# THE TWO SIDES OF VALUE PREMIUM: DECOMPOSING THE VALUE PREMIUM

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Scholars and investors have studied the value premium for several decades. However, the debate over whether risk factors or biased market participants cause the value premium has never been settled. The risk explanation argues that value firms are fundamentally riskier than growth firms. At the same time, the behavioral explanation argues that biased market participants systematically misprice value and growth stocks. In this paper, I use the implied cost of equity capital to capture all risks that investors demand a premium and sort stocks into risk quantiles. The implied cost of equity capital is estimated using models proposed by Gebhardt et al., Claus and Thomas, Ohlson and Juettner-Nauroth, and Easton. I find that value stocks have higher implied cost of equity capital and lower forecasted earnings growth while growth stocks have lower implied cost of equity capital and higher forecasted earnings growth. More importantly, even within the same risk quantile, the value premium still exists. The results suggest that risk and behavioral factors simultaneously cause the value premium. Furthermore, by decomposing the holding period return, I find that adjustments in valuation ratios caused by negative earnings surprises for growth firms and positive earnings surprises for value firms at least partially lead to the value premium.

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# CHAPTER 1

# INTRODUCTION

Scholars and investors have documented the value premium for many years. The value investing strategy was discussed in great detail by the first edition “Security Analysis,” which is published in 1934 by Graham and Dodd. Since then, many legendary investors, including Warren Buffet, Charlie Munger, and Walter Schloss, consider the value investing strategy as one of the most useful, profitable, and reliable investment strategies. Basu (1977) is the first paper that statistically exhibits positive abnormal returns with low price-earnings ratio (hereinafter, referred to as the PE ratio) stocks. However, the debate over whether risk factors or biased market participants create the value premium has never been settled. Classic research papers Fama and French (1992, 1993, and 1995) claim that value firms are fundamentally riskier than growth firms. On the contrary, the behavioral explanation for the value premium introduced by Lakonishok, Shleifer, and Vishny (1994) argues that biased market participants systematically misprice value and growth stocks and create the value premium. Many other papers have attempted to address the value premium puzzle from either side of the debate.

I argue that the value premium must contain the risk premium, but the risk might not be the only source of the value premium. The “risk” school fails to answer what the value premium beyond the risk induced part is, and the “behavior” school fails to document the behavior-related contribution to the value premium empirically. In Chapters 3 and 4, I focus on sorting stocks into risk quantiles to investigate the risk-adjusted value premium and explaining the value premium from risk and behavioral perspective simultaneously. In Chapter 5, I aim to explain the mechanism of how biased earnings growth expectations contribute to the value premium.

In the first part, I investigate the risk-adjusted value premium by using the implied cost of equity as the risk implied by the actual market price. The implied cost of equity capital should capture all risks that investors demand a premium. Given severe issues of the Capital Asset Pricing Model and other empirical factor models' inability to capture all risk factors, the implied cost of equity capital is a better measurement of what discount rate investors really demand. In Chapter 3, I estimate the implied cost of equity capital using models proposed by Gebhardt et al. (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004) with earnings forecasts generated by the Hou et al. (2012) model.

To decompose the value premium into the risk and behavioral premium, I create twenty-five two-dimensional portfolios by sorting stocks into five risk (the implied cost of equity capital) quantiles and then five earnings growth prospect quantiles. By examining the PE ratio, I find that value portfolios have relatively higher risk and lower earnings growth, and growth portfolios have relatively lower risk and higher earnings growth. Further, by examining return patterns of 25 two-dimensional portfolios, I find that within the same risk quantile portfolios with higher earnings growth prospects generally have lower returns than with lower earnings growth prospects, and within the same earnings growth prospect quantile portfolios with higher risk generally have higher returns than with lower risk. Therefore, risk and non-risk factors jointly contribute to the value premium.

In Chapter 5, I use earnings per share (hereinafter, referred to as EPS) forecasted by analysts to demonstrate how biased earnings growth expectations contribute to the behavior-related value premium. Bauman and Miller (1997) find that, in general, analysts are overly optimistic about earnings of growth stocks and pessimistic about earnings of value stocks. Encouraged by their findings, I exhibit that negative earnings surprises for growth firms and positive earnings surprises for value firms lead to adjustments in valuation ratio and at least partially cause the value premium.

This study contributes to a better understanding of the cause and mechanism of the value premium. Instead of examining the value premium from either the risk or behavior perspective, the first idea tries to investigate the risk-adjusted value premium by decomposing the value premium into the risk and behavioral effect simultaneously. The second idea goes further and tries to demonstrate the mechanism of how valuation ratios adjustments caused by errors in earnings growth expectations lead to the risk-adjusted value premium.

# CHAPTER 2

## LITERATURE REVIEW

The value strategy is one of the most popular investment strategies in the capital market. People have realized the value premium since it was initially discussed by the first edition "Security Analysis," which is published in 1934 by Graham and Dodd. Higher than market returns of value strategy mutual funds show that the value premium is consistently reliable and profitable. The robustness of value premium has attracted a tremendous amount of attention from both the industry and academics.

In academics, Basu (1977) is the first paper that statistically exhibits the value premium. Basu (1977) finds that returns of stocks with low PE ratios tend to be higher than returns suggested by the underlying risk. Since then, scholars have tried to explain what causes the value premium. There are three different ways to explain the value premium. The first group of scholars denies the existence of the value premium and believes that the value premium is a result of statistical problems. Kothari et al. (1995) claim that sample selection bias causes the value premium, and MacKinlay (1995) and Conrad et al. (2003) claim that data snooping causes the value premium. However, many studies find that the value premium does really exist. Fama and French (1998) find that value strategy portfolios perform better than growth strategy portfolios in most major stock markets. Average yearly returns of global value portfolios significantly outperform global growth portfolios by 7.68%. Davis et al. (2000) find that the magnitude of the value premium remains at a similar level with an extended sample period and selection. Chen et al. (2008) find that the value premium has been remarkably stable over the last half century. They even exhibit evidence that the value premium is positive ex-ante. In recent years, due to strong evidence of the existence of the value premium across different markets, scholars in finance now have accepted the conclusion that the value premium is real.

Instead of denying the existence of the value premium, later on, people focused on attempting to address the value premium puzzle from two different perspectives. One group of scholars tries to explain the value premium by claiming that the risk factors cause the value premium. The value stocks are fundamentally riskier compare to the growth stocks. Another group of scholars tries to explain the value premium by claiming that mispricing causes the value premium. Since Basu (1977) first empirically identified the value premium, scholars still debate on what causes the value premium.

On the risk explanation side, Fama and French (1992, 1993) adopt the book to market ratio as a risk factor to capture the value premium. Fama and French (1995) claim that persistently disappointing long-term profitability causes the risk of value firms to be higher, and persistently encouraging long-term profitability of growth firms causes the risk of growth firms to be lower. Thus, fundamental risk factors drive the value premium. After that, Lu Zhang (2005) investigates why value firms are riskier than growth firms and finds that value firms have more difficulty in cutting capital. Chen et al. (2008) further exploring the value premium and claim that fundamental cash flow factors cause value firms to be riskier. Lettau et al. (2007) add additional evidence by suggesting that value firms are short-term investments with higher uncertainty in their future cash flows, and growth firms are long-term investments with higher uncertainty in their future discount rates. Since discount rates do not affect future cash flows, investors consider that uncertainty in future discount rates is less influential than uncertainty in future cash flows. Thus, value stocks are riskier than growth stocks. To sum up, the ‘risk’ school believes that fundamental risk factors cause higher risk and returns of value firms.

On the other hand, the behavioral explanation for the value premium argues that biased market participants systematically misprice value and growth stocks and create the value premium. An earlier behavioral study, De Bondt and Thaler (1985), suggests that investors overact to unexpected news. Though they have not provided an explanation for the value premium in their study, their finding provides the behavioral theory to explain the value premium. Past superior earnings growth performance of growth firms may make market participants overly confident about growth firms' earnings growth prospects, and past frustrating earnings growth performance of value firms may make market participants overly doubt value firms' earnings growth prospects. Therefore, earnings growth forecasts of value firms are generally lower than actual earnings growth, and earnings growth forecasts of growth firms are generally higher than actual earnings growth. Market participants will eventually realize errors in their earnings growth expectations. They may reduce valuation ratios assigned to growth firms and raise valuation ratios assigned to value firms. Therefore, biased market expectations may cause the value premium. Lakonishok et al. (1994) find empirical evidence to support the behavioral theory prediction. They find that value strategy and growth strategy portfolios have a relatively similar level of risk based on conventional risk measurements. They suggest that market participants consistently overestimate earnings growth opportunities of growth firms. Thus, the value premium is a result of biased earnings growth expectations. La Porta (1996) also suggests that market participants' expectations on earnings are overly extreme. Furthermore, Bauman and Miller (1997) also indicate that analysts are overly optimistic about growth stocks' earnings prospects and pessimistic about value stocks' earnings prospects. To sum up, the 'behavior' school believes that errors in market participants' expectations cause misprice in value and growth stocks and lead to the value premium.

Since both risk-related and behavioral-related studies present convincing evidence to support their arguments, it is tough to determine which side wins. It is possible that actually, both sides are correct. This study shows that risk and errors in market participants' expectations simultaneously contribute to the value premium.

# CHAPTER 3

# ESTIMATION OF THE IMPLIED COST OF EQUITY CAPITAL

The implied cost of equity capital is the discount rate which makes the present value of all future cash flow that a company pays to common shareholders equal its current stock price, as defined by Modigliani and Miller (1958) and Gebhardt et al. (2001). A primary task of this study is to obtain the implied cost of equity capital for companies in the sample. However, the cost of equity capital is not directly observable in the financial market. Therefore, many scholars have created a variety of methods to estimate the cost of equity capital. In this chapter, my goal is to demonstrate the rationale behind my decision to use models proposed by Easton (2004), Ohlson and Juettner-Nauroth (2005), Gebhardt et al. (2001), and Claus and Thomas (2001) to estimate the implied cost of equity capital with earnings estimated by the Hou et al. (2012) model.

## 3.1 Methods to Estimate the Implied Cost of Equity Capital

In general, there are two different approaches to estimate the implied cost of equity capital. One of the strategies employs the realized return to determine the implied cost of equity capital. The implied cost of equity capital is expected returns of common shareholders. However, Elton (1999) shows that there are long-period examples that realized returns are awfully lower than risk-free rates and are substantially different from expected returns. Fama and French (1997) claim that those implied cost of equity capital estimations derived from realized returns are inaccurate and unreliable. There are many other papers (for example, Easton and Monahan 2005) that also exhibit a similar conclusion that proxies created by employing realized returns are not reliable and accurate estimations of expected returns. The non-existent or weak correlation between realized returns and expected returns suggests scholars to avoid using the realized returns to estimate expected returns or the implied cost of equity capital. Another approach to estimating the implied cost of equity capital relies on the proxies created based on the risk characteristics of companies. Botosan and Plumlee (2011) show that the second approach that uses risk characteristics of companies outperforms the first approach that uses realized returns. Many other recent papers also present strong evidence to support estimation models of the second approach outperform estimation models of the first approach. To increase the accuracy and reliability of the study, I use models based on risk characteristics of companies to estimate the implied cost of equity capital.

Prior literature provides an assortment of methods to estimate the implied cost of equity capital using companies' risk characteristics. The evidence regarding which model is significantly superior to others is mixed. Gode and Mohanram (2003) suggest using the Gebhardt et al. (2001) model. Botosan and Plumlee (2005) recommend models proposed by Botosan and Plumlee (2002) and Easton (2004). Core et al. (2006) study the models to estimate the implied cost of equity capital and claim that the implied cost of equity capital estimated by the Gebhardt et al. (2001) model and the Claus and Thomas (2001) have a relatively higher correlation with actual future returns compared to the ones estimated by the Ohlson and Juettner-Nauroth (2005) model and the Easton (2004) models. Kitagawa and Gotoh (2011) find that the implied cost of equity capital determined by the Easton (2004) models is relatively more reliable with their sample. Different researches exhibit evidence to support different models. Though there is no conclusion on which model is the most appropriate and reliable one to estimate the implied cost of equity capital, it seems that the Gebhardt et al. (2001) model, the Claus and Thomas (2001) model, the Ohlson and Juettner-Nauroth (2005) model, and the Easton (2004) models are among the most appropriate and reliable ones. These models are also the most widely cited models to estimate the implied cost of equity capital in accounting and finance studies. In this study, I sort them into two categories. The first category includes the Gebhardt et al. (2001) model and the Claus and Thomas (2001) model derived from the residual income model. The second category consists of the abnormal earnings growth model introduced by Ohlson and Juettner-Nauroth (2005) and the price earnings growth model and modified price earnings growth model derived from the abnormal earnings growth model and proposed by Easton (2004). In this paper, I use all of these four most appropriate and widely accepted models to estimate the implied cost of equity capital to avoid any potential estimation bias that may be a consequence of employing only one estimation model.

The Gebhardt et al. (2001) model considers the implied cost of equity capital as the internal rate of return implicitly accepted by the capital market to discount all future cash flow that a firm pays to its common shareholders. In the subsequent discussion, I will refer to the Gebhardt et al. (2001) model as the GLS model. According to the definition of the GLS model in Gebhardt et al. (2001) and the application of the GLS model in Hou et al. (2012), I can estimate the implied cost of equity capital of using the equation below.

$$P_t = BVPS_t + \sum_{n=1}^{11} \frac{FROE_{t+n} - r_{GLS}}{(1 + r_{GLS})^n} BVPS_{t+n-1} + \frac{FROE_{t+12} - r_{GLS}}{r_{GLS}(1 + r_{GLS})^{11}} BVPS_{t+11} \qquad (1)$$

In Equation (1), $P_t$ is the stock price in year $t$, $FROE_T$ is the forecasted return on equity in year $T$, $r_{GLS}$ represents the implied cost of equity capital estimated by the GLS model, and $BVPS_{t+n-1}$ stands for the book value per share in year $t$ when $n = 1$ and the forecasted book value per share in year $t + n - 1$ when $n > 1$.[1] Since the forecast horizon of earnings forecasts is typically limited, the GLS model uses earnings forecasts from year $t + 1$ to year $t + 3$ to calculate the forecasted return on equity from year $t + 1$ to year $t + 3$. To calculate the

[1] $BVPS_{t+11}$ is the forecasted book value per share at year $t + 11$.

forecasted return on equity after the first three years ahead, I assume that the forecasted return on equity converges to its industry median. I define $FROE_T$ as forecasted earnings per share at time $T$ divided by the one-year prior corresponding book value per share.[2] Since the GLS model requires the clean surplus assumption, the forecasted book value per share equals the one-year prior forecasted book value per share plus forecasted earnings per share in the same year minus the forecasted dividend per share paid to common shareholders in the same year.[3] The forecasted dividend per share paid to common shareholders is the product of forecasted earnings per share in the same year and three-year average historical dividend payout ratio. However, negative earnings can lead to a negative dividend payout ratio, which the GLS model does not allow. For negative earnings observations, the dividend payout ratio equals dividends paid to common shareholders divided by 6% of total assets. The GLS model requires earnings forecasts from year $t + 1$ to year $t + 3$ to estimation of the implied cost of equity capital.

The method of Claus and Thomas (2001) model to estimate the implied cost of equity capital is highly similar to the GLS model. However, the Claus and Thomas (2001) model assumes that after year $t + 5$, the appropriate equity valuation model is the constant growth model. In the rest discussion, I will refer to the Claus and Thomas (2001) model as the CT model. Based on the definition of CT model in Claus and Thomas (2001) and the application of CT model in Hou et al. (2012), the CT model uses the equation below to estimate the implied cost of equity capital.

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[2] To calculate $FROE_T$, I use the book value per share at year $t$, when $T = t + 1$, and the forecasted book value per share at year $T - 1$, when $T > t + 1$.

[3] One exception is that when $n = 2$ the forecasted book value per share equals the book value per share in year $t$ plus forecasted earnings per share in year $t + 1$ minus the forecasted dividend per share paid to common shareholders in year $t + 1$.

$$P_t = BVPS_t + \sum_{n=1}^{5} \frac{FROE_{t+n} - r_{CT}}{(1 + r_{CT})^n} BVPS_{t+n-1} + \frac{(FROE_{t+5} - r_{CT})(1 + g)}{(r_{CT} - g)(1 + r_{CT})^5} BVPS_{t+4} \qquad (2)$$

In Equation (2), the definitions of most variables are as same as the ones in the GLS model. I will focus on explaining the differences. In the CT model, $g$ is the forecasted growth rate and $r_{CT}$ is the implied cost of equity capital estimated by the CT model. A major challenge is that the calculation of implied cost of equity capital using the CT model depends on the estimation of forecasted long-term earnings growth rate. Scholars typically adopt the analyst forecasted five-year earnings growth rate as a proxy for the forecasted long-term earnings growth rate. However, according to Claus and Thomas (2001), Da and Warachka (2011), etc., there are significant differences between the forecasted short-term earnings growth rate and the forecasted long-term earnings growth rate. Therefore, it is improper to use the forecasted short-term earnings growth rate as a proxy for the forecasted long-term earnings growth rate. Furthermore, Harris (1999) claims that both the short-term analyst earnings growth forecasts and long-term analyst earnings growth forecasts are biased and inefficient. Thus, any long-term forecasted earnings growth rate estimated based on earnings forecasts seems to be inadequate. Later, Claus and Thomas (2001) and Gode and Mohanram (2003) suggest employing the risk-free rate minus 3% as the long-term forecasted earnings growth rate. Ashton and Wang (2013) find that this method provides a relatively reliable estimation of the long-term earnings growth rate. In this paper, I define $g$ as the average risk-free rate over the sample period minus 3%. To estimate the implied cost of equity capital using the CT model, I need earnings forecasts from year $t + 1$ to year $t + 5$.

The Ohlson and Juettner-Nauroth (2005) model based on the abnormal earnings growth model is considerably different from the GLS model and the CT model in at least two aspects.

Unlike the GLS model and the CT model, the Ohlson and Juettner-Nauroth (2005) model does not require a clean surplus assumption. Another significant difference is that both the GLS model and the CT model require forecasted return on equity or earnings over a relatively more extended period to estimate the implied cost of equity capital compared to the Ohlson and Juettner-Nauroth (2005) model. The GLS model uses forecasted return on equity over 12 future periods, and the CT model uses forecasted return on equity over five future periods to estimate the implied cost of equity capital. However, the Ohlson and Juettner-Nauroth (2005) model only requires two-period ahead return on equity forecasts to estimate the implied cost of equity capital. Since the Ohlson and Juettner-Nauroth (2005) model is remarkably different in assumption and requirement, it helps improve the reliability and robustness of this study. I will refer to the Ohlson and Juettner-Nauroth (2005) model as the OJN model for the remaining part of this study. To estimate the implied cost of equity capital using the OJN model, I follow Gode and Mohanran (2003) using the equation below.

$$r_{OJN} = A + \sqrt{A^2 + \frac{FEPS_1}{P_0}\left[\frac{FEPS_2 - FEPS_1}{FEPS_1} - (\gamma - 1)\right]} \quad (3)$$

$$where, A \equiv \frac{1}{2}\left(\gamma - 1 + \frac{FDPS_1}{P_0}\right)$$

In Equation (3), $P_0$ is the current stock price, $FDPS_t$ represents the forecasted dividend per share paid in year $t$ calculated by multiplying $FEPS_t$ with the dividend payout ratio, $FEPS_t$ is the forecasted earnings per share at the end of fiscal year $t$, and $r_{OJN}$ donates the implied cost of equity capital forecasted by the OJN model. The method to estimate the dividend payout ratio in the OJN model is as same as the GLS model. The most critical variable of the OJN model is $\gamma$. The definition of $\gamma$ is that $\gamma - 1 = g$. Ohlson and Juettner-Nauroth (2005) do not specifically show how to estimate the $\gamma$. Since the $\gamma - 1$ represents the forecasted long-term earnings growth rate, I follow the discussion in the CT model part to define $\gamma$ as the average risk-free rate over the sample period minus 3% plus 1. As discussed above, the OJN model only requires two-period ahead earnings forecasts to estimate the implied cost equity capital.

The last two methods, the price earnings growth model and the modified price earnings growth model, proposed by Easton (2004), are special derivations of the OJN model by assuming that $\gamma = 1$. I will cite the price earnings growth model as the PEG model and modified price earnings growth model as the MPEG model for the remaining discussion. The difference between the PEG model and the MPEG model is that the PEG model further assumes the forecasted dividend per share as 0. In this paper, I adopt the MPEG model to estimate the implied cost of equity capital. Following Easton (2004), I use the equation below to estimate the implied cost of equity capital of the MPEG model.

$$r_{MPEG} = \sqrt{\frac{FEPS_2 + r_{MPEG} * FDPS_1 - FEPS_1}{P_0}} \quad (4)$$

In the above Equation (4), $FEPS_t$ is the forecasted earnings per share in year $t$, $FDPS_t$ is the forecasted dividend per share paid in year $t$ calculated by multiplying $FEPS_t$ with the corresponding dividend payout ratio, $P_0$ is the current stock price, and $r_{MPEG}$ represents the implied cost of equity capital forecasted by the MPEG model. As same as the OJN model, the MPEG model requires two-period ahead earnings forecasts to estimate the implied cost of equity capital.

