)	(12.90)	

$$v_{it} = \omega_{20} + w_{22}v_{it-1} + \varepsilon_{2,it}$$

	Without LIM Structure			With LIM Structure		
		ω_{22}	R^2		ω_{22}	R^2
Coefficient		0.799***	58.16%		0.911***	57.04%
t-statistics		(31.60)			(60.68)	

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI^a_{it} + \alpha_2 v_{it} + u_{it}$$

	Without LIM Structure			With LIM Structure		
	α_1	α_2	R^2	α_1	α_2	R^2
Coefficient	1.587***	0.657***	89.36%	0.962***	0.661***	89.26%
t-statistics	(9.25)	(22.07)		(9.96)	(25.86)	

- Variables are as defined in Table 3-1.
- LIM1 is the linear information dynamics based on the Ohlson model (1995).
- The values on the left-hand side (right-hand side) are an estimation of the model without (with) the restrictions imposed on the values of α_1 and α_2.
- We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations.
- The results are not based on jack-knifing procedures, though these are used to make out of sample predictions.
- *,**, and *** denote significance at 10%, 5%, and 1%.

Table 3-3: LIM2, effect of conservatism as measured by book value, regression statistics for a sample of 718 firm-year observations, 2001-2012

$$NI_{it}^{a} = \omega_{10} + \omega_{11} NI_{it-1}^{a} + \omega_{12} BV_{it-1} + \varepsilon_{1,it}$$

	Without LIM Structure			With LIM Structure		
	ω_{11}	ω_{12}	R^2	ω_{11}	ω_{12}	R^2
Coefficient	0.522***	-0.01***	18.80%	0.877***	0.01***	-4.17%
t-statistics	19.88	-3.62		98.15	6.61	

$$BV_{it} = \omega_{20} + w_{22} BV_{it-1} + \varepsilon_{2,it}$$

	Without LIM Structure		With LIM Structure	
	ω_{22}	R^2	ω_{22}	R^2
Coefficient	1.05***	98.35%	1.05***	98.34%
t-statistics	206		278.00	

$$MVE_{it} = \alpha_0 + BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 BV_{it} + u_{it}$$

	Without LIM Structure			With LIM Structure		
	α_1	α_2	R^2	α_1	α_2	R^2
Coefficient	3.95***	1.145***	82.62%	3.624***	1.13***	82.76%
t-statistics	21.03	7.49		21.23	7.21	

- Variables are as defined in Table 3-1.
- LIM2 is the linear information dynamics based on Myers (1999), the effect of conservatism as measured by book value.
- The values on the left-hand side (right-hand side) are an estimation of the model without (with) restrictions imposed on the values of α_1 and α_2.
- We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations.
- The results are not based on jack-knifing procedures, which are used to make out of sample predictions.
- *,**, and *** denote significance at 10%, 5%, and 1%.

Table 3-4: LIM3, the effect of total accruals (Acc), regression statistics for a sample of 718 firm-year observations, 2001-2012

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}ACC_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it}$$

	Without LIM Structure				With LIM Structure			
	ω_{11}	ω_{12}	ω_{13}	R^2	ω_{11}	ω_{12}	ω_{13}	R^2
Coefficient	0.568***	-0.05***	-0.02***	20.36	0.933***	-0.166***	-0.01***	5.30%
t-statistics	21.80	-2.22	-4.97		154.89	-11.98	-6.79	

$$ACC_{it}^{a} = \omega_{20} + \omega_{22}ACC_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it}$$

	Without LIM Structure			With LIM Structure		
	ω_{22}	ω_{23}	R^2	ω_{22}	ω_{23}	R^2
Coefficient	0.564***	-0.04***	48.56%	0.561***	-0.04***	48.54%
t-statistics	19.09	-9.26		19.02	-8.72	

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it}$$

	Without LIM Structure		With LIM Structure	
	w_{33}	R^2	w_{33}	R^2
Coefficient	1.05***	98.35%	1.06***	98.34%
t-statistics	206.87		245.98	

$$MVE_{it} = \alpha_0 + \alpha_1 NI_{it}^{a} + \alpha_2 ACC_{it} + \alpha_3 BV_{it} + u_{it}$$

	Without LIM Structure				With LIM Structure			
	α_1	α_2	α_3	R^2	α_1	α_2	α_3	R^2
Coefficient	5.06***	-1.68***	1.06***	85.13%	4.97***	-1.77***	1.07***	84.94%
t-statistics	25.24	-11.1	3.03		25.93	-13.61	4.35	

- Variables are as defined in Table 3-1.
- LIM3 is the linear information dynamics based on Barth et al (1999), the effect of total accruals.
- The value on the left-hand side (right-hand side) are an estimation of the model without (with) restrictions imposed on the values of α_1, α_2 and α_3.
- We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations.
- The results are not based on jack-knifing procedures, though these are used to make out of sample predictions.
- *,**, and *** denote significance at 10%, 5%, and 1%, respectively.

Table 3-5: LIM4, the effect of changes of insurance reserve ($\Delta\mathbf{INR}$), regression statistics for a sample of 718 firm-year observations, 2001-2012

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}\Delta INR_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it}$$

	Without LIM Structure				With LIM Structure			
	ω_{11}	ω_{12}	ω_{13}	R^2	ω_{11}	ω_{12}	ω_{13}	R^2
Coefficient	0.563***	0.01	-0.01***	18.12%	0.893***	0.05***	0.00	-2.95%
t-statistics	22.01	0.72	-4.12		112.9	7.12	0.00	

$$\Delta INR_{it} = \omega_{20} + \omega_{22}\Delta INR_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it}$$

	Without LIM Structure			With LIM Structure		
	ω_{22}	ω_{23}	R^2	ω_{22}	ω_{23}	R^2
Coefficient	0.36***	0.03***	15.21%	0.34***	0.03***	15.17%
t-statistics	10.14	3.64		9.71	3.27	

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it}$$

	Without LIM Structure		With LIM Structure	
	w_{33}	R^2	w_{33}	R^2
Coefficient	1.04***	98.35%	1.05***	98.34%
t-statistics	206.84		259.9	

$$MVE_{it} = \alpha_0 + \alpha_1 NI_{it}^{a} + \alpha_2\Delta INR_{it-1} + \alpha_3 BV_{it} + u_{it}$$

	Without LIM Structure				With LIM Structure			
	α_1	α_2	α_3	R^2	α_1	α_2	α_3	R^2
Coefficient	4.07***	0.524***	1.14***	83.77%	3.93***	0.371***	1.17***	83.44%
t-statistics	22.25	7.66	7.63		22.93	7.58	10.15	

- Variables are as defined in Table 3-1.
- LIM4 is the linear information dynamics to investigate the effect of the changes of insurance reserve on equity market value.
- The value on the left-hand side (right-hand side) are an estimation of the model without (with) restrictions imposed on the values of α_1, α_2 and α_3.
- We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations.
- The results are not based on jack-knifing procedures, though these are used to make out of sample predictions.
- *,**, and *** denote significance at 10%, 5%, and 1%, respectively.

Table 3-6: LIM5, the effect of changes of account receivables ($\Delta\mathbf{AR}$), regression statistics for sample of 718 firm-year observations, 2001-2012

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + \omega_{12}\Delta AR_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it}$$

	Without LIM Structure				With LIM Structure			
	ω_{11}	ω_{12}	ω_{13}	R^2	ω_{11}	ω_{12}	ω_{13}	R^2
Coefficient	0.576***	0.03*	-0.012***	18.01%	0.895***	0.125***	0.01***	-2.53%
t-statistics	21.84	1.70	-3.70		112.1	7.36	5.58	

$$\Delta AR_{it} = \omega_{20} + \omega_{22}\Delta AR_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it}$$

	Without LIM Structure			With LIM Structure		
	ω_{22}	ω_{23}	R^2	ω_{22}	ω_{23}	R^2
Coefficient	0.098***	-0.01	1.04%	0.09**	-0.01**	0.94%
t-statistics	3.17	-0.94		2.83	-2.00	

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it}$$

	Without LIM Structure		With LIM Structure	
	w_{33}	R^2	w_{33}	R^2
Coefficient	1.05***	98.35%	1.06***	98.34%
t-statistics	206.81		257.16	

$$MVE_{it} = \alpha_0 + \alpha_1 NI_{it}^{a} + \alpha_2\Delta AR_{it} + \alpha_3 BV_{it} + u_{it}$$

	Without LIM Structure				With LIM Structure			
	α_1	α_2	α_3	R^2	α_1	α_2	α_3	R^2
Coefficient	4.12***	0.96***	1.16***	83.51%	3.96***	0.60***	1.18***	83.09%
t-statistics	21.98	6.74	8.51		22.61	7.37	10.97	

- Variables are as defined in Table 3-1.
- LIM5 is the linear information dynamics to investigate the effect of the changes of account receivables on equity market value.
- The values on the left-hand side (right-hand side) are an estimation of the model without (with) restrictions imposed on the values of α_1, α_2 and α_3.
- We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations.
- The results are not based on jack-knifing procedures, though these are used to make out of sample predictions.
- *,**, and *** denote significance at 10%, 5%, and 1%, respectively.

Table 3-7: LIM6, the effect of changes of deferred acquisition costs ($\Delta\mathbf{DAC}$), regression statistics for sample of 718 firm-year observations, 2001-2012

$$NI^a_{it} = \omega_{10} + \omega_{11}NI^a_{it-1} + \omega_{12}\Delta DAC_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1,it}$$

	Without LIM Structure				With LIM Structure			
	ω_{11}	ω_{12}	ω_{13}	R^2	ω_{11}	ω_{12}	ω_{13}	R^2
Coefficient	0.47***	0.07*	-0.01***	15.3%	0.86***	0.29***	0.01***	-3.16%
t-statistics	18.53	1.31	-3.49		91.38	5.58	6.48	

$$\Delta DAC_{it} = \omega_{20} + \omega_{22}\Delta DAC_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2,it}$$

	Without LIM Structure			With LIM Structure		
	ω_{22}	ω_{23}	R^2	ω_{22}	ω_{23}	R^2
Coefficient	0.157***	-0.004***	3.96%	0.182***	-0.004**	3.83%
t-statistics	4.59	-3.23		5.06	-2.72	

$$BV_{it} = \omega_{30} + w_{33}BV_{it-1} + \varepsilon_{3,it}$$

	Without LIM Structure		With LIM Structure	
	w_{33}	R^2	w_{33}	R^2
Coefficient	1.04***	98.35%	1.05***	98.34%
t-statistics	206.7		253.4	

$$MVE_{it} = \alpha_0 + \alpha_1 NI^a_{it} + \alpha_2\Delta DAC_{it} + \alpha_3 BV_{it} + u_{it}$$

	Without LIM Structure				With LIM Structure			
	α_1	α_2	α_3	R^2	α_1	α_2	α_3	R^2
Coefficient	3.68***	2.43***	1.15***	83.44%	3.42***	1.38***	1.18***	82.95%
t-statistics	19.55	5.74	8.20		20.67	5.57	10.82	

- Variables are as defined in Table 3-1.
- LIM6 is the linear information dynamics to investigate the effect of the changes of deferred acquisition costs on equity market value.
- The value on the left hand side (right hand side) are an estimation of the model without (with) imposing restrictions on the values of α_1, α_2 and α_3.
- We used nonlinear seemingly unrelated regression (NLSUR) when estimating each system of equations.
- The results are not based on jack-knifing procedures, which are used to make out of sample predictions.
- *,**, and *** denote significance at 10%, 5%, and 1%, respectively.

3.6.2 Comparison of out-of-sample equity value prediction errors

3.6.2.1 Within–LIM comparison of equity value prediction errors

Table 3-8 presents metrics of the equity value prediction errors, mean (median) absolute and squared errors, obtained from estimations of six different LIM models in which the parameters (α_1, α_2, and α_3) are estimated with and without the imposition of the LIM structure. These estimations are performed using the jack-knife procedure, which means that the estimation of firm i's equity value in year t is the value predicted from the valuation equation in each LIM using estimated coefficients from the valuation equation and the data of all firms except those of firm i in year t when the LIM structure is not imposed, and from the valuation and forecasting equations and all firms' data except that of firm i in year t when LIM structures are imposed. Because firm i's data in year t are not used to estimate the coefficients, each prediction is out of sample. Panel A of Table 3-8 shows the mean AE and mean SE with the corresponding t-statistics based on the t-test for differences in mean metrics for dependent samples, i.e., to compare mean AEs and mean SEs when the LIM structure is imposed (with) versus not imposed (without). The findings reveal that applying the LIM structure results in a significantly smaller mean AE and smaller SE for all LIM models. For example, Panel A reveals that imposing the LIM structure for LIM1 reduces the mean AEs (mean SEs) from 1.37 to 1.11 (21.31 to 13.99). Furthermore, for LIM 3, imposing the LIM structure reduces the mean AEs (mean SEs) from 0.789 to 0.402 (3.81 to 0.476).

Panel B of Table 3-8 presents the findings for both the median AEs and median SEs, with and without the LIM structure imposed, along with the corresponding z-score based on the Wilcoxon matched-pairs signed-rank test for differences in the median. The finding shows that imposing LIM structures results in a significant reduction in median AEs and median SEs for all LIM models. For example, the imposition of LIM reduces the median AE (median SE) of LIM6 from 0.451 to 0.241 (from 0.203 to 0.059).

Table 3-8 Comparison of out of sample equity market value forecast errors with and without imposing the LIM structure

Panel A	Mean SE			Mean AE		
	Without	With	t-statistics	Without	With	t-statistics
LIM 1	21.31	13.99	2.14**	1.37	1.11	8.23**
LIM 2	8.15	5.45	2.15**	0.86	0.72	7.67**
LIM 3	3.81	0.476	2.63**	0.789	0.402	6.88**
LIM 4	5.60	0.81	2.11**	0.86	0.437	7.27**
LIM 5	7.74	1.02	2.01**	0.93	0.435	7.32**
LIM 6	7.03	0.38	2.07**	0.91	0.38	7.11**

Panel B	Median SE			Median AE		
	Without	With	z-score	Without	With	z-score
LIM 1	0.181	0.122	17.38**	0.425	0.349	17.66**
LIM 2	0.132	0.109	12.05**	0.363	0.331	12.55**
LIM 3	0.168	0.061	11.61**	0.410	0.247	11.49**
LIM 4	0.194	0.067	12.77**	0.441	0.259	12.95**
LIM 5	0.207	0.073	13.18**	0.455	0.271	13.22**
LIM 6	0.203	0.059	12.15**	0.451	0.241	12.15**

Panel A (B) shows the value of the mean absolute errors (AE) and mean squared errors (SE) along with the t-statistics for a t-test of mean differences within each LIM. i.e., without being compared to with the LIM structure imposed (median Absolute Errors and median Squared Errors, along with the z-score for the Wilcoxon matched-pairs signed-ranks test for median differences within each LIM). The errors metrics are calculated using the jack-knifing procedures. NLSUR are used to estimate the models. * and ** denote statistical significance at the 10% and 5% levels, respectively.

3.6.2.2 Cross –LIM comparison of equity value prediction errors

Table 3-9 presents the results of the comparison errors' metrics across six LIM models. In Panel A (B) of Table 3-9, the t-statistics for the differences in mean AEs (mean SEs) of dependent samples are shown, while panel C (D) presents the z-score based on the Wilcoxon matched-pairs signed-ranks test for differences in the median AEs (median SEs). In each panel of the table, the values over (under) the diagonal are based on comparing results with (without) the imposition of the LIM structures.

The results in panels A and B show that LIM2 has smaller mean AEs and mean SEs than LIM1 has. Turning to the results for LIM3, it is found that the mean AE and mean SE metrics for LIM3 are smaller than those for LIM1 and LIM2. Similarly, the mean AE and mean SE for LIM3 are smaller than those of LIM4, LIM5 and LIM6 when the LIM structure is not imposed. However, there is no significant difference in the mean AE and mean SE between those of LIM3 and those of LIM4, LIM5 and LIM6 when the LIM structure is imposed. On the basis of these results, it is clear that total accruals help to predict equity market values as the mean SEs and mean AEs become smaller.

LIM4, LIM5 and LIM6 have smaller mean AEs and mean SEs metrics than those of LIM1. These results suggest that change in the insurance reserve, change in account receivables, and change in deferred acquisition costs have greater incremental ability than total abnormal earnings to predict equity market value. Furthermore, mean AEs and mean SEs for LIM4 are smaller than those of LIM5 and LIM6 but larger than those of LIM3 without imposing LIM structures. Turning to LIM6, the mean AE and mean SE metrics are smaller than those of LIM4 and LIM5 when the LIM structure is imposed.

Table 3-9 Comparison of out of sample equity market value forecast errors across LIM, both with and without LIM structures being imposed

Panel A		MEAN AE					
		LIM 1	LIM 2	LIM 3	LIM 4	LIM 5	LIM 6
	Mean	1.11	0.72	0.402	0.437	0.435	0.38
LIM 1	1.375	-	-7.25**	-5.62**	-6.06**	-6.43**	-6.29**
LIM 2	0.899	-7.68**	-	-4.09**	-4.63**	-5.24**	-5.13**
LIM 3	0.789	-5.46**	-1.64*	-	1.40	1.09	-1.05
LIM 4	0.861	-5.85**	-0.23	2.32**	-	-0.17	-5.11**
LIM 5	0.936	-6.21**	7.33**	3.36**	3.71**	-	-3.85**
LIM 6	0.917	-6.05**	3.61**	3.42**	3.25**	-1.68*	-

Panel B		MEAN SE					
		LIM 1	LIM 2	LIM3	LIM 4	LIM 5	LIM 6
	Mean	13.99	5.54	0.475	0.810	1.027	0.524
LIM 1	21.3	-	-2.21**	-2.02**	-2.06**	-2.09**	-2.06**
LIM 2	8.15	-2.18**	-	-1.76**	-1.82**	-1.88**	-1.85**
LIM 3	3.80	-1.93**	-1.41*	-	1.11	1.09	0.26
LIM 4	5.61	-2.08**	-1.66*	1.12	-	1.01	-2.21**
LIM 5	7.75	-2.15**	-1.45*	1.39*	1.69*	-	-1.51*
LIM 6	7.03	-2.07**	-1.22	1.47*	2.12*	-1.07	-

Panel A (B) shows the value of mean absolute errors (mean squared errors) along with t-statistics for a t-test of mean differences across LIMs; i.e., the error metrics for each LIM are compared to the error metrics for all the other LIMs both with and without the LIM structures imposed. In each panel of the table, the values over (under) the diagonal are based on a comparison of the results with (without) the LIM structures imposed. Errors metrics are calculated using the jack-knifing procedures. NLSUR are used to estimate the models. * and ** denote statistical significance at the 10% and 5% levels, respectively.