Besides earnings forecasts, all these methods to estimate the implied cost of equity capital require the estimation of dividend payout ratio. It is inappropriate to use the actual dividend payout ratio in fiscal year $t$ as an approximation of the estimated dividend payout ratio in fiscal year $t$ in the implied cost of equity capital models since many factors could affect a company's actual dividend payout ratio in a particular year. The estimated dividend payout ratio in the implied cost of equity capital models should describe the general condition of a company's dividend policy. Therefore, I estimate the dividend payout ratio following the method used by Hou et al. (2012). The actual dividend payout ratio in year $t$ for firms with positive earnings equals firms' total dividends per share paid to common shareholders in year $t$ divided by EPS in year $t$ and for firms with negative earnings equals total dividends paid to common shareholders in year $t$ divided by 6% of total assets in year $t$. The estimated dividend payout ratio used for the implied cost of equity capital models is the three-year average actual dividend payout ratio from $t-2$ to $t$. If the three-year average actual dividend payout ratio is not available for a company $i$ in year $t$ or is out of the range from 0 to 1, I use the firm's average actual dividend payout ratio over the whole sample period as an approximation for the three-year average.

### 3.2 The Estimation of Earnings Forecast

In the models to estimate the implied cost of equity capital discussed above, earnings forecasts are critical inputs. In general, scholars can obtain earnings forecasts from several sources including the IBES database and earnings forecast estimation models. The IBES is the Institutional Brokers' Estimate System that collects analyst earnings forecasts since the late 1970s. There are also various earnings forecast models to estimate future earnings. I choose to use the earnings forecast model to forecast future earnings for several reasons.

First, the IBES database only provides earnings forecasts over a relatively shorter period compared to earnings forecast estimation models. The IBES database has coverage of analysts' earnings forecasts only dated back to the late 1970s. However, with the earnings forecast estimation models, we were able to generate earnings forecasts for most of the firms that have the required financial data in Compustat. Earnings forecast estimation models are more appropriate than the IBES database for the sample period from 1968 to 2018 adopted in this study. Second, prior literature has identified that analysts' earnings forecasts are biased. Derman and Berry (1995) study analysts' forecasts from Wall Street and find significant differences between earnings forecasts and actual earnings. Their evidence indicates that the average error increases over time. Many papers find that stock analysts are inordinately optimistic about companies' future earnings. Chopra (1998) shows that the average twelve-month analysts' EPS growth forecast from 1985 to 1996 is 17.7%, while the average twelve-month actual EPS growth is only 8.6% that is less than half of the forecasted value. Scholars have investigated possible theories to explain the phenomena. Francis and Philbrick (1993) claim that analysts' motivation to preserve good relationships with management may lead to positive earnings forecast bias. Dechow et al. (2000) support the idea with their conclusion that affiliated analysts from underwriters tend to publish systematically excessively optimistic earnings forecasts. Lim (2001) finds that earnings forecasts from rational analysts can be optimistically biased since analysts following poorly performed companies may avoid fully downgrading earnings estimations. De Bondt and Thaler (1990) claim that even professionals, including analysts and economists, overreact and make overly extreme earnings forecasts. However, Mendenhall (1991) shows that analysts have the tendency to underreact to information related to future earnings, and Abarbanell and Bernard (1992) show that analysts underreact to recent earnings information. Easterwood and Nutt (1999) consolidate the findings by indicating that the analysts' systematic overreaction to the positive information and underreaction to the negative information can lead to optimistic biases in analysts' earnings forecasts. Besides the above explanations, both Irvine (2004) and Cowen et al. (2006) indicate that analysts may issue optimistic earnings forecasts to benefit brokerage firms. Irvine (2004) claims that the trading volume at brokerage firms may increase, and Cowen et al. (2006) claim that brokerage firms' revenue may increase because of optimistically inflated earnings forecasts. Studies find not only the optimistic bias but also the pessimistic bias in analysts' earnings forecasts. Richardson et al. (2004) find that analysts revise their earnings forecasts from a relatively high level issued initially to a relatively low level that firms can beat before earnings announcements. Hilary and Hsu (2013) show that analysts strategically forgo accuracy and downward their earnings forecasts to increase forecast consistency so that they have higher probabilities of becoming All-Star analysts. Considering the evidence that analysts' earnings forecasts are biased, it seems inappropriate to adopt analysts' earnings forecasts in my study. Third, the analysts provide relatively limited and selected coverage for firms with certain characteristics, while the earnings forecast models provide relatively extensive and random coverage for all firms. Considering that the IBES database contains analysts' earnings forecasts only from the late 1970s, even with a shortened sample period from 1979 to 2018, using analysts' earnings forecasts to estimate the implied cost of equity capital only produces less than half number of observations compared to using estimation models to forecast earnings. The limited coverage of analysts' earnings forecasts could lead to much fewer observations in the sample. When using the cross-sectional estimation model suggested by Hou et al. (2012) to estimate earnings forecasts and the GLS model to estimate the implied cost of equity capital, there are around 110 observations in each portfolio for every year. Employing analysts' earnings forecasts from the IBES database to estimate the implied cost of equity capital will lead to a significantly reduced and undesired number of observations in each portfolio every year. In general, a limited number of observations means some large cap firms may have more significant weights in the portfolio and eventually lead to the result that observed value-weighted holding period returns depart from actual values. Another concern is that analysts have the tendency to issue earnings forecasts for firms with certain characteristics. McNichols and O'Brien (1997) find that analysts prefer to issue forecast reports for their favorable firms and ignore their unfavorable firms. Barth et al. (2001) find that analyst coverage is positively correlated with intangible assets, research and development expense, firm size, and growth rate. A serious concern raised by their findings is that analysts tend to issue forecast reports for growth firms. Estimating the implied cost of equity capital with analysts' earnings forecasts will lead to a higher proportion of growth firms in the sample. Considering the fact that analysts' earnings forecasts from the IBES database provide a relatively limited and selected coverage, earnings estimation models are more appropriate resources to obtain earnings forecasts for this study. Besides the above discussion that demonstrates the advantages and rationale to use earnings estimation models in this study, many papers have directly evaluated the implied cost of equity capital obtained adopting analysts' earnings forecasts. Easton and Monahan (2005) indicate that none of the implied cost of equity capital measurements estimated with analysts' earnings forecasts has a reliable correlation with future realized returns due to the analyst earnings forecast errors. Guay et al. (2011) study various measurements of the implied cost of equity estimated with analysts' earnings forecasts and find that unreliable analysts' earnings forecasts cause these measurements to be unreliable estimations of expected returns. In conclusion, the implied cost of equity capital estimated employing model-based earnings forecasts is more accurate and reliable than the implied cost of equity capital estimated employing analysts' earnings forecasts from the IBES database.

Though most scholars used the analysts' earnings forecasts in early studies, the number of studies using estimation models to forecast earnings have dramatically increased in recent years. The evidence of the superiority of a particular estimation model is mixed and unclear.

Therefore, I employ one of the most commonly adopted earnings estimation models, the cross-sectional earnings estimation model proposed by Hou et al. (2012), to estimate earnings forecasts in this paper. Hereinafter, I refer to the Hou et al. (2012) model as the HVZ model. Hou et al. (2012) claim that their model can significantly reduce survivorship bias. Earnings forecasts estimated by the HVZ models have significantly lower forecast bias and higher earnings response rates compared to analysts' earnings forecasts. The implied cost of equity capital estimated with earnings forecasts from the HVZ model is a better proxy for expected returns compared to the implied cost equity capital estimated with analysts' earnings forecasts. As discussed in Hou et al. (2012), I can use the following equation to estimate earnings forecasts.

$$E_{i,t+\tau} = \alpha_0 + \alpha_1 TA_{i,t} + \alpha_2 D_{i,t} + \alpha_3 DD_{i,t} + \alpha_4 E_{i,t} + \alpha_5 NegE_{i,t} + \alpha_6 ACC_{i,t} + \varepsilon_{i,t+\tau} \quad (5)$$

In Equation (5), $E_{i,t+\tau}$ represents the $\tau$ year ahead net income before extraordinary items of the company $i$ with financial data in year $t$,[4] $TA_{i,t}$ is the total assets, $D_{i,t}$ is the total dividend paid to common shareholders, $DD_{i,t}$ is a dummy variable that equals 1 if the company paid any dividend to common shareholders and 0 otherwise, $NegE_{i,t}$ is a dummy variable that equals 1 if the firm's $E_{i,t}$ is negative and 0 otherwise, and $TACC_{i,t}$ is the accruals.[5] First, I estimate the coefficients of Equation (5) for each $\tau$ in each year $t$ using observations in the previous ten years. Then, I estimate earnings forecasts from $\tau = 1$ to $\tau = 5$ for each firm $i$ in each year $t$ by applying values of independent variables of firm $i$ in year $t$ in the HVZ model with coefficient

[4] $\tau$ takes value from 1 to 5. In first step to find the coefficients of the HVZ model for each $t$ and each $\tau$, $E_{i,t+\tau}$ equals actual net income before extraordinary items in year $t + \tau$. In second step to find forecasted earnings, $E_{i,t+\tau}$ is the $\tau$-year ahead forecasted net income before extraordinary items for company $i$ in year $t$. $E_{i,t+\tau}$ is earnings forecasts from the HVZ model.

[5] Following Hou et al. (2012), I use balance sheet method to calculate the accruals for fiscal year is before 1988 and cash flow statement method for fiscal years from 1988. The balance sheet method in Hou et al. (2012) defines accruals as the change in non-cash current assets minus the change in current liabilities excluding the change in short-term debt and the change in taxes payable less depreciation and amortization expense. The cash flow statement method defines accruals as earnings minus cash flow from operating activities.

values for corresponding $\tau$ in year $t$. One of the major benefits of using the HVZ model is that as long as a firm has data for all required variables, I can successfully estimate earnings forecasts.

## 3.3 Data and Sample

Stock data is from the CRSP database, and firms' financial data is from the Compustat database. The sample includes stocks traded in the NYSE, Nasdaq, and AMEX and excludes financial firms. The original sample period is from 1961 to 2018. Since the HVZ model requires the most recent ten years observations to estimate future earnings, I am only able to generate earnings forecasts since 1970. Also, since the HVZ model requires actual future earnings to estimate the coefficients, I am only able to generate five-year ahead earnings forecasts up to 2013. Therefore, I can only estimate the implied cost of equity capital for the period from 1970 to 2013.

## 3.4 Empirical Results

Table 1 reports the detailed definition of variables used by the HVZ model. Table 2 presents descriptive statistics for variables of the HVZ model. As expected, sizes, total dividends paid to common shareholders, income before extraordinary items, and accruals of companies in the sample vary extensively. About half of firm-year observations paid dividends. Only around 12% of firm-year observations have negative earnings. Table 3 presents the cross-sectional regression results of the HVZ model. To obtain estimations of coefficients in fiscal year $t$, the cross-sectional regression employs recent 10-year observations from fiscal year $t-9$ to fiscal year $t$. The original sample period is from the fiscal year 1961 to 2018. However, to estimate the coefficients in the fiscal year 1970, the HVZ model requires observations from the fiscal year 1961 to 1970. Therefore, the fiscal year 1970 is the first year that I can obtain estimations of coefficients. For cross-sectional regressions with five-year ahead earnings in fiscal year $t$, the

HVZ model requires actual earnings data in fiscal year $t + 5$. The cross-sectional regression with five-year ahead earnings for the fiscal year 2013 requires actual earnings data in the fiscal year 2018. Therefore, the fiscal year 2013 is the last year that I can obtain estimations of coefficients when regressing the HVZ model with five-year ahead earnings. To maintain consistency, I only report the estimation of coefficients from the fiscal year 1970 to 2013 in all panels. As defined by the model, I have to estimate coefficients for every $\tau$ and $t$ combination. Since $\tau$ takes value from 1 to 5, for a 44 fiscal years period from 1970 to 2013, there are 220 sets of estimations of coefficients. I report estimations of coefficients, $t$-values, and the adjusted $R$-squared for one-year ahead to five-year ahead earnings forecast models in 5 different panels. From all the panels, the adjusted *R*-squared is relatively higher in earlier years and decreases gradually from 1970 to around 2002. In the most recent ten years in the sample, the adjusted *R*-squared shows an upward trend. For one-year ahead earnings regressions, in the 1970s, the adjusted *R*-squared is over 90%, and even the lowest adjusted *R*-squared in all fiscal years is 74%. As suggested by the adjusted *R*-squared, the HVZ model provides considerably strong explanatory power for predicting future earnings. As I expected, in general, the one-year ahead earnings forecast model has the highest adjusted *R*-squared, and the five-year ahead earnings forecast model has the lowest adjusted *R*-squared. The results are consistent with analysts' earnings forecasts since many studies document that as the forecast horizon increases, analyst's earnings forecast accuracy drops. $t$-values of *TA*, *D*, *DD*, *NI*, and *AC* are significant at 1% level for nearly every $\tau$ and $t$ combination. Overall, the future earnings are significantly positively correlated with total assets, total dividend paid to common shareholders, and income before extraordinary items, and significantly negatively correlated with accruals. Table 4 reports one-year ahead to five-year ahead earnings forecasts estimated by the HVZ model in 5 different panels. An advantage of using the HVZ model to forecast earnings is that numbers of observations are relatively consistent across the sample period compared to analysts' earnings forecasts from the IBES database. Therefore, the number of observations of the implied cost of equity capital estimated using model-based earnings forecasts should distribute more evenly across all fiscal years. As I expected, within the same panel, the mean of earnings forecasts increases as fiscal year increases. Across panels, the mean of earnings forecasts increases as the forecast horizon increases. Both trends indicate that earnings growth is generally positive over the sample period. Table 5 reports the descriptive statistics of EPS forecasts. Similar to earnings forecasts, the mean of EPS forecasts increases as the forecast horizon increases. However, there is no clear trend of EPS forecasts across the sample period within the same panel. The mean and median of EPS forecasts from 1974 to 1981 are much higher after 1981. Fama and French (2004) find that the profitability of public listed firms has dropped after the 1970s. The trend of my EPS forecasts is consistent with their finding. It verifies the reliability and accuracy of my EPS forecasts. Table 6 presents descriptive statistics of the estimated dividend payout ratio. The average dividend payout ratio over the sample period is 19.78% with a 28.12% standard deviation.

With EPS forecasts and estimated dividend payout ratio, I can estimate the implied cost of equity capital using the GLS, CT, OJN, and MPEG models. I present the descriptive statistics for the implied cost of equity capital estimated by these models in Tables 7, 8, 9, and 10. The mean, median, 25% quantile, and 75% quantile of the implied cost of equity capital listed in Tables 7, 8, 9, and 10 are highly similar to results reported in previous literature. The implied cost of equity capital estimated by the GLS, CT, OJN, and MPEG models have a mean of 0.1297, 0.1394, 0.1372, and 0.1420, respectively. Estimated results from all models show that in the 1970s, the implied cost of equity capital is dramatically higher than later years and remains relatively stable since the 1980s. This finding is consistent with many other implied cost of equity capital studies. The GLS, CT, and OJN model provide roughly similar numbers of observations (118652, 118658, and 103961, respectively). The MPEG model only provides 76103 observations that are only 64% of what the GLS model can provide. Since I will sort the stocks into 25 portfolios for every fiscal year from 1970 to 2013 in the next chapter, with the implied cost of equity capital estimated by the MPEG model, each portfolio only has an average of 69 companies. Therefore, high market cap stock performance may have a much greater influence on the returns of these portfolios. Considering the limited number of observations when estimating the implied cost of equity capital employing the MPEG model, it is more appropriate to use the implied cost of equity capital estimated by the GLS, CT, and OJN models in this study. The CT model requires one-year ahead to five-year ahead earnings forecasts, while the GLS model only requires one-year ahead to three-year ahead earnings forecasts, and the OJN model only requires one-year ahead and two-year ahead earnings forecasts. As presented in Table 3, with an increasing forecast horizon, the explanatory power of the HVZ model drops. Therefore, the implied cost of equity capital estimated with a model that requires a relatively shorter earnings forecast horizon is more accurate than it estimated with a model that requires a relatively longer earnings forecast horizon. Therefore, it is more reliable to employ the implied cost of equity capital estimated by the GLS and OJN models in this study. I will employ the implied cost of equity capital estimated by the GLS and OJN models to decompose the value premium in the next chapter and the implied cost of equity capital estimated by the CT and MPEG models as robustness tests to improve the reliability of this study.

# CHAPTER 4

# DISCOVER THE RISK-ADJUSTED VALUE PREMIUM

## 4.1 Theory

A significant number of papers, including Fama and French (1992, 1993, and 1995), propose the risk explanation for the value premium but did not present empirical evidence that independent risk factors exclusively cause the value premium. Standard valuation models imply the risk-related contribution to the value premium but ignore the possibility of behavior-related contribution to the value premium. On the other side, behavioral finance papers only focus on the behavioral explanation of the value premium but fail to empirically document the magnitude of behavioral contribution to the value premium. Instead of addressing the value premium puzzle from either the risk or behavior perspective, I argue that the value premium must contain the risk premium, but the risk might not be the only source of the value premium. Therefore, I will focus on investigating the value premium from the risk and behavioral perspective simultaneously.

The traditional valuation model introduced by Gordon and Shapiro (1956) suggests that investors can use the following equation to determine the current stock price.

$$P_0 = \frac{D_1}{r - g} \tag{6}$$

In Equation (6), $P_0$ is the stock price at time 0, $D_1$ is the dividend payment at time 1, $r$ is the required rate of return, and $g$ is the earnings growth rate of the firm. A derivation of Equation (6) is Equation (7), as demonstrated below.

$$P_0 = \frac{EPS_1 \times DPR}{r - g} \tag{7}$$

In Equation (7), $EPS_1$ is the earnings at time 1, and $DPR$ is the dividend payout ratio of the firm. Substituting $EPS_1$ of Equation (7) with $EPS_0 \times (1 + g)$ and rearrange the equation, I can form Equation (8) to help us understand the value premium.

$$\frac{P_0}{EPS_0} = \frac{(1+g) \times DPR}{r-g} \tag{8}$$

The left side of Equation (8) is the PE ratio at time 0. The PE ratio is a standard measurement to distinguish between value and growth stocks. Many of the earliest studies, for example, Nicholson (1960) and Basu (1977), use the PE ratio as a criterion to identify value and growth stocks. As defined by many studies, growth stocks generally have higher PE ratios compared with value stocks. Now let us focus on the right side of Equation (8). It shows that the PE ratio is positively correlated to the growth rate of the firm and negatively correlated to the required rate of return. Therefore, a higher discount rate leads to a lower PE ratio, and a lower discount rate leads to a higher PE ratio. At the same time, a higher expected earnings growth rate leads to a higher PE ratio and a lower expected earnings growth rate leads to a lower PE ratio. Thus, value stocks are companies with low PE ratios, high required rate of returns and low expected earnings growth rates, and growth stocks are companies with high PE ratios, low required rate of returns, and high expected earnings growth rates. Because risk requires a reward, the required rate of return is positively associated with the risk. Therefore, value stocks are companies with higher risk and lower expected earnings growth rates and growth stocks are companies with lower risk and higher expected earnings growth rates. Based on the theoretical analysis, I suggest that unreasonably higher returns of value stocks could be results of higher risk or/and overpessimistic expected earnings growth rates, and unreasonably lower returns of growth stocks could be results of lower risk or/and overoptimistic expected earnings growth rates. The risk difference between value and growth stocks must contribute to the value premium. However, it is also possible that the market participants incorrectly estimate future earnings growth rates. The expected earnings growth rates of value stocks may be lower than the realized future earnings growth rates, and the expected earnings growth rates of growth stocks may be higher than the realized future earnings growth rates. The biases in expected earnings growth rates can cause downward biases in PE ratios of some value stocks, and upward biases in PE ratios of some growth stocks. Such biases in PE ratios could at least lead to the value premium in the following way. Since we can express the stock price as earnings multiplying by the PE ratio, downward biases in PE ratios of value stocks could cause current stock prices of value stocks to be lower than their fair prices and upward biases in PE ratio of growth stocks could cause current stock prices of growth stocks to be higher than their fair prices. As time progresses, more and more information regarding firms' earnings growth prospects is available to the market. Market participants may adjust their earnings growth forecasts based on earnings surprises. For value stocks, market participants may realize that they are excessively pessimistic about future earnings growth rates and then inflate expected earnings growth rates. A higher expected earnings growth rate will lead to a higher PE ratio, and stock price adjusted upwardly toward its fair price. For growth stocks, market participants may realize that they are excessively optimistic about future earnings growth rates and then deflate the expected earnings growth rates. A lower expected earnings growth rate will lead to a lower PE ratio, and stock price adjusted downwardly toward its fair price. Therefore, besides risk factors, the way that market participants adjusting their expectations regarding the firms' earnings growth prospects could also lead to part of the value premium. Thus, I suspect that the value premium should contain both the behavioral and risk premium.

## 4.2 Method

I propose to control the risk difference between value and growth stocks to investigate the risk and behavioral contributions to the value premium simultaneously. I predict that within the same risk level, value stocks should have similar returns as growth stocks if risk factors can fully explain the value premium. Since the implied cost of equity capital is a risk measurement that captures all risks that investors demand a premium, the implied cost of equity capital is an ideal measurement of risk. By utilizing the implied cost of equity capital as a risk measurement to sort stocks into five risk quantiles, I can control the differences in returns between value and growth stocks induced by risks. If there are differences in returns between value stocks and growth stocks within the same implied cost of equity capital quantile, behavioral finance can step in and help explain the differences. In this chapter, I will focus on identifying whether value stocks have return premiums over growth stocks after controlling for risks. In the next chapter, I will further investigate the possible market mechanism that creates the risk-adjusted value premium.

To control returns differences between value and growth stocks induced by risk, I sort stocks in the sample evenly into five risk (the implied cost of equity capital) quantiles by fiscal year in the first step. Then in the second step, within each risk quantile, I sort the stocks evenly into five forecasted earnings growth rate quantiles to create 25 two-dimensional portfolios for each fiscal year from 1970 to 2013. I form portfolios at the end of each June from 1970 to 2013 and hold them to the end of next June. The forecasted earnings growth rate that I use to sort the stocks in this study equals the average of the near-term forecasted earnings growth rate and five-year ahead forecasted earnings growth rate. For clarity and simplicity, I will use the $XY$ format to describe portfolio categories in the rest discussion. The first letter $X$ represents the implied cost of equity capital rank and takes value from 1 to 5, which 1 is the lowest implied cost of equity capital rank, and 5 is the highest implied cost of equity capital rank. The second letter $Y$ represents the forecasted earnings growth rate rank and also takes value from 1 to 5, which 1 is the lowest forecasted earnings growth rate rank, and 5 is the highest forecasted growth rate rank.

Therefore, portfolios in the highest implied cost of equity capital rank and the lowest forecasted earnings growth rate rank are in the ‘51’ category, and portfolios in the lowest implied cost of equity capital rank and the highest forecasted earnings growth rate rank are in the ‘15’ category.

Now, the first question is whether the conclusion of theoretical analysis that a value portfolio category has higher implied cost of equity capital and a lower forecasted growth rate and a growth portfolio category has lower implied cost of equity capital and a higher forecasted lower growth rate is accurate. I decided to examine the average PE ratio of each portfolio category to identify value and growth strategy portfolio categories. I first measure the average PE ratio of each portfolio in each June from 1970 to 2013 and then find the 44-year average PE ratio of portfolios within the same portfolio category. I predict that portfolio categories with lower implied cost of equity capital and higher forecasted earnings growth rates are growth strategy portfolio categories with relatively higher PE ratios and portfolio categories with higher implied cost of equity capital and lower forecasted earnings growth rates are value strategy portfolio categories with relatively lower PE ratios. After identifying value and growth portfolio categories, I measure the value-weighted one-year realized holding period return of each portfolio from the end of each June to the end of the next June, and then find the mean of value-weighted one-year realized holding period returns of portfolios within the same portfolio category for the period from 1970 to 2013. The value-weighted one-year realized holding period return includes both the realized capital gain yield and the realized dividend yield. I predict that overall, value-weighted portfolio returns should gradually increase as the implied cost of equity capital increases and gradually decrease as the forecasted earnings growth rate increases. The first phenomenon is the classic risk-return tradeoff, and the second phenomenon is the value premium puzzle. I further predict that within the same implied cost of equity capital rank, a portfolio with a lower forecasted earnings growth rate has a higher return than a portfolio with a higher forecasted earnings growth rate. The portfolio categories within the same implied cost of equity capital rank should have a similar level of risk. Therefore, if the value premium does exist even within the same risk rank, I can conclude that the risk-adjusted value premium is a result of non-risk related factors. Thus, I predict that risk and biased market expectations simultaneously contribute to return differences between value portfolios (which have higher implied cost of equity capital and lower forecasted earnings growth rates) and growth portfolios (which have lower implied cost of equity capital and higher forecasted earnings growth rates).

## 4.3 Data and Sample

Stock data is from the CRSP database, and firms' financial data is from the Compustat database. The sample includes stocks traded in the NYSE, Nasdaq, and AMEX and excludes financial firms. The implied cost of equity capital estimations are from the previous chapter. The sample period for Chapter 4 is from 1970 to 2013.

## 4.4 Empirical Results

In the first set of tests, I sort stocks into portfolios by the implied cost of equity capital estimated by the GLS model and forecasted earnings growth rate. Table 11 to Table 14 present the results of the first set of tests. Table 11 presents the value-weighted realized returns of portfolios by the implied cost of equity capital ranks. Portfolios have an average implied cost of equity capital of 16.47% and an average return of 10.33% in the highest implied cost of equity capital rank and an average implied cost of equity capital of 5.28% and an average return of 4.11% in the lowest implied cost of equity capital rank. The return trend indicates the risk-return tradeoff that higher risk higher return. The PE ratio of the lowest implied cost of equity capital rank is 44.27 and gradually decreases to 20.84 of the highest implied cost of equity capital rank.

The PE ratio column shows that the PE ratio increases as the implied cost of equity capital decreases. Since the implied cost of equity capital is a proxy for risk, the PE ratio trend indicates that market participants prefer to pay higher stock prices for firms with lower risk and lower stock prices for firms with higher risk. In general, firms with lower risk have higher valuation ratios than firms with higher risk. In the fifth and sixth column of Table 11, I decompose the holding period return into capital gain yield and dividend yield. The capital gain yield column indicates that stocks with higher risk have higher price appreciation. The dividend yield column suggests that dividend yield is relatively stable across all implied cost of equity capital ranks.

Table 12 exhibits the value-weighted realized returns of portfolios by forecasted earnings growth rate ranks. Portfolios have an average forecasted earnings growth rate of 40.67% and an average return of 4.93% in the highest forecasted earnings growth rate rank, and an average forecasted earnings growth rate of 0.78% and an average return of 10.53% in the lowest forecasted earnings growth rate rank. The 5.60% return difference between the lowest and highest forecasted earnings growth rate rank suggests the existence of the value premium in our data sample. The PE ratio of the lowest forecasted earnings growth rate rank is 15.53 and gradually increases to 53.65 of the highest forecasted earnings growth rate rank. As expected, in general, growth firms have higher PE ratios than value firms. Market participants prefer to assign higher valuation ratios to firms with better future earnings growth prospects. Same as in Table 11, in the fifth and sixth column of Table 12, I decompose the holding period return into capital gain yield and dividend yield. The capital gain yield column indicates that stocks with lower forecasted earnings growth rates have higher price appreciation. The dividend yield of the lowest forecasted earnings growth rate rank is 3.83% and gradually decreases to 1.45% of the highest forecasted earnings growth rate rank. It suggests that growth firms pay relatively fewer dividends to investors than value firms. The result is consistent with the findings of Rozeff (1982) and Amidu and Abor (2006) that growth firms have lower dividend payout ratios. The reasonable explanation is that growth firms have better growth prospects and tend to retain a higher proportion of earnings to fund new growth opportunities, while value firms have relatively fewer growth opportunities and tend to distribute most of the earnings to shareholders.

Table 13 presents the PE ratios of portfolios sorted on the implied cost of equity capital estimated by the GLS model and forecasted earnings growth rate. The table contains 25 two-dimensional portfolio categories. I use the average PE ratio to identify value and growth strategy portfolio categories. Overall, as predicted by theoretical analysis, the PE ratio of a portfolio category decreases as the implied cost of equity capital increases and increases as the forecasted earnings growth rate increases. In this study, I consider a stock portfolio category with an average PE ratio higher than 35 as a growth strategy portfolio category and lower than 15 as a value strategy portfolio category. As shown by Table 13, portfolio categories 15, 14, 25, 35, and 45 are growth strategy portfolio categories with an average PE ratio of 95.39, 46.45, 53.08, 47.50, and 38.54, respectively, and portfolio categories 21, 31, 41, and 51 are value strategy portfolio categories with an average PE ratio of 14.81, 12.99, 13.92, and 14.37, respectively. Portfolio categories in the highest forecasted earnings growth rank are growth strategy portfolio categories with one exception. The portfolio category 55 with the highest forecasted earnings growth rate rank and highest implied cost of equity capital rank has an average PE ratio of 33.78, which is even lower than the PE ratio of portfolio category 14. It seems that market participants do not consider all stocks with high forecasted earnings growth as growth stocks. Stocks in portfolio category 55 have the strongest earnings growth prospects. However, since their future is highly uncertain, investors are unwilling to pay higher prices for them and tend to assign relatively lower PE ratios to them. As suggested by relatively lower valuation ratios from the market, instead of identifying these stocks as growth strategy stocks, I recommend to recognize them as gambling stocks. On the other side of the table, portfolio categories in the lowest forecasted earnings growth rank are value strategy portfolio categories with one exception. The portfolio category 11 with the lowest forecasted earnings growth rate rank and lowest implied cost of equity capital rank has an average PE ratio of 21.55, which is even higher than PE ratios of many portfolio categories with relatively higher forecasted earnings growth rates. It seems that market participants do not consider all stocks with low forecasted earnings growth as value stocks. Stocks in portfolio category 11 have exceedingly low forecasted earnings growth rates. However, the future performance of these firms is highly predictable. Investors are satisfied with the certainty offered by these stocks and are willing to pay higher prices despite their low earnings growth prospects. The characteristics of these stocks remind me of the cash cows concept from the growth-share matrix proposed by Boston Consulting Group. As suggested by relatively high valuation ratios from the market, I do not consider stocks in portfolio category 11 as value stocks. To sum up, value stocks do not include stocks in the lowest implied cost of equity capital rank, and growth stocks do not include stocks in the highest implied cost of equity capital rank. Therefore, the overall risk of value stocks is slightly higher than the overall risk of growth stocks. The risk difference between value and growth portfolios must contribute to the value premium. In the next step, I will investigate whether a value strategy portfolio category has a risk-adjusted return premium over a growth strategy portfolio category within the same implied cost of equity capital rank.

Table 14 reports the value-weighted realized returns of portfolios sorted on the implied cost of equity capital estimated by the GLS model and forecasted earnings growth rate. In general, a portfolio category with higher implied cost of equity capital has a relatively higher return, and a portfolio category with a higher forecasted earnings growth rate has a relatively lower return. Growth strategy portfolio categories 15, 14, 25, 35, and 45 have an average return of -1.30%, 2.29%, 3.81%, 3.84%, and 7.78%, respectively, and value strategy portfolio categories 21, 31, 41, and 51 have an average return of 9.32%, 11.16%, 12.07, and 12.98%, respectively. Every value strategy portfolio category has a higher return than any of the growth strategy portfolio categories. The value strategy portfolio categories have an average return of 11.38%, and the growth strategy portfolio categories have an average return of 3.28%. The overall value premium between the average return of value strategy and growth strategy portfolio categories is 8.10%. More importantly, as expected in the theoretical analysis, within the same implied cost of equity capital rank, a portfolio category with a lower forecasted earnings growth rate generally has a higher return than a portfolio category with a higher forecasted earnings growth rate. Within the second-lowest implied cost of equity capital rank, the value strategy portfolio category 21 has a risk-adjusted value premium of 5.51% over the growth strategy portfolio category 25. Within the middle and second-highest implied cost of equity capital rank, the risk-adjusted value premiums are 7.32% and 4.29%, respectively. Since stocks within the same implied cost of equity capital rank have a similar level of risk, the result indicates that non-risk-related factors cause the value premium within the same risk rank. Furthermore, surprisingly, behavior-related factors may contribute such an enormous part to the value premium.

To increase the reliability of this study, I also sort stocks into portfolios by the implied cost of equity capital estimated by the OJN model and forecasted earnings growth rate. The OJN model, as a derivation of the abnormal earnings growth model, estimates the implied cost of equity capital differently in method compared to the GLS model based on the residual income model. If the risk-adjusted value premium also presents in risk quantiles created by different implied cost of equity capital estimation models, it is more convincible to announce that behavior-related factors also contribute to the value premium. Table 15 to Table 18 present the results of tests employing the implied cost of equity capital estimated by the OJN model. Table 15 presents the value-weighted realized returns of portfolios by the implied cost of equity capital ranks. Portfolios have average implied cost of equity capital of 20.40% and an average return of 9.18% in the highest implied cost of equity capital rank and average implied cost of equity capital of 5.00% and an average return of 5.02% in the lowest implied cost of equity capital rank. The result indicates that the risk-return tradeoff exists using the implied cost of equity capital estimated by the OJN model as a risk measurement. Similar to the result in Table 11, the PE ratio of the lowest implied cost of equity capital rank is 29.25 and gradually decreases to 17.89 of the highest implied cost of equity capital rank. The result is consistent with the finding in Table 11 that firms with lower risk generally have higher valuation ratios than firms with higher risk. The capital gain yield gradually increases as the implied cost of equity capital increases. However, I find no noticeable difference among dividend yields across different implied cost of equity capital ranks.

Table 16 exhibits the value-weighted realized returns of portfolios by forecasted earnings growth rate ranks. As mentioned in Chapter 4.2, the initial sort criterion to create 25 two-dimensional portfolios is the implied cost of equity capital. Within each implied cost of equity capital rank, I form five forecasted earnings growth rate rank. Therefore, stock components of each forecasted earnings growth rate rank in Table 16 are different from stock components of the same rank in Table 12 due to the difference in the initial sort criterion. In Table 16, portfolios have an average forecasted earnings growth rate of 39.29% and an average return of 2.06% in the highest forecasted earnings growth rate rank, and an average forecasted earnings growth rate of 6.77% and an average return of 10.45% in the lowest forecasted earnings growth rate rank. The value premium based on forecasted earnings growth rate ranks is 8.39%. Similar to the result of Table 12, the PE ratio of the lowest forecasted earnings growth rate rank is 13.53 and gradually increases to 48.97 of the highest forecasted earnings growth rate rank. The capital gain yield of the lowest forecasted earnings growth rate rank has a 5.12% premium over the highest forecasted earnings growth rate rank. As expected, the dividend yield gradually increases from 1.24% of the highest forecasted earnings growth rate rank to 4.51% of the lowest forecasted earnings growth rate rank.

Table 17 presents the PE ratios of portfolios sorted on the implied cost of equity capital estimated by the OJN model and forecasted earnings growth rate. Similar to Table 13, PE ratios in the highest forecasted earnings growth rate rank are generally much higher than PE ratios in the lowest forecasted earnings growth rate rank, and PE ratios in the highest implied cost of equity capital rank are generally lower than PE ratios in the lowest implied cost of equity capital rank. Using the same standard to identify value strategy portfolio category and growth strategy portfolio category, I find that portfolio categories 15, 25, 35, and 45 are growth strategy portfolio categories with an average PE ratio of 63.11, 69.56, 50.71, and 37.11, respectively and portfolio categories 21, 22, 31, 32, 41, 42, 51, and 52 are value strategy portfolio categories with an average PE ratio of 12.17, 14.23, 12.53, 14.53, 12.39, 13.45, 14.37, and 14.16, respectively. Portfolio category 55, with the highest forecasted earnings growth rate and the highest implied cost of equity capital, only has an average PE ratio of 23.76. As defined in the discussion of Table 13, stocks in portfolio category 55 are gambling stocks instead of growth stocks. Portfolio category 11, with the lowest forecasted earnings growth rate and the lowest implied cost of equity capital, only has an average PE ratio of 16.19. Stocks in portfolio category 11 are not value stocks. Again, the overall risk of value stocks is slightly higher than growth stocks.

Table 18 reports the value-weighted realized returns of portfolios sorted on the implied cost of equity capital estimated by the OJN model and forecasted earnings growth rate. Growth strategy portfolio categories 15, 25, 35, and 45 have an average return of -0.39%, -0.10%, 1.25%, and 3.69%, respectively, and value strategy portfolio categories 21, 22, 31, 32, 41, 42, 51, and 52 have an average return of 7.68% 6.48%, 10.00%, 7.80%, 9.94%, 9.54%, 10.25%, and 8.61%, respectively. As expected, value strategy portfolio categories have exceedingly higher returns than growth strategy portfolio categories. Value strategy portfolio categories in the lowest forecasted earnings growth rate rank have an average return of 9.47%, value strategy portfolio categories in the second-lowest forecasted earnings growth rate rank have an average return of 8.11%, and growth strategy portfolio categories have an average return of 1.11%. Same as the results presented in Table 14, within the same implied cost of equity capital rank, the return of a portfolio category generally increases as forecasted earnings growth rate decreases. The average return of value strategy portfolio category 21 and 22 is 7.08%, and the growth strategy portfolio category 25 in the same implied cost of equity capital rank only has a return of -0.10%. Within the second-lowest implied cost of equity capital rank, the risk-adjusted value premium is over 7%. A similar amount of risk-adjusted value premium also presents in the middle and second-highest implied cost of equity capital rank. Considering the return difference between the highest and lowest implied cost of equity capital rank in Table 15 is only 4.16%, the risk-adjusted value premium within the same implied cost of equity capital rank suggests that besides risk factors, behavior-related factors also contribute to the value premium.

The results adopting the implied cost of equity capital estimated by the OJN model are highly similar to the results of tests based on the GLS model. Both sets of tests show that the PE ratio increases as the implied cost of equity capital decreases and decreases as forecasted earnings growth rate decreases. In general, market participants prefer to pay higher stock prices for stocks with relatively lower risk and better earnings prospects. By sorting stocks into the implied cost of equity capital and forecasted earnings growth rate quantiles, returns of value stocks are still substantially higher than returns of growth stocks. The risk-adjust value premium suggests that risk factors cannot entirely explain the value premium. Besides the risk-induced premium, the value premium must also contain a non-risk-related premium part. The magnitude of the risk-adjusted value premium even suggests that behavioral contribution is the primary source of the value premium. Now, the question is what causes the behavior-related contribution to the value premium. Since the forecasted earnings growth rate determines the PE ratio and the PE ratio as a valuation ratio has a direct relationship with stock price and return, I propose that the biased expected earnings growth rate may cause the risk-adjusted value premium. In the next chapter, I will investigate how systematically biased market expectations regarding firms' earnings growth prospects lead to the risk-adjusted value premium.

## 4.5 Robustness Tests

Besides the GLS and OJN model, I have also obtained the implied cost of equity capital estimations employing the CT and MPEG model. The CT model requires earnings forecasts for the next five periods. Thus, the implied cost of equity capital estimated by the CT model is less accurate compared to the GLS model that only requires earnings forecasts for the next three periods. The MPEG model generates much less number of implied cost of equity capital estimations than other models. Though both the CT and MPEG model have drawbacks and are less appropriate for this study, I decided to include them in the robustness tests part to provide additional evidence to support the finding that the value premium contains both the risk-related and behavior-related premium.

Appendix A to Appendix D present the results employing the CT model and have the same layout following Table 11 to 14. In Appendix A, for the lowest implied cost of equity capital rank, the average implied cost of equity capital is 4.32% and the average holding period return is -1.38%, and for the highest implied cost of equity capital rank, the average implied cost of equity capital is 15.57% and the average holding period return is 8.59%. The PE ratio increases as the implied cost of equity capital decreases. In Appendix B, portfolios have an average forecasted earnings growth rate of 46.14% and an average return of 1.79% in the highest forecasted earnings growth rate rank, and an average forecasted earnings growth rate of 5.45% and an average return of 7.70% in the lowest forecasted earnings growth rate rank. The PE ratio increases as the implied cost of equity capital increases. The results in Appendix A and B are highly similar to the results employing the GLS and OJN model. Appendix C reports the PE ratio matrix for 25 two-dimensional portfolio categories. Overall, the PE ratio increases as the forecasted earnings growth rate increases and decreases as the implied cost of equity captain increases. As expected, it suggests that value stocks have relatively higher risk and lower forecasted earnings growth rates, and growth stocks have relatively lower risk and higher forecasted earnings growth rates. Portfolio categories 15, 14, 25, 35, 45, and 55 are growth strategy portfolio categories and portfolio categories 31, 32, 41, 42, 51, and 52 are value strategy portfolio categories. In Appendix D, returns of the above value strategy portfolio categories are greatly higher than returns of the above growth strategy portfolio categories. Same as the results adopting the GLS and OJN model, within the same implied cost of equity capital rank, a value strategy portfolio category has an exceedingly higher return than a growth strategy portfolio. The result indicates that the value premium contains not only the risk premium but also the behavioral premium.

Appendix E to H report the results employing the MPEG model following the layout of Table 11 to 14. However, due to the limited number of implied cost of equity capital estimations generated by the MPEG model, I sort the stocks into five implied cost of equity capital and three forecasted earnings growth rate ranks to create 15 two-dimensional portfolios instead of 25. In Appendix E, portfolios in the highest rank have average implied cost of equity capital of 15.19% and an average return of 8.05%, and portfolios in the lowest rank have average implied cost of equity capital of 3.67% and an average return of 4.26%. In Appendix F, the PE ratio increases as the forecasted earnings growth rate increases. The highest forecasted earnings growth portfolios have an average return of 8.47%, and the lowest forecasted earnings growth portfolios have an average return of 3.45%. In Appendix G, the average PE ratio matrix shows that portfolio categories 11, 12, 13, 14, and 15 are value strategy portfolio categories, and portfolio categories 31, 32, 33, 34, and 35 are growth strategy portfolio categories. According to the returns reported in Appendix H, a growth portfolio category has a much higher return than a value portfolio category within the same implied cost of equity capital rank.

Using the implied cost of equity capital estimated by the CT or MPEG model does not change the results. The risk-adjusted value premium presents in every set of tests. No matter what method I use to estimate the implied cost of equity capital, a value portfolio category always has an exceedingly higher return than a growth portfolio category with in the same implied cost of equity capital rank. The return trend within every risk rank suggests that the value premium must contain the behavior-related premium besides the risk-related premium.

# CHAPTER 5

# WHAT CAUSES THE RISK-ADJUSTED VALUE PREMIUM

## 5.1 Theory

Employing the implied cost of equity capital as a proxy for all risk that investors demand a premium, I find that the risk-related and behavior-related premium simultaneously contribute to the value premium. However, the mechanism of how market participants' behavior causes the risk-adjusted value premium is uncertain. In the previous chapter, the theoretical analysis based on the Gordon growth model suggests that changes in valuation ratio as a result of earnings growth forecast errors may play a key role in creating the risk-adjusted value premium. However, no study has provided empirical evidence to explain the whole process of how valuation ratio changes aggravate the value premium. The behavioral finance studies like Lakonishok et al. (1994), La Porta et al. (1997), etc., provide hope for me to explore the formation process of behavior-related contribution to the value premium. Lakonishok et al. (1994) suggest that market participants consistently overestimated the growth prospects of growth firms. Later on, La Porta et al. (1997) suggest that earnings surprises of value stocks are typically more favorable than earnings surprises of growth stocks. Bauman and Miller (1997) even find that, in general, analysts are too optimistic about future earnings of growth stocks and pessimistic about future earnings of value stocks. Such bias in market expectations causes sizable negative earnings surprises for growth stocks, which can be the explanation for the value premium puzzle. All these studies indicate that errors in earnings growth forecasts lead to the value premium. Encouraged by their findings, I propose to demonstrate how valuation ratio changes as results of earnings growth forecast errors cause the behavioral contribution to the value premium. In Chapter 4, I find that the PE ratio generally increases as the forecasted earnings growth rate increases. Since earnings growth forecasts for value stocks tend to be lower than actual and earnings growth forecasts for growth stocks tend to be higher than actual, PE ratios of value stocks generally are lower than them should be in an efficient market and PE ratios of growth stocks generally are higher than them should be in an efficient market. The product of PE ratio and EPS is the stock price. Therefore, downward biases in PE ratios of value stocks can cause stock prices to be lower than their fair prices, and upward biases in PE ratios of growth stock can cause stock prices to be higher than their fair prices. Market participants eventually will realize that their earnings growth expectations for growth firms are too optimistic, and for value firms are too pessimistic as soon as new earnings growth information declared to the market. Market participants may downgrade earnings growth forecasts for growth firms. Thus, PE ratios of growth firms may decline. On the contrary, market participants may upgrade earnings growth forecasts for value firms. Thus, PE ratios of values firms may increase. I propose to break down returns of value stocks and growth stocks to investigate the influence of valuation ratio adjustments caused by earnings growth expectation errors on the value premium.