Table 3-9 Continued: Comparison of Out of Sample Equity Market Value Forecast Errors across LIM both with and without Imposing LIM Structures.

Panel C		Median AE					
		LIM 1	LIM 2	LIM 3	LIM 4	LIM 5	LIM 6
	Median	0.349	0.331	0.247	0.259	0.271	0.241
LIM 1	0.425	-	-9.54**	-8.45**	-7.9**	-8.68**	-8.88**
LIM 2	0.363	-11.69**	-	-6.62**	-5.6**	-6.68**	-6.92**
LIM 3	0.410	-9.315	-0.821	-	2.34**	1.413	-1.146
LIM 4	0.441	-7.55**	1.39	3.56**	-	1.572	-4.12**
LIM 5	0.455	-7.62**	8.79**	8.46**	8.02**	-	-4.31**
LIM 6	0.451	-8.1**	7.17**	7.20**	6.63**	-1.36	-

Panel D		Median SE					
		LIM 1	LIM 2	LIM 3	LIM 4	LIM 5	LIM 6
	Median	0.122	0.109	0.061	0.067	0.073	0.059
LIM 1	0.181	-	-9.67**	-8.41**	-8.01**	-8.61**	-8.95**
LIM 2	0.132	-11.78**	-	-6.35**	-5.13**	-6.28**	-6.42**
LIM 3	0.168	-9.73**	-1.196	-	2.75**	1.72*	-0.679
LIM 4	0.194	-7.87**	0.691	3.12**	-	1.67*	-3.73**
LIM 5	0.207	-8.15**	8.79**	8.89**	8.56**	-	-4.13**
LIM 6	0.203	-8.48	7.91**	7.59**	7.52**	-1.43	-

Panel C (D) shows the value of median absolute errors (median squared errors) along with the z-score for the Wilcoxon matched-pairs signed-ranks test for median differences across LIMs; i.e., the error metrics for each LIM are compared to the error metrics for all other LIMs both with and without LIM structures. The values over (under) the diagonal are based on comparison with (without) imposing the LIM structures. Errors metrics are calculated using the jack-knifing procedures. NLSUR are used to estimate the models. * and ** denote statistical significance at the 10% and 5% levels, respectively.

These results suggest that changes in insurance reserves, changes in account receivables, and deferred acquisition costs have incremental ability in predicting equity market value over the total earnings. Interestingly, their abilities are very similar to the ability of total accruals to predict equity value when the LIM structure is imposed. Moreover, the predictive ability of changes in insurance reserves is higher than the predictive ability of changes in account receivables and change in deferred acquisition costs without imposition of the LIM structures. However, the predictive ability of changes in deferred acquisition costs is greater than the predictive ability of both changes in account receivables and the change in insurance reserve when LIM structure is imposed.

The results in panel C and D of the median AEs and Median SEs are very similar to those of mean AEs and mean SEs, both with and without the imposition of the LIM structures. For instance, the median AE (median SE) with the imposition of the LIM1 restriction is 0.349 (0.122), which is significantly larger than those of LIM2, LIM3, LIM4, LIM5 and LIM6. The Z-score based on the Wilcoxon matched-pairs signed-ranks test for the differences in median AEs (median SEs) between LIM1 and LIM2, LIM1 and LIM3, LIM1 and LIM4, LIM1 and LIM5 and LIM1 and LIM6 are -9.54, -8.45, -7.9, -8.68, -8.88 (-9.67, -8.41, -8.01, -8.61, -8.95), respectively.

3.7 Conclusions

This chapter seeks to determine the importance of accruals components apart from book value and abnormal earnings in evaluating insurance companies, by following the methodology suggested by Barth et al. (1999, 2005). To achieve our objectives, we estimated the ability of six different linear information models to predict the equity value of insurance companies. Moreover, to investigate whether imposing LIM structure helps to predicting equity value more accurately, a comparison of out-of-sample equity value prediction errors within each LIM was performed. Furthermore, to investigate which LIM produces the fewest prediction errors, we made another comparison of out-of-sample equity value prediction errors across LIMs. To do so, we calculated two measures of prediction errors, namely, AEs and SEs, for each LIM both with and without imposing the LIM structure. Then, to assess the differences in prediction metrics statistically, the means and medians of the AE and SE distributions were compared using a t-test to find the differences in the means and the Wilcoxon-z test for the differences in the median.

Our estimates were based on a sample of US insurance companies, consisting of 718 firm-year observations over the period from 2001 to 2012. The results suggest that imposing the LIM structures results in lower prediction errors for all six models. Our results also suggest that the Ohlson model (1995) and Feltham and Ohlson (1995) result in higher error metrics for the insurance companies than our suggested models do. For instance, our results suggest that total accruals, changes in insurance reserves, changes in account receivables, and deferred acquisition costs have incremental ability to predict equity market value over the abnormal earnings and book values. More interestingly, the predictive ability of changes in insurance reserves is higher than the predictive ability of changes in account receivables and changes in deferred acquisition costs, without the imposition of the LIM structures. Finally, the predictive ability of changes in deferred acquisition costs is greater than the predictive ability of both changes in account receivables and changes in insurance reserves when the LIM structure is imposed. Overall, the LIM models which incorporate accrual components produce an equity value very close to the market one. Surprisingly, the predictive abilities of each individual accrual component depend on whether or not the model is estimated as a system.

CHAPTER FOUR

Stock Returns Predictability of the Residual Income Valuation Model: Risk versus Mispricing in Explaining the V/P Anomaly

4.1 Introduction

Motivated by the work of Fama and French's (2016) entitled "Dissecting Anomalies with a Five-Factor Model", we examined the ability of the five-factor model to explain the puzzling feature of the anomalous fundamental value to price ratio (V/P, hereafter), which estimates the fundamental value (V) using the residual income valuation model. Fama and French (2016) find that the number of anomalies shrinks when they add profitability and investment to their traditional three-factor model, because excess return on those anomalies becomes less anomalous, or because they are exposed to similar risk factors. Fama and French (2015) argue that, as suggested by the dividend discount model, it is a natural choice to add profitability and investment to their traditional three-factor model. These two writers (2016) tested the abilities of their new model to explain several anomalies such as accruals, net share issues, momentum, volatility and a number of other anomalies that are known to challenge their older three-factor model.

The aim of this paper is to extend Fama and French (2016) by testing the ability of their new five-factor model to explain the V/P anomaly. It may be asked why the Fama and French's five-factor model has been chosen. The answer is that the fundamental value (v) in the V/P anomaly is theoretically driven by the dividend discount model. Fama and French (2016) argue that if we hold constant the market value, book value and stream of future investment in the dividend discount model[8],

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[8] Fama and French employ $\frac{M_t}{B_t} = \frac{\sum_{\tau=1}^{\infty} E(Y_{t+\tau} - dB_{t+\tau})/(1+r)^{\tau}}{B_t}$ to explain their argument. M_t, B_t, $Y_{t+\tau}$ and $dB_{t+\tau}$ respectively indicate market value, book value, the stream of future earnings and the stream of future investment.

the higher expected profitability indicates a higher expected cash flow and higher expected stock returns. Similarly, if we hold market value, book value and the stream of future earnings constant, the higher expected investment indicates a lower expected cash flow and lower expected stock returns. In other words, profitability and investment have a direct impact on the fundamental value calculation and hence on the expected stock returns. Therefore, it is an open question whether the five-factor model can explain the excess returns of V/P strategies, given that both Fama and French's five-factor model and the residual income valuation model theoretically developed from the same dividend discount model proposed by Miller and Modigliani (1961).

The V/P anomaly finds its origin in the work of Frankel and Lee (1998). They suggest that V/P can be used to predict cross sectional abnormal returns for up to three years. They claim that the V/P trading strategy is more successful and leads to better abnormal returns than simple market-multiples do. Frankel and Lee (1998) admit that the gradual price convergence to estimated fundamental value over a 36-month period is quite a puzzling process. One possible explanation of this slow price convergence is the speed at which long-term fundamental information is incorporated in stock prices. An alternative explanation of the V/P effect is that it reflects cross-sectional risk differences. Frankel and Lee (1998) control for market beta, size and B/M risk factors and find that those factors cannot explain the V/P anomaly.

In a follow up study, Ali et al. (2003) investigate the mispricing versus risk explanation of the V/P anomaly. They conclude that V/P anomalies are largely concentrated around dates of earnings announcements. Their findings suggest that the power to predict the returns of the V/P strategy is attributable to market mispricing and this mispricing is subsequently corrected during earnings announcement periods when a substantial amount of accounting information reaches the market. To explore the risk factors which might cause the V/P anomaly, as an alternative explanation, Ali et al. (2003) control for a large set of risk factors as suggested by Gebhardt et al. (2003) and Gode and Mohanram (2001). Their collective evidence supports the mispricing explanation of the V/P anomaly and confirms Frankel and Lee's anomaly (1998).

More recently, Hwang and Lee (2013) in one part of their paper replicate Ali et al.'s work (2003) and confirm the return predictability of the V/P strategy. In order to determine whether the V/P anomaly is better explained by market inefficiency or reflects risks factors, Hwang and Lee (2013) use Fama and French's three-factor and V/P four-factor models, where the V/P factor is constructed as a mimicking portfolio based on the V/P ratio, similarly to their original factors. They conclude that Fama and French's three-factor model cannot explain the excess returns of the V/P strategy. More interestingly, they find that the V/P factor can partly explain the excess returns of the V/P strategy. Their findings collectively suggest that using the word "anomaly" to refer to the V/P strategy may be inappropriate (Xu, 2007). They suggest that mispricing as an explanation of this anomaly is still premature and further research is necessary. The findings of Hwang and Lee (2013), Fama and French (2015) and Fama and French (2016) motivate us to ask the following two questions. What are the reasons for the excess returns of the V/P trading strategy? and Is Fama and French's five-factor model able to explain all the variations of the V/P's excess returns?

To answer these questions we use data from the merger of COMPUSTAT, CRSP, I/B/E/S for all non-financial firms listed in AMEX, NYSE and NASDAQ during the period from 1987 to 2015. We follow Ohlson (1995), Feltham and Ohlson (1995), Barth et al., (1999), Dechow et al., (1999) and Myers (1999) in estimating the fundamental value (V) using the residual income valuation model with both historical information and a one-year financial analysts' forecasts. Our valuation model differs from those in previous studies. For instance, Frankel and Lee (1999) and Ali et al. (2003) use merely the financial analysts' forecasts in calculating the fundamental value, while Hwang and Lee (2013) depends only on historical data.

To investigate the risk explanation of V/P strategies, we examine whether such strategies are associated with several firm characteristics that are known to be proxies of common risk factors, such as market beta, size, book to market ratio, return volatility, earnings variability, leverage, bankruptcy and analyst coverage. Then we explore the relationship between the V/P ratio and future stock returns after controlling for the previous risk factors. If the coefficient of the V/P ratio is significantly greater than zero after controlling for previous risk factors, it indicates that the V/P captures additional risk factors beyond the controlled risk proxies. In other words, it can indicate the V/P anomaly.

To investigate the ability of Fama and French's five-factor model to explain the excess return of the V/P strategy, we form V/P quintile portfolios by sorting all stocks in our sample into five portfolios where portfolio 1consists of firms with the lowest V/P ratio and portfolio 5 consists of firms with the highest V/P ratio. We assess the performance of CAPM, the traditional three-factor model and the five-factor model using GRS F-statistics. The null hypothesis of the test proposes that the intercepts α_i are jointly equal to zero. In other words, if the intercept in regression of the V/P quintile's excess returns against the asset-pricing model's factor returns does not differ significantly from zero, then the asset-pricing model should capture the expected returns of V/P. Otherwise, it indicates the V/P's anomaly.

This paper contributes to the finance literature in several ways. First, we calculate the fundamental value using both historical information and a one-year analysts' forecasts as proposed by the original Ohlson model (1995). Second, it provides more empirical evidence for the mispricing/risk explanation argument for the V/P anomaly. Finally, it compares the performance of CAPM with the three-factor and five-factor models.

The next section of this paper is devoted to a literature review of the V/P anomaly and the mispricing versus risk explanation of the V/P anomaly. The methodological development and data used for empirical implementation are described in sections 4-3 and 4-4, respectively. Section 4-5 presents the main empirical results and discusses them. The last section presents some conclusions and offers suggestions for future research.

4.2 Literature review

4.2.1 Value to price (V/P) anomaly

Frankel and Lee (1998) suggest that fundamental value-to-price trading strategy (V/P) can be used to predict cross sectional abnormal returns for up to three years. They use a version of the residual income model that incorporates financial analysts' forecasts to estimate the fundamental value (V). Their results confirm that the V/P ratio reliably predicts cross sectional stock returns, especially over longer horizons. In particular, the predictability of the book to price (B/P) ratio over the first twelve months can be compared to this. . However, over a 36-month period, the predictability of the V/P ratio is far more powerful than is the B/P ratio. Thus, they claim that the V/P trading strategy is more successful and leads to better abnormal returns than simple market-multiples do. However, Frankel and Lee (1998) admit that the gradual price convergence to estimated fundamental value, taking over 36 month periods, is quite a puzzling process. One possible explanation of this slow price convergence is the speed at which long-term fundamental information is incorporated in stock prices. An alternative explanation of the V/P effect is that it reflects cross-sectional risk differences. Frankel and Lee (1998) control for three common risk factors, namely, B/P, firm size and market beta, but find that these factors cannot explain the V/P anomaly. Therefore, these two authors suggest that the V/P anomaly may be attributed to temporary mispricing by the market, even though they do not completely rule out the possibility that V/P strategies may be riskier in other dimensions. Frankel and Lee (1998) clarify that their implementation of V/P strategies is rather simple and it focuses on a valuation model based on analysts' forecasts. They suggest that future research may adopt different valuation approaches that refine the model parameters.

Dechow et al. (1999) adopt a different approach in their implementation of the V/P strategy. They facilitate several variations of the Ohlson based residual income model (1995), which include ignoring other information[9], incorporating both historical earning information and other information and other alternatives which restrict the abnormal earnings parameters and other information parameters either to zero or to unity in different combinations. Dechow et al. (1998) calculated the 12-month buy-hold returns of V/P decile portfolios and find that the models which ignore other information have the strongest power to predict future returns.

Unlike the attempts by Frankel and Lee (1998) and Dechow et al. (1999) to document the cross-sectional return predictability of the residual income valuation model, Lee and Swaminathan (1999) and Lee et al. (1999) investigate, respectively, the time-series relationship for several US indices between stock price and intrinsic value and stock returns and intrinsic value. Their work emphasizes the statistical predictive

[9] Dechow et al. (1999) facilitate one year ahead financial analysts' forecasts as a proxy for other information variables

reliability of the V/P ratio, where value is estimated using a residual income valuation model. They claim that using a time- varying discount rate and a one-year analysts' forecast are crucial for the success of the V/P strategy. Collectively, these studies substantiate the importance of understanding the reasons behind the superior predictive power of the V/P ratio. However, none of them investigates this issue directly. For instance, Lee et al. (1999) argue in favour of market inefficiency. They state that when it is difficult to measure the firm-fundamental value and/or when transaction costs are relatively high, the time required for prices to converge to corresponding intrinsic value tends to be lengthy. Lee et al. (1999) conclude the paper by stating, "We leave the exact explanation for the predictive power of V/P (fundamental value to price) to future research" (Lee et al. 1999, p.1737).

In contrast to the previous argument, which supports the superior power to predict of the cross-sectional and time-series V/P model, Xu (2007) argues that the numerator of the V/P ratio is based on several fundamental variables (such as book value, earnings and analysts' forecasts) which have been recognised to be correlated with future abnormal returns. Thus, it is an open question whether adding all these anomalous components to the V/P creates incremental predictive power and whether the residual income valuation model or its underlying components are the reasons for the V/P anomaly. Xu (2007) concludes that the V/P has no incremental ability to explain the associated abnormal returns over its components, particularly the analysts' forecasts of earnings. Therefore, the V/P has no anomalous power and the reason for the V/P effect is the investors' subjective expectations regarding its underlying variables.

Similarly, Myers (1999) and Lo and Lys (2000) show their concern regarding Frankel and Lee's implementation of the residual income valuation model. For instance, Lo and Lys (2000) argue that adding analysts' forecasts of earnings beyond one year has no significant impact on the correlation between intrinsic value and price. They claim that analysts' forecasts tend to be noisier after the first year and impounding them in residual income valuation model has little effect. Instead, most of the cross-sectional correlation between price and value is primarily attributed to the book value of equity and to a lesser extent to the first year's earnings. The conclusions of Lo and Lys (2000) are in line with those of Myers (1999). Furthermore, Lo and Lys (2000) claim that Frankel and Lee's argument (1998) that the mispricing is not the only explanation for the V/P effect. An alternative argument may be that the discount rates used to calculate the intrinsic value were too high /too low. Thus, using very low discount rates results in a higher V/P ratio and inevitably leads to higher realised returns.

4.2.2 Mispricing versus the risk explanation of the V/P anomaly

4.2.2.1 Mispricing explanation

Overall, academics and practitioners in the finance field have agreed that the V/P strategy can predict the contemporaneous returns for up to a three-year horizon. However, the reasons for this superior predictability of V/P strategies remain open to discussion. Frankel and Lee (1998), as noted above (p.5), turn to temporary mispricing by the market to explain the V/P anomaly, while not completely dismissing the possible riskiness of V/P strategies in other dimensions. In other words, the firm in the top V/P portfolio may be still riskier in other dimensions than the firms in the bottom V/P portfolio.

In a follow-up paper, Ali et al. (2003) investigate mispricing versus risk as the explanation of the V/P anomaly. They conclude that V/P anomalies are largely concentrated around earnings announcement dates. Their findings suggest that power of V/P strategy to predict the returns is attributable to market mispricing and this mispricing is subsequently corrected during earnings announcement periods, since a substantial amount of accounting information reaches the market after earnings announcement dates. As an alternative explanation in exploring the risk factors which might cause V/P anomaly, Ali et al. (2003) control for a large set of risk factors which are suggested by Gebhardt et al. (2003) and Gode and Mohanram (2001). The empirical results suggest that the V/P ratio is significantly positively associated with future abnormal returns from the V/P strategy, even after controlling for known risk factors, including book to market ratio, market beta, Altman’s Z score, the implied cost of capital and the debt equity ratio. Their collective evidence supports the mispricing explanation of the V/P anomaly and confirms the anomaly noted by Frankel and Lee (1998).

Unlike previous researchers (for instance, Frankel and Lee, 1998 and Ali et al., 2003) who concentrate on the general predictive ability of V/P strategy, Xie (2004) investigates the movement of stocks in the extreme V/P quantile portfolios. He states that if risk is the underlying reason for the V/P anomaly, then the abnormal returns of this strategy should be concentrated mainly in the portfolio of stocks that remain in the extreme V/P portfolios. However, if mispricing is the underlying reason for the V/P anomaly, then the abnormal returns of the V/P strategy should be concentrated mainly in the subsample of stocks in the extreme V/P portfolios that show price convergence. Xie (2004) concludes from his empirical evidence that less than 30% of the stocks in the extreme V/P quantiles show price convergence to fundamental values after 36 months and the abnormal returns of the V/P strategy are mainly driven by this small subsample of stocks. These empirical findings support the mispricing explanation of the V/P anomaly and raise several interesting questions regarding the reasons for price divergence between the fundamental value and the effect of the limit of market arbitrage on price convergence to fundamental value (Xie, 2004).

Since most of the existing empirical evidence tends to support mispricing rather than the risk explanation for the V/P anomaly (Frankel and Lee, 1998; Ali et al. 2003; Xie, 2004), the V/P anomaly can be used as a good example in investigating the impact of arbitrage[10] on the realized abnormal returns. For instance, Wei and Zhang (2007) argue that if mispricing is the underlying reason for the V/P anomaly, then V/P trading strategies should be successful only for stocks with low arbitrage risk. Wei and Zhang (2007) investigate the V/P anomaly for stocks with low (high) arbitrage risk and find evidence that stocks of this kind have strong (weak) profitability with low (high) arbitrage risk. Wei and Zhang (2007) use accrual quality, divergence of opinion, investor sophistication, firm age, idiosyncratic return volatility, liquidity and institutional ownership as measures of arbitrage risk. They find that the profitability of V/P trading strategies improves significantly after controlling for all the previous

[10] Arbitrage is selling and buying activities which are riskless and do not need any capital investment. If the market prices of stocks deviate from their intrinsic values, then smart arbitrageurs would engage in buying cheap stocks and selling expensive ones. By taking a position in the market, arbitrage brings the market price of these stocks back to their intrinsic value and provides riskless returns. However, in the real world, trading strategies that are designed to exploit such an opportunity are both costly and risky, which limits the activities of the arbitrageurs and allows the mispricing in the market to continue longer.

risk factors together and after dropping stocks from the research sample if they have any of these arbitrage risk factors in the highest quintiles. These findings collectively support the mispricing explanation of the V/P anomaly.

4.2.2.2 Risk explanation

Even though most of the existing evidence supports the mispricing explanation of V/P strategies, none of them rules out completely the possibility that the stocks in the top V/P portfolio may in some dimensions be riskier than stocks in the bottom V/P portfolio (Frankel and Lee, 1998; Ali et al., 2003). Other researchers have suggested that the mispricing explanation of V/P ratio may be premature (Lo and Lys. 2000; Myers, 1999; Kothari, 2001; Beaver, 2002). For instance, Frankel and Lee (1988) confess that the V/P anomaly could still be due to unidentified risk factors other than book to price ratio, firm size and market beta.

Myers (1999) and Lo and Lys (2000) question the accuracy of the empirical implementation of Frankel and Lee’s equity valuation model (1998). For example, they argue that adding analysts’ forecasts of earnings beyond one year has no significant impact on the correlation between intrinsic value and price. Furthermore, Lo and Lys (2000) claim that Frankel and Lee’s argument (1998) that the V/P anomaly is driven by market mispricing is not the only explanation for the V/P effect. An alternative explanation may be that the discount rates used to calculate the intrinsic value were too high/too low. Thus, using very low discount rates results in a higher V/P ratio and inevitably leads to higher realised returns.

Furthermore, Kothari (2001) argues that the V/P strategy is quite puzzling because it generates relatively low abnormal returns in the first year and a half, but larger abnormal returns for the next year and a half. He states that the researchers may be wrong to suggest that long-term market inefficiency is the reason for the V/P anomaly. He claims that inferences about long-term market mispricing over a longer period are usually confounded by omitted risk factors, the long-term nature of the anomaly itself, or other biases such as survival, statistical and performance assessment. Thus, he suggests that more carefully designed studies are needed, to determine the conditions of market efficiency. Similarly, Beaver (2002) argues that it is very challenging to resolve the contradiction between the rapid market reaction to new information, which implies market efficiency, with the persistence of abnormal returns for three years after forming portfolios (the V/P anomaly is an example), which implies that market inefficiency is responsible. Thus, Beaver (2002) calls for more research to discriminate between the mispricing and risk explanations of the V/P anomaly.

More recently, Hwang and Lee (2013) in one part of their paper replicate the work of Ali et al. (2003) and confirm the return predictability of V/P strategy. In order to determine whether the V/P anomaly is better explained by market inefficiency or reflects risk factors, Hwang and Lee (2013) use the Fama and French's three-factor and V/P four-factor models where the V/P factor is constructed as a mimicking portfolio, based on the V/P ratio as their original factors were. They conclude that Fama and French's three-factor model is unable to explain the excess returns of the V/P strategy. More interestingly, Hwang and Lee (2013) use the characteristics versus covariance analysis suggested by Daniel and Titman (1997). The strength of this test is its ability to distinguish between the mispricing explanation and risk explanation. They find that V/P factor loading is still able to predict returns after controlling for V/P characteristics and conclude that Frankel and Lee's effect (1998) may be driven by risk factors instead of temporary mispricing. Their findings collectively suggest that using the word "anomaly" to refer to V/P strategies may be inappropriate (Xu, 2007). They suggest that the mispricing explanation of the V/P anomaly is still premature and further research is necessary.

4.3 Methodology and empirical implementation

This section explains the steps we followed in order to achieve the paper's main objectives. In the first subsection, we discuss the theoretical development of the residual income valuation model. Then we move on to explain the empirical implementation of the model. The third subsection is devoted to explaining the construction of V/P trading strategies. The fourth subsection presents the model we used to investigate the mispricing versus risks explanation. In the last subsection, we discuss asset pricing models that are used to investigate the performance of V/P trading strategies.

4.3.1 Theoretical development of the residual income valuation model

The most popular accounting-based approach used to predict firms' value is the residual income model (RIM, hereafter) developed by Edwards & Bell (1961), Peasnell (1982), Ohlson (1990, 1995) and Feltham and Ohlson (1995). According to the RIM model, the value of any firm can be expressed as a function of its current year book value plus the present value of expected future residual income[11] as shown in Equation 4-1.

$$MV_t = BV_t + \sum_{T=1}^{\infty} R^{-T} E_t\left(\widetilde{NI}_{t+T}^{a}\right) \quad \text{Equation 4-1}$$

where:

MV_t= Market value of equity at date t;

BV_t= Book value of equity at date t;

$R = 1 + r$, where r is the cost of equity capital;

$E_t[.]$= Expectation operator based on information available at time t;

NI_t= Net income for period t; and

$\widetilde{NI}_t^a = NI_t - r.b_{t-1}$ = Residual income.

[11] Residual income is defined as the difference between the investors' expected income and the required income, where the required income is calculated as forecast book equity at the start of each period multiplied by the cost of equity capital.

Frankel and Lee (1998) use the residual income model by simplifying the valuation technique in a short horizon. They assume that, after the third year, the residual income will continue to perpetuity. Thus, the market value calculation is based on a three-year horizon, as shown in Equation 4-2:

$$MV_t = BV_t + \frac{(FROE_t - r_e)}{(1 + r_e)} BV_t + \frac{(FROE_{t+1} - r_e)}{(1 + r_e)^2} BV_{t+1} + \frac{(FROE_{t+2} - r_e)}{(1 + r_e)^2 r_e} BV_{t+2}$$

Equation 4-2

where:

BV_{t+k}: is the forecast book value of equity at the end of year $t + k$, k=1, 2 or 3;

$FROE_{t+k}$: is the forecast return on equity for year $t + k$, k=1, 2 or 3; and

r_e: is the estimated cost of capital equity.

According to Frankel and Lee (1998), the empirical implementation of the residual income model requires us to estimate the future book value of equity, future return on equity and the cost of capital for the next three years. Frankel and Lee (1998) use two alternative approaches to estimate $FROE_t$. The first approach ($MV_{\boldsymbol{h}}$) is based on the earnings in the previous period, while the second (MV_f) is based on I/B/E/S analysts' forecasts. To estimate MV_h, the authors use return on equity for period t to proxy for all three future returns on equity ($FROE_{t+k}$) in Equation 4-2. To estimate MV_f, they use a one-year-ahead, a two-years-ahead consensus I/B/E/S earnings-per-share forecast and a five-year I/B/E/S consensus growth to proxy for$FROE_{t+1}$, $FROE_{t+2}$ and $FROE_{t+3}$ in Equation 4-2.

Frankel and Lee's implementation of residual income model (1998) differs from the original implementation by Ohlson (1995) and Dechow et al. (1999). Ohlson (1995) not only derived the equation to measure the market value of any company but also suggested that future abnormal earnings follow an autoregressive linear dynamic. Ohlson (1995) argues that a firm's ability to generate residual income is driven by its monopolistic power. However, this monopolistic power will diminish after several years due to competition in the market. Thus, residual income will shrink as well and the returns earned by the firm will be equal to the cost of capital. Ohlson (1995) claims that, to capture this process, an autoregressive technique can be used to model residual income series.

According to Ohlson's linear information dynamics, the abnormal income in the period t+1 is a linear function of the abnormal income in the current period and other information (v)[12]. Thus, Ohlson's linear information model can be expressed using Equation 4-3.

$$NI^{a}_{it} = \omega_{11} NI^{a}_{it-1} + \nu_{it-1} + \varepsilon_{1,it} \quad (\alpha) \qquad \text{Equation 4-3}$$

$$\nu_{it} = \omega_{22} \nu_{it-1} + \varepsilon_{2,it} \quad (b)$$

$$MV_{it} = BV_{it} + \alpha_1 NI^{a}_{it} + \alpha_2 \nu_{it} + u_{it} \quad (c)$$

$$\alpha_1 = \frac{\omega_{11}}{[(1+r) - \omega_{11}]}$$

$$\alpha_2 = \frac{(1+r)}{[(1+r) - \omega_{11}][(1+r) - \omega_{22}]}$$

Where:

ν_{it} = Other information;

$\varepsilon_{1,it}$, $\varepsilon_{2,it}$ and u_{it} are error terms;

i and t subscripts refer to the firm and year respectively; and

ω_{11} *and* ω_{22}: Equation parameters satisfy the following condition: $\omega_{11} > 0$, $\omega_{22} > 1$.

Feltham and Ohlson (1995) argue neither that accounting measures of performance are neutral nor that competitive power will over time drive residual income to zero, as proposed by Ohlson (1995). On the contrary, accounting practices, and particularly accounting conservatism, cause the book value of equity to differ systemically from the market value of equity. In other words, accounting conservatism influences the residual income series in the long run, because it understates the book value of equity[13]. Thus, Feltham and Ohlson (1995) suggest a second linear information dynamics in which the book value of equity can be used as a proxy of conservatism.

[12] Other information represents any relevant information other than accounting information. According to Ohlson (1995), other information in the next period (t+ 1) is a linear function of other information from the current period (t).

[13] Book value of equity is used as a benchmark to calculate normal returns and, consequently, residual income, as shown in Equation 4-1.

Myers (1999) emphasises that the key contribution of Ohlson (1995) and Feltham and Ohlson (1995) stems from their linear information dynamics. He argues that ad hoc modifications of these linear information dynamics could violate the internal consistency of the model, for example the modifications in Frankel and Lee (1998) and Dechow et al. (1999). Myers (1999) maintains that intrinsic value calculation as implemented by Frankel and Lee in one part of their model, often implies arbitrage. Consequently, Myers (1999) proposes a framework for modifying linear information dynamics while preserving the internal consistency of the model.

Similarly, Ohlson (2001) contends that ignoring other information variable (v) or equating it to zero, as proposed by Dechow et al (1999), could be of empirical interest. However, these propositions drastically shrink the empirical content of the linear information model. More importantly, Ohlson (2001) states that it is plausible to use a consensus of analysts' forecasts (f_t) for period t+1 as a proxy for expected earnings, based on all available information at period t, and hence to calculate other information variables (v). According to Dechow et al. (1999) and Ohlson (2001), other information variables (v) can be calculated as in Equation 4-4.

$$v_t = E_t[NI^a_{t+1}] - \omega_{11} NI^a_t \qquad \text{Equation 4-4}$$

$$E_t[x^a_{t+1}] = f^a_t = f_t - r.BV_t$$

$$v_t = f^a_t - \omega_{11} NI^a_t$$

where $E_t[NI^a_{t+1}]$ is the conditional expectation of abnormal income for the period t+1 based on the whole information set available at period t; $f_t$is the consensus of analysts' forecasts of expected earnings for period t+1; and ω_{11} is the parameters of abnormal income persistency, estimated by ignoring other information variables of Equation 4-3 (a).

4.3.2 Empirical implementation of the residual income valuation model

For the purposes of the present paper, we adopted the residual income valuation model as developed by Feltham and Ohlson (1995) and Ohlson (1995) and as implemented by Dechow et al. (1999), Barth et al. (1999), Barth et al. (2005) and Myers[14] (1999). The model in Equation 4-5[15] consists of three forecasting equations

[14]In contrast to Feltham and Ohlson (1995), Myers (1999) does not differentiate between operating assets and financial assets a) because it is difficult, if not impossible, to separate the financial assets from the operating assets and b) because

(a, b and c) and one valuation equation (d). To ensure no arbitrage condition, clean surplus relations and the internal consistency of the model, the valuation parameters and forecasting parameters were simultaneously estimated in a system of equations. In other words, the simultaneous estimation of the model ensured one-to-one mapping between the forecasting equations and the valuation equation (Barth et al., 2005; Pope and Wang, 2005; Myers, 1999; Tsay et al., 2008; Tsay, 2009; Wang 2013). Furthermore, due to the possible correlation among the error terms ($\varepsilon_{1,it}$, $\varepsilon_{2,it}$, $\varepsilon_{3,it}$ and u_{it}) in Equations a-d, seemingly unrelated regression is used to estimate the system of equations.

Following Barth et al. (2005) and Wang (2013), the predicted market value for each firm-year is estimated by using the last five years of data for all firms in the industry[16] but without using any firm specific data. Thus, the prediction was strictly considered to be out of sample prediction. In other words, the parameters and errors in forecasting and valuation equation were estimated using a jack-knifing procedure. For instance, to estimate the parameters for firm i in industry j for the year t, the data for all firms in industry j for the period from year t-4 to year t were included except the data for firm i in year t. Thus, the parameters were firm-year-industry specific, because they incorporate data updated on a yearly basis. We used five years of data to estimate the parameters to reflect the trade-off between efficiency and stationarity. The efficiency of the estimate would improve by increasing the number of years. However, the parameters would become nonstationary.

For the purposes of this paper, different discount rates (r) were used to calculate abnormal income (NI^{a}_{it}). First, we used a range of discount rates from 8% to 16%. Second, we used CAPM and Fama and French's three-factor model to calculate the discount rate on a five-year rolling basis (see table A1, for details). The results did not change significantly between different methods. To maintain simplicity, our results are reported using a 13% discount rate.

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residual operating income and residual income are equal to each other since the financial assets earn only the normal income.

[15]We include a constant in the abnormal income forecasting equation and in the valuation equation because abnormal income on average may be different from zero.

[16] We follow Fama and French's industry classification and divide our sample into 12 sectors.

$$NI_{it}^{a} = \omega_{10} + \omega_{11}NI_{it-1}^{a} + w_{12}bv_{it-1} + w_{13}\nu_{it-1} + \varepsilon_{1,it} \quad (\alpha) \quad \text{Equation 4-5}$$

$$BV_{it} = w_{22}BV_{it-1} + \varepsilon_{2,it} \quad (b)$$

$$\nu_{it} = w_{33}\nu_{it-1} + \varepsilon_{3,it} \quad (c)$$

$$MV_{it} = \alpha_0 + BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 BV_{it} + \alpha_3 \nu_{it} + u_{it} \quad (d)$$

$$\alpha_0 = \frac{(1+r)}{r} * \frac{w10}{1+r-w11}$$

$$\alpha_1 = \frac{\omega_{11}}{[(1+r)-\omega_{11}]}$$

$$\alpha_2 = \frac{(1+r)*\omega_{12}}{[(1+r)-\omega_{11}][(1+r)-\omega_{22}]}$$

$$\alpha_3 = \frac{(1+r)*\omega_{13}}{[(1+r)-\omega_{11}][(1+r)-\omega_{33}]}$$

where:

BV_{it} : Book value of equity;

MV_{it}: Market value of equity;

r: Cost of equity capital;

NI_{it}^{a}: Residual income that is calculated as $NI_{it} - r.BV$;

ν_{it}: Other information;

ω_{11}: Residual income persistency parameters that satisfy $0 < \omega_{11} < 1$;

ω_{12} The conservatism parameter; this must be positive ($\omega_{12} > 0$) if residual income is driven in part by understated book value instead of monopolistic power;

ω_{22} Growth in book value; this must satisfy the following conditions, $1 < \omega_{22} < (1+r)$, for a going concern;

ω_{33}: Other information persistency parameters that satisfy $0 < \omega_{33} < 1$;

$\varepsilon_{1,it}$, $\varepsilon_{2,it}$ *and* u_{it}= are error terms; and

i and t subscripts refer to the firm and year respectively.