## 5.2 Method

In the first step, I sort stocks in the sample evenly into ten analyst’s one-year earnings growth forecast ranks by fiscal year. I form portfolios at the end of each June and hold it until the end of the next June. Since stock price equals the product of the PE ratio and EPS, I propose to break down the capital gain yield into three parts. Table 19 presents an example to help demonstrate the research design and main table layouts. In Table 19, I assume that there is a firm with a $100 stock price per share and $5 EPS at time 0, and a $150 stock price per share and $6 EPS at time 1. Therefore, the PE ratio of the firm is 20 at time 0 and 25 at time 1. The capital gain yield of the firm from time 0 to time 1 equals 50% and contains three different contributions. The first part is a 20% EPS growth, the second part is a 25% growth in PE ratio, and the third part is a 5% interaction term of the EPS growth and growth in PE ratio. Therefore, I can conclude that the valuation ratio change contributes at least a 20% return to the capital gain yield. I use the above method to decompose the holding period return of each stock in the sample to investigate what contributes the most to the value premium. In the second step, I compare the analysts' one-year earnings growth forecasts at time 0 with actual earnings growth from time 0 to time 1 to verify the assumption that analysts are too optimistic about earnings growth prospects of growth firms and too pessimistic about earnings growth prospects of value firms. I predict that systematic errors in earnings growth forecasts cause PE ratios of value firms at time 0 to be lower than fair values, and PE ratios of growth firms at time 0 to be higher than fair values since the PE ratio increases as the forecasted earnings growth rate increases. Therefore, stock prices of value firms at time 0 are systematically lower than fair prices, and stock prices of growth firms at time 0 are systematically higher than fair prices. Afterward, I compare the analysts' one-year earnings growth forecasts at time 0 with forecasts at time 1 to demonstrate that at time 1, for value firms, analysts increase forecasted earnings growth rates, and for growth firms, analysts decrease forecasted earnings growth rates. I predict that adjustments in forecasted earnings growth rates at time 1 cause PE ratios of value firms to increase and growth firms to decrease. The changes in PE ratios from time 0 to time 1 cause stock prices shifting toward fair values. For value firms, holding period returns include positive growth in valuation ratios, and for growth firms, holding period returns include negative growth in valuation ratios. If the results are consistent with my prediction, I can conclude that the value premium at least partially contains valuation ratio adjustments. People may argue that valuation ratio adjustments could be a result of risk level changes instead of biased earnings expectations. Therefore, in the last step, I measure the pooled standard deviation of individual monthly stock prices or returns at time 0 and time 1 for each analyst's one-year earnings growth forecast rank, following the method suggested by Cohen (2013). I use 24-month data from 12 months ago to 11 months later to calculate the standard deviation of individual stock prices or returns for each firm. If risk remains at a similar level, I can conclude that growth in PE ratios as a result of earnings growth forecast errors causes the behavioral contribution to the value premium.

### 5.3 Data and Sample

Analysts' earnings forecasts are from the IBES database. Stock data is from the CRSP database, and firms' financial data is from the Compustat database. Since analysts' earnings forecasts from the IBES database are only available since the later 1970s, the sample period for investigating the behavior-related value premium is from 1980 to 2017. The sample includes stocks traded in the NYSE, Nasdaq, and AMEX and excludes financial firms. The sample only includes observations with both one-year ahead earnings forecasts at time 0 and time 1. Due to the research design, I form portfolios at the end of each June only considering firms with positive PE ratios in that fiscal year.

### 5.4 Empirical Results

Table 20 reports components of the holding period returns of portfolios by analyst's one-year earnings growth forecast ranks. The returns in the table are means of value-weighted returns of portfolios within the same analyst's one-year earnings growth forecast rank. In this study, I consider the top three ranks with forecasted earnings growth rates of 3565.17%, 72.54%, and 27.49%, as growth strategy ranks, and the bottom three ranks with forecasted earnings growth rates of -93.11%, -78.29%, and -62.15% as value strategy ranks. The value-weighted EPS at time 0 and time 1 both increase as forecasted earnings growth rate decreases. The results indicate that value firms generally have higher EPS than growth firms. The EPS at time 0 is higher than the EPS at time 1 for value strategy ranks and lower for growth strategy ranks. The decreases in EPS for value strategy ranks indicate that the profitability of value firms generally decreases after one year, and the increases in EPS for growth strategy ranks indicate that the profitability of growth firms increases after one year. The PE ratio at time 0 and time 1 both increase as forecasted earnings growth rate increases. In general, firms with better earnings growth prospects have higher valuation ratios. PE ratios of value strategy ranks are higher at time 1 than at time 0, suggesting that investors increase valuation ratios for value firms after a year. On the other hand, PE ratios of growth strategy ranks are lower at time 1 than at time 0, suggesting that investors decrease valuation ratios for growth firms after a year. The capital gains of value strategy rank 1, 2, and 3 are 16.26%, 15.08%, and 13.48%, respectively, and the capital gains of growth strategy rank 8, 9, and 10 are 2.33%, 1.09%, and -0.98%, respectively. The capital gain generally decreases as forecasted earnings growth rate increases. The relatively higher returns of value strategy ranks are results of higher growth in PE ratio since both the EPS growth and interaction are negative in value strategy ranks. The results suggest that positive adjustments in valuation ratios lead to exceedingly higher returns of value firms. On the contrary, in growth strategy ranks, EPS growth is generally positive. The negative growth in PE ratios causes relatively lower returns of growth strategy ranks. The positive valuation ratio adjustments for value firms and negative valuation ratio adjustments for growth firms cause capital gains of value firms are generally higher than growth firms. As expected, dividend yield increases as forecasted earnings growth rate decreases. Value firms have higher dividend yields than growth firms. Higher dividend yields of value firms and valuation ratio adjustments jointly cause the value premium.

In Table 21, I compare the analyst's one-year earnings growth forecasts with actual earnings growth rates to investigate what causes the valuation ratio change. In value strategy rank 1, analysts are incredibly pessimistic about earnings growth prospects of value firms and predict that their EPS may decline by 93.11% after one year. However, the actual EPS only declines by 10.47% in the same period. In value strategy rank 2 and 3, I find similar results that actual earnings growth rates are substantially less negatively than forecasted earnings growth rates. Now let us focus on the growth strategy ranks. In growth strategy rank 10, analysts are incredibly optimistic about the earnings growth prospects of growth firms and predict that EPS after one year is 35.6517 times current EPS. However, growth firms in the top growth rank disappoint investors and analysts, although their EPS on average grows by 120.80%. The actual EPS growth is significantly lower than forecasted growth. In growth strategy rank 8 and 9, the forecasted earnings growth rates are also higher than actual. The results suggest that analysts are overly pessimistic about earnings growth of value firms and optimistic about earnings growth of growth firms. Since investors tend to assign higher PE ratios to firms with better growth prospects, at time 0, significantly downward biased earnings growth forecasts for value firms may lead their PE ratios to be greatly lower than fair values. On the other hand, growth firms may receive higher PE ratios than they should in an efficient market.

After one year, firms announce their actual earnings to the market. Analysts eventually realize their errors in expectations and make adjustments to earnings growth forecasts accordingly. For value strategy rank 1, 2, and 3, analysts raise earnings growth forecasts. In value strategy rank 1, analysts have an average forecasted earnings growth rate of -93.11% at time 0 and significantly raise it to 70.02%. In value strategy rank 2 and 3, analysts raise their earnings growth forecasts by 43.30% and 50.83%, respectively. The situation of growth strategy ranks is much complicated than value strategy ranks. In growth strategy rank 10, analysts have an average forecasted earnings growth rate of 3565.17%. However, the actual earnings growth rate is only 120.80%. Analysts severely overestimate the earnings growth prospects of firms in the highest forecasted earnings growth rank. At time 1, analysts lower their earnings growth forecasts. In rank 8 and rank 9, analysts also overestimate the earnings growth rates. However, although firms have not met their earnings growth forecasts, analysts seem to be satisfied with firms' actual earnings growth. In rank 9, firms have an average earnings growth of 48.78% that is 23.76% lower than the forecasted earnings growth, and in rank 8, firms have an average earnings growth of 18.20% that is 9.29% lower than the forecasted earnings growth. Instead of deflating earnings growth forecasts, analysts increase earnings growth forecasts for these firms. However, it seems that the market does not agree with analysts. The investors are not satisfied with the earnings growth performance of firms in rank 8 and 9. Thus, they lower PE ratios at time 1. Though it is impossible to observe investors' expectations on firms' earnings prospects, based on decreased PE ratios, I suggest that investors actually lower their earnings growth expectations on firms in rank 8 and 9. It would be interesting to investigate when analysts and investors have different opinions. To sum up, for the highest analyst's forecasted earnings growth rank, analysts and investors both agree that earnings growth forecasts at time 0 are too optimistic. As a result, analysts and investors both deflate earnings growth forecasts at time 1. However, for the second-highest and third-highest analyst's forecasted earnings growth rank, analysts and investors show inconsistency in opinions. Analysts overestimate earnings growth at time 0 and surprisingly further increase their forecasts at time 1. Investors cutting down PE ratios assigned to the firms in rank 8 and 9 indicate that they are not happy with actual earnings growth and lower their expectations.

Overall, evidence from Table 21 suggests that analyst's earnings growth forecast errors cause PE ratio adjustments. Therefore, upward biased earnings growth forecasts for value firms and downward biased earnings growth forecasts for growth firms together lead to valuation ratio changes and eventually contribute to the behavioral part of the value premium.

Since people may argue that risk may change over time and lead to PE ratio changes, In Table 22, I compare risk measurements at time 0 with time 1 to exhibit that the risk remains at a similar level. Therefore, adjustments in PE ratios are results of biased earnings growth forecasts. Table 22 reports pooled standard deviation of individual monthly prices and returns at time 0 and time 1 for each analyst's one-year earnings growth forecast rank. The difference between the pooled standard deviation of individual returns at time 0 and time 1 for each rank is extremely tiny. For value strategy rank 1, 2, and 3, the pooled standard deviation of returns only decrease by 0.0008, 0.0005, 0.0008, respectively, and for growth strategy rank 8, 9, and 10, the pooled standard deviation of returns only increase by 0.0018, 0.0001, 0.0002, respectively. The valuation ratio adjustments for value strategy ranks are around 30%, and for growth strategy ranks are from -11.40% to -51.49%. Such tiny changes in risk can not be the explanation for adjustments in valuation ratios. Therefore, I conclude that errors in earnings growth expectations cause valuation ratio changes and eventually lead to the risk-adjusted value premium.

### 5.5 Robustness Tests

Since analysts' earnings growth forecasts are inaccurate and unreliable, I also sort stocks into ten quantiles by PE ratios at time 0. Appendix I to K show the results of portfolios formed by PE ratio ranks following the same layouts of Table 20 to 22. Appendix I shows that EPS increases as the PE ratio increases. For value strategy rank 1, 2, and 3, EPS decreases from time 0 to time 1, and for growth strategy rank 8, 9, and 10, EPS increases from time 0 to time 1. The results indicate that value firms have declined earnings from time 0 to time 1, and growth firms have increased earnings from time 0 to time 1. In growth strategy rank 10, the value-weighted price decreases from time 0 to time 1 as a result of decreasing PE ratio from time 0 to time 1. In growth strategy rank 8 and 9, the value-weighted price increase slightly from time 0 to time 1 due to exceedingly decrease in PE ratio. The result indicates that in growth strategy ranks, investors significantly lower valuation ratios from time 0 to time 1. On the left side of Appendix I, PE ratio adjustments are exceeding positive, ranging from 23.57% to 30.85%. The positive PE ratio growth causes higher capital gain yields of value strategy ranks. The dividend yield increase as the PE ratio increases suggesting that value stocks pay higher dividends. The results of Appendix I are highly consistent with Table 20. They all indicate that positive growth in PE ratios of value firms, negative growth in PE ratios of growth firms, and higher dividend yields of value firms simultaneously cause the value premium.

Appendix J shows that analysts systematically overestimate earnings growth for growth firms and underestimate earnings growth for value firms. For value strategy ranks, analysts' earnings growth forecasts on average are 77.61%, 37.89%, and 35.66% lower than the actual earnings growth from time 0 time 1, respectively, and for growth strategy ranks, analysts' earnings growth forecasts on average are 98.53%, 139.70%, and 2396.93% higher than actual, respectively. Analysts increase earnings growth forecasts at time 1 for value strategy ranks 1, 2, and 3, and lower earnings growth forecasts at time 1 for top growth strategy rank 10. Investors significantly inflate PE ratios assigned to value firms and deflate PE ratios assigned to growth firms. The errors in earnings growth forecasts at time 0 may cause valuation ratio adjustments.

Appendix K compares the risk of a portfolio at time 0 with time 1 to demonstrate that the risk does not change enough to cause valuation ratio adjustments. For value strategy ranks 1, 2, and 3, pooled standard deviations of individual monthly stock returns only change by -0.0006, -

0.0005, and 0.0004 from time 0 to time 1, respectively, and for growth strategy ranks 8 and 9, pooled standard deviations of individual monthly stock returns only change by 0.0010 and -0.0006 from time 0 to time 1, respectively. For the highest PE ratio rank, the pooled standard deviation of individual monthly stock returns does not even change from time 0 to time 1. The evidence indicates that risk remains at a similar level. Therefore, I conclude that the behavior-related value premium is a result of valuation ratios adjustments caused by errors in earnings growth expectations.

# CHAPTER 6

# CONCLUSION

The study shows that value strategy portfolios have excessively higher returns than growth strategy portfolios. More importantly, adopting the implied cost of equity capital estimated using a variety of models, I find that within the same implied cost of equity capital rank, value strategy portfolios still have exceedingly higher returns than growth strategy portfolios. Since the implied cost of equity capital is a risk measurement that contains all risks that investors demand a premium, the finding indicates that the value premium exists even after controlling for risk. Furthermore, PE ratios of portfolios sorted on the implied cost of equity capital and forecasted earnings growth rate reveal that market participants do not consider high forecasted earnings growth stocks within the highest implied cost of equity capital quantile as growth stocks and low forecasted earnings growth stocks within the lowest implied cost of equity capital quantile as value stocks. Therefore, the overall risk of value stocks is slightly higher than growth stocks. Returns of two-dimensional portfolios present unambiguous trends that return increases as the implied cost of equity capital increases and forecasted earnings growth rate decreases. All in all, the results indicate that the value premium contains both the risk-related and behavior-related premium.

After empirically presenting the risk-adjusted value premium, I further investigate what causes the behavioral contribution to the value premium. By decomposing the holding period return, I find that adjustments in PE ratios and differences in dividend yields cause the value premium. Systematically overestimated earnings growth of growth firms and underestimated earnings growth of value firms from the IBES database suggest that errors in market participants' expectations regarding firms' growth prospects lead to valuation ratio adjustments and, eventually, the risk-adjusted value premium.

This study provides empirical evidence to support the behavioral explanation of the value premium without ignoring the risk contribution. To sum up, upwardly biased earnings growth expectations of growth firms, downwardly biased earnings growth expectations of value firms, and risk jointly create the value premium.

**Table 1: Definitions of Variables of the HVZ Model**

| Variables | Definition | Unit |
|---|---|---|
| $TA$ | Total assets. | Million Dollars |
| $D$ | Total dividend payments to common shareholders. | Million Dollars |
| $DD$ | Dummy variable that equals 1 if the company paid any dividend to common shareholders, and 0 otherwise. | |
| $NI$ | Income before extraordinary items. | Million Dollars |
| $NegE$ | Dummy variable that equals 1 if the company's income before extraordinary items is less than 0, and 0 otherwise. | |
| $AC$ | $AC$ is total accruals.<br>Before 1998, accruals equal the change in short-term debt and the change in taxes payable less depreciation and amortization expense.<br>From 1998, accruals equal earnings minus cash flow from operating activities. | Million Dollars |

**Table 2: Descriptive Statistics for Variables of the HVZ Model**

| Variables | Mean | SD | 1% | 25% | Median | 75% | 99% |
|---|---|---|---|---|---|---|---|
| $TA$ | 2009.30 | 5856.82 | 0.06 | 27.53 | 141.16 | 855.57 | 34599.12 |
| □ | 33.35 | 115.58 | 0.00 | 0.00 | 0.03 | 6.00 | 703.72 |
| $DD$ | 0.51 | 0.50 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| □□ | 98.45 | 307.90 | -284.56 | 0.96 | 6.36 | 40.04 | 1860.00 |
| $NegE$ | 0.12 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| $AC$ | -104.30 | 366.10 | -2304.00 | -30.64 | -2.30 | 0.36 | 98.52 |

Note: The definitions of variables are in Table 1. This table presents summary statistics including mean, standard deviation (SD), select percentiles (1%, 25%, 75%, 99%), and median for variables of the HVZ model.