Furthermore, we used two alternative approaches to estimate other information variables (v). First, we follow the procedures of Dechow et al. (1999) and Ohlson (2001). Thus, other information variables (v) are defined as the difference between (1) the conditional expectation of residual income for the period t+1 based on the whole information set available in period t; and (2) the expectation of abnormal income for year t+1 based only on abnormal income for year t, as expressed in

Equation 4-3. Second, we adopt the approach of Bryan and Tiras (2007) in calculating other information variables (v), as expressed in Equation 4-6.

$$f_{i,t} = \delta_0 + \delta_1 NI_{i,t} + \delta_2 BV_{i,t} + v_{i,t} \quad \text{Equation 4-6}$$

Where:

$f_{i,t}$ is the consensus of analysts' forecasts for next year's earnings by firm i;

$NI_{i,t}$ and $BV_{i,t}$ are the net income and book value of firm I in year t;

δ_0, δ_1 and δ_2 are regression parameters; and

$v_{i,t}$ is the regression residual, which proxies for other information in Equation 4-5.

Bryan and Tiras' approach is theoretically equivalent to the Dechow et al. (1999) model. However, they differ in several ways. First, Dechow et al. (1999), in estimating ω_{11}, adopt the restriction proposed by Ohlson's linear information making it positive but less than unity. In contrast, Bryan and Tiras (2007) allow the regression parameters to be estimated empirically and relax the assumption of linear information dynamics. Second, the approach of Dechow et al. (1999) requires the cost of capital (r) and abnormal income persistency parameter (ω_{11}) to be estimated in order to estimate (v). Thus, the accuracy of (v) depends on the accuracy of both (r) and (ω_{11}). However, Bryan and Tiras (2007) regress the consensus of financial analysts' forecasts directly on the fundamental variables (BV and NI). Thus, the accuracy of the model depends on the accuracy of the regression residual only[17].

4.3.3 Forming V/P portfolios

At the end of June each year, we sorted all stocks in the sample into five decile portfolios based on the V/P ratio. Portfolio 1 consisted of stocks with the lowest V/P ratio, while stocks with the highest V/P ratio were in Portfolio 5. We matched the fundamental value in December of years t-1 to the share prices for June in year t in order to calculate V/P ratio and to form the V/P portfolios. We followed this procedure to ensure that the accounting variables were known and reflected in stock prices before the returns were computed. For comparability reasons, we formed two additional trading strategies based on book to market and equity market value. In the same way as the V/P trading strategies, at the end of June each year, we sorted all the

[17] Both approaches give very similar results; hence, our main analysis depends only on DHS.

stocks in the sample based on either the B/M ratio or ME into five quintile portfolios. For a share to be included in a quantile portfolio, the return data had to be available, at least for the next 12 months from the portfolio formation date. After combining the estimated fundamental value with the monthly returns data, we found that 16580 firm-year observations had been made over the period between 1993 and 2015. Details of other criteria and the filters used to form the portfolios are in the data section of this paper.

We computed equal weighted returns and size adjusted returns over horizons of one year, two years and three years by compounding the monthly returns data for each of the quintile portfolios. These and other characteristics, for the sake of comparability are reported below in Table 4-2.

4.3.4 Association with traditional risk measures

In order to investigate the risk explanation for the superior predictability of the V/P strategy, we incorporated several traditional risk factors, as expressed in Equation 4-7. These factors are primarily motivated by the example set by several previous studies. For instance, Frankel and Lee (1998) investigate the extent to which firm size, book to market ratio and firm beta explain the predictive power of V/P strategy. Similarly, Ali et al. (2003) and Hwang and Lee (2013) control for some additional risk factors which had been suggested by Gebhardt et al. 2003 and Gode and Mohnram (2001) as proxies for firm characteristics. Below are definitions of all the risk factors included in Equation 4-7.

$$V/P = \beta_0 + \beta_1 Beta + \beta_2 Ivolatility + \beta_3\, D/M + \beta_4 Ln(ME) + \beta_5 Analysts + \beta_6 Altman's\ Z + \beta_7 Std(ROA) + \beta_8\, B/M + \varepsilon$$

Equation 4-7

V/P: This is a measure of the value to price ratio. We match the fundamental value of December in year t-1 to the share price for June in year t in order to calculate the V/P ratio.

$Beta$: This is a measure of systematic risk. Beta is estimated for each firm-year by implementing the capital asset pricing model (CAPM). Previous studies have documented a positive relationship between a firm's specific Beta and future stock returns (Fama and French, 1992; Frankel and Lee, 1998; Ali et al, 2003). We use the

CRSP value weighted index as a proxy for market returns. We estimated firm specific Betas at the end of December each year, by regressing the monthly returns of each firm against the contemporaneous monthly returns of the CRSP value-weighted index using the previous 36 months of data. In other words, to estimate the Beta of firm i for year t, we use firm i's monthly returns over the period from January t-3 to December t.

$Ivolatility$: This is a measure of unsystematic or idiosyncratic risk. Unsystematic risk for each firm-year is calculated as follows. First, we regressed the daily returns data for the previous year at the end of December each year, against the contemporaneous daily returns of the CRSP value weighted index. Second, we used the variance of the residuals from the previous regression as a proxy of $Ivolatility$. Several previous empirical studies have documented an association between future stocks returns and idiosyncratic risk (Ali et al, 2003; Gebhardt et al., 2003; Gode and Mohanram, 2001).

$\mathrm{D/M}$: This is a measure of leverage in the firm. Several prior studies have suggested a positive association between a firm's future stocks returns and its leverage ratio (Fama and French, 1992; Gebhardt et al., 2003; Gode and Mohanram, 2001). For every year, we measured D/M as the ratio of the book value of long-term debt at the end of December of the previous year to the market capitalization at the end of June in the current year.

$Ln(ME)$: This is a measure of firm size. Several previous studies use firm size as a proxy of the information environment. It is argued that the information environment is influenced by several interrelated factors such as trading volume, bid-ask spreads, firm size and institutional investors (Barth and Hutton, 2000; Mohanram, 2000). It is expected that firms with a better information environment have a lower risk premium because it reduces the information asymmetry between the firm and investors (Ali et al, 2003). It is well documented that size is correlated with the differences in information environment that lead to a lower risk for large firms than for small firms (Gebhardt et al., 2003; Gode and Mohanram, 2001). For the purposes of this study, size is measured as the log of firm i's market value at the end of June in year t. A negative association between the risk premium and firm size is expected.

$Analysts$: They are a measure of the financial analysts' coverage of the firm. It is another measure of the information environment. For instance, Brennan et al. (1993) argue that a firm with better coverage from financial analysts responds faster to market information than those with inferior analysts' coverage. Furthermore, analysts' coverage can be used as a proxy of firm liquidity. For instance, Brennan and Subrahmanyam (1995) argue that firms with better analysts' coverage tend to be more liquid than those with inferior analysts' coverage. Therefore, we used the number of analysts' estimates included in the I/B/E/S database in May of year t as a proxy for liquidity and information environment. We expected a negative association between firms with better analysts' coverage and future stock returns.

$Altman's\ Z$: This is a measure of financial distress. It is measured as a bankruptcy score, from Altman's (1968) model[18]. We expect a positive association between Altman's Z score and future stock returns.

$Std(ROA)$: This is a measure of earnings variability. Several previous studies have argued that the variability of earnings is likely to reflect intrinsic cash flow risks and is considered a main source of risk for firm valuations (Gebhardt et al., 2003; Gode and Mohanram, 2001). For the purposes of this paper, $Std(ROA)$ is calculated as the standard deviation of returns on assets in the past five years.

B/M: This is a measure of the book to market ratio. It has been argued that B/M can be used as a proxy for accounting conservatism, the growth opportunities of a firm, or perceived risk (Fama and French, 1992; Lakonishok et al., 1994). It is very difficult to distinguish empirically between various interpretations of B/M and to predict the direction of the relationship between the B/M ratio and future stock returns. For the purposes of this paper, it is calculated as the book value of equity at the end of December of the previous year divided by the market value of equity at the end of June in the current year.

[18] $ALtman's\ Z$ = 0/012*(working capital/Total assets) + 0.014*(retained earnings/Total assets) + 0.033*(earnings before interest and tax/Total assets) + 0.006*(Market value of equity/Book value of Total liabilities) + 0.999*(Sales/Total assets)

4.3.5 Returns predictability of the V/P

To investigate the returns predictability of the V/P ratio, we explored the relationship between this ratio and future stock returns after controlling for various risk factors, as expressed in Equation 4-8. If the coefficient of the V/P ratio (β_1) is significantly greater than zero after controlling for various risk factors, it indicates that the V/P captures additional risk factors beyond the controlled risk proxies. In other words, it indicates a V/P anomaly.

$$\text{Ret36} = \beta_0 + \beta_1 V/P + \beta_2 Beta + \beta_3 Ivolatility + \beta_4\, D/M + \beta_5 Ln(ME) + \beta_6 Analysts + \beta_7 Altman's\ Z + \beta_8 Std(ROA) + \beta_9\, B/M + \varepsilon$$

Equation 4-8

4.3.6 Asset pricing model

To investigate further the risk explanation of V/P effect, we tested for CAPM, Fama and French's three- and five-factors models, as expressed in Equation 4-9. The purpose was to find whether Fama and French's five-factor model better explains the excess returns of the V/P anomaly than do the CAPM and Fama and French's three-factor model. To achieve this objective, first, we estimated the CAPM by regressing the monthly excess returns of the V/P quintile portfolios against the excess returns of the weighted average market index, as expressed in the first model in Equation 9-4. where R_{it} are the monthly weighted average returns of the quintile portfolio i; R_{mt} are the monthly weighted average returns of market index; and R_{ft} are the monthly riskless rate on treasury bills.

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_t \quad (1)$$

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_t \quad (2)$$

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \varepsilon_t \quad (3)$$

Equation 4-9

Second, we estimated Fama and French's three-factor model by regressing the excess returns of the V/P quintile portfolios against the excess return on the market index and the returns on the SMB and HML mimicking portfolios, as expressed in the second model of Equation 9-4. The SMB and HML mimicking portfolios were formed by independently sorting all the stocks in NYSE, AMEX and NASDAQE into two sizes of portfolio (S and B) and three B/M portfolios (L, M and H). The NYSE median point was used as the breakpoint for the different-sized portfolios, while the 30th and 70th percentiles were used as breakpoint for the B/M portfolios. The intersections of the previous two sorting activities produced six portfolios (S/L, S/M, S/H, B/L, B/M and B/H). The returns of the SMB portfolio were calculated as the differences between the average returns of the three small portfolios ((SL+SM+SH)/3) and the average returns of the three big portfolios ((BL+BM+BH)/3). The returns of HML were calculated as the difference between the average returns on the two high B/M portfolios ((SH+BH)/2) and the average returns of the two low B/M portfolios ((SL+BL)/2).

Third, Fama and French's five-factor model was estimated by regressing the excess returns of the V/P quintiles portfolios against the excess returns on the market index and the returns on SMB, HML, RMW and CMA mimicking portfolios, as expressed in the third model of Equation 4-9. The returns on RMW and CMA mimicking portfolios were calculated in similar ways to the returns on the HML portfolio. To construct an RMW factor, all the stocks in NYSE, AMEX and NASDAQE were sorted into three groups based on the 30th and 70th percentiles of NYSE's operating income (robust minus weak). The intersections between the size sort and operating income sort produced another six portfolios (SR, SN, SW, BR, BN and BW). The returns of the RMW mimicking portfolio were calculated as the difference between the average returns on the two robust operating income portfolios and the average returns on the two weak operating income portfolios. Similarly, to construct the CMA factors, all the stocks in NYSE, AMEX and NASDAQE were sorted into three groups based on the 30th and 70th percentiles of NYSE's investment (measured as the change in total assets). The intersections between size sort and investment sort produced another six portfolios (SC, SN, SA, BC, BN and BA). The returns of the RMW mimicking portfolio were calculated as the difference between the average returns on the two conservative investment portfolios and the average returns on the two aggressive investment portfolios. The 2×3 sorts used to construct HML, RMW and CMA factors produced three size factors, namely, $SMB_{M/P}$, SMB_{OP} and SMB_{INV}. The SMB factor was calculated as the average of these three factors.

We compare the performance of the various models by calculating the F- statistics of Gibbons et al., (1989), or GRS F-statistics, as they are known. The null hypothesis of the test proposes that the intercepts α_i are jointly equal to zero. In other words, if the intercept in the regression of the V/P quintile's excess returns against the asset-pricing model's factor returns does not differ from zero, then the asset-pricing model should capture the expected returns of V/P.

4.4 Data

The original data used in this chapter consisted of all the AMEX, NYSE and NASDAQ non-financial firms at the merger of the COMPUSTAT fundamental files, CRSP returns files and Thomson I/B/E/S summary files of analysts' forecasts for one year ahead. For a firm to be included in the equity valuation estimate, it must satisfy the following conditions. First, it must have valid data for its book value, net income before extraordinary items, outstanding shares and fiscal year closing price from the fundamental COMPUSTAT files; and also one-year-ahead consensual forecasts by financial analysts for earnings per share (EPS) from the THOMSON I/B/E/S summary files. Second, the firm must have total assets of at least $10 million and a closing share price greater than one dollar to mitigate the effect of small companies and to ensure that firms each have a stable V/P ratio[19]. Third, firms with negative book value and/or negative consensus in the financial analysts' forecasts for one year ahead were deleted from the study sample, because including them implied a negative market value (Bryan and Tiras, 2007). Finally, we restricted our sample to firms with a year ending in December to simplify the analysis and to ensure that there was a six month gap between the fiscal year end and the portfolios formation date. Taking all the filters together, our final sample, used to estimate fundamental values, consisted of 22873 firm-year observations over the period 1987-2015. Table 4-1 shows the

[19] Frankel and Lee (1998) claim that firms with stock price of less than unity are characterised by an unstable V/P ratio and poor market liquidity.

distribution of the firms in the sample by industry and year. It shows that the number of observations in the durable goods sectors was the lowest and in business equipment was the highest.

We estimated the fundamental value for each firm-year observation using the previous five years of accounting data. We matched the fundamental value of December in year t-1 to the share price for June in year t in order to calculate the V/P ratio and form the V/P portfolios. We followed this procedure to ensure that the accounting variables were known before the returns were computed.

For a firm to be included in the V/P portfolios, the monthly returns data had to be available from July in year t to June in year t+1. The monthly returns data were collected from the CRSP monthly files for the whole sample period. Thus, the firm-year observations, after combining the estimated fundamental value with the monthly returns data, were reduced to a final number of 16580 over the period between 1993 and 2015.

Table 4-1Number of observations by year and industry

year	NoDur	Durbl	Manuf	Enrgy	Chems	BusEq	Telcm	Utils	shops	Hlth	other	Total
1987	22	12	41	14	14	31	5	34	12	15	41	**241**
1988	23	12	41	14	13	33	5	37	13	18	46	**255**
1989	23	12	43	19	14	35	5	37	13	20	48	**269**
1990	23	10	46	18	17	37	7	42	14	23	48	**285**
1991	23	10	54	21	17	37	8	43	15	25	49	**302**
1992	25	13	57	21	18	44	8	43	19	30	50	**328**
1993	26	16	72	28	17	50	12	45	22	32	62	**382**
1994	27	18	81	30	21	53	13	45	27	36	70	**421**
1995	29	19	95	35	23	74	14	48	29	38	77	**481**
1996	34	19	100	39	23	89	18	52	37	48	93	**552**
1997	36	21	107	46	24	99	18	57	38	48	112	**606**
1998	35	21	108	42	25	113	18	57	44	55	117	**635**
1999	38	21	109	51	26	129	23	59	47	59	127	**689**
2000	36	21	108	58	27	139	22	63	44	66	122	**706**
2001	43	20	111	64	25	114	25	64	47	67	122	**702**
2002	46	21	114	66	28	133	31	65	52	72	150	**778**
2003	49	24	125	71	29	173	38	66	57	82	158	**872**
2004	50	25	136	73	31	182	40	68	71	85	177	**938**
2005	51	29	142	86	33	202	47	72	79	84	196	**1021**
2006	54	30	158	99	39	214	50	76	84	94	226	**1124**
2007	57	35	164	108	39	230	54	79	88	100	238	**1192**
2008	57	25	151	98	34	183	47	85	85	101	230	**1096**
2009	63	34	175	109	42	235	50	89	93	115	255	**1260**
2010	69	39	194	123	45	280	53	90	101	123	280	**1397**

Table 4-1 Continued.

year	NoDur	Durbl	Manuf	Enrgy	Chems	BusEq	Telcm	Utils	shops	Hlth	other	Total
2011	70	46	186	145	48	284	62	90	104	123	292	**1450**
2012	73	43	192	144	52	304	63	93	113	126	304	**1507**
2013	79	46	205	152	54	330	69	94	141	138	344	**1652**
2014	85	48	197	121	60	350	71	107	141	159	357	**1696**
Total	**1,246**	**690**	**3,312**	**1,895**	**838**	**4,177**	**876**	**1,800**	**1,630**	**1,982**	**4,391**	**22837**
%	5.46	3.02	14.5	8.3	3.67	18.29	3.84	7.88	7.14	8.68	19.23	100

The sectors are defined as follows:

1) NoDur: Consumer Non-Durables - Food, Tobacco, Textiles, Apparel, Leather, Toys (SIC code: 0100-0999, 2000-2399, 2700-2749, 2770-2799, 3100-3199 and 3940-3989)
2) Durbl: Consumer Durables - Cars, TV's, Furniture, Household Appliances (Sic code: 2500-2519, 2590-2599, 3630-3659, 3710-3711, 3714-3714, 3716-3716, 3750-3751, 3792-3792, 3900-3939 and 3990-3999)
3) Manuf Manufacturing - Machinery, Trucks, Planes, Off Furn, Paper, Com Printing (SIC code: 2520-2589, 2600-2699, 2750-2769, 3000-3099, 3200-3569, 3580-3629, 3700-3709, 3712-3713, 3715-3715, 3717-3749, 3752-3791, 3793-3799, 3830-3839 and 3860-3899)
4) Enrgy: Oil, Gas and Coal Extraction and Products (SIC code: 1200-1399 and 2900-2999)
5) Chems: Chemicals and Allied Products (SIC code: 2800-2829 and 2840-2899)
6) BusEq: Business Equipment -- Computers, Software and Electronic Equipment (SIC code: 3570-3579, 3660-3692, 3694-3699, 3810-3829 and 7370-7379)
7) Telcm: Telephone and Television Transmission (SIC code: 4800-4899)
8) Utils: Utilities (SIC code: 4900-4949)
9) Shops: Wholesale, Retail and Some Services, e.g. Laundries, Repair Shops (SIC code:5000-5999, 7200-7299 and 7600-7699)
10) Hlth: Healthcare, Medical Equipment and Drugs (SIC code: 2830-2839, 3693-3693, 3840-3859 and 8000-8099)
11) Other: Other - Mines , Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment

4.5 Results and discussion

4.5.1 V/P characteristics

Table 4-2 reports the characteristics of the quintile portfolios formed by the market equity (ME), book to market ratio (B/M), or value to price ratio (V/P). All the firms in the sample were uni-dimensionally divided into five quintile portfolios at the end of June each year based on one of these measures. Table 4-2 provides the average ME, B/M and V/P value for each portfolio, as well as the average post-formation market beta and the average raw/size-adjusted buy and hold returns over the next 12 months (Ret12/SRet12), 24 months (Ret24/Sret24) and 36 months (Ret36/SRet36). We calculated post-market beta for each firm by regressing an equal-weighted market index against the contemporaneous firm-monthly returns over the next 36 months. The size-adjusted buy and hold returns were calculated as the difference between the raw buy and hold returns and the corresponding CRSP size-decile index returns. The purpose of calculating the size-adjusted buy and hold returns is to control for the effect of size differences (ME) among the quintile portfolios. We report the numbers of observation for each portfolio in the last row of each panel of Table 4-2, which applies to all variables except the post estimation returns. The numbers of observations drop to 15271, 13970 and 12738 for Ret12/SRet12, Ret24/SRet24 and Ret36/SRret36, respectively.

The right column of Table 4-2 reports the post formation returns for the hedge portfolios. We formed the hedge portfolios by taking a long position in portfolio Q5 and a short position in portfolio Q1. We assessed the statistical significance of the difference (Q5-Q1) by computing portfolio characteristics on a yearly basis. Then we used the time-series variations of the estimated value to compute the statistical significance for the mean value over the whole sample period[20].

Panel A of Table 4-2 shows that a hedge portfolio formed by taking a long position in large ME stocks and a short position in small ME stocks to generate an average row (size adjusted) buy and hold returns of -7.8% (-6.3%), -16.8% (-10.6%) and -28.6%

[20] The procedure proposed by Newey and West (1987) was used to correct for the serial correlation in buy and hold returns which was induced by overlapping the holding periods beyond the first year (Ret24/ SRet24 and Ret36/ Sret36).

(-15.1%) over 12, 24 and 36 months period. These results indicate that firms with small ME mostly outperform firms with large ME.

Panel B of Table 4-2 confirms B/M effect for our sample. The firms in Q1 (The lowest B/M ratio) earn on average raw (size-adjusted) hold and buy returns of 13.6% (2.4%) over a one-year horizon, while the firms in Q5 earn 17.7% (5.4%). The difference of 4.1% (3%) is statistically significant at 5% and is comparable in magnitude to the findings in Frankel and Lee (1998). Furthermore, our findings suggest that the B/M effect is also held over longer horizons. For instance, the B/M hedge portfolio (Q5-Q1) generates on average raw (size-adjusted) buy and hold returns of 11.1% (10.7%) over the next 36-month period, which is statistically significant at 5%.

Panel C of Table 4-2 shows that the quintile portfolios formed by the V/P ratio are somewhat similar to those formed by the B/M ratio. First, the firms in the lowest V/P quintile (Q1) have the lowest B/M ratio, while the firms in the highest V/P quintile (Q5) have the highest B/M ratio. In other words, the B/M and V/P ratios are positively correlated with each other. More importantly, a hedge portfolio formed by the V/P ratio produced on average raw (size adjusted)buy and hold returns of 5.3% (3.2%), 13.7% (8.8%) and 27.8% (14.5%) over the next 12 months, 24 months and 36 months, respectively. Our results indicate that the prediction power of the V/P strategy is very similar to the prediction power of the B/M strategy in the short term (with a one-year horizon). However, the performance of the V/P strategy significantly improved over longer horizons in comparison with those of the B/M. For instance, the performance of the V/P hedge portfolio spread over 36 months was 27.8% (14.5%), compared with only 11.1% (10.6%) for the B/M hedge portfolios. Overall, the V/P effect of our sample was very consistent with those reported in Frankel and Lee (1998) and Ali et al. (2003).

Table 4-2 Characteristics of quantile-portfolio formed by ME, B/P and V/P ratios

Panel A- Market equity portfolios (In sample size quintiles)

	Q1 Low ME	Q2	Q3	Q4	Q5 High ME	All Firms	Q5-Q1 Diff.
ME	274	1014	2392	5837	20491	6984	20216***
V/P	2.243	1.285	1.081	0.992	0.904	1.476	-1.339***
B/M	1.670	1.110	0.859	0.692	0.470	1.104	-1.201***
beta	1.262	1.291	1.209	1.164	1.003	1.186	-0.259***
Ret12	0.187	0.140	0.151	0.130	0.109	0.152	-0.078***
Ret24	0.411	0.329	0.324	0.298	0.247	0.340	-0.168***
Ret36	0.585	0.426	0.366	0.388	0.304	0.447	-0.286***
SRet12	0.069	0.027	0.028	0.005	0.005	0.035	-0.063***
SRet24	0.124	0.062	0.043	0.019	0.017	0.067	-0.106***
SRet36	0.179	0.097	0.028	0.037	0.027	0.094	-0.151***
Obs.	3325	3314	3315	3296	3330	16,580	

Panel B- Book to Market (B/M) portfolios

	Q1 Low B/M	Q2	Q3	Q4	Q5 High B/M	All Firms	Q5-Q1 Diff.
B/M	0.155	0.320	0.478	0.702	2.496	1.104	2.340***
V/P	0.890	1.097	1.343	1.678	2.370	1.476	1.480***
ME	10846	7784	6062	5546	4686	6984	-6160***
beta	1.219	1.168	1.154	1.117	1.241	1.186	0.022
Ret12	0.136	0.141	0.153	0.152	0.177	0.152	0.041**
Ret24	0.300	0.314	0.340	0.334	0.411	0.340	0.111*
Ret36	0.386	0.405	0.450	0.453	0.542	0.447	0.156**
SRet12	0.024	0.027	0.037	0.033	0.054	0.035	0.030**
SRet24	0.042	0.048	0.069	0.058	0.118	0.067	0.076*
SRet36	0.058	0.066	0.083	0.101	0.165	0.094	0.106*
Obs.	3325	3314	3315	3296	3330	16,580	

Table 4-2 continued

Panel C- Value to Price (V/P) portfolios							
	Q1 Low V/P	Q2	Q3	Q4	Q5 High V/P	All Firms	Q5-Q1 Diff.
V/P	0.580	0.876	1.142	1.531	3.184	1.476	2.604***
B/M	0.538	0.647	0.858	1.368	1.800	1.104	1.261***
ME	12400	7747	5033	3086	944	6984	-11455**
beta	1.10	1.04	1.03	1.13	1.28	1.186	0.18
Ret12	0.148	0.149	0.137	0.176	0.201	0.152	0.053*
Ret24	0.330	0.307	0.325	0.365	0.467	0.340	0.137**
Ret36	0.413	0.382	0.383	0.449	0.691	0.447	0.278**
SRet12	0.028	0.024	0.014	0.048	0.060	0.035	0.032*
SRet24	0.050	0.035	0.042	0.070	0.138	0.067	0.088*
SRet36	0.077	0.043	0.046	0.083	0.223	0.094	0.145*
Obs.	3325	3314	3315	3296	3330	16,580	

All the NYSE, AMEX, NASDAQE stocks in the sample, were sorted into five quintile portfolios based on ME, B/M, or $\frac{V}{P}$ at the end of June each year. ME is the market value of equity at the end of June of year t. V/P is the fundamental value of year $t-1$, measured using the previous five years' data, divided by the stock price at the end of June of year t. B/M is the book market of equity at the end of December of year $t-1$ divided by the market value of equity at the end of June of year t. The stocks in Q1 (Q5) were the stocks with the lowest (highest) ME, B/M, or V/P. Each panel of the table reports the characteristics of the quintile portfolios. Beta is estimated using the next 36 months of returns data. Ret12, Ret24 and Ret36 are the average buy-and-hold returns over 12, 24 and 36 months, respectively, at the beginning of July of year t. Sret12, Sret24, and Sret36 are size-adjusted returns over 12, 24 and 36 months, respectively, beginning from the July of year t. The size-adjusted returns were calculated as the difference between the raw returns and the corresponding size index returns where the cut-off point of the size deciles was based on all AMEX and NYSE stocks. Obs. denotes the number of observations in each quintile portfolio and it applies to all variables except returns. Q5-Q1 diff. represents the differences between the top portfolio and bottom portfolio. The statistical significance of the difference is based on t-statistics derived from the annual mean and the standard error of the variables. The procedures of Newey and West (1987) were followed to adjust for the serial correlation for Ret24, Ret36, Sret24, Sret36 due to overlapping holding periods. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively (two-sided tests).

4.5.2 Risk explanation of the V/P strategy

As noted above, to investigate the risk explanation for the superior predictability of V/P strategy, we used several traditional risk factors that were common to a number of previous studies (Frankel and Lee, 1998; Ali et al., 2003). In particular, we examined the relationship between the V/P ratio and several firm characteristics, as expressed in Equation 4-9. We included the B/M ratio as a proxy for firm growth and Beta and Ivolatility to capture the systematic and non-systematic risks of stock variability. Size and Analysts were used to capture the differences in the information environment and their impact on the risks perceived among small and large firms. In addition, we included Altman's Z score to capture the risk of financial distress, the D/M ratio to capture the influence of firm leverage and the standard deviation of ROA (Std. ROA) as a proxy of firms' earning variability.

Before running the main regression as expressed in Equation 4-9, we report the Pearson (Spearman) correlation matrix among the V/P and various risk factors over (under) the diagonal in Table 4-3. We found that the V/P ratio was positively and significantly correlated with B/M, beta, Ivolatility, D/M and Std. ROA, which indicated that the firms with the highest V/P ratio were the riskier ones. However, the negative and strong association of V/P with Ln (ME) and Analysts indicated that the firms with the lowest V/P ratio were much riskier.

To investigate further the risk explanation of the V/P effect, we report in Table 4-4 the regression analysis results for Equation 4-9. We estimated two different versions of Equation 4-9. In the first model, we regressed V/P against beta, Ln (ME) and B/M, as suggested by Frankel and Lee (1998). It is clear from the first two columns of Table 4-4 that the coefficients on Beta and B/M are positive (0.144 and 0.027, respectively) and statistically significant (t-statistics of 8.72 and 6.51, respectively), while the coefficient on Ln(ME) is negative and statistically significant (t-statistics of -43.03). Our results indicate that firms with the highest V/P ratio are characterised by a high book to market ratio, high beta and small size, while firms with the lowest V/P ratio are large firms with low beta and low book to market ratio. Our results are in line with the findings of Frankel and Lee (1998).

The regression results for the second model, which include all risk factors as expressed in Equation 4-9, are reported in the last two column of Table 4-4. The coefficient on B/M, Ivolitality, Std. (ROA) and D/M are positive and strongly significant, which indicates that firms with a higher V/P ratio are riskier and are likely to require a higher expected return. The negative and significant coefficient on Ln(ME) suggests that a higher V/P ratio is associated with smaller firms, which support the risk explanation of the V/P strategy. The sign of the coefficient on Beta, Analysts and Altman's Z score are not consistent with the risk explanation of the V/P strategy. We notice that the coefficient on Beta is positive and significant in the first model, but become negative and significant in the full model. The positive sign on Analysts and the negative sign on Altman's Z score indicate that firms with a higher V/P ratio are less risky and are most probably to be associated with lower future returns.

Although the overall results of the first model support the risk explanation of the V/P effect, the regression results of the full model do not conclusively indicate that stocks with a high V/P ratio are riskier. Therefore, we cannot guarantee that the V/P effect is driven by omitted risk factors.

To investigate further the returns predictability of the V/P ratio, we explored the relationship between the V/P ratio and future stock returns after controlling for various risk factors, as expressed in Equation 4-8. If the coefficient of the V/P ratio (β_1) is significantly greater than zero after controlling for various risk factors, it indicates that the V/P captures additional risk factors beyond the controlled risk proxies. In other words, it indicates the V/P anomaly. Table 4-5 reports the regression results for three different variations of the model in Equation 4-8. As shown in the first two columns of Table 4-5, we regressed Ret36 against V/P only. The positive and significant coefficient (t-statistics 10.23) confirms the V/P effect in our sample. The second model, reported in columns 3 and 4, has Beta, Ln(ME) and the B/M ratio in addition to the V/P as explanatory variables, while the last model, reported in the last two columns, has all the variables of Equation 4-8. The results indicate that the coefficient on V/P remains significant and positive (t statistics of 1.9 for the full model) after controlling for all risk factors, confirming that the omission of risk factors is not likely as an explanation of the V/P effect.

Table 4-3 Pearson and Spearman correlation matrix among V/P and various risk indicators

	V/P	Analysts	Ln(ME)	D/M	Beta	volatility	Std. ROA	Z Score	B/M
V/P	-	-0.275***	-0.478***	0.161***	0.118***	0.437***	0.112***	-0.017	0.148***
Analysts	-0.391***	-	0.721***	-0.125***	-0.053***	-0.270***	-0.075***	-0.157***	-0.159***
Ln(ME)	-0.553***	0.754***	-	-0.139***	-0.103***	-0.491***	-0.115***	-0.173***	-0.165***
D/M	0.196***	0.039***	0.086***	-	0.034***	0.035***	-0.038***	-0.146***	0.791***
Beta	0.116***	-0.032***	-0.092***	-0.059***	-	0.2912***	0.136***	0.015*	0.021***
Volatility	0.361***	-0.327***	-0.538***	-0.178***	0.290***	-	0.148***	0.101***	-0.006
Std. ROA	0.154***	-0.135***	-0.222***	-0.223***	0.286***	0.369***	-	0.011***	-0.035***
Z Score	-0.039	-0.176***	-0.201***	-0.341***	0.027***	0.130***	0.079***	-	-0.103***
B/M	0.577***	-0.237***	-0.303***	0.431***	0.025***	0.037***	-0.069***	-0.218***	-

The table reports the Pearson (Spearman) correlation matrix over (under) the diagonal. V/P is the fundamental value of year $t-1$, measured using the previous five years' data, divided by the stock price at the end of June in year t. $Analysts$ is the number of financial analysts following the share, which is included in ` I/B/E/S files in the month following the annual earnings announcements. Ln(ME) is the logarithm of the market value of equity at the end of June in year t. D/M is the ratio of the long-term debt at the end of December of year t-1 to the market value of equity as measured at the end of June in year t. Beta is measured using the capital asset pricing model (CAPM) using monthly data over the maximum of 36 previous months ending in the December of year t-1. Volatility is calculated as the standard deviation of the residual from the CAPM model using daily returns data that end on the last trading day of year t-1. Std. ROA is the standard deviation of return over assets over the previous five years ending in the December of year t-1. Z score is an Altman's Z score (1968) calculated as $ALtman's\ Z$ = 0/012*(working capital/Total assets) + 0.014*(retained earnings/Total assets) + 0.033*(earnings before interest and tax/Total assets) + 0.006*(Market value of equity/Book value of Total liabilities) + 0.999*(Sales/Total assets). B/M is calculated as the book value of equity of year t-1 divided by the market value of equity at the end of June in year t. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively (two-sided tests).

Table 4-4 Regression of V/P on various risk factors

$$V/P = \beta_0 + \beta_1 Beta + \beta_2 Ivolatility + \beta_3\, D/M + \beta_4 Ln(ME) + \beta_5 Analysts + \beta_6 Altman's\, Z + \beta_7 Std(ROA) + \beta_8\, B/M + \varepsilon$$

Equation 4-7

	Frankel and Lee (1998)		Ali et al (2003)	
	β	t-statistics	β	t-statistics
Intercept	3.312	40.60 ***	2.55	26.58***
$Beta$	0.144	8.72***	-0.046	-6.92***
$Ivolatility$			3.99	17.32***
D/M			0.041	2.30**
$Ln(ME)$	-0.329	-49.03***	-0.28	-29.55***
$Analysts$			0.018	11.23***
$Altman's\ Z$			-0.167	-9.95***
$Std(ROA)$			1.33	6.92***
B/M	0.027	6.51***	0.018	2.18**
Industry dummy	Yes		Yes	
Year dummy	Yes		Yes	
Adj. R^2	26.5%		33.17%	
Obs.	16548		16548	
Years	1993-2014		1992-2014	

The table reports the pooled regression of Equation 4-7 with year and industry fixed effect. The industry classification is based on Fama and French (1997), as reported in Table 4-1. The sample consists of 16548 firm-year observations over the period from 1993 to 2014.

*, ** and *** denote statistical significance at 10%, 5% and 1%, respectively (two-sided tests).