**Table 3: Cross-sectional Regression Results of the HVZ Model**

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| **Panel A Cross-sectional Regression Results of the HVZ Model with One-year Ahead Earnings** | | | | | | | | |
| 1970 | 0.7838 | 0.0016 | 1.0872 | -1.0576 | 0.4716 | -0.5862 | -0.0494 | 0.95 |
| | 2.90 | 3.37 | 54.98 | -3.31 | 53.02 | -1.12 | -9.15 | |
| 1971 | 0.7897 | 0.0011 | 0.8886 | -0.5638 | 0.5610 | -0.3309 | -0.0593 | 0.95 |
| | 3.51 | 2.96 | 53.14 | -2.10 | 73.20 | -0.77 | -13.55 | |
| 1972 | 0.5406 | 0.0063 | 0.7184 | -0.0877 | 0.6194 | -0.1125 | -0.0342 | 0.95 |
| | 2.42 | 17.10 | 50.91 | -0.33 | 88.98 | -0.26 | -7.91 | |
| 1973 | 0.3958 | 0.0073 | 0.5446 | 0.4645 | 0.6919 | 0.0784 | -0.0283 | 0.93 |
| | 1.59 | 18.35 | 34.17 | 1.53 | 90.08 | 0.15 | -6.29 | |
| 1974 | 0.7334 | 0.0029 | 0.6648 | 0.8942 | 0.6200 | -0.5996 | -0.1011 | 0.93 |
| | 3.07 | 8.50 | 48.21 | 3.06 | 97.04 | -1.26 | -27.89 | |
| 1975 | 0.6916 | 0.0038 | 0.6331 | 1.2059 | 0.6113 | -0.6448 | -0.1252 | 0.93 |
| | 3.24 | 12.60 | 49.41 | 4.57 | 105.46 | -1.59 | -40.26 | |
| 1976 | 0.5665 | 0.0042 | 0.5191 | 1.3653 | 0.6670 | -0.3592 | -0.1169 | 0.93 |
| | 2.80 | 15.18 | 42.95 | 5.43 | 122.17 | -0.96 | -40.19 | |
| 1977 | 0.4500 | 0.0050 | 0.4238 | 1.6429 | 0.7094 | -0.0727 | -0.1025 | 0.94 |
| | 2.33 | 20.35 | 41.49 | 6.84 | 147.07 | -0.21 | -38.52 | |
| 1978 | 0.3823 | 0.0070 | 0.3560 | 1.7262 | 0.7395 | 0.0507 | -0.0979 | 0.92 |
| | 1.73 | 26.14 | 33.42 | 6.24 | 141.81 | 0.13 | -33.49 | |
| 1979 | 0.3363 | 0.0039 | 0.3163 | 2.0564 | 0.8096 | 0.5984 | -0.0838 | 0.91 |
| | 1.31 | 13.57 | 28.37 | 6.44 | 152.80 | 1.30 | -27.88 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1980 | 0.2821 | 0.0025 | 0.2759 | 2.2632 | 0.8476 | 0.5946 | -0.0728 | 0.91 |
| | 1.08 | 9.46 | 26.61 | 6.96 | 188.29 | 1.28 | -26.26 | |
| 1981 | 0.2916 | 0.0012 | 0.2834 | 1.9618 | 0.8372 | 0.3054 | -0.0637 | 0.90 |
| | 1.01 | 4.48 | 26.42 | 5.46 | 185.12 | 0.61 | -21.91 | |
| 1982 | 0.2356 | 0.0042 | 0.1678 | 1.6793 | 0.8207 | 0.2648 | -0.0673 | 0.90 |
| | 0.78 | 16.00 | 15.91 | 4.45 | 189.96 | 0.53 | -23.60 | |
| 1983 | 0.2447 | 0.0047 | 0.1166 | 1.8941 | 0.8256 | 0.4480 | -0.0669 | 0.90 |
| | 0.80 | 18.20 | 11.78 | 4.96 | 201.20 | 0.91 | -24.43 | |
| 1984 | -0.2295 | 0.0055 | 0.0600 | 2.1345 | 0.8457 | 1.1076 | -0.0399 | 0.89 |
| | -0.70 | 20.93 | 5.97 | 5.16 | 201.46 | 2.15 | -13.87 | |
| 1985 | -0.7448 | 0.0053 | 0.1289 | 2.5241 | 0.8257 | 1.9892 | -0.0129 | 0.88 |
| | -2.01 | 19.47 | 12.76 | 5.41 | 194.50 | 3.52 | -4.25 | |
| 1986 | -0.9426 | 0.0075 | 0.1487 | 2.9223 | 0.7875 | 2.6012 | -0.0155 | 0.87 |
| | -2.36 | 27.75 | 15.32 | 5.78 | 189.96 | 4.41 | -5.04 | |
| 1987 | -1.1059 | 0.0084 | 0.1278 | 3.2198 | 0.7843 | 2.5727 | -0.0171 | 0.87 |
| | -2.61 | 31.64 | 13.38 | 5.90 | 187.48 | 4.19 | -5.53 | |
| 1988 | -1.3319 | 0.0076 | 0.1450 | 3.2344 | 0.7632 | 2.4703 | -0.0277 | 0.87 |
| | -3.05 | 29.96 | 16.15 | 5.67 | 188.77 | 3.98 | -9.36 | |
| 1989 | -1.5156 | 0.0059 | 0.2011 | 3.0733 | 0.7599 | 2.1868 | -0.0306 | 0.86 |
| | -3.41 | 24.36 | 23.18 | 5.20 | 192.82 | 3.52 | -10.55 | |
| 1990 | -1.8303 | 0.0029 | 0.2037 | 3.5809 | 0.7744 | 2.8963 | -0.0357 | 0.84 |
| | -3.85 | 11.98 | 22.69 | 5.55 | 189.31 | 4.39 | -11.63 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | ***TA*** | ***D*** | ***DD*** | ***NI*** | ***NegE*** | ***AC*** | **Adj.$R^2$** |
| 1991 | -1.6896 | 0.0013 | 0.2055 | 4.6355 | 0.7905 | 3.1805 | -0.0497 | 0.84 |
| | -3.49 | 5.68 | 22.96 | 6.92 | 201.30 | 4.78 | -16.37 | |
| 1992 | -1.7289 | 0.0019 | 0.2413 | 5.1950 | 0.7551 | 3.0168 | -0.0476 | 0.82 |
| | -3.42 | 7.84 | 26.18 | 7.24 | 193.10 | 4.32 | -15.25 | |
| 1993 | -1.6012 | 0.0030 | 0.2974 | 4.9023 | 0.7196 | 2.7222 | -0.0562 | 0.81 |
| | -3.11 | 12.75 | 32.60 | 6.56 | 187.81 | 3.83 | -18.13 | |
| 1994 | -1.3647 | 0.0028 | 0.2956 | 5.6627 | 0.7282 | 2.6423 | -0.0649 | 0.82 |
| | -2.65 | 12.41 | 33.17 | 7.41 | 193.79 | 3.70 | -21.29 | |
| 1995 | -1.0794 | 0.0033 | 0.2995 | 5.3789 | 0.7204 | 1.8474 | -0.0790 | 0.83 |
| | -2.12 | 15.02 | 34.63 | 6.97 | 197.49 | 2.61 | -26.81 | |
| 1996 | -0.7963 | 0.0021 | 0.2620 | 4.7687 | 0.7362 | 1.1495 | -0.0926 | 0.82 |
| | -1.56 | 9.45 | 30.77 | 6.02 | 205.14 | 1.60 | -32.33 | |
| 1997 | -1.1606 | 0.0012 | 0.3202 | 4.5242 | 0.7053 | 0.9209 | -0.1008 | 0.81 |
| | -2.15 | 5.40 | 36.60 | 5.33 | 194.61 | 1.22 | -34.63 | |
| 1998 | -0.7318 | 0.0014 | 0.3262 | 4.3731 | 0.6892 | -0.5062 | -0.1211 | 0.80 |
| | -1.32 | 6.43 | 37.10 | 4.93 | 193.26 | -0.65 | -41.99 | |
| 1999 | -0.6248 | 0.0013 | 0.2686 | 5.0247 | 0.7095 | -1.8608 | -0.1386 | 0.79 |
| | -1.07 | 5.79 | 30.11 | 5.30 | 198.15 | -2.30 | -47.58 | |
| 2000 | 0.0699 | -0.0009 | 0.4428 | 5.1647 | 0.6513 | -4.8315 | -0.1398 | 0.76 |
| | 0.11 | -3.95 | 48.20 | 4.95 | 181.49 | -5.53 | -47.36 | |
| 2001 | -0.0130 | -0.0003 | 0.4465 | 5.4499 | 0.6510 | -4.8982 | -0.1302 | 0.75 |
| | -0.02 | -1.41 | 48.36 | 4.94 | 184.75 | -5.40 | -46.33 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 2002 | -0.0146 | 0.0007 | 0.4197 | 5.6831 | 0.6455 | -4.9006 | -0.1402 | 0.74 |
| | -0.02 | 3.07 | 45.10 | 4.87 | 184.21 | -5.20 | -51.00 | |
| 2003 | 0.5291 | 0.0013 | 0.3810 | 6.6241 | 0.6521 | -5.5832 | -0.1432 | 0.75 |
| | 0.72 | 5.48 | 40.61 | 5.39 | 187.32 | -5.69 | -51.73 | |
| 2004 | 0.4007 | 0.0018 | 0.3415 | 7.5995 | 0.6703 | -5.2988 | -0.1393 | 0.76 |
| | 0.53 | 7.75 | 36.90 | 5.97 | 196.53 | -5.26 | -50.75 | |
| 2005 | 0.3413 | 0.0020 | 0.2917 | 9.3957 | 0.6933 | -4.5841 | -0.1366 | 0.77 |
| | 0.43 | 8.61 | 31.46 | 7.02 | 203.46 | -4.35 | -49.53 | |
| 2006 | 0.1836 | 0.0024 | 0.2860 | 9.7810 | 0.7016 | -4.3243 | -0.1338 | 0.78 |
| | 0.22 | 10.19 | 30.96 | 6.94 | 205.97 | -3.91 | -48.19 | |
| 2007 | -0.7096 | 0.0015 | 0.2695 | 10.5920 | 0.7106 | -3.7335 | -0.1323 | 0.77 |
| | -0.77 | 5.95 | 28.59 | 6.97 | 201.85 | -3.13 | -46.15 | |
| 2008 | -1.0537 | 0.0018 | 0.2763 | 8.4131 | 0.6970 | -2.6336 | -0.1244 | 0.76 |
| | -1.07 | 6.94 | 28.78 | 5.24 | 195.93 | -2.07 | -43.57 | |
| 2009 | -0.7724 | 0.0030 | 0.2894 | 9.1656 | 0.6707 | -1.7456 | -0.1299 | 0.76 |
| | -0.74 | 11.55 | 29.72 | 5.46 | 185.74 | -1.31 | -44.61 | |
| 2010 | -0.3183 | 0.0053 | 0.2206 | 12.3690 | 0.6841 | -0.6685 | -0.1167 | 0.79 |
| | -0.30 | 20.63 | 23.18 | 7.33 | 190.24 | -0.49 | -40.07 | |
| 2011 | -0.3733 | 0.0055 | 0.2131 | 13.7223 | 0.6806 | -0.4298 | -0.1148 | 0.79 |
| | -0.34 | 20.86 | 22.30 | 7.90 | 184.66 | -0.31 | -38.47 | |
| 2012 | -0.5529 | 0.0048 | 0.2144 | 12.6446 | 0.6948 | -0.4738 | -0.1104 | 0.80 |
| | -0.50 | 18.38 | 22.90 | 7.22 | 189.11 | -0.33 | -36.89 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 2013 | -1.4865 | 0.0043 | 0.2149 | 10.4900 | 0.7030 | 0.1547 | -0.1039 | 0.80 |
| | -1.28 | 16.50 | 23.04 | 5.87 | 190.55 | 0.11 | -34.74 | |
| **Panel B Cross-sectional Regression Results of the HVZ Model with Two-year Ahead Earnings** | | | | | | | | |
| 1970 | 1.4127 | -0.0075 | 1.1880 | -0.1222 | 0.4406 | -0.2653 | -0.2292 | 0.94 |
| | 4.86 | -15.09 | 56.22 | -0.36 | 46.35 | -0.47 | -39.73 | |
| 1971 | 1.3974 | -0.0007 | 1.2414 | 0.1613 | 0.4200 | -0.3672 | -0.1603 | 0.94 |
| | 5.02 | -1.51 | 60.71 | 0.49 | 44.80 | -0.68 | -29.95 | |
| 1972 | 1.1404 | 0.0120 | 1.1510 | 0.5788 | 0.3546 | -0.9182 | -0.0902 | 0.90 |
| | 3.27 | 21.20 | 52.92 | 1.37 | 33.04 | -1.32 | -13.56 | |
| 1973 | 1.2667 | 0.0097 | 1.1802 | 1.1811 | 0.3293 | -1.3441 | -0.1191 | 0.90 |
| | 3.85 | 18.69 | 56.95 | 2.95 | 33.05 | -1.99 | -20.36 | |
| 1974 | 1.2227 | 0.0121 | 1.1587 | 1.3231 | 0.3366 | -1.1879 | -0.0847 | 0.90 |
| | 3.98 | 28.02 | 66.20 | 3.53 | 41.61 | -1.92 | -18.42 | |
| 1975 | 1.2245 | 0.0126 | 1.0968 | 1.8272 | 0.3397 | -1.4891 | -0.1205 | 0.90 |
| | 4.25 | 31.19 | 64.40 | 5.14 | 44.18 | -2.71 | -29.18 | |
| 1976 | 1.1145 | 0.0128 | 0.9505 | 2.3444 | 0.4137 | -1.1165 | -0.1072 | 0.90 |
| | 4.04 | 34.61 | 58.69 | 6.85 | 56.64 | -2.16 | -27.51 | |
| 1977 | 0.8078 | 0.0163 | 0.7335 | 2.5240 | 0.5297 | -0.2376 | -0.0523 | 0.88 |
| | 2.65 | 42.47 | 46.30 | 6.64 | 70.89 | -0.42 | -12.67 | |
| 1978 | 0.8635 | 0.0161 | 0.6961 | 2.7155 | 0.5850 | -0.1392 | -0.0186 | 0.85 |
| | 2.43 | 38.35 | 41.70 | 6.14 | 71.65 | -0.21 | -4.05 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 1979 | 0.8913 | 0.0125 | 0.6543 | 3.4817 | 0.6159 | 0.1177 | -0.0436 | 0.84 |
| | 2.33 | 29.98 | 40.31 | 7.33 | 79.83 | 0.17 | -9.97 | |
| 1980 | 0.9467 | 0.0075 | 0.6044 | 3.5712 | 0.6511 | -0.2825 | -0.0760 | 0.83 |
| | 2.34 | 18.90 | 38.59 | 7.10 | 95.79 | -0.39 | -18.16 | |
| 1981 | 0.7773 | 0.0097 | 0.5404 | 3.4493 | 0.5954 | -0.5501 | -0.0856 | 0.82 |
| | 1.81 | 24.64 | 34.66 | 6.44 | 90.59 | -0.72 | -20.25 | |
| 1982 | 0.6416 | 0.0123 | 0.3515 | 3.4269 | 0.6160 | -0.0370 | -0.0773 | 0.82 |
| | 1.45 | 32.72 | 23.40 | 6.23 | 100.03 | -0.05 | -19.05 | |
| 1983 | 0.4684 | 0.0123 | 0.2329 | 3.5642 | 0.6612 | 0.2406 | -0.0525 | 0.82 |
| | 1.01 | 32.74 | 15.94 | 6.17 | 109.11 | 0.32 | -12.99 | |
| 1984 | -0.0336 | 0.0099 | 0.1838 | 4.1997 | 0.6954 | 0.7576 | -0.0470 | 0.80 |
| | -0.07 | 25.47 | 12.47 | 6.75 | 112.80 | 0.96 | -11.13 | |
| 1985 | -0.5415 | 0.0113 | 0.2096 | 4.6952 | 0.6834 | 2.2330 | -0.0224 | 0.80 |
| | -1.02 | 29.53 | 14.78 | 7.02 | 114.62 | 2.71 | -5.29 | |
| 1986 | -0.7074 | 0.0133 | 0.2083 | 4.9981 | 0.6615 | 2.9011 | -0.0269 | 0.80 |
| | -1.25 | 35.79 | 15.45 | 6.98 | 115.38 | 3.42 | -6.34 | |
| 1987 | -1.0071 | 0.0129 | 0.1910 | 4.9439 | 0.6595 | 2.7908 | -0.0367 | 0.80 |
| | -1.75 | 36.77 | 14.98 | 6.70 | 118.92 | 3.31 | -9.01 | |
| 1988 | -1.6999 | 0.0107 | 0.2187 | 5.0108 | 0.6570 | 3.2871 | -0.0462 | 0.80 |
| | -2.91 | 32.42 | 18.59 | 6.60 | 124.74 | 3.92 | -12.01 | |
| 1989 | -1.9401 | 0.0079 | 0.3168 | 4.9392 | 0.6422 | 3.2483 | -0.0292 | 0.77 |
| | -3.11 | 23.85 | 26.47 | 5.97 | 118.87 | 3.68 | -7.32 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 1990 | -1.8690 | 0.0040 | 0.3202 | 6.3181 | 0.6793 | 3.8280 | -0.0389 | 0.76 |
| | -2.91 | 12.46 | 26.85 | 7.28 | 125.61 | 4.26 | -9.59 | |
| 1991 | -1.7346 | 0.0028 | 0.3051 | 7.3690 | 0.6850 | 4.1247 | -0.0570 | 0.75 |
| | -2.66 | 8.82 | 25.69 | 8.19 | 132.21 | 4.55 | -14.21 | |
| 1992 | -1.6201 | 0.0048 | 0.3809 | 7.1633 | 0.6359 | 3.9128 | -0.0512 | 0.75 |
| | -2.47 | 15.80 | 32.34 | 7.74 | 128.17 | 4.29 | -12.89 | |
| 1993 | -1.2014 | 0.0057 | 0.4456 | 7.9357 | 0.6080 | 3.4673 | -0.0598 | 0.75 |
| | -1.80 | 19.03 | 38.30 | 8.25 | 125.17 | 3.73 | -15.16 | |
| 1994 | -0.9551 | 0.0066 | 0.4166 | 8.2170 | 0.6299 | 3.2209 | -0.0667 | 0.77 |
| | -1.46 | 23.00 | 37.34 | 8.51 | 134.54 | 3.52 | -17.55 | |
| 1995 | -0.0902 | 0.0063 | 0.4190 | 6.9851 | 0.6228 | 1.3442 | -0.0771 | 0.76 |
| | -0.14 | 22.33 | 38.24 | 7.06 | 135.41 | 1.46 | -20.69 | |
| 1996 | -0.4199 | 0.0050 | 0.4166 | 6.4808 | 0.6268 | 1.0695 | -0.0753 | 0.75 |
| | -0.63 | 18.04 | 38.10 | 6.31 | 136.61 | 1.14 | -20.54 | |
| 1997 | -0.3208 | 0.0044 | 0.4298 | 6.2273 | 0.6158 | 0.4646 | -0.0955 | 0.74 |
| | -0.47 | 15.91 | 39.34 | 5.82 | 136.42 | 0.48 | -26.35 | |
| 1998 | 0.0379 | 0.0046 | 0.3925 | 7.0782 | 0.6142 | -1.2702 | -0.1233 | 0.73 |
| | 0.05 | 16.11 | 34.63 | 6.17 | 134.13 | -1.25 | -33.32 | |
| 1999 | -0.3048 | 0.0016 | 0.4630 | 9.0081 | 0.5958 | -3.3527 | -0.1476 | 0.70 |
| | -0.40 | 5.50 | 40.46 | 7.35 | 129.79 | -3.16 | -39.58 | |
| 2000 | 0.0409 | 0.0003 | 0.5789 | 9.5269 | 0.5438 | -4.7992 | -0.1584 | 0.68 |
| | 0.05 | 0.91 | 50.28 | 7.22 | 120.84 | -4.28 | -42.96 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 2001 | 0.2251 | 0.0020 | 0.5310 | 10.0564 | 0.5435 | -4.9960 | -0.1615 | 0.68 |
| | 0.27 | 7.16 | 46.27 | 7.28 | 124.11 | -4.33 | -46.29 | |
| 2002 | 1.1215 | 0.0033 | 0.4814 | 10.9144 | 0.5395 | -6.0209 | -0.1743 | 0.67 |
| | 1.26 | 11.54 | 41.36 | 7.41 | 123.00 | -4.99 | -50.83 | |
| 2003 | 1.8935 | 0.0045 | 0.4158 | 11.9089 | 0.5557 | -6.7959 | -0.1735 | 0.68 |
| | 2.04 | 15.51 | 35.44 | 7.71 | 127.57 | -5.44 | -50.43 | |
| 2004 | 2.4148 | 0.0051 | 0.3603 | 14.2504 | 0.5710 | -7.0089 | -0.1738 | 0.69 |
| | 2.46 | 17.38 | 30.62 | 8.74 | 131.55 | -5.36 | -49.99 | |
| 2005 | 2.0211 | 0.0056 | 0.3131 | 16.7117 | 0.5934 | -5.8144 | -0.1699 | 0.70 |
| | 1.95 | 18.86 | 26.46 | 9.70 | 136.12 | -4.23 | -48.44 | |
| 2006 | 1.2691 | 0.0045 | 0.3148 | 17.2559 | 0.6006 | -5.4010 | -0.1734 | 0.69 |
| | 1.13 | 14.56 | 26.16 | 9.30 | 134.96 | -3.65 | -48.05 | |
| 2007 | 1.2137 | 0.0039 | 0.3061 | 14.6820 | 0.5940 | -5.2021 | -0.1672 | 0.68 |
| | 1.02 | 12.37 | 25.47 | 7.51 | 131.95 | -3.33 | -45.91 | |
| 2008 | 1.6507 | 0.0051 | 0.3292 | 13.4155 | 0.5745 | -3.8276 | -0.1624 | 0.69 |
| | 1.33 | 16.36 | 27.77 | 6.70 | 130.43 | -2.37 | -46.16 | |
| 2009 | 3.3592 | 0.0078 | 0.3012 | 16.7170 | 0.5625 | -3.7204 | -0.1550 | 0.71 |
| | 2.61 | 24.96 | 25.47 | 8.12 | 128.10 | -2.23 | -43.93 | |
| 2010 | 3.9421 | 0.0094 | 0.2447 | 20.2781 | 0.5751 | -3.4535 | -0.1386 | 0.73 |
| | 2.97 | 29.88 | 20.93 | 9.67 | 130.08 | -2.02 | -38.79 | |
| 2011 | 3.3185 | 0.0088 | 0.2509 | 20.6026 | 0.5858 | -2.4954 | -0.1312 | 0.74 |
| | 2.43 | 27.32 | 21.52 | 9.60 | 130.21 | -1.41 | -36.10 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 2012 | 1.6514 | 0.0077 | 0.2515 | 17.6982 | 0.6052 | -0.8705 | -0.1221 | 0.74 |
| | 1.18 | 23.91 | 21.91 | 8.14 | 134.37 | -0.48 | -33.34 | |
| 2013 | -0.2242 | 0.0067 | 0.2529 | 12.9115 | 0.6119 | 0.5131 | -0.1106 | 0.73 |
| | -0.15 | 20.54 | 21.76 | 5.71 | 133.07 | 0.27 | -29.69 | |
| **Panel C Cross-sectional Regression Results of the HVZ Model with Three-year Ahead Earnings** | | | | | | | | |
| 1970 | 1.6039 | -0.0002 | 1.6546 | -0.0861 | 0.2972 | 0.0540 | -0.1210 | 0.93 |
| | 4.34 | -0.39 | 62.28 | -0.20 | 24.87 | 0.07 | -16.67 | |
| 1971 | 1.6328 | 0.0131 | 1.9421 | 0.0088 | 0.0998 | -0.6695 | -0.0072 | 0.89 |
| | 3.83 | 18.77 | 62.95 | 0.02 | 7.06 | -0.79 | -0.89 | |
| 1972 | 1.2717 | 0.0158 | 1.4529 | 1.1712 | 0.2551 | -0.3983 | -0.0116 | 0.88 |
| | 3.13 | 24.33 | 57.81 | 2.39 | 20.64 | -0.48 | -1.52 | |
| 1973 | 1.2713 | 0.0153 | 1.3434 | 1.7782 | 0.3205 | -0.2621 | -0.0114 | 0.89 |
| | 3.42 | 26.51 | 57.97 | 3.94 | 28.85 | -0.34 | -1.75 | |
| 1974 | 1.4059 | 0.0173 | 1.3474 | 1.7976 | 0.3127 | -0.3959 | 0.0131 | 0.89 |
| | 3.88 | 34.60 | 66.29 | 4.07 | 33.37 | -0.53 | 2.46 | |
| 1975 | 1.4810 | 0.0184 | 1.2921 | 2.6194 | 0.3066 | -0.9650 | -0.0251 | 0.88 |
| | 4.32 | 39.07 | 64.80 | 6.20 | 34.13 | -1.46 | -5.21 | |
| 1976 | 1.2781 | 0.0216 | 1.0671 | 3.2797 | 0.4121 | -0.5341 | 0.0081 | 0.86 |
| | 3.41 | 44.02 | 49.51 | 7.06 | 42.49 | -0.75 | 1.56 | |
| 1977 | 1.1699 | 0.0242 | 0.9989 | 3.5751 | 0.4728 | -0.1371 | 0.0801 | 0.83 |
| | 2.74 | 46.06 | 46.13 | 6.74 | 46.36 | -0.17 | 14.21 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1978 | 1.2884 | 0.0234 | 0.9833 | 3.8398 | 0.4949 | -0.3778 | 0.0906 | 0.81 |
| | 2.81 | 44.41 | 46.91 | 6.75 | 48.28 | -0.45 | 15.74 | |
| 1979 | 1.4610 | 0.0154 | 0.9273 | 4.6653 | 0.5075 | -1.0210 | -0.0065 | 0.79 |
| | 2.99 | 29.71 | 45.96 | 7.71 | 52.49 | -1.15 | -1.20 | |
| 1980 | 1.3277 | 0.0151 | 0.8487 | 4.9605 | 0.4536 | -1.4031 | -0.0765 | 0.78 |
| | 2.60 | 31.06 | 44.24 | 7.84 | 54.17 | -1.52 | -14.94 | |
| 1981 | 1.1140 | 0.0165 | 0.6904 | 5.1912 | 0.4501 | -0.9681 | -0.0808 | 0.78 |
| | 2.10 | 34.77 | 36.93 | 7.87 | 56.83 | -1.02 | -15.88 | |
| 1982 | 1.2102 | 0.0189 | 0.5320 | 4.7861 | 0.4705 | -1.3912 | -0.0410 | 0.76 |
| | 2.13 | 40.16 | 27.88 | 6.80 | 60.80 | -1.44 | -8.10 | |
| 1983 | 1.0086 | 0.0185 | 0.4304 | 4.9485 | 0.5095 | -1.4472 | 0.0022 | 0.74 |
| | 1.68 | 38.84 | 23.01 | 6.62 | 66.31 | -1.47 | 0.43 | |
| 1984 | 0.4249 | 0.0164 | 0.3270 | 5.8909 | 0.5795 | -0.0175 | -0.0026 | 0.74 |
| | 0.68 | 34.45 | 17.96 | 7.57 | 76.94 | -0.02 | -0.50 | |
| 1985 | 0.0104 | 0.0186 | 0.3596 | 6.2985 | 0.5538 | 1.3148 | 0.0192 | 0.74 |
| | 0.02 | 39.58 | 20.45 | 7.47 | 75.53 | 1.25 | 3.70 | |
| 1986 | -0.2182 | 0.0196 | 0.3629 | 6.0715 | 0.5289 | 1.7594 | 0.0085 | 0.75 |
| | -0.31 | 43.90 | 22.44 | 6.93 | 77.25 | 1.68 | 1.69 | |
| 1987 | -0.7705 | 0.0156 | 0.3842 | 6.0408 | 0.5436 | 2.0685 | -0.0290 | 0.76 |
| | -1.09 | 37.21 | 25.20 | 6.70 | 82.28 | 1.98 | -5.98 | |
| 1988 | -1.3163 | 0.0113 | 0.3948 | 6.3381 | 0.5541 | 2.6012 | -0.0344 | 0.73 |
| | -1.77 | 27.58 | 26.92 | 6.57 | 84.75 | 2.41 | -7.24 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1989 | -0.8100 | 0.0077 | 0.4936 | 7.0472 | 0.5387 | 1.9698 | -0.0394 | 0.70 |
| | -1.03 | 19.15 | 33.57 | 6.82 | 81.50 | 1.76 | -8.10 | |
| 1990 | -0.6319 | 0.0050 | 0.4405 | 8.1952 | 0.5746 | 2.4210 | -0.0502 | 0.69 |
| | -0.79 | 12.67 | 30.29 | 7.62 | 87.51 | 2.14 | -10.21 | |
| 1991 | -0.2214 | 0.0057 | 0.4956 | 8.3845 | 0.5410 | 2.2689 | -0.0661 | 0.69 |
| | -0.28 | 15.13 | 34.77 | 7.64 | 87.33 | 2.03 | -13.79 | |
| 1992 | -0.2188 | 0.0071 | 0.5593 | 9.8444 | 0.5025 | 2.5949 | -0.0704 | 0.69 |
| | -0.27 | 19.63 | 39.62 | 8.70 | 84.55 | 2.30 | -14.82 | |
| 1993 | 0.0719 | 0.0083 | 0.5955 | 10.4995 | 0.4940 | 2.3412 | -0.0845 | 0.71 |
| | 0.09 | 23.50 | 43.51 | 9.11 | 86.52 | 2.08 | -18.27 | |
| 1994 | 0.7566 | 0.0078 | 0.5640 | 9.8337 | 0.5097 | 1.4784 | -0.0996 | 0.71 |
| | 0.94 | 22.77 | 41.98 | 8.31 | 90.52 | 1.30 | -21.82 | |
| 1995 | 1.0986 | 0.0068 | 0.5733 | 8.9144 | 0.5043 | 0.1461 | -0.1028 | 0.69 |
| | 1.35 | 20.11 | 42.95 | 7.29 | 90.27 | 0.13 | -22.73 | |
| 1996 | 1.2386 | 0.0062 | 0.5200 | 8.5340 | 0.5221 | -0.5294 | -0.1197 | 0.69 |
| | 1.51 | 18.49 | 39.40 | 6.81 | 94.79 | -0.45 | -27.27 | |
| 1997 | 1.7778 | 0.0054 | 0.5037 | 9.2719 | 0.5249 | -1.8189 | -0.1447 | 0.68 |
| | 2.07 | 15.99 | 37.51 | 6.97 | 94.88 | -1.49 | -32.68 | |
| 1998 | 1.2786 | 0.0046 | 0.5636 | 11.0079 | 0.5030 | -3.9534 | -0.1441 | 0.66 |
| | 1.43 | 13.42 | 41.25 | 7.85 | 91.24 | -3.14 | -32.47 | |
| 1999 | 0.7224 | 0.0026 | 0.5516 | 12.8159 | 0.5071 | -4.2943 | -0.1716 | 0.64 |
| | 0.78 | 7.48 | 40.63 | 8.69 | 93.32 | -3.31 | -39.03 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 2000 | 0.8136 | 0.0026 | 0.5635 | 13.9897 | 0.5007 | -3.9366 | -0.1782 | 0.64 |
| | 0.85 | 7.69 | 42.36 | 9.06 | 96.74 | -2.95 | -42.10 | |
| 2001 | 1.5630 | 0.0051 | 0.5209 | 15.6844 | 0.4921 | -4.5678 | -0.1728 | 0.64 |
| | 1.55 | 15.59 | 38.87 | 9.60 | 96.79 | -3.30 | -42.69 | |
| 2002 | 2.5879 | 0.0066 | 0.4558 | 17.5451 | 0.4922 | -5.8160 | -0.1869 | 0.64 |
| | 2.44 | 19.77 | 33.53 | 10.10 | 96.66 | -4.03 | -46.97 | |
| 2003 | 4.2636 | 0.0077 | 0.3843 | 19.7388 | 0.5024 | -7.4561 | -0.1904 | 0.64 |
| | 3.81 | 22.78 | 27.75 | 10.70 | 98.19 | -4.93 | -47.10 | |
| 2004 | 5.1749 | 0.0089 | 0.3444 | 22.0575 | 0.5101 | -8.4856 | -0.1865 | 0.65 |
| | 4.38 | 25.67 | 24.83 | 11.32 | 99.95 | -5.36 | -45.67 | |
| 2005 | 4.3545 | 0.0079 | 0.3225 | 23.9072 | 0.5287 | -7.6899 | -0.1856 | 0.64 |
| | 3.43 | 22.03 | 22.83 | 11.45 | 101.74 | -4.55 | -44.45 | |
| 2006 | 4.4613 | 0.0069 | 0.3595 | 21.0279 | 0.5140 | -7.6132 | -0.1827 | 0.63 |
| | 3.31 | 19.07 | 25.50 | 9.53 | 98.49 | -4.27 | -43.22 | |
| 2007 | 4.6901 | 0.0079 | 0.3147 | 19.6475 | 0.5250 | -6.3036 | -0.1672 | 0.65 |
| | 3.39 | 22.03 | 23.09 | 8.74 | 102.78 | -3.46 | -40.48 | |
| 2008 | 6.7417 | 0.0099 | 0.3069 | 20.9151 | 0.5197 | -5.6681 | -0.1570 | 0.67 |
| | 4.71 | 28.09 | 22.91 | 9.12 | 104.47 | -3.02 | -39.46 | |
| 2009 | 7.9607 | 0.0116 | 0.2777 | 26.2776 | 0.5198 | -5.7482 | -0.1436 | 0.69 |
| | 5.34 | 32.87 | 20.80 | 11.16 | 104.92 | -2.97 | -36.01 | |
| 2010 | 9.0683 | 0.0122 | 0.2679 | 27.0511 | 0.5234 | -7.3183 | -0.1324 | 0.70 |
| | 5.88 | 34.03 | 20.19 | 11.21 | 104.28 | -3.66 | -32.62 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 2011 | 7.7858 | 0.0105 | 0.2519 | 24.6941 | 0.5471 | -6.0237 | -0.1312 | 0.70 |
| | 4.90 | 28.84 | 19.00 | 9.99 | 106.92 | -2.91 | -31.77 | |
| 2012 | 5.5088 | 0.0093 | 0.2501 | 18.2921 | 0.5659 | -4.0646 | -0.1123 | 0.69 |
| | 3.33 | 25.05 | 18.92 | 7.21 | 109.10 | -1.89 | -26.65 | |
| 2013 | 2.5838 | 0.0094 | 0.2386 | 13.5618 | 0.5632 | -1.4377 | -0.0925 | 0.69 |
| | 1.50 | 25.44 | 18.05 | 5.22 | 107.83 | -0.65 | -21.90 | |
| **Panel D Cross-sectional Regression Results of the HVZ Model with Four-year Ahead Earnings** | | | | | | | | |
| 1970 | 1.5320 | 0.0107 | 1.6241 | 0.4060 | 0.3417 | 0.0248 | 0.0588 | 0.87 |
| | 2.82 | 11.86 | 42.19 | 0.63 | 19.73 | 0.02 | 5.59 | |
| 1971 | 1.8041 | 0.0124 | 1.7749 | 0.7842 | 0.2502 | -0.4949 | 0.0695 | 0.87 |
| | 3.69 | 15.74 | 50.36 | 1.35 | 15.58 | -0.50 | 7.62 | |
| 1972 | 1.9652 | 0.0143 | 1.7484 | 1.5141 | 0.2492 | -0.9855 | 0.0515 | 0.88 |
| | 4.43 | 20.41 | 54.13 | 2.84 | 16.87 | -1.08 | 6.30 | |
| 1973 | 1.7930 | 0.0167 | 1.5355 | 2.0229 | 0.3583 | -0.3074 | 0.0951 | 0.88 |
| | 4.29 | 26.29 | 51.47 | 3.99 | 26.68 | -0.35 | 13.21 | |
| 1974 | 2.1550 | 0.0168 | 1.5235 | 2.5198 | 0.3528 | -0.8364 | 0.0859 | 0.88 |
| | 5.23 | 30.25 | 60.67 | 5.03 | 32.18 | -0.98 | 14.44 | |
| 1975 | 2.2790 | 0.0210 | 1.3692 | 3.9286 | 0.3413 | -2.2267 | -0.0025 | 0.85 |
| | 5.03 | 34.68 | 48.63 | 7.07 | 28.23 | -2.53 | -0.39 | |
| 1976 | 2.0920 | 0.0234 | 1.2455 | 4.7205 | 0.4318 | -1.5801 | 0.0744 | 0.81 |
| | 4.11 | 36.18 | 40.52 | 7.53 | 32.57 | -1.64 | 10.88 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1977 | 2.0540 | 0.0261 | 1.2564 | 5.0329 | 0.4301 | -1.5207 | 0.1284 | 0.79 |
| | 3.81 | 40.60 | 45.01 | 7.56 | 33.76 | -1.51 | 18.64 | |
| 1978 | 1.9316 | 0.0213 | 1.2069 | 4.9065 | 0.4827 | -1.0892 | 0.1167 | 0.77 |
| | 3.47 | 34.26 | 47.04 | 7.13 | 39.37 | -1.06 | 17.25 | |
| 1979 | 1.8244 | 0.0172 | 1.0802 | 5.6334 | 0.4772 | -1.4484 | 0.0205 | 0.77 |
| | 3.21 | 29.34 | 45.84 | 8.03 | 43.23 | -1.39 | 3.36 | |
| 1980 | 1.6444 | 0.0173 | 0.9836 | 6.5729 | 0.4084 | -1.2425 | -0.0628 | 0.76 |
| | 2.76 | 31.52 | 44.04 | 8.93 | 42.63 | -1.15 | -10.87 | |
| 1981 | 1.4625 | 0.0188 | 0.8896 | 6.8223 | 0.3713 | -1.0240 | -0.0588 | 0.74 |
| | 2.27 | 33.67 | 39.00 | 8.59 | 39.61 | -0.89 | -9.90 | |
| 1982 | 1.2836 | 0.0218 | 0.7174 | 6.6157 | 0.3817 | -1.1277 | 0.0077 | 0.71 |
| | 1.85 | 39.10 | 31.26 | 7.73 | 41.60 | -0.95 | 1.28 | |
| 1983 | 1.0856 | 0.0222 | 0.5768 | 7.1088 | 0.4251 | -0.6524 | 0.0185 | 0.71 |
| | 1.51 | 40.15 | 26.25 | 7.98 | 47.64 | -0.55 | 3.14 | |
| 1984 | 0.5887 | 0.0201 | 0.4664 | 8.2772 | 0.4819 | 0.5409 | -0.0122 | 0.71 |
| | 0.78 | 36.05 | 21.61 | 8.83 | 54.47 | 0.45 | -2.02 | |
| 1985 | -0.0658 | 0.0216 | 0.5018 | 8.2479 | 0.4497 | 2.1093 | 0.0053 | 0.71 |
| | -0.08 | 40.32 | 24.85 | 8.36 | 53.76 | 1.70 | 0.90 | |
| 1986 | -0.4533 | 0.0204 | 0.5359 | 7.6255 | 0.4470 | 2.4580 | -0.0008 | 0.72 |
| | -0.56 | 40.41 | 29.12 | 7.49 | 57.72 | 1.99 | -0.13 | |
| 1987 | -0.9581 | 0.0138 | 0.5450 | 8.0252 | 0.4773 | 3.0872 | -0.0337 | 0.70 |
| | -1.12 | 27.86 | 29.80 | 7.36 | 61.01 | 2.41 | -5.90 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1988 | -0.7106 | 0.0097 | 0.5725 | 9.0155 | 0.4800 | 2.6990 | -0.0446 | 0.67 |
| | -0.79 | 20.20 | 32.81 | 7.78 | 62.29 | 2.05 | -8.01 | |
| 1989 | -0.2689 | 0.0069 | 0.5584 | 9.5577 | 0.4930 | 2.4827 | -0.0539 | 0.65 |
| | -0.29 | 14.88 | 32.67 | 7.87 | 64.47 | 1.87 | -9.66 | |
| 1990 | 0.2935 | 0.0057 | 0.5145 | 9.5387 | 0.5307 | 2.5923 | -0.0634 | 0.66 |
| | 0.32 | 13.00 | 31.36 | 7.77 | 72.02 | 1.99 | -11.54 | |
| 1991 | 0.8353 | 0.0064 | 0.5681 | 11.0165 | 0.5058 | 2.5401 | -0.0773 | 0.66 |
| | 0.90 | 15.08 | 35.21 | 8.74 | 72.33 | 1.96 | -14.35 | |
| 1992 | 1.2921 | 0.0080 | 0.6135 | 11.7052 | 0.4888 | 2.1589 | -0.0846 | 0.68 |
| | 1.41 | 19.90 | 38.96 | 9.15 | 73.93 | 1.67 | -16.02 | |
| 1993 | 1.9261 | 0.0084 | 0.6169 | 11.3953 | 0.4894 | 1.7165 | -0.0950 | 0.68 |
| | 2.08 | 21.15 | 39.81 | 8.63 | 75.80 | 1.31 | -18.12 | |
| 1994 | 2.2010 | 0.0072 | 0.6101 | 10.9038 | 0.5047 | 1.2175 | -0.0954 | 0.67 |
| | 2.34 | 18.40 | 39.71 | 7.97 | 78.51 | 0.91 | -18.25 | |
| 1995 | 3.1658 | 0.0071 | 0.5800 | 10.0601 | 0.5126 | -0.5343 | -0.1037 | 0.66 |
| | 3.35 | 18.46 | 38.21 | 7.16 | 80.90 | -0.40 | -20.20 | |
| 1996 | 3.6190 | 0.0051 | 0.4797 | 11.5322 | 0.5543 | -1.4491 | -0.1433 | 0.66 |
| | 3.72 | 13.14 | 31.14 | 7.83 | 86.36 | -1.04 | -27.97 | |
| 1997 | 3.1148 | 0.0047 | 0.6102 | 12.6934 | 0.5020 | -2.7199 | -0.1300 | 0.63 |
| | 3.09 | 11.90 | 39.53 | 8.18 | 78.83 | -1.89 | -25.40 | |
| 1998 | 2.7208 | 0.0047 | 0.6254 | 14.0694 | 0.4900 | -3.3517 | -0.1306 | 0.62 |
| | 2.60 | 11.89 | 40.12 | 8.65 | 77.83 | -2.26 | -25.67 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1999 | 2.9022 | 0.0040 | 0.5529 | 16.6754 | 0.5101 | -3.6014 | -0.1597 | 0.62 |
| | 2.70 | 10.32 | 36.02 | 9.82 | 82.99 | -2.38 | -32.02 | |
| 2000 | 3.4060 | 0.0048 | 0.5282 | 19.2889 | 0.5263 | -3.2120 | -0.1489 | 0.62 |
| | 3.07 | 12.64 | 35.11 | 10.85 | 89.87 | -2.07 | -31.00 | |
| 2001 | 4.1513 | 0.0077 | 0.4503 | 22.0335 | 0.5169 | -3.6344 | -0.1548 | 0.62 |
| | 3.55 | 20.47 | 29.50 | 11.69 | 89.25 | -2.25 | -33.41 | |
| 2002 | 5.5844 | 0.0092 | 0.3647 | 25.9088 | 0.5101 | -4.9504 | -0.1760 | 0.61 |
| | 4.49 | 24.12 | 23.34 | 12.81 | 87.14 | -2.91 | -38.26 | |
| 2003 | 7.3619 | 0.0108 | 0.3255 | 28.4533 | 0.5055 | -6.9021 | -0.1768 | 0.62 |
| | 5.60 | 27.63 | 20.49 | 13.23 | 86.07 | -3.87 | -37.91 | |
| 2004 | 6.8604 | 0.0104 | 0.3335 | 31.2072 | 0.4964 | -7.1915 | -0.1772 | 0.60 |
| | 4.89 | 26.01 | 20.75 | 13.59 | 83.85 | -3.81 | -37.23 | |
| 2005 | 6.8326 | 0.0098 | 0.3584 | 28.9719 | 0.4898 | -6.8797 | -0.1690 | 0.60 |
| | 4.63 | 23.97 | 22.32 | 12.04 | 82.79 | -3.48 | -35.40 | |
| 2006 | 7.5651 | 0.0108 | 0.3464 | 27.1486 | 0.4930 | -6.0481 | -0.1515 | 0.62 |
| | 4.97 | 26.93 | 22.29 | 11.00 | 85.40 | -2.98 | -32.32 | |
| 2007 | 9.3329 | 0.0117 | 0.2684 | 29.4292 | 0.5153 | -5.9909 | -0.1466 | 0.64 |
| | 5.97 | 29.69 | 17.84 | 11.72 | 91.19 | -2.89 | -32.01 | |
| 2008 | 11.1233 | 0.0127 | 0.2493 | 32.7756 | 0.5128 | -6.4775 | -0.1408 | 0.65 |
| | 6.85 | 32.54 | 16.80 | 12.74 | 92.92 | -3.03 | -31.84 | |
| 2009 | 12.0730 | 0.0138 | 0.2590 | 35.2138 | 0.5052 | -7.1723 | -0.1289 | 0.67 |
| | 7.15 | 35.21 | 17.51 | 13.34 | 91.88 | -3.25 | -29.10 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 2010 | 12.1225 | 0.0139 | 0.2587 | 33.4855 | 0.4959 | -7.8600 | -0.1250 | 0.67 |
| | 6.87 | 34.78 | 17.44 | 12.25 | 88.21 | -3.42 | -27.47 | |
| 2011 | 10.3566 | 0.0122 | 0.2483 | 27.5676 | 0.5072 | -6.7077 | -0.1176 | 0.66 |
| | 5.61 | 29.69 | 16.56 | 9.71 | 87.38 | -2.78 | -25.15 | |
| 2012 | 7.7467 | 0.0117 | 0.2443 | 20.5906 | 0.5167 | -4.6272 | -0.0939 | 0.65 |
| | 4.07 | 28.31 | 16.51 | 7.14 | 88.81 | -1.86 | -19.92 | |
| 2013 | 6.7446 | 0.0117 | 0.2590 | 16.5528 | 0.5116 | -4.7903 | -0.0852 | 0.66 |
| | 3.44 | 28.60 | 17.69 | 5.67 | 88.37 | -1.89 | -18.24 | |
| **Panel E Cross-sectional Regression Results of the HVZ Model with Five-year Ahead Earnings** | | | | | | | | |
| 1970 | 2.3446 | 0.0047 | 1.7053 | 1.1221 | 0.2913 | -1.6413 | -0.0350 | 0.86 |
| | 4.13 | 5.05 | 42.43 | 1.68 | 16.24 | -1.41 | -3.23 | |
| 1971 | 2.6532 | 0.0085 | 1.8043 | 1.9240 | 0.2302 | -1.9420 | -0.0435 | 0.87 |
| | 5.11 | 10.30 | 48.54 | 3.12 | 13.67 | -1.86 | -4.58 | |
| 1972 | 2.7290 | 0.0124 | 1.7348 | 2.7546 | 0.2536 | -2.1141 | -0.0314 | 0.87 |
| | 5.47 | 16.03 | 48.24 | 4.61 | 15.49 | -2.07 | -3.48 | |
| 1973 | 2.5570 | 0.0169 | 1.4824 | 3.5925 | 0.3815 | -1.1088 | 0.0483 | 0.87 |
| | 5.26 | 23.36 | 43.47 | 6.13 | 24.96 | -1.08 | 5.91 | |
| 1974 | 2.3336 | 0.0195 | 0.8857 | 4.3579 | 0.7025 | 0.3649 | 0.1433 | 0.85 |
| | 4.41 | 28.11 | 28.12 | 6.80 | 51.29 | 0.34 | 19.30 | |
| 1975 | 2.2106 | 0.0214 | 0.6521 | 5.6724 | 0.8245 | 0.0632 | 0.1502 | 0.81 |
| | 3.82 | 28.56 | 18.58 | 8.02 | 54.89 | 0.06 | 19.42 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1976 | 2.1826 | 0.0241 | 0.6882 | 6.2139 | 0.8140 | -0.1352 | 0.2043 | 0.79 |
| | 3.58 | 32.00 | 19.19 | 8.31 | 52.76 | -0.12 | 25.71 | |
| 1977 | 2.1547 | 0.0209 | 0.8323 | 5.8582 | 0.7893 | -0.3161 | 0.2278 | 0.77 |
| | 3.47 | 29.04 | 26.61 | 7.67 | 55.23 | -0.27 | 29.62 | |
| 1978 | 1.7875 | 0.0186 | 0.7609 | 5.7378 | 0.8009 | 0.1804 | 0.1752 | 0.77 |
| | 2.88 | 27.64 | 27.47 | 7.52 | 60.45 | 0.16 | 24.05 | |
| 1979 | 1.7958 | 0.0155 | 0.8027 | 7.2719 | 0.6811 | -0.3255 | 0.0540 | 0.76 |
| | 2.78 | 24.06 | 31.03 | 9.19 | 56.07 | -0.28 | 8.07 | |
| 1980 | 1.7503 | 0.0182 | 0.9435 | 8.0592 | 0.4677 | -0.8341 | -0.0184 | 0.73 |
| | 2.49 | 28.97 | 36.78 | 9.32 | 42.74 | -0.65 | -2.79 | |
| 1981 | 1.5839 | 0.0220 | 0.9679 | 8.4417 | 0.3304 | -1.2604 | 0.0058 | 0.69 |
| | 2.05 | 33.93 | 36.38 | 8.87 | 30.34 | -0.91 | 0.84 | |
| 1982 | 1.3395 | 0.0247 | 0.7686 | 8.8117 | 0.3502 | -0.6611 | 0.0211 | 0.68 |
| | 1.64 | 38.97 | 29.50 | 8.81 | 33.60 | -0.47 | 3.11 | |
| 1983 | 1.0195 | 0.0256 | 0.6659 | 9.7034 | 0.3660 | 0.2022 | 0.0181 | 0.68 |
| | 1.19 | 40.30 | 26.42 | 9.23 | 35.70 | 0.14 | 2.68 | |
| 1984 | 0.5697 | 0.0245 | 0.6475 | 10.2712 | 0.3519 | 0.5270 | -0.0145 | 0.68 |
| | 0.65 | 39.11 | 26.70 | 9.49 | 35.34 | 0.37 | -2.15 | |
| 1985 | 0.1193 | 0.0232 | 0.7340 | 9.5128 | 0.3378 | 1.4108 | -0.0022 | 0.69 |
| | 0.13 | 38.58 | 32.48 | 8.39 | 36.10 | 0.98 | -0.33 | |
| 1986 | -0.8378 | 0.0176 | 0.6635 | 9.7185 | 0.4271 | 3.7291 | 0.0070 | 0.67 |
| | -0.87 | 30.20 | 30.92 | 8.06 | 47.66 | 2.53 | 1.07 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | Adj.$R^2$ |
| 1987 | -0.6615 | 0.0105 | 0.7427 | 11.0582 | 0.4424 | 3.7007 | -0.0334 | 0.65 |
| | -0.65 | 18.29 | 34.98 | 8.62 | 49.09 | 2.44 | -5.07 | |
| 1988 | -0.3394 | 0.0089 | 0.6724 | 11.6230 | 0.4398 | 3.2798 | -0.0454 | 0.62 |
| | -0.32 | 16.17 | 33.46 | 8.62 | 49.98 | 2.13 | -7.13 | |
| 1989 | 0.6490 | 0.0076 | 0.6273 | 11.0211 | 0.4715 | 2.4140 | -0.0587 | 0.63 |
| | 0.62 | 14.60 | 32.79 | 8.03 | 55.64 | 1.59 | -9.44 | |
| 1990 | 1.3709 | 0.0058 | 0.5670 | 12.4887 | 0.5187 | 2.4156 | -0.0830 | 0.64 |
| | 1.31 | 11.74 | 30.72 | 8.96 | 63.02 | 1.62 | -13.48 | |
| 1991 | 2.1892 | 0.0072 | 0.5988 | 13.1956 | 0.5202 | 2.1358 | -0.0882 | 0.66 |
| | 2.10 | 15.55 | 33.43 | 9.34 | 67.41 | 1.45 | -14.79 | |
| 1992 | 2.9204 | 0.0091 | 0.6349 | 12.9344 | 0.4929 | 1.7072 | -0.0826 | 0.66 |
| | 2.78 | 20.15 | 35.80 | 8.88 | 66.73 | 1.15 | -13.94 | |
| 1993 | 3.1719 | 0.0079 | 0.6344 | 12.8191 | 0.5096 | 1.2748 | -0.0912 | 0.65 |
| | 2.99 | 17.67 | 36.28 | 8.54 | 70.55 | 0.85 | -15.46 | |
| 1994 | 4.3128 | 0.0070 | 0.5813 | 12.6293 | 0.5337 | 0.0485 | -0.1110 | 0.65 |
| | 4.01 | 15.98 | 33.57 | 8.14 | 74.39 | 0.03 | -18.90 | |
| 1995 | 5.6259 | 0.0059 | 0.4941 | 13.9226 | 0.5572 | -2.1346 | -0.1446 | 0.63 |
| | 5.09 | 13.45 | 28.10 | 8.54 | 76.89 | -1.36 | -24.49 | |
| 1996 | 4.9831 | 0.0035 | 0.5873 | 15.5319 | 0.5242 | -3.1545 | -0.1574 | 0.62 |
| | 4.42 | 7.87 | 33.37 | 9.17 | 72.27 | -1.95 | -27.08 | |
| 1997 | 4.6047 | 0.0045 | 0.6307 | 16.1628 | 0.4958 | -3.1932 | -0.1363 | 0.60 |
| | 3.95 | 10.16 | 35.94 | 9.10 | 69.12 | -1.91 | -23.61 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 1998 | 5.0894 | 0.0049 | 0.6024 | 18.6433 | 0.4932 | -3.6430 | -0.1525 | 0.59 |
| | 4.23 | 11.03 | 34.14 | 10.04 | 69.82 | -2.13 | -26.71 | |
| 1999 | 6.0503 | 0.0052 | 0.5388 | 21.6339 | 0.5111 | -3.9910 | -0.1670 | 0.59 |
| | 4.86 | 11.70 | 30.87 | 11.09 | 73.57 | -2.27 | -29.65 | |
| 2000 | 6.9478 | 0.0068 | 0.4781 | 24.7732 | 0.5297 | -4.0943 | -0.1574 | 0.60 |
| | 5.38 | 15.54 | 27.83 | 12.09 | 79.58 | -2.26 | -28.78 | |
| 2001 | 8.1067 | 0.0094 | 0.3794 | 29.8316 | 0.5173 | -4.5806 | -0.1726 | 0.59 |
| | 5.94 | 21.79 | 21.65 | 13.65 | 78.18 | -2.42 | -32.44 | |
| 2002 | 10.0798 | 0.0113 | 0.3145 | 33.5497 | 0.5033 | -6.8377 | -0.1890 | 0.59 |
| | 6.96 | 25.70 | 17.61 | 14.33 | 75.43 | -3.44 | -35.90 | |
| 2003 | 10.3094 | 0.0117 | 0.3504 | 36.2218 | 0.4858 | -7.1560 | -0.1743 | 0.58 |
| | 6.67 | 26.08 | 19.12 | 14.42 | 71.86 | -3.40 | -32.44 | |
| 2004 | 10.4119 | 0.0111 | 0.3738 | 34.7010 | 0.4721 | -7.6652 | -0.1726 | 0.57 |
| | 6.48 | 24.54 | 20.71 | 13.31 | 71.07 | -3.52 | -32.34 | |
| 2005 | 11.1808 | 0.0119 | 0.3458 | 34.1338 | 0.4821 | -6.6066 | -0.1586 | 0.59 |
| | 6.75 | 26.59 | 19.60 | 12.75 | 74.08 | -2.96 | -30.26 | |
| 2006 | 13.8646 | 0.0135 | 0.2979 | 35.9470 | 0.4931 | -7.6924 | -0.1437 | 0.61 |
| | 8.10 | 30.59 | 17.45 | 13.08 | 77.57 | -3.35 | -27.85 | |
| 2007 | 15.1922 | 0.0135 | 0.2273 | 40.9526 | 0.5067 | -8.2139 | -0.1430 | 0.62 |
| | 8.57 | 30.88 | 13.65 | 14.53 | 80.84 | -3.48 | -28.18 | |
| 2008 | 16.6349 | 0.0143 | 0.2395 | 41.3455 | 0.4952 | -9.4161 | -0.1349 | 0.63 |
| | 9.06 | 33.23 | 14.63 | 14.37 | 81.16 | -3.88 | -27.55 | |