V/P is the fundamental value of year $t-1$ divided by the stock price at the end of June in year t. $Analysts$ is the number of financial analysts following the share. Ln(ME) is the logarithm of the market value of equity at the end of June in year t. D/M is the ratio of the long-term debt at the end of December in year t-1 to the market value of equity as measured at the end of June in year t. Beta is measured using the capital asset pricing model (CAPM) using monthly data over the maximum of 36 previous months ending at the December of year t-1. Volatility is calculated as the standard deviation of the residual from the CAPM model using daily returns data ending on the last trading day of year-1. Std. ROA is the standard deviation of return over assets over the previous five years ending in the December of year t-1. Z score is an Altman's Z score (1968). B/M is calculated as the book value of equity of year t-1 divided by the market value of equity at the end of June of year t. Adj. R^2 is the adjusted R-square.

Table 4-5 Regression of future returns on V/P and various risk factors

$$Ret36 = \beta_0 + \beta_1 V/P + \beta_2 Beta + \beta_3 Ivolatility + \beta_4 D/M + \beta_5 Ln(ME) + \beta_6 Analysts + \beta_7 Altman's\ Z + \beta_8 Std(ROA) + \beta_9 B/M + \varepsilon$$

Equation 4-8

	V/P only		Frankel and Lee		Ali et al (2003)	
	β	t-statistics	β	t-statistics	β	t-statistics
Intercept	0.522	9.24***	0.852	12.62***	0.647	7.94***
V/P	0.054	10.23***	0.031	4.67***	0.013	1.9**
$Beta$			0.009	0.93	-0.030	-2.58***
$Ivolatility$					1.431	7.49***
D/M					0.036	4.79***
$Ln(ME)$			-0.428	-9.35***	-0.037	-5.06***
$Analysts$					0.003	2.51**
$Altman's\ Z$					0.045	3.54***
$Std(ROA)$					-0.163	-1.29
B/M			-0.003	-1.23	-0.014	-3.25***
Ind. dummy	Yes		Yes		Yes	
Year dummy	Yes		Yes		Yes	
Adj. R^2	21.88%		22.50%		23.39%	
Obs.	12733		12707		11693	
Years	1993-2011		1993-2011		1993-2011	

The table reports the pooled regression of Equation 4-8 with year and industry fixed effect. The industry classification is based on Fama and French (1997), as reported in Table 4-1. The sample consists of 16548 firm-year observations over the period from 1993 to 2014.

*, ** and *** denote statistical significance at 10%, 5% and 1%, respectively (two-sided tests).

Ret36 is the buy-and-hold returns over 36 months beginning in the July of year t. V/P is the fundamental value of year $t-1$ divided by the stock price at the end of June of year t. $Analysts$ is the number of financial analysts following the share. Ln(ME) is the logarithm of the market value of equity at the end of June in year t. D/M is the ratio of the long-term debt at the end of December of year t-1 to the market value of equity as measured at the end of June in year t. Beta is measured using the capital asset pricing model (CAPM) using monthly data over the maximum of 36 previous months ending in the December of year t-1. Volatility is calculated as the standard deviation of the residual from the CAPM model using daily returns data ending on the last trading day of year t-1. Std. ROA is the standard deviation of return over assets over the previous five years ending in December of year t-1. Z score is an Altman's Z score (1968). B/M is calculated as the book value of the equity of year t-1 divided by the market value of equity at the end of June of year t. Adj. R^2 is the adjusted R-square.

4.5.3 The performance of asset pricing model

Now we turn to the main research question of this paper, testing how well our asset pricing models explain the excess returns of the V/P quintile portfolios. We compared the relative performance of seven alternative models by calculating the GRS statistics of each model. We used (i) the capital asset pricing model; (ii) Fama and French's three-factor model which combined excess returns on the market $(R_m - R_f)$, SMB and HML factors; (iii) three four-factor models that combined $(R_m - R_f)$, SMB and pairs of HML, RMW, or CMA; and (iv) a five-factor model that combined $(R_m - R_f)$, SMB, HML, RMW and CMA.

Panel A of Table 4-6 reports the intercepts and slopes for five V/P quintile portfolios produced by the CAPM. Results in panel A show that the coefficients on $(R_m - R_f)$ are positive and significant for all V/P portfolios, while the intercept is significantly different from zero for four of the five V/P portfolios. It is clear that the value of the intercept is positive and significant for low V/P portfolios and is negative and significant for only the highest V/P portfolios. The GRS F-statistics for CAPM of 20.121 with p-value (0.00) invalidate the null hypothesis that the five intercepts produced by CAPM are jointly different from zero. These results suggest that CAPM cannot fully explain the excess returns of V/P strategy. In other words, V/P excess returns are driven by omitted risk factors other than the market risk.

The results of Fama and French's three-factor model are reported in panel B of Table 4-6. The coefficients on $(R_m - R_f)$, Size (SMB) and B/M (HML), are positive and significant across the V/P portfolios except the HML of the lowest V/P portfolio (negative and significant). The significant coefficients confirm that the excess returns of the V/P strategy vary due to the differences in size, B/M ratio and betas across quintile portfolios. The results in the table show that the intercept of Fama and French's three-factor model are positive and significant for low V/P portfolios, but negative and significant for the highest V/P portfolio. The GRS F-statistics of 22.079 (p-value < 0.05) invalidate the null hypothesis that the five intercepts produced by the three-factor model are jointly indistinguishable from zero. These results suggest that Fama and French's three-factor model cannot explain all the variation in excess returns among quintile portfolios. Therefore, the V/P excess returns are driven by omitted risk factors other than size, B/M ratio and market risks.

Panels C, D and E of Table 4-6 report the intercepts and slopes for three four-factor models, which combine the market and size factors with pairs of B/M and the profitability or investment factors. In Panel C, we add profitability to the traditional three-factor model. It is clear that the coefficients on the profitability factor (RMW) are positive and significant for the low V/P portfolios (p-value <0.05), but negative and significant for the highest V/P portfolio (p-values <0.1). In panel D, we add the investment factor to the traditional three-factor model. The coefficients on the investment factor are weakly significant only for the two low V/P quintile portfolios (p-value <0.1), suggesting that adding the investment factor has negligible influence on the performance of the traditional three-factor model. In panel E of table 4-6, we add both profitability and investment factors, but excluding the B/M factor from the traditional three factor model. The reported results show that investment factors become positive (negative) and significant in the low V/P (the highest V/P) at the 1% significance level. The results in panel D and E suggest that the investment factor becomes redundant when we include the HML factor in the regression. Moreover, the joint results in panel C, D and E show that the intercept of three four-factor model are positive and significant for the low V/P quintile portfolios, but negative and significant for the highest V/P quintile portfolio. The GRS F-statistics of the three four-factor model are 19.47, 22.27 and 20.75, respectively. These results confirm that the four-factor model, which includes $(R_m - R_f)$, SMB, HML and RMW, performs the best among the three versions.

Panel F of Table 4-6 reports the results of Fama and French’s five-factor model. The coefficient on the market factor $(R_m - R_f)$, size factor (SMB), B/M factor (HML) and profitability factor (RMW) are in most cases positive and significant. The significant coefficients confirm that the excess returns of the V/P strategy vary due to differences in size, the B/M ratio, operating profit and betas across the quintile portfolios. Yet the coefficient on investment factor (CMA) is weakly significant and negative in two cases only. These results, together with the results of the four-factor model, confirm that investment factor become redundant when we include the HML factor.

More importantly, the results in Table 4-6 show that the intercept of the Fama and French five-factor model are positive and significant for low V/P portfolios, but negative and significant for the high V/P portfolios. The GRS F-statistics of 19.35 (p-value < 0.05) invalidate the null hypothesis that the five intercepts produced by the five-factor model are jointly indistinguishable from zero. These results suggest that Fama and French's five-factor model cannot explain all the variation in excess returns among the quintile portfolios. Therefore, the V/P excess returns are driven by omitted risk factors other than size, B/M ratio, investment, profitability and market risks.

By comparing the GRS F-statistics of the previous seven models, it is clear that Fama and French's five-factor model performs better than either the CAPM or the traditional Fama and French three factor model. However, the performance of the four-factor model, which adds profitability to the traditional three-factor model, is very similar to that of the five-factor model. These results confirm that the excess returns of V/P strategy vary due to differences in size, the B/M ratio, operating profit and betas across quintile portfolios. Furthermore, Fama and French's five-factor model suggests that the V/P anomaly becomes less anomalous after introducing the profitability factor. However, these factors cannot explain all the variation in excess returns and the stocks in the high V/P portfolios may be riskier than the stocks in the low ones in some other dimensions.

Table 4-6 Factors regression for quintile portfolios formed on (V/P)

Panel A: One Factor Model $(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_t$ (1)

	V/P	ME	α	β	Adj.R^2
Q1	0.580	12400	0.012***	1.062***	0.754
			(7.93)	(29.11)	
Q2	0.876	7747	0.006***	1.041***	0.764
			(4.54)	(29.91)	
Q3	1.142	5033	0.004***	.994***	0.726
			(2.73)	(27.05)	
Q4	1.531	3086	0.001	1.115***	0.713
			(0.26)	(26.16)	
Q5	3.184	944	-0.006**	1.237***	0.643
			(-2.77)	(22.28)	

GRS F-value:20.121***

Panel B: Three Factor Model

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_t \quad (2)$$

	V/P	ME	α	β	s	h	Adj.R^2
Q1	0.580	12400	0.01***	0.98***	0.41***	-0.09***	0.810
			(8.98)	(29.11)	(8.60)	(-2.17)	
Q2	0.876	7747	0.005***	1.022***	0.427***	0.292***	0.844
			(4.58)	(34.39)	(9.94)	(7.29)	
Q3	1.142	5033	0.002**	0.995***	0.435***	0.425***	0.845
			(2.27)	(34.22)	(10.36)	(10.86)	
Q4	1.531	3086	-0.001*	1.104***	0.582***	0.488***	0.854
			(-1.08)	(34.70)	(12.66)	(11.38)	
Q5	3.184	944	-0.01***	1.173***	0.838***	0.412***	0.797
			(-4.67)	(26.73)	(13.22)	(6.97)	

GRS F-value:22.079***

Table 4-7 Factors regression for quintile portfolios formed on (V/P)

Panel C : Four Factor Model (Profitability, size and B/M)

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + \varepsilon_t \quad (3)$$

	V/P	ME	α	β	s	h	r	Adj.R^2
Q1	0.580	12400	0.01***	0.99***	0.43***	-0.11**	0.06	0.809
			(8.52)	(26.89)	(8.32)	(-2.31)	(0.78)	
Q2	0.876	7747	0.004***	1.07***	0.49***	0.23***	0.25***	0.852
			(3.58)	(33.96)	(11.00)	(5.62)	(4.07)	
Q3	1.142	5033	0.001	1.05***	0.51***	0.36***	0.27***	0.854
			(1.18)	(34.19)	(11.62)	(8.98)	(4.52)	
Q4	1.531	3086	-0.002*	1.14***	0.62***	0.44***	0.17**	0.857
			(-1.69)	(33.08)	(12.90)	(9.89)	(2.59)	
Q5	3.184	944	-0.01***	1.14***	0.80***	0.43***	-0.119	0.797
			(-4.23)	(23.93)	(11.97)	(6.98)	(-1.25)	

GRS F-value: 19.474***

Panel D: Four factor model (Investment, size and B/M)

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + c_i CMA_t + \varepsilon_t \quad (3)$$

	V/P	ME	α	β	s	h	c	Adj.R^2
Q1	0.580	12400	0.012***	0.968***	0.424***	-0.046	-0.126	0.810
			(9.10)	(27.75)	(8.70)	(-0.80)	(-1.39)	
Q2	0.876	7747	0.005***	1.01***	0.432***	0.340***	-0.118	0.845
			(4.78)	(32.85)	(10.05)	(6.58)	(-1.48)	
Q3	1.142	5033	0.002***	0.991***	0.437***	0.441***	-0.037	0.844
			(2.32)	(32.83)	(10.35)	(8.68)	(-0.48)	
Q4	1.531	3086	-0.001	1.101***	0 .58***	0.503***	-0.036	0.854
			(-0.99)	(33.30)	(12.64)	(9.05)	(-0.43)	
Q5	3.184	944	-.008***	1.17***	0.84***	0.423***	-0.026	0.796
			(-4.55)	(25.68)	(13.17)	(5.52)	(-0.22)	

GRS F-value: 22.272***

Table 4-8 Factors regression for quintile portfolios formed on (V/P)

Panel E: Four factor model (investment, profitability and size)

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + r_i RMW_t + c_i CMA_t + \varepsilon_t \quad (3)$$

	V/P	ME	α	β	s	r	c	Adj.R^2
Q1	0.580	12400	0.012***	0.970***	0.431***	0.011	-0.173***	0.810
			(8.80)	(25.37)	(8.32)	(0.17)	(-2.46)	
Q2	0.876	7747	0.003***	1.096***	0.498***	0.363***	0.187***	0.840
			(2.93)	(32.12)	(10.75)	(5.92)	(2.98)	
Q3	1.142	5033	0.001	1.095***	0.513***	0.437***	0.361***	0.831
			(0.17)	(31.89)	(11.01)	(7.08)	(5.70)	
Q4	1.531	3086	-0.003***	1.191***	0.638***	0.378***	0.428***	0.828
			(-2.45)	(30.35)	(11.99)	(5.36)	(5.91)	
Q5	3.184	944	-0.008***	1.193***	0.822***	0.081	0.384***	0.774
			(-4.75)	(22.70)	(11.53)	(0.87)	(3.96)	

GRS F-value: 20.745***

Panel F: Five factor model

$$(R_{it} - R_{ft}) = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \varepsilon_t \quad (3)$$

	V/P	ME	α	β	s	h	r	c	Adj.R^2
Q1	0.58	12400	0.012***	0.97***	0.43***	-0.05	0.038	-0.11*	0.810
			(8.60)	(25.11)	(8.53)	(-0.94)	(0.52)	(-1.26)	
Q2	0.87	7747	0.004***	1.06***	0.49***	0.25***	0.24***	-0.05	0.852
			(3.65)	(31.92)	(11.00)	(4.74)	(3.85)	(-0.73)	
Q3	1.14	5033	0.001*	1.05***	0.50***	0.34***	0.28***	0.03	0.854
			(1.07)	(32.48)	(11.60)	(6.56)	(4.50)	(0.40)	
Q4	1.53	3086	-0.01*	1.14***	0.62***	0.44***	0.17**	0.006	0.857
			(-1.66)	(31.32)	(12.87)	(7.46)	(2.55)	(0.08)	
Q5	3.18	944	-0.01***	1.14***	0.80***	0.46***	-0.12	-0.05	0.797
			(-4.02)	(22.50)	(11.96)	(5.60)	(-1.32)	(-0.47)	

GRS F-value: 19.351***

Table 4-9 Factors regression for quintile portfolios formed on (V/P)

The table reports the regression results of the capital asset pricing model and Fama and French's three-, four- and five-factor models by regressing the excess monthly returns of the V/P quintile portfolios against the market excess returns and combinations of SMB, HML, CMA and RMW factors. The performance of different models was compared by calculating the GRS F-statistics. The significant GRS F-statistics indicate that the combined intercepts are not equal to zero. *, ** and *** denote significant level at 10%, 5% and 1%, respectively (for two-sided tests).

All the NYSE, AMEX, NASDAQE stocks in the sample, were sorted into five quintile portfolios based on $\frac{V}{P}$ at the end of June each year. The V/P is the fundamental value at the end of December of year t-1, measured using the previous five years' data, divided by the stock price at the end of June of year t. ME is the market value of equity at the end of June in year t. Q1 consists of stocks with the lowest V/P ratio and Q5 consists of stocks with the highest V/P ratio. R_{it} are the monthly weighted average returns of the quintile portfolio i. R_{mt} are the monthly weighted average returns of the market index. R_{ft} denotes the monthly riskless rate on treasury bills. SMB is the size factor and is measured as the returns on small stocks minus the returns on the large stocks. HML is the book to market ratio factor and is measured as the returns on shares with a high B/M ratio minus the return on stocks with a low B/M ratio. RMW is the profitability factor and is measured as the return on the robust stocks (top 30% of shares with the highest operating income) minus the return on the weak stocks (bottom 30% of shares with the smallest operating income). CMA is the investment factor whose returns make up the difference between the conservative stocks (top 30% of firms with the smallest changes in total assets) and the returns on the most aggressive stocks (lowest 30% of firms with the greatest change in total assets). The monthly data for R_{mt}, R_{ft}, SMB, HML, RMW and CMA were downloaded from Ken French's website of data for 276 months over the period from 1993 to 2015.

4.6 Conclusion

Motivated by the work of Fama and French (2016) entitled "Dissecting Anomalies with a Five-Factor Model", we examined the ability of the five-factor model to explain the puzzling feature of the fundamental value to price (V/P, hereafter) anomaly, where the fundamental value (V) was estimated using the residual income valuation model. The V/P anomaly finds its origin in the work of Frankel and Lee (1998). They propose that V/P can be used to predict cross sectional abnormal returns for up to three years. Frankel and Lee (1998) and Ali et al., (2003) claim that the predictive ability of V/P strategy is most probably due to market mispricing. On the contrary, recent research by Hwang and Lee (2013) suggests that the mispricing explanation of the V/P anomaly is over-hasty and further research is necessary. Motivated by the findings of Hwang and Lee (2013), Fama and French (2015) and Fama and French (2016), **this paper sought to discover whether V/P strategies reflect risks factors or they are better explained by market inefficiency; and whether Fama and French's five-factor model can explain the excess return of V/P.**

To answer these questions we used data from the merger of COMPUSTAT, CRSP, I/B/E/S for all the non-financial firms listed in AMEX, NYSE and NASDAQ in the period from 1987 to 2015. We followed Ohlson (1995), Feltham and Ohlson (1996), Barth et al., (1999), Dechow et al., (1999) and Myers (1999) in estimating the fundamental value (V) using the residual income valuation model with both historical information and one-year forecasts from financial analysts. Our valuation model differs from those in previous studies. For instance, Frankel and Lee (1999) and Ali et al., (2003) use merely the forecasts from financial analysts in calculating the fundamental value, while Hwang and Lee (2013) use only historical data.