*(table continues)*

| Fiscal Year | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | $TA$ | $D$ | $DD$ | $NI$ | $NegE$ | $AC$ | **Adj.** $R^2$ |
| 2009 | 16.3847 | 0.0149 | 0.2447 | 41.8389 | 0.4822 | -9.0777 | -0.1300 | 0.64 |
| | 8.52 | 34.24 | 14.94 | 14.09 | 79.01 | -3.60 | -26.37 | |
| 2010 | 15.4021 | 0.0149 | 0.2326 | 37.4337 | 0.4661 | -9.0886 | -0.1213 | 0.63 |
| | 7.58 | 33.05 | 13.99 | 12.05 | 73.82 | -3.42 | -23.73 | |
| 2011 | 13.5631 | 0.0139 | 0.2267 | 29.7084 | 0.4769 | -7.3728 | -0.1008 | 0.62 |
| | 6.47 | 30.50 | 13.68 | 9.34 | 74.25 | -2.68 | -19.51 | |
| 2012 | 12.1602 | 0.0134 | 0.2591 | 24.1868 | 0.4781 | -6.9635 | -0.0876 | 0.63 |
| | 5.68 | 29.59 | 15.98 | 7.56 | 74.91 | -2.48 | -17.00 | |
| 2013 | 14.7207 | 0.0138 | 0.2319 | 20.3593 | 0.4842 | -10.3043 | -0.0867 | 0.65 |
| | 6.80 | 31.36 | 14.67 | 6.39 | 77.51 | -3.67 | -17.25 | |

Note: The definitions of variables are in Table 1. This table reports the cross-sectional regression results of the HVZ model. Panel A presents the regression results with one-year ahead earnings (when $\tau = 1$), panel B presents the regression results with two-year ahead earnings (when $\tau = 2$), panel C presents the regression results with three-year ahead earnings (when $\tau = 3$), panel D presents the regression results with four-year ahead earnings (when $\tau = 4$), and panel E presents the regression results with five-year ahead earnings (when $\tau = 5$). The values below estimations of coefficients are *t*-values. The values in the last column of all panels are the adjusted *R*-squared.

**Table 4: Descriptive Statistics for Earnings Forecasts Estimated by the HVZ Model**

| Fiscal Year | N | Mean | SD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| **Panel A One-year Ahead Earnings Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 15.66 | 73.54 | 1.09 | 2.29 | 7.24 |
| 1974-1977 | 15766 | 19.57 | 82.87 | 1.15 | 3.19 | 9.18 |
| 1978-1981 | 15496 | 32.44 | 122.23 | 0.93 | 4.17 | 14.95 |
| 1982-1985 | 13755 | 38.05 | 142.41 | 0.89 | 3.84 | 16.10 |
| 1986-1989 | 12883 | 54.81 | 181.36 | 1.21 | 4.53 | 22.31 |
| 1990-1993 | 13427 | 55.71 | 183.93 | 1.10 | 5.41 | 23.14 |
| 1994-1997 | 16047 | 78.45 | 231.71 | 1.75 | 8.36 | 35.45 |
| 1998-2001 | 13598 | 108.99 | 272.94 | 4.00 | 15.28 | 65.29 |
| 2002-2005 | 13926 | 141.19 | 320.49 | 5.37 | 21.78 | 93.75 |
| 2006-2009 | 12464 | 200.31 | 392.29 | 9.99 | 35.76 | 152.73 |
| 2010-2013 | 12137 | 236.76 | 422.13 | 14.51 | 49.68 | 204.99 |
| Total | 151547 | 86.14 | 252.56 | 1.70 | 7.63 | 39.06 |
| **Panel B Two-year Ahead Earnings Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 16.51 | 74.03 | 1.81 | 3.24 | 7.95 |
| 1974-1977 | 15766 | 21.38 | 85.37 | 1.65 | 4.36 | 10.40 |
| 1978-1981 | 15496 | 34.34 | 122.63 | 1.45 | 5.94 | 16.94 |
| 1982-1985 | 13755 | 39.63 | 141.99 | 1.29 | 5.69 | 18.36 |
| 1986-1989 | 12883 | 55.55 | 179.41 | 1.62 | 5.99 | 23.75 |
| 1990-1993 | 13427 | 57.22 | 181.69 | 2.02 | 7.49 | 24.81 |
| 1994-1997 | 16047 | 79.43 | 228.56 | 2.43 | 9.98 | 37.02 |
| 1998-2001 | 13598 | 109.79 | 266.07 | 4.41 | 17.20 | 68.86 |
| 2002-2005 | 13926 | 146.12 | 315.49 | 7.41 | 26.62 | 102.52 |
| 2006-2009 | 12464 | 203.79 | 380.12 | 13.88 | 42.17 | 169.44 |
| 2010-2013 | 12137 | 239.28 | 410.17 | 20.20 | 56.33 | 215.78 |
| Total | 151547 | 88.05 | 247.89 | 2.58 | 9.51 | 42.66 |
| **Panel C Three-year Ahead Earnings Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 11633 | 18.89 | 79.55 | 0.76 | 1.01 | 2.08 |
| 1974-1977 | 14870 | 24.96 | 93.18 | -4.84 | 0.84 | 1.99 |
| 1978-1981 | 14470 | 37.82 | 128.03 | -8.61 | -0.10 | 1.96 |
| 1982-1985 | 12710 | 43.33 | 147.67 | -2.86 | -0.57 | 1.60 |

*(table continues)*

| Fiscal Year | N | Mean | SD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| 1986-1989 | 12112 | 58.75 | 183.84 | 0.10 | 0.41 | 1.36 |
| 1990-1993 | 12712 | 62.26 | 188.38 | 0.82 | 1.18 | 2.28 |
| 1994-1997 | 14652 | 83.84 | 231.53 | -1.36 | 0.66 | 3.75 |
| 1998-2001 | 12755 | 117.50 | 271.40 | -2.02 | 0.93 | 5.73 |
| 2002-2005 | 12942 | 159.23 | 324.74 | 0.57 | 2.97 | 10.26 |
| 2006-2009 | 11799 | 218.45 | 385.69 | 3.24 | 4.79 | 20.10 |
| 2010-2013 | 11454 | 251.60 | 415.04 | 2.90 | 5.34 | 25.36 |
| Total | 142109 | 94.57 | 254.00 | -8.61 | 0.21 | 3.68 |
| **Panel D Four-year Ahead Earnings Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 11208 | 20.96 | 82.81 | -0.32 | 1.11 | 2.67 |
| 1974-1977 | 13959 | 28.98 | 100.66 | -22.04 | 0.46 | 2.84 |
| 1978-1981 | 13495 | 41.38 | 134.29 | -19.76 | 0.27 | 2.46 |
| 1982-1985 | 11817 | 47.22 | 154.65 | -0.40 | 0.12 | 1.96 |
| 1986-1989 | 11493 | 61.62 | 187.76 | -0.20 | 0.30 | 2.05 |
| 1990-1993 | 11956 | 68.73 | 198.54 | 1.66 | 2.31 | 3.52 |
| 1994-1997 | 13337 | 90.34 | 238.59 | 0.36 | 2.10 | 5.62 |
| 1998-2001 | 12024 | 127.86 | 282.84 | 0.42 | 3.46 | 8.47 |
| 2002-2005 | 12086 | 173.47 | 336.72 | 5.06 | 6.02 | 13.60 |
| 2006-2009 | 11133 | 238.59 | 399.44 | 7.32 | 8.00 | 27.38 |
| 2010-2013 | 10808 | 264.20 | 423.27 | 3.71 | 8.54 | 30.41 |
| Total | 133316 | 102.29 | 263.45 | -22.04 | 0.45 | 5.19 |
| **Panel E Five-year Ahead Earnings Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 10715 | 23.03 | 86.03 | 0.50 | 0.68 | 3.50 |
| 1974-1977 | 13126 | 33.54 | 108.92 | -27.58 | 1.47 | 3.24 |
| 1978-1981 | 12525 | 45.60 | 141.20 | -27.58 | 0.37 | 2.69 |
| 1982-1985 | 11009 | 51.46 | 163.26 | 0.37 | 0.66 | 1.85 |
| 1986-1989 | 10974 | 64.94 | 192.48 | -0.21 | 0.22 | 2.90 |
| 1990-1993 | 11163 | 75.47 | 208.59 | 2.43 | 3.29 | 4.67 |
| 1994-1997 | 12253 | 97.98 | 247.53 | 1.28 | 1.78 | 7.56 |
| 1998-2001 | 11255 | 141.47 | 295.51 | 0.95 | 6.04 | 12.25 |
| 2002-2005 | 11348 | 188.80 | 349.53 | 9.05 | 10.35 | 18.14 |
| 2006-2009 | 10536 | 260.06 | 412.75 | 10.94 | 14.26 | 35.19 |
| 2010-2013 | 10179 | 277.79 | 431.97 | 6.35 | 12.93 | 37.57 |

*(table continues)*

| Fiscal Year | N | Mean | SD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| Total | 125083 | 110.99 | 273.76 | -27.58 | 0.82 | 7.31 |

Note: The unit of earnings forecasts listed in the table is million dollars. This table presents summary statistics including number of observations (N), mean, standard deviation (SD), select percentiles (25%, 75%), and median for earnings forecasts estimated by the HVZ model. The earnings forecasts obtained from the HVZ model are income before extraordinary items.