To investigate the risk explanation of V/P strategies, we examined whether the V/P was associated with several firm characteristics which are known to be proxies of common risk factors such as market beta, size, book to market ratio, return volatility, earnings variability, leverage, bankruptcy and analyst coverage. Our results show a positive association between the V/P ratio and B/M, volatility, Std. (ROA) and D/M, but a negative and significant association between Ln (ME) and V/P. These results indicate that firms with a higher V/P ratio are riskier and likely to require higher expected returns. However, the signs of the coefficients on beta, analysts and Altman's Z score are not consistent with the risk explanation of V/P strategy. Therefore, the V/P regression results did not conclusively indicate that stocks with a high V/P ratio are riskier. Hence, we cannot guarantee that the V/P effect is driven by omitted risk factors. Then we explored the relationship between the V/P ratio and future stock returns after controlling for the previous risk factors. The results confirm that the coefficient on the V/P remains significant and positive after controlling for all risk factors, confirming that the omission of risk factors is not a likely explanation of the V/P effect.

To investigate the ability of Fama and French's five-factor model to explain the excess return of V/P strategy, we formed V/P quintile portfolios by sorting all the stocks in our sample into five portfolios, of which portfolio one consisted of firms with the lowest V/P ratio and portfolio five consisted of firms with the highest V/P ratio. We assessed the performance of CAPM, the traditional three-factor model, three four-factor models and a five-factor model using GRS F-statistics. By comparing the GRS F-statistics of the previous seven models, we established that Fama and French's five-factor model performs better than either CAPM or the Fama and French traditional three-factor model. However, the performance of these authors' four-factor model, which adds profitability to the traditional three-factor model, is very similar to that of the five-factor model. These results confirm that the excess returns of V/P strategy vary due to differences in size, the B/M ratio, operating profit and betas across the quintile portfolios. However, these factors cannot explain all the variation in excess returns; the stocks in the high V/P may be riskier than the stocks in the low V/P portfolios in some other dimensions.

In summary, this paper contributes to the finance literature in several ways. First, we calculated the fundamental value using both historical information and one-year analysts' forecasts, as proposed by the original Ohlson model (1995). Second, it provides more empirical evidence for the argument that mispricing/risk explain the V/P anomaly. Finally, it compares the performance of the CAPM with three-factor and five-factor models. Our results indicate that the V/P anomaly becomes less anomalous after we control for size, B/M, investment, market risk and profitability. However, those variables cannot explain all the variation in the stocks' returns.

CHAPTER FIVE

Conclusion

Fundamental analysis and accounting anomalies studies are two of the most active research fields in finance and accounting Their aim is to understand the link between accounting numbers and firm value, and to understand how accurately and quickly investors evaluate the information in financial reports. In this thesis, we have investigated three interrelated topics: accounting conservatism, equity valuation, and the value to price anomaly. We provide empirical evidence on the effect of accounting conservatism and equity valuation in the context of insurance companies, concomitant with their important functions. For instance, insurance companies contribute to the global economic growth through their direct and indirect supplements of gross domestic income and financial markets. Insurance companies play an important role in stabilizing the financial markets by pooling the risks and diversifying them. Their roles have become increasingly apparent since the credit crisis of 2008.

More specifically, the extraordinary volatility in the market value of insurance firms during and after the financial crisis of 2008 motivated academic researchers to investigate insurance companies' financial information and understand their implications for risk and equity valuation (Nissim 2010). For instance, Nissim (2010, 2013a and 2013b) suggests that the book value of equity and accounting income variables can be used to evaluate insurance companies. However, these accounting variables are mostly biased and could lead to inaccurate equity valuation because of accounting conservatism, among other factors. Thus, it is essential to understand and account for the impact of conservatism on equity valuation models (Feltham and Ohlson 1995, Mayer 1999, Barth et al. 1999, 2005, Beaver and Ryan 2000, and Ashton and Wang 2008). Providing information about the level and measures of accounting conservatism of insurance companies is an objective of this thesis. This information can be very useful for investors and other interested parties, permitting them to evaluate their investments in insurance companies more accurately and thus make more informed decisions.

Similarly, sector-specific accounting standards for insurance firms have been developed by the accounting profession in response to their unique features, such as the longer operating cycle and the financial nature of most of their assets and liabilities (Acharya et al. 2009, Damodaran 2009). Specifically, insurance companies mostly issue long-term contracts, especially in life insurance, with an effective life of more than one year or even than a decade. Therefore, at the end of any there will be large differences between the cash flow of these contracts that is received and that which is paid and the corresponding accounting income that should be recognised for the accounting period. These differences are due to matching and accrual principles, which require precise estimates of expenses and revenues, as well as of accrued insurance liabilities and receivables (Acharya et al. 2009). As a consequence, accrual items tend to be very big in insurers' accounts, for instance accrued insurance liabilities, which form the largest liability item in the balance sheet (Reichert 2009). It is well known that the value relevance of earning components such as accruals is driven by their ability to predict future cash flow and earnings (Dechow, 1994; Sloan 1996; Ohlson 1999; Barth et al., 2001). As a result, incorporating information about the accruals components should generate better forecasts of future earnings and lead to a greater accuracy in stock valuations since they have different valuation weights (Stark, 1997; Barth et al, 1999; Walker and Wang, 2003; Barth et al, 2005; Pope and Wang, 2005, Wang, 2005; Wang, 2013). We expect that accrual components will play a vital role in measuring the fundamental value of insurance companies, which is another objective of this thesis.

Understanding that the ultimate objective of fundamental analysis is to identify mispriced securities relative to their intrinsic value for investment purpose, Frankel and Lee (1998) used residual income model to form a value to price (V/P) trading strategy. They suggest that the V/P ratio can be used to predict cross sectional abnormal returns for up to three years. They claim that a V/P trading strategy is more successful and leads to better abnormal returns than a simple market-multiples strategy. In follow-up research, Ali et al. (2003) investigated a mispricing versus risk explanation of the V/P anomaly. They controlled for the large set of risk factors that was suggested by Gebhardt et al. (2003) and Gode and Mohanram (2001). Their collective evidence supports the mispricing explanation of V/P anomaly and confirms its superior predictive ability (Frankel and Lee, 1998). More recently, Hwang and Lee

(2013) suggest that using the word "anomaly" to refer to V/P strategies may be inappropriate (Taylor and Xu, 2006; Xu, 2007). They suggest that the mispricing explanation of V/P anomaly is still premature and further research is necessary, which is a further objective of this thesis.

The following is a summary of our methodology and main findings. **Chapter 2** provides evidence of accounting conservatism for insurance companies, using the four most common measures: the accumulation of non-operating accruals, skewness of earnings and cash flows, book to market ratio, and Basu's asymmetric timeliness. The results in this paper are mostly based on a constant sample of 46 insurance companies with non-missing data over 21 years, from 1993 to 2013.

First, this paper investigated the changes in the time series prosperities of both the accounting performance of insurance companies, as measured by ROA, and their underlying economic performance, as measured by CFO/A. Our results showed that the mean value of ROA dropped more significantly than the contemporaneous mean value of CFO/A, suggesting that the changes in ROA can be explained in part by changes in accruals, and particularly by the non-operating component of total accruals which have accumulated negatively over time. Moreover, the paper shows that an ROA series is more negatively skewed than is CFO/A over most of the sample years, indicating the early and full recognition of unfavourable events (bad news) in the financial reports and delayed and gradual recognition of favourable events (good news). Similarly, the results for book to market ratio and the adjusted book to market ratio confirm that the accumulated non-operating accruals cause the book value of assets to be downward biased, bringing about a downward bias in the ratio. At the same time, the results of Basu's test of the asymmetric timeliness of earnings show that the accounting earnings are more sensitive to bad news than to good news in most of the sample years. Further, the degree of association between accounting earnings and bad news becomes more significant and higher over time. In summary, the results for the four different measures of conservatism give evidence that insurance companies' accounts tend to be conservative for the whole sample period, and the level of conservatism increases over time.

Second, the paper examined the correlation and differences in mean and median among the four measures of accounting conservatism, to determine whether they have similar ability to assess the level of accounting conservatism. The findings suggest that both book value conservatism and accrual conservatism are positively correlated. Thus, congruent with the previous literature (Xie, 2015), both measures can be used to gauge the overall level of conservatism. More interestingly, a t-test for the differences in means suggests that accruals conservatism shows on average a higher level of accounting conservatism than does book value conservatism. These results are in alignment with our expectation that accrual based measures will be very important in gauging accounting conservatism, in comparison to the book to market ratio measure; both of them are affected by the unique features of insurance companies and the sector-specific accounting treatments. Finally, the level of accounting conservatism of the insurance companies is compared to that of a sample of commercial banks to find whether they have similar levels of accounting conservatism. Our results are based on a constant sample consisting of 92 banks and 46 insurance companies whose data are available for all the sample years; they suggest that both insurance and banks have similar levels of accounting conservatism due to their similar reporting characteristics.

Chapter Three attempts to determine the importance of accruals components, apart from book value and abnormal earnings, in evaluating insurance companies by following the methodology suggested by Barth et al (1999, 2005). To achieve our objectives, six different linear information models were estimated to predict the equity value of insurance companies. Furthermore, to investigate whether imposing LIM structures helps to predict equity value more accurately, a comparison of out-of-sample equity value prediction errors within each LIM was performed. Moreover, to investigate which LIM produced the fewest prediction errors, another comparison of out-of-sample equity value prediction errors across LIMs was carried out. To do so, two measures of prediction errors, namely AEs and SEs, were calculated for each LIM, both with and without imposing the LIM structure. Then, to assess the differences in prediction metrics statistically, the means and medians of the AE and SE distributions were compared using a t-test for the differences in the means and the Wilcoxon-z test for the differences in the median. Our estimates are based on a sample of US insurance companies, consisting of 718 firm-year observations over the period from 2001 to 2012. The results suggest that imposing the LIM structures results in lower prediction errors for all six models. Furthermore, our findings suggest that the Ohlson model (1995) and the Feltham and Ohlson model (1995) result in higher error metrics than do our suggested models for the insurance companies. More specifically, total accruals, changes in insurance reserves, changes in account receivables, and deferred acquisition costs have an incremental ability to predict equity market value over abnormal earnings and book values. More interestingly, the predictive ability of changes in insurance reserves is higher than the predictive ability of changes in account receivables and changes in deferred acquisition costs without imposing the LIM structures. Finally, the predictive ability of changes in deferred acquisition costs is higher than the predictive ability of both changes in account receivables and changes in insurance reserves when the LIM structure is imposed. Overall, the LIM models which incorporate accrual components produce equity values very close to the market ones. Surprisingly, the predictive abilities of each individual accrual component depend on whether or not the model is estimated as a system.

In **Chapter Four**, we examine the ability of the five-factor model to explain the puzzling feature of the fundamental value to price (V/P, hereafter) anomaly, where the fundamental value (V) is estimated using a residual income valuation model. The V/P anomaly finds its origin in the work of Frankel and Lee (1998). They propose that the V/P ratio can be used to predict cross sectional abnormal returns for up to three years. Frankel and Lee (1998) and Ali et al., (2003) claim that the predictive ability of V/P strategy is most likely due to market mispricing. Contrariwise, recent research by Hwang and Lee (2013) suggests that the mispricing explanation of V/P anomaly is still premature and further research is necessary. Motivated by the findings of Hwang and Lee (2013), Fama and French (2015), and Fama and French (2016), this paper sets out to find whether V/P strategies reflect risk factors or whether market inefficiency better explains them and whether Fama and French's five-factor model can explain the excess return of the V/P ratio. To answer the previous questions we used data from the merger of COMPUSTAT, CRSP, I/B/E/S for all the non-financial firms listed in AMEX, NYSE, and NASDAQ during the period from 1987 to 2015. We followed Ohlson (1995), Feltham and Ohlson (1996), Barth et al., (1999), Dechow et al., (1999), and Myers (1999) in estimating the fundamental value (V) using the residual income valuation model with both historical information and one-year ahead financial analysts' forecasts. Our valuation model differs from those in previous studies. For instance, Frankel and Lee (1999) and Ali et al., (2003) use merely the financial analysts' forecast in calculating the fundamental value, while Hwang and Lee (2013) use only historical data.

To investigate the risk explanation of V/P strategies, we examined whether V/P are associated with several firm characteristics which are known to be the proxies of common risk factors. Our results show a positive association between the V/P ratio and the book to market ratio, volatility, earnings variability, and leverage, but a negative and significant association between size and V/P. These results indicate that firms with a higher V/P ratio are riskier and are likely to require higher expected returns. However, the sign of the coefficient on beta, analysts and Altman's Z score are not consistent with the risk explanation of V/P strategy. Therefore, the V/P regression results do not conclusively indicate that stocks with a high V/P ratio are riskier. For this reason we cannot guarantee that the V/P effect is driven by omitted risk factors. Then we explore the relationship between the V/P ratio and future stock returns after controlling for the previous risk factors. The results confirm that the coefficient on the V/P remains significant and positive after controlling for all risk factors, confirming that the omission of risk factors is not likely to explain the V/P effect.

To investigate the ability of Fama and French's five-factor model to explain the excess return of the V/P strategy, we form V/P quintile portfolios by sorting all stocks in our sample into five portfolios where portfolio one consists of the firms with the lowest V/P ratio and portfolio five consists of firms with the highest V/P ratio. We assess the performance of the CAPM, the traditional three-factor model, three different four-factor models, and the five-factor model using GRS F-statistics. By comparing the F- statistics of the previous seven models (Gibbons et al., 1989, it is clear that Fama and French's five-factor model performs better than both CAPM and the traditional Fama and French three-factor model. However, the performance of a four-factor model, which adds the factor of profitability to the traditional three-factor model, is very similar to that of the five factor model. These results confirm that the excess returns of the V/P strategy vary due to the differences in size, B/M ratio, operating profit and betas across quintile portfolios. However, these factors cannot explain all the variation in the excess returns; the stocks in the high V/P portfolios may be riskier in other dimensions than the stocks in the low V/P portfolios are.

APPENDIX A

Table A1: Industry specific cost of equity

Panel A: Factor risk premiums for the CAPM and Fama and French's three factor model, 7/1986 – 12/ 2015.

Monthly Factor risk premium[1]	$R_{m-}R_f$ [2]	SMB	HML
Average premium	0.636	0.076	0.189
Standard deviation (SD)	4.484	3.193	2.997

Panel B: Cost of equity (CEs) and regression slopes of the CAPM and Fama and French's three factor model, 7/1986 – 12/ 2015.

Industry[3]	CAPM[4]		Three factor			
	CE[5]	β_i	CE	β_i	SMB	HML
Banks	8.19	1.07	10.99	1.23	-0.12	0.75
Buseq	10.26	1.34	7.59	1.18	0.2	-0.71
Chems	6.38	0.84	7.37	0.91	-0.15	0.25
Durabl	9.38	1.23	12.06	1.33	0.26	0.75
Energy	5.59	0.73	7.36	0.83	-0.07	0.47
Manuf	8.5	1.11	9.66	1.16	0.11	0.32
Nodur	5.44	0.71	6.06	0.78	-0.22	0.15
Other	8.16	1.07	8.91	1.08	0.16	0.22
Shops	7.19	0.94	7.4	0.95	0.02	0.06
Telcm	7.08	0.93	6.98	0.96	-0.23	-0.05
Util	3.17	0.42	4.89	0.53	-0.2	0.45

[1]The monthly return dataR_m, SMB, and HML are collected from the Kenneth R. French data library. The value reported in panel A is the monthly average and monthly standard deviation for the whole sample period.
[2] R_f is the one-month treasury bill rate observed at the beginning of the month. The average annualised 30-day t-bill rate is estimated to be 3.37%.
[3]The definition of industry is provided in Table 1.
[4]β_i, SMB, HML are regression slopes of the following models.
$CAPM: R_i - R_f = \alpha_i + \beta_i[R_{m-}R_f] + \varepsilon_i$
FF three factor: $R_i - R_f = \alpha_i + \beta_i[R_{m-}R_f] + s_i\, SMB + h_i\, HML + \varepsilon_i$
The slopes are estimated for each industry rate using a five-year rolling basis. All regression slopes are significant at a 5% level.
[5] CE: are obtained by substituting the regression slopes of the previous models and the average monthly returns from Panel A and then multiplying them by 12 (annualising the returns). We add the constant riskless rate (3.37%) to the cost of equity in order to calculate the discount rate.

LIST OF REFERENCE

Acharya, V., Philippon, T., Richardson, M. and Roubini, N. (2009) 'The financial crisis of 2007-2009: causes and remedies', *Financial Markets, Institutions & Instruments,* 18(2), pp. 89-137.

Ahmed, A.S., Billings, B.K., Morton, R.M. and Stanford-Harris, M. (2002) 'The role of accounting conservatism in mitigating bondholder-shareholder conflicts over dividend policy and in reducing debt costs', *The Accounting Review,* 77(4), pp. 867-890.

Ahmed, A.S. and Duellman, S. (2013) 'Managerial overconfidence and accounting conservatism', *Journal of Accounting Research,* 51(1), pp. 1-30.

Ahmed, A.S. and Duellman, S. (2007) 'Accounting conservatism and board of director characteristics: An empirical analysis', *Journal of Accounting and Economics,* 43(2), pp. 411-437.

Ali, A., Hwang, L. and Trombley, M.A. (2003) 'Residual-income-based valuation predicts future stock returns: Evidence on mispricing vs. risk explanations', *The Accounting Review,* 78(2), pp. 377-396.

Altman, E.I. (1968) 'Financial ratios, discriminant analysis and the prediction of corporate bankruptcy', *The Journal of Finance,* 23(4), pp. 589-609.

Ashton, D. and Wang, P. (2013) 'Valuation weights, linear dynamics and accounting conservatism: an empirical analysis', *Journal of Business Finance & Accounting,* 40(1-2), pp. 1-25.

Balachandran, S. and Mohanram, P. (2011) 'Is the decline in the value relevance of accounting driven by increased conservatism?', *Review of Accounting Studies,* 16(2), pp. 272-301.

Ball, R., Kothari, S. and Robin, A. (2000) 'The effect of international institutional factors on properties of accounting earnings', *Journal of Accounting and Economics,* 29(1), pp. 1-51.

Ball, R., Kothari, S. and Robin, A. (2000) 'The effect of international institutional factors on properties of accounting earnings', *Journal of Accounting and Economics,* 29(1), pp. 1-51.

Ball, R. and Shivakumar, L. (2006) 'The role of accruals in asymmetrically timely gain and loss recognition', *Journal of Accounting Research,* 44(2), pp. 207-242.

Bandyopadhyay, S.P., Chen, C., Huang, A.G. and Jha, R. (2010) 'Accounting conservatism and the temporal trends in current earnings' ability to predict future cash flows versus future earnings: evidence on the trade-off between relevance and reliability*', *Contemporary Accounting Research,* 27(2), pp. 413-460.

Barth, M.E., Beaver, W.H., Hand, J.R. and Landsman, W.R. (2005) 'Accruals, accounting-based valuation models, and the prediction of equity values', *Journal of Accounting, Auditing & Finance,* 20(4), pp. 311-345.

Barth, M.E., Beaver, W.H., Hand, J.R. and Landsman, W.R. (2002) 'Constraints on accrual components of earnings in equity valuation', *Available at SSRN 319841,* .

Barth, M.E., Beaver, W.H., Hand, J.R. and Landsman, W.R. (1999) 'Accruals, cash flows, and equity values', *Review of Accounting Studies,* 4(3-4), pp. 205-229.

Barth, M.E., Beaver, W.H. and Landsman, W.R. (2001) 'The relevance of the value relevance literature for financial accounting standard setting: another view', *Journal of Accounting and Economics,* 31(1), pp. 77-104.

Barth, M.E., Cram, D.P. and Nelson, K.K. (2001) 'Accruals and the prediction of future cash flows', *The Accounting Review,* 76(1), pp. 27-58.

Barth, M.E. and Hutton, A.P. (2000) 'Information intermediaries and the pricing of accruals', *Harvard University and Stanford University,(working paper),* .

Basu, S. (1997) 'The conservatism principle and the asymmetric timeliness of earnings', *Journal of Accounting and Economics,* 24(1), pp. 3-37.

Basu, S. (1995) *Conservatism and the asymmetric timeliness of earnings.* UMI.

Beatty, A., Weber, J. and Yu, J.J. (2008) 'Conservatism and debt', *Journal of Accounting and Economics,* 45(2), pp. 154-174.

Beaver, W.H. (2002) 'Perspectives on recent capital market research', *The Accounting Review,* 77(2), pp. 453-474.

Beaver, W.H. and McNichols, M.F. (2001) 'Do stock prices of property casualty insurers fully reflect information about earnings, accruals, cash flows, and development?', *Review of Accounting Studies,* 6(2-3), pp. 197-220.

Beaver, W.H. and Ryan, S.G. (2005) 'Conditional and unconditional conservatism: Concepts and modeling', *Review of Accounting Studies,* 10(2-3), pp. 269-309.

Bernard, V.L. and Stober, T.L. (1989) 'The nature and amount of information in cash flows and accruals', *Accounting Review,* 64(4), pp. 624-652.

Bowen, R.M., Burgstahler, D. and Daley, L.A. (1987) 'The incremental information content of accrual versus cash flows', *Accounting Review,* 62(4), pp. 723-747.

Brennan, M.J., Jegadeesh, N. and Swaminathan, B. (1993) 'Investment analysis and the adjustment of stock prices to common information', *Review of Financial Studies,* 6(4), pp. 799-824.

Brennan, M.J. and Subrahmanyam, A. (1995) 'Investment analysis and price formation in securities markets', *Journal of Financial Economics*, 38(3), pp. 361-381.

Bryan, D.M. and Tiras, S.L. (2007) 'The influence of forecast dispersion on the incremental explanatory power of earnings, book value, and analyst forecasts on market prices', *The Accounting Review,* 82(3), pp. 651-677.

Chen, L.H., Folsom, D.M., Paek, W. and Sami, H. (2013) 'Accounting conservatism, earnings persistence, and pricing multiples on earnings', *Accounting Horizons,* 28(2), pp. 233-260.

Chung, H.H. and Wynn, J.P. (2008) 'Managerial legal liability coverage and earnings conservatism', *Journal of Accounting and Economics,* 46(1), pp. 135-153.

Collins, D.W., Maydew, E.L. and Weiss, I.S. (1997) 'Changes in the value-relevance of earnings and book values over the past forty years', *Journal of Accounting and Economics,* 24(1), pp. 39-67.

Courteau, L., Kao, J.L. and Richardson, G.D. (2001) 'Equity valuation employing the ideal versus ad hoc terminal value expressions*', *Contemporary* Accounting Research, 18(4), pp. 625-661.

Damodaran, A. (2009), Valuing Financial Service Firms, working paper, http://pages.stern.nyu.edu/~adamodar/New_Home_Page/papers.html#finfirms09

Daniel, K. and Titman, S. (1997) 'Evidence on the characteristics of cross sectional variation in stock returns', *The Journal of Finance,* 52(1), pp. 1-33.

Dechow, P.M. (1994) 'Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals', *Journal of Accounting and Economics*, 18(1), pp. 3-42.

Dechow, P.M. and Dichev, I.D. (2002) 'The quality of accruals and earnings: The role of accrual estimation errors', *The Accounting Review,* 77(s-1), pp. 35-59.

Dechow, P.M., Hutton, A.P. and Sloan, R.G. (1999) 'An empirical assessment of the residual income valuation model', *Journal of Accounting and Economics,* 26(1), pp. 1-34.

Dechow, P.M., Kothari, S.P. and L Watts, R. (1998) 'The relation between earnings and cash flows', *Journal of Accounting and Economics*, 25(2), pp. 133-168.

Dietrich, J.R., Muller III, K.A. and Riedl, E.J. (2007) 'Asymmetric timeliness tests of accounting conservatism', *Review of Accounting Studies,* 12(1), pp. 95-124.

Edwards, E. and Bell, P.W. (1961) *The Theory and Measurement of Business Income.* Berkeley: University of California Press.

Ettredge, M., Huang, Y. and Zhang, W. (2012) 'Earnings restatements and differential timeliness of accounting conservatism', *Journal of Accounting and Economics,* 53(3), pp. 489-503.

Fama, E.F. and French, K.R. (2015) 'A five-factor asset pricing model', *Journal of Financial Economics,* 116(1), pp. 1-22.

Fama, E.F. and French, K.R. (2016) 'Dissecting anomalies with a five-factor model', *Review of Financial Studies,* 29(1), pp. 69-103.

Fama, E.F. and French, K.R. (1997) 'Industry costs of equity', *Journal of Financial Economics,* 43(2), pp. 153-193.

Fama, E.F. and French, K.R. (1995) 'Size and book-to-market factors in earnings and returns', *The Journal of Finance,* 50(1), pp. 131-155.

Fama, E.F. and French, K.R. (1993) 'Common risk factors in the returns on stocks and bonds', *Journal of Financial Economics,* 33(1), pp. 3-56.

Fama, E.F. and French, K.R. (1992) 'The cross-section of expected stock returns', *The Journal of Finance,* 47(2), pp. 427-465.

Feltham, G.A. and Ohlson, J.A. (1999) 'Residual earnings valuation with risk and stochastic interest rates', *The Accounting Review,* 74(2), pp. 165-183.

Feltham, G.A. and Ohlson, J.A. (1995) 'Valuation and clean surplus accounting for operating and financial activities*', *Contemporary Accounting Research,* 11(2), pp. 689-731.

Francis, J., Olsson, P. and Oswald, D.R. (2000) 'Comparing the accuracy and explainability of dividend, free cash flow, and abnormal earnings equity value estimates (digest summary)', *Journal of Accounting Research,* 38(1), pp. 45-70.

Frankel, R. and Lee, C.M. (1998) 'Accounting valuation, market expectation, and cross-sectional stock returns', *Journal of Accounting and Economics,* 25(3), pp. 283-319.

García Lara, J.M., Osma, B.G. and Penalva, F. (2007) 'Board of directors' characteristics and conditional accounting conservatism: Spanish evidence', *European Accounting Review,* 16(4), pp. 727-755.

Gebhardt, W.R., Lee, C. and Swaminathan, B. (2001) 'Toward an implied cost of capital', *Journal of Accounting Research*, 39(1), pp. 135-176.

Gibbons, M.R., Ross, S.A. and Shanken, J. (1989) 'A test of the efficiency of a given portfolio', *Econometrica: Journal of the Econometric Society,*57(5) , pp. 1121-1152.

Givoly, D. and Hayn, C. (2002) 'Rising conservatism: Implications for financial analysis', *Financial Analysts Journal,* 58(1), pp. 56-74.

Givoly, D. and Hayn, C. (2000) 'The changing time-series properties of earnings, cash flows and accruals: Has financial reporting become more conservative?', *Journal of Accounting and Economics*, 29(3), pp. 287-320.

Givoly, D., Hayn, C.K. and Natarajan, A. (2007) 'Measuring reporting conservatism', *The Accounting Review*, 82(1), pp. 65-106.

Gode, D. and Mohanram, P. (2003) 'Inferring the cost of capital using the Ohlson–Juettner model', *Review of Accounting Studies*, 8(4), pp. 399-431.

Gordon, M.J. (1959) 'Dividends, earnings, and stock prices', *The Review of Economics and Statistics*, 41(2), pp. 99-105.

Horton, J. (2007) 'The value relevance of 'realistic reporting': evidence from UK life insurers', *Accounting and Business Research*, 37(3), pp. 175-197.

Hui, K.W., Matsunaga, S. and Morse, D. (2009) 'The impact of conservatism on management earnings forecasts', *Journal of Accounting and Economics*, 47(3), pp. 192-207.

Hwang, L. and Lee, W. (2013) 'Stock Return Predictability of Residual-Income-Based Valuation: Risk or Mispricing?', *Abacus*, 49(2), pp. 219-241.

International Accounting Standards Board (IASB) 1989, Framework for the preparation and presentation of financial statements, International Accounting Standards Committee Foundation, London.

Jackson, S.B. and Liu, X.K. (2010) 'The allowance for uncollectible accounts, conservatism, and earnings management', *Journal of Accounting Research*, 48(3), pp. 565-601.

Khan, M. and Watts, R.L. (2009) 'Estimation and empirical properties of a firm-year measure of accounting conservatism', *Journal of Accounting and Economics*, 48(2), pp. 132-150.

Kothari, S. (2001) 'Capital markets research in accounting', *Journal of Accounting and Economics*, 31(1), pp. 105-231.

Kothari, S.P. and Zimmerman, J.L. (1995) 'Price and return models', *Journal of Accounting and Economics*, 20(2), pp. 155-192.

Lakonishok, J., Shleifer, A. and Vishny, R.W. (1994) 'Contrarian investment, extrapolation, and risk', *The Journal of Finance*, 49(5), pp. 1541-1578.

Lee, C.M. and Swaminathan, B. (1999) 'Valuing the Dow: A bottom-up approach', *Financial Analysts Journal*, 55(5), pp. 4-23.

Lee, C., Myers, J. and Swaminathan, B. (1999) 'What is the Intrinsic Value of the Dow?', *The Journal of Finance*, 54(5), pp. 1693-1741.

Lim, C.Y., Lee, E., Kausar, A. and Walker, M. (2014) 'Bank accounting conservatism and bank loan pricing', *Journal of Accounting and Public Policy,* 33(3), pp. 260-278.

Lo, K. and Lys, T. (2000) 'The Ohlson model: contribution to valuation theory, limitations, and empirical applications', *Journal of Accounting, Auditing & Finance,* 15(3), pp. 337-367.

Manganaris, P., Spathis, C. and Dasilas, A. (2015) 'The effects of mandatory IFRS adoption and conditional conservatism on European bank values', *Journal of International Accounting, Auditing and Taxation,* 24, pp. 72-81.

Miller, M.H. and Modigliani, F. (1961) 'Dividend policy, growth, and the valuation of shares', *the Journal of Business,* 34(4), pp. 411-433.

Mohanram, P. (2000) 'How Do Young Firms Choose Among Different Modes of Disclosure?, *Working Paper* .

Mulford, C., Parkhurst, A. and Miller, B. (2010) *The financial statement effects of proposed changes to the accounting for deferred acquisition costs in the insurance industry.* Atlanta, GA 30332-0520.: the College of Management, Georgia Institute of Technology, Atlanta.

Myers, J.N. (1999) 'Implementing residual income valuation with linear information dynamics', *The Accounting Review,* 74(1), pp. 1-28.

Newey, W.K. and West, K.D. (1987) 'Hypothesis testing with efficient method of moments estimation', *International Economic Review,* 28(3), pp. 777-787.

Nichols, D.C., Wahlen, J.M. and Wieland, M.M. (2009) 'Publicly traded versus privately held: implications for conditional conservatism in bank accounting', *Review of Accounting Studies,* 14(1), pp. 88-122.

Nissim, D. (2013a) 'Implied cost of equity capital in the US insurance industry', *Journal of Financial Perspectives, Forthcoming,* pp. 13-20.

Nissim, D. (2013b) 'Relative valuation of US insurance companies', *Review of Accounting Studies,* 18(2), pp. 324-359.

Nissim, D. (2010) 'Analysis and valuation of insurance companies', *CE| ASA (Center for Excellence in Accounting and Security Analysis) Industry Study,* (2).

Ohlson, J.A. (2001) 'Earnings, book values, and dividends in equity valuation: An empirical perspective', *Contemporary Accounting Research,* 18(1), pp. 107-120.

Ohlson, J.A. (1999) 'On transitory earnings', *Review of Accounting Studies,* 4(3-4), pp. 145-162.

Ohlson, J.A. (1995) 'Earnings, book values, and dividends in equity valuation*', *Contemporary Accounting Research*, 11(2), pp. 661-687.

Ohlson, J.A. (1990) 'A synthesis of security valuation theory and the role of dividends, cash flows, and earnings', *Contemporary Accounting Research*, 6(2), pp. 648-676.

Ohlson, J.A. and Zhang, X. (1998) 'Accrual accounting and equity valuation', *Journal of Accounting Research*, 36, pp. 85-111.

Peasnell, K.V. (1982) 'Some formal connections between economic values and yields and accounting numbers', *Journal of Business Finance & Accounting*, 9(3), pp. 361-381.

Penman, S.H. and Sougiannis, T. (1998) 'A Comparison of Dividend, Cash Flow, and Earnings Approaches to Equity Valuation*', *Contemporary Accounting Research*, 15(3), pp. 343-383.

Penman, S.H. and Zhang, X. (2002) 'Accounting conservatism, the quality of earnings, and stock returns', *The accounting review*, 77(2), pp. 237-264.

Pope, P.F. (2005) 'Discussion—Accruals, Accounting-Based Valuation Models, and the Prediction of Equity Values', *Journal of Accounting, Auditing & Finance*, 20(4), pp. 347-354.

Pope, P.F. and Walker, M. (1999) 'International differences in the timeliness, conservatism, and classification of earnings', *Journal of Accounting Research*, 37(1), pp. 53-87.

Pope, P.F. and Wang, P. (2005) 'Earnings components, accounting bias and equity valuation', *Review of Accounting Studies*, 10(4), pp. 387-407.

Qiang, X. (2007) 'The effects of contracting, litigation, regulation, and tax costs on conditional and unconditional conservatism: cross-sectional evidence at the firm level', *The Accounting Review*, 82(3), pp. 759-796.

Reichert, O. (2009) 'Insurance Accrual Accounting', *Washington DC: The World Bank, Working Paper.*

Richardson, S., Tuna, İ. and Wysocki, P. (2010) 'Accounting anomalies and fundamental analysis: A review of recent research advances', *Journal of Accounting and Economics*, 50(2), pp. 410-454.

Roychowdhury, S. and Watts, R.L. (2007) 'Asymmetric timeliness of earnings, market-to-book and conservatism in financial reporting', *Journal of Accounting and Economics*, 44(1), pp. 2-31.

Ruch, G.W. and Taylor, G. (2015) 'Accounting conservatism: A review of the literature', *Journal of Accounting Literature*, 34, pp. 17-38.

Sloan, R.G. (1996) 'Do stock prices fully reflect information in accruals and cash flows about future earnings?(Digest summary)', *Accounting Review*, 71(3), pp. 289-315.

Stark, A.W. (1997) 'Linear information dynamics, dividend irrelevance, corporate valuation and the clean surplus relationship', *Accounting and Business Research,* 27(3), pp. 219-228.

Sterling, R.R. (1970) *Theory of the measurement of enterprise income.* University Press of Kansas.

Stober, T.L. (1999) 'Empirical applications of the Ohlson [1995] and Feltham and Ohlson [1995, 1996] valuation models', *Managerial Finance*, 25(12), pp. 3-16.

Tsay, R.S., Lin, Y. and Wang, H. (2008) 'Residual income, value-relevant information and equity valuation: a simultaneous equations approach', *Review of Quantitative Finance and Accounting,* 31(4), pp. 331-358.

Tsay, R.S., Lin, Y. and Wang, H. (2009) 'Residual income, non-earnings information, and information content', *Journal of Forecasting,* 28(6), pp. 487-511.

U.S. Bureau of Economic Analysis, "GDP by Industry, Annual value added by industry", released on april 23, 2015, accessed on august 22, 2015 via http://www.bea.gov/itable/itable.cfm?reqid=51&step=1#reqid=51&step=51&isuri=1&5114=a&5102=1

Wang, P. (2013) 'The role of disaggregation of earnings in stock valuation and earnings forecasting', *Accounting and Business Research,* 43(5), pp. 530-557.

Watts, R.L. (2003) 'Conservatism in accounting part I: Explanations and implications', *Accounting Horizons,* 17(3), pp. 207-221.

Wei, J.K. and Zhang, J. (2007) Arbitrage risk and arbitrage returns: Evidence from the fundamental value to price anomaly, *Working Paper.*

Xie, S. (2004) *The convergence of prices to fundamental values, Working Paaper*.

Xie, Y. (2015) 'Confusion over accounting conservatism: a critical review', *Australian Accounting Review,* 25(2), pp. 204-216.

Xu, L. (2007) 'Is V/P a distinct anomaly?', *Review of Accounting and Finance,* 6(4), pp. 404-418.

Zhang, J. (2008) 'The contracting benefits of accounting conservatism to lenders and borrowers', *Journal of Accounting and Economics,* 45(1), pp. 27-54.