**Table 5: Descriptive Statistics for Estimated EPS Forecasts**

| Fiscal Year | N | Mean | SD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| **Panel A One-year Ahead EPS Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 1.6205 | 1.5186 | 0.7221 | 1.2598 | 2.1039 |
| 1974-1977 | 15766 | 2.6018 | 3.1146 | 0.9236 | 1.8891 | 3.2329 |
| 1978-1981 | 15496 | 3.0751 | 4.0355 | 0.7399 | 2.0948 | 3.8324 |
| 1982-1985 | 13755 | 2.1662 | 3.7004 | 0.3411 | 1.1303 | 2.5089 |
| 1986-1989 | 12883 | 2.0445 | 4.2119 | 0.2446 | 0.8731 | 2.0108 |
| 1990-1993 | 13427 | 1.6618 | 3.7370 | 0.2180 | 0.7207 | 1.6173 |
| 1994-1997 | 16047 | 1.6646 | 3.7296 | 0.2368 | 0.7532 | 1.6068 |
| 1998-2001 | 13598 | 1.5942 | 3.6414 | 0.2886 | 0.7546 | 1.5258 |
| 2002-2005 | 13926 | 1.7058 | 3.6665 | 0.2980 | 0.8333 | 1.6854 |
| 2006-2009 | 12464 | 1.8089 | 3.4703 | 0.3552 | 0.9810 | 1.9962 |
| 2010-2013 | 12137 | 2.0415 | 3.7433 | 0.4155 | 1.1095 | 2.2435 |
| Total | 151547 | 2.0199 | 3.6157 | 0.3893 | 1.0708 | 2.2399 |
| **Panel B Two-year Ahead EPS Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 2.1971 | 1.9185 | 1.0813 | 1.7976 | 2.8234 |
| 1974-1977 | 15766 | 3.3192 | 3.9361 | 1.2852 | 2.4234 | 4.0703 |
| 1978-1981 | 15496 | 3.9057 | 5.0606 | 1.1405 | 2.6729 | 4.6998 |
| 1982-1985 | 13755 | 2.7178 | 4.6838 | 0.4696 | 1.4284 | 3.1130 |
| 1986-1989 | 12883 | 2.4350 | 5.2126 | 0.3370 | 1.0226 | 2.3166 |
| 1990-1993 | 13427 | 2.0952 | 4.7434 | 0.3413 | 0.9133 | 1.9649 |
| 1994-1997 | 16047 | 1.9749 | 4.6460 | 0.3485 | 0.8426 | 1.7788 |
| 1998-2001 | 13598 | 1.8311 | 4.5259 | 0.3295 | 0.7830 | 1.6466 |
| 2002-2005 | 13926 | 2.0905 | 4.6057 | 0.4438 | 0.9785 | 1.9402 |
| 2006-2009 | 12464 | 2.1406 | 4.3215 | 0.4950 | 1.1346 | 2.2092 |
| 2010-2013 | 12137 | 2.3683 | 4.5672 | 0.5714 | 1.2657 | 2.4400 |

*(table continues)*

| Fiscal Year | N | Mean | SD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| Total | 151547 | 2.4899 | 4.5267 | 0.5228 | 1.3118 | 2.6848 |
| **Panel C Three-year Ahead EPS Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 2.5457 | 2.1769 | 1.2408 | 2.0799 | 3.2755 |
| 1974-1977 | 15766 | 4.0516 | 4.8504 | 1.5642 | 2.9301 | 4.9060 |
| 1978-1981 | 15496 | 4.6386 | 6.1500 | 1.3610 | 3.1595 | 5.4846 |
| 1982-1985 | 13755 | 3.1699 | 5.6284 | 0.5527 | 1.6605 | 3.5565 |
| 1986-1989 | 12883 | 2.7486 | 6.2486 | 0.3295 | 1.0476 | 2.5385 |
| 1990-1993 | 13427 | 2.4962 | 5.7529 | 0.4195 | 1.0033 | 2.2731 |
| 1994-1997 | 16047 | 2.3080 | 5.5665 | 0.4600 | 0.9494 | 1.9787 |
| 1998-2001 | 13598 | 2.1517 | 5.4497 | 0.4215 | 0.8720 | 1.8141 |
| 2002-2005 | 13926 | 2.5349 | 5.6112 | 0.5788 | 1.1594 | 2.2442 |
| 2006-2009 | 12464 | 2.5580 | 5.2705 | 0.6627 | 1.3265 | 2.5013 |
| 2010-2013 | 12137 | 2.6775 | 5.4324 | 0.6824 | 1.4197 | 2.6058 |
| Total | 151547 | 2.9359 | 5.4677 | 0.6265 | 1.5000 | 3.0882 |
| **Panel D Four-year Ahead EPS Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 3.0174 | 2.5901 | 1.4900 | 2.4861 | 3.8742 |
| 1974-1977 | 15766 | 5.1379 | 6.2191 | 1.9962 | 3.6645 | 6.0758 |
| 1978-1981 | 15496 | 5.3937 | 7.4377 | 1.5672 | 3.5833 | 6.2238 |
| 1982-1985 | 13755 | 3.7034 | 6.8709 | 0.6177 | 1.8230 | 3.9969 |
| 1986-1989 | 12883 | 3.1774 | 7.5478 | 0.3961 | 1.1584 | 2.7861 |
| 1990-1993 | 13427 | 3.0051 | 6.9521 | 0.5825 | 1.2365 | 2.6311 |
| 1994-1997 | 16047 | 2.7411 | 6.7230 | 0.6089 | 1.1391 | 2.2209 |
| 1998-2001 | 13598 | 2.6110 | 6.6111 | 0.5667 | 1.0689 | 2.0949 |
| 2002-2005 | 13926 | 3.0233 | 6.8690 | 0.6932 | 1.3460 | 2.5691 |
| 2006-2009 | 12464 | 3.0643 | 6.5297 | 0.7843 | 1.5316 | 2.8625 |
| 2010-2013 | 12137 | 2.9664 | 6.4868 | 0.7458 | 1.5179 | 2.7395 |
| Total | 151547 | 3.4904 | 6.6656 | 0.7583 | 1.7252 | 3.5697 |
| **Panel F Five-year Ahead EPS Forecasts from 1970 to 2013** | | | | | | |
| 1970-1973 | 12048 | 3.7376 | 3.3791 | 1.7550 | 3.0019 | 4.7425 |
| 1974-1977 | 15766 | 6.0425 | 7.2298 | 2.3063 | 4.2122 | 7.1724 |
| 1978-1981 | 15496 | 6.0496 | 8.3893 | 1.7346 | 3.9451 | 6.9284 |
| 1982-1985 | 13755 | 4.1242 | 7.7856 | 0.6350 | 1.9469 | 4.3680 |

*(table continues)*

| Fiscal Year | N | Mean | SD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| 1986-1989 | 12883 | 3.5677 | 8.4520 | 0.4512 | 1.3166 | 3.0661 |
| 1990-1993 | 13427 | 3.4462 | 7.8211 | 0.7026 | 1.4311 | 2.9556 |
| 1994-1997 | 16047 | 3.1250 | 7.5661 | 0.7094 | 1.3117 | 2.4856 |
| 1998-2001 | 13598 | 3.0889 | 7.4355 | 0.7120 | 1.3304 | 2.4782 |
| 2002-2005 | 13926 | 3.4634 | 7.7351 | 0.8155 | 1.5428 | 2.9241 |
| 2006-2009 | 12464 | 3.5468 | 7.4376 | 0.9182 | 1.7452 | 3.2381 |
| 2010-2013 | 12137 | 3.2434 | 7.1892 | 0.8262 | 1.6388 | 2.9301 |
| Total | 151547 | 4.0051 | 7.5432 | 0.8798 | 1.9547 | 4.0565 |

Note: The unit of EPS forecasts listed in the table is the US dollar. This table presents summary statistics including number of observations (N), mean, standard deviation (SD), select percentiles (25%, 75%), and median for EPS forecasts estimated using earnings forecasts from the HVZ model. If three-year ahead, four-year ahead, or five-year ahead EPS forecast is not available for a company that has one-year ahead and two-year ahead EPS forecasts, I use the inflation rate as an approximation for the EPS growth rate to estimate the missing values.

**Table 6: Descriptive Statistics for Estimated Dividend Payout Ratio for the Implied Cost of Equity Capital Models**

| Fiscal Year | N | Mean | SD | 1% | 25% | Median | 75% | 99% |
|---|---|---|---|---|---|---|---|---|
| 1970-1973 | 12048 | 0.2539 | 0.2583 | 0.000 | 0.000 | 0.2118 | 0.4418 | 0.9218 |
| 1974-1977 | 15766 | 0.1897 | 0.2196 | 0.000 | 0.000 | 0.1245 | 0.3197 | 0.8520 |
| 1978-1981 | 15496 | 0.1912 | 0.2166 | 0.000 | 0.000 | 0.1390 | 0.3174 | 0.8715 |
| 1982-1985 | 13755 | 0.1942 | 0.2453 | 0.000 | 0.000 | 0.0790 | 0.3456 | 0.9112 |
| 1986-1989 | 12882 | 0.1879 | 0.2750 | 0.000 | 0.000 | 0.0054 | 0.3202 | 0.9829 |
| 1990-1993 | 13423 | 0.2014 | 0.2939 | 0.000 | 0.000 | 0.0000 | 0.3551 | 1.0000 |
| 1994-1997 | 16046 | 0.1752 | 0.2832 | 0.000 | 0.000 | 0.0000 | 0.2875 | 1.0556 |
| 1998-2001 | 13596 | 0.1666 | 0.2845 | 0.000 | 0.000 | 0.0000 | 0.2613 | 1.2573 |
| 2002-2005 | 13925 | 0.1658 | 0.2987 | 0.000 | 0.000 | 0.0000 | 0.2318 | 1.3574 |
| 2006-2009 | 12463 | 0.2236 | 0.3414 | 0.000 | 0.000 | 0.0106 | 0.3412 | 1.4777 |
| 2010-2013 | 12137 | 0.2469 | 0.3553 | 0.000 | 0.000 | 0.0562 | 0.3998 | 1.5331 |
| Total | 151537 | 0.1978 | 0.2812 | 0.000 | 0.000 | 0.0414 | 0.3303 | 1.1113 |

Note: Note: This table presents summary statistics including number of observations (N), mean, standard deviation (SD), select percentiles (1%, 25%, 75%, 99%), and median for estimated dividend payout ratios for the implied cost of equity capital models. For a company in year $t$, the dividend payout ratio used for implied cost of equity capital models is the three-year average dividend payout ratio from $t-2$ to $t$. If the three-year average dividend payout ratio is not available for a company $i$ in year $t$ or is out of the range from 0 to 1, I use the company's average dividend payout ratio over the sample period as an approximation for the three-year average dividend payout ratio.

**Table 7: Descriptive Statistics for the Implied Cost of Equity Capital Estimated by the GLS Model**

| Fiscal Year | N | Mean | SD | 1% | 25% | Median | 75% | 99% |
|---|---|---|---|---|---|---|---|---|
| 1970-1973 | 10091 | 0.1337 | 0.1124 | 0.0287 | 0.0791 | 0.1131 | 0.1575 | 1.0000 |
| 1974-1977 | 9903 | 0.1931 | 0.1169 | 0.0588 | 0.1297 | 0.1692 | 0.2185 | 0.7337 |
| 1978-1981 | 10777 | 0.1877 | 0.1318 | 0.0378 | 0.1180 | 0.1583 | 0.2095 | 0.8955 |
| 1982-1985 | 10975 | 0.1308 | 0.1219 | 0.0208 | 0.0786 | 0.1038 | 0.1380 | 0.9848 |
| 1986-1989 | 9482 | 0.1224 | 0.1300 | 0.0274 | 0.0737 | 0.0957 | 0.1241 | 1.0000 |
| 1990-1993 | 9608 | 0.1201 | 0.1415 | 0.0272 | 0.0642 | 0.0856 | 0.1203 | 1.0000 |
| 1994-1997 | 13077 | 0.1096 | 0.1330 | 0.0218 | 0.0623 | 0.0827 | 0.1097 | 1.0000 |
| 1998-2001 | 11642 | 0.1062 | 0.1311 | 0.0142 | 0.0546 | 0.0807 | 0.1124 | 1.0000 |
| 2002-2005 | 11659 | 0.1059 | 0.1258 | 0.0225 | 0.0584 | 0.0774 | 0.1062 | 1.0000 |
| 2006-2009 | 10915 | 0.1183 | 0.1402 | 0.0234 | 0.0632 | 0.0843 | 0.1161 | 1.0000 |
| 2010-2013 | 10523 | 0.1103 | 0.1379 | 0.0185 | 0.0598 | 0.0796 | 0.1078 | 1.0000 |
| Total | 118652 | 0.1297 | 0.1330 | 0.0225 | 0.0686 | 0.0966 | 0.1424 | 1.0000 |

Note: This table presents summary statistics including mean, standard deviation (SD), select percentiles (1%, 25%, 75%, 99%), and median for the implied cost of equity capital estimated by the Gebhardt et al. (2001) model defined as Equation (1) in Chapter 4.1.

**Table 8: Descriptive Statistics for the Implied Cost of Equity Capital Estimated by the OJN Model**

| Fiscal Year | N | Mean | SD | 1% | 25% | Median | 75% | 99% |
|---|---|---|---|---|---|---|---|---|
| 1970-1973 | 9745 | 0.1637 | 0.0893 | 0.0311 | 0.1001 | 0.1465 | 0.2054 | 0.4646 |
| 1974-1977 | 9398 | 0.2378 | 0.1181 | 0.0573 | 0.1506 | 0.2111 | 0.2990 | 0.5629 |
| 1978-1981 | 10072 | 0.1940 | 0.1173 | 0.0354 | 0.1129 | 0.1639 | 0.2404 | 0.5629 |
| 1982-1985 | 9148 | 0.1402 | 0.0984 | 0.0223 | 0.0759 | 0.1143 | 0.1713 | 0.5629 |
| 1986-1989 | 6800 | 0.1239 | 0.0924 | 0.0200 | 0.0629 | 0.0972 | 0.1540 | 0.5021 |
| 1990-1993 | 8763 | 0.1199 | 0.0910 | 0.0197 | 0.0634 | 0.0947 | 0.1432 | 0.5290 |
| 1994-1997 | 11119 | 0.1035 | 0.0843 | 0.0179 | 0.0511 | 0.0828 | 0.1268 | 0.4889 |
| 1998-2001 | 10460 | 0.1155 | 0.0904 | 0.0179 | 0.0556 | 0.0908 | 0.1465 | 0.5134 |
| 2002-2005 | 10758 | 0.1089 | 0.0858 | 0.0179 | 0.0547 | 0.0846 | 0.1337 | 0.4802 |
| 2006-2009 | 9713 | 0.1198 | 0.0974 | 0.0179 | 0.0595 | 0.0914 | 0.1444 | 0.5629 |
| 2010-2013 | 7985 | 0.1052 | 0.0886 | 0.0179 | 0.0517 | 0.0787 | 0.1258 | 0.5276 |
| Total | 103961 | 0.1394 | 0.1047 | 0.0182 | 0.0673 | 0.1103 | 0.1779 | 0.5629 |

This table presents summary statistics including mean, standard deviation (SD), select percentiles (1%, 25%, 75%, 99%), and median for the implied cost of equity capital estimated by the Ohlson and Juettner-Nauroth (2005) model defined as Equation (3) in Chapter 4.1.

**Table 9: Descriptive Statistics for the Implied Cost of Equity Capital Estimated by the CT Model**

| Fiscal Year | N | Mean | SD | 1% | 25% | Median | 75% | 99% |
|---|---|---|---|---|---|---|---|---|
| 1970-1973 | 10091 | 0.1625 | 0.1058 | 0.0299 | 0.0858 | 0.1367 | 0.2118 | 0.5150 |
| 1974-1977 | 9903 | 0.2522 | 0.1536 | 0.0546 | 0.1451 | 0.2164 | 0.3166 | 0.8206 |
| 1978-1981 | 10777 | 0.2118 | 0.1544 | 0.0327 | 0.1128 | 0.1692 | 0.2588 | 0.8454 |
| 1982-1985 | 10976 | 0.1383 | 0.1297 | 0.0248 | 0.0647 | 0.0993 | 0.1593 | 0.6953 |
| 1986-1989 | 9482 | 0.1185 | 0.1388 | 0.0167 | 0.0479 | 0.0765 | 0.1316 | 1.0000 |
| 1990-1993 | 9608 | 0.1149 | 0.1180 | 0.0221 | 0.0507 | 0.0753 | 0.1301 | 0.6381 |
| 1994-1997 | 13078 | 0.0965 | 0.1030 | 0.0187 | 0.0451 | 0.0670 | 0.1080 | 0.5590 |
| 1998-2001 | 11642 | 0.1066 | 0.1171 | 0.0167 | 0.0435 | 0.0717 | 0.1218 | 0.6527 |
| 2002-2005 | 11660 | 0.1077 | 0.1149 | 0.0212 | 0.0479 | 0.0702 | 0.1181 | 0.6136 |
| 2006-2009 | 10916 | 0.1168 | 0.1258 | 0.0200 | 0.0509 | 0.0746 | 0.1282 | 0.6992 |
| 2010-2013 | 10525 | 0.1029 | 0.1256 | 0.0184 | 0.0461 | 0.0650 | 0.1055 | 0.7739 |
| Total | 118658 | 0.1372 | 0.1349 | 0.0200 | 0.0551 | 0.0916 | 0.1693 | 0.7072 |

Note: This table presents summary statistics including mean, standard deviation (SD), select percentiles (1%, 25%, 75%, 99%), and median for the implied cost of equity capital estimated by the Claus and Thomas (2001) model defined as Equation (2) in Chapter 4.1.

**Table 10: Descriptive Statistics for the Implied Cost of Equity Capital Estimated by the MPEG Model**

| Fiscal Year | N | Mean | SD | 1% | 25% | Median | 75% | 99% |
|---|---|---|---|---|---|---|---|---|
| 1970-1973 | 6889 | 0.1949 | 0.0998 | 0.0265 | 0.1164 | 0.1830 | 0.2652 | 0.4059 |
| 1974-1977 | 5157 | 0.1811 | 0.0816 | 0.0318 | 0.1175 | 0.1760 | 0.2391 | 0.3932 |
| 1978-1981 | 6415 | 0.1816 | 0.0833 | 0.0327 | 0.1180 | 0.1734 | 0.2396 | 0.3931 |
| 1982-1985 | 7729 | 0.1533 | 0.0851 | 0.0194 | 0.0877 | 0.1376 | 0.2067 | 0.3866 |
| 1986-1989 | 5744 | 0.1443 | 0.0856 | 0.0181 | 0.0785 | 0.1268 | 0.1960 | 0.3883 |
| 1990-1993 | 5615 | 0.1460 | 0.0960 | 0.0137 | 0.0698 | 0.1212 | 0.2058 | 0.4059 |
| 1994-1997 | 9166 | 0.1076 | 0.0741 | 0.0137 | 0.0548 | 0.0876 | 0.1407 | 0.3536 |
| 1998-2001 | 6181 | 0.1094 | 0.0784 | 0.0137 | 0.0527 | 0.0881 | 0.1453 | 0.3710 |
| 2002-2005 | 8796 | 0.1217 | 0.0847 | 0.0137 | 0.0597 | 0.0987 | 0.1620 | 0.3983 |
| 2006-2009 | 7310 | 0.1289 | 0.0880 | 0.0137 | 0.0637 | 0.1074 | 0.1722 | 0.4059 |
| 2010-2013 | 7101 | 0.1203 | 0.0831 | 0.0137 | 0.0608 | 0.0993 | 0.1557 | 0.4031 |
| Total | 76103 | 0.1420 | 0.0901 | 0.0137 | 0.0717 | 0.1216 | 0.1965 | 0.4031 |

Note: This table presents summary statistics including mean, standard deviation (SD), select percentiles (1%, 25%, 75%, 99%), and median for the implied cost of equity capital estimated by the modified price earnings growth model of Easton (2004) defined as Equation (4) in Chapter 4.1.

**Table 11: Value-weighted Realized Returns of Portfolios by the Implied Cost of Equity Capital Ranks (Portfolios Formed by the Implied Cost of Equity Capital Estimated by the GLS Model and Forecasted Earnings Growth Rate)**

| Implied Cost of Equity Capital Rank | Implied Cost of Equity Capital | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0528 | 44.27 | 0.0411 | 0.0195 | 0.0216 |
| 2 | 0.0800 | 26.85 | 0.0724 | 0.0454 | 0.0270 |
| 3 | 0.0987 | 24.25 | 0.0820 | 0.0516 | 0.0304 |
| 4 | 0.1198 | 21.72 | 0.0975 | 0.0667 | 0.0308 |
| 5(High) | 0.1647 | 20.84 | 0.1033 | 0.0728 | 0.0305 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the GLS model ranks and then by five forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. The implied cost of equity capital in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same implied cost of equity capital rank. Each implied cost of equity capital rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

**Table 12: Value-weighted Realized Returns of Portfolios by Forecasted Earnings Growth Rate Ranks (Portfolios Formed by the Implied Cost of Equity Capital Estimated by the GLS Model and Forecasted Earnings Growth Rate)**

| Forecasted Earnings Growth Rate Rank | Forecasted Earnings Growth Rate | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0078 | 15.53 | 0.1053 | 0.0670 | 0.0383 |
| 2 | 0.0681 | 18.75 | 0.0922 | 0.0584 | 0.0337 |
| 3 | 0.1266 | 20.49 | 0.0827 | 0.0517 | 0.0310 |
| 4 | 0.2014 | 29.54 | 0.0670 | 0.0441 | 0.0229 |
| 5(High) | 0.4067 | 53.65 | 0.0493 | 0.0348 | 0.0145 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the GLS model ranks and then by five forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The forecasted earnings growth rate in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same forecasted earnings growth rate rank. Each forecasted earnings growth rate rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

**Table 13: PE Ratios of Portfolios Sorted on the Implied Cost of Equity Capital Estimated by the GLS Model and Forecasted Earnings Growth Rate**

| **Forecasted Earnings Growth Rate** | **Implied Cost of Equity Capital Rank** | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | 21.55 | **14.81** | **12.99** | **13.92** | **14.37** |
| 2 | 27.95 | 16.46 | 15.74 | 15.85 | 17.77 |
| 3 | 30.10 | 21.04 | 18.19 | 16.61 | 16.50 |
| 4 | **46.45** | 28.92 | 26.85 | 23.71 | 21.80 |
| 5(High) | **95.39** | **53.08** | **47.50** | **38.54** | 33.78 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the GLS model ranks and then by five forecasted earnings growth rate ranks. The table reports average PE ratios of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. PE ratios of portfolios are average PE ratios.

**Table 14: Value-weighted Realized Returns of Portfolios Sorted on the Implied Cost of Equity Capital Estimated by the GLS Model and Forecasted Earnings Growth Rate**

| **Forecasted Earnings Growth Rate** | **Implied Cost of Equity Capital Rank** | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | 0.0710 | **0.0932** | **0.1116** | **0.1207** | **0.1298** |
| 2 | 0.0691 | 0.0859 | 0.0960 | 0.1056 | 0.1043 |
| 3 | 0.0554 | 0.0797 | 0.0882 | 0.0982 | 0.0918 |
| 4 | **0.0229** | 0.0650 | 0.0758 | 0.0853 | 0.0860 |
| 5(High) | **(0.0130)** | **0.0381** | **0.0384** | **0.0778** | 0.1050 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the GLS model ranks and then by five forecasted earnings growth rate ranks. The table reports average returns of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. Returns of portfolios are value-weighted realized returns. The numbers in the parentheses are negatives.

**Table 15: Value-weighted Realized Returns of Portfolios by the Implied Cost of Equity Capital Ranks (Portfolios Formed by the Implied Cost of Equity Capital Estimated by the OJN Model and Forecasted Earnings Growth Rate)**

| Implied Cost of Equity Capital Rank | Implied Cost of Equity Capital | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0500 | 29.25 | 0.0502 | 0.0262 | 0.0240 |
| 2 | 0.0806 | 28.76 | 0.0616 | 0.0349 | 0.0267 |
| 3 | 0.1074 | 25.28 | 0.0740 | 0.0449 | 0.0291 |
| 4 | 0.1407 | 21.54 | 0.0773 | 0.0485 | 0.0288 |
| 5(High) | 0.2040 | 17.89 | 0.0918 | 0.0656 | 0.0262 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the OJN model ranks and then by five forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. The implied cost of equity capital in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same implied cost of equity capital rank. Each implied cost of equity capital rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

**Table 16: Value-weighted Realized Returns of Portfolios by Forecasted Earnings Growth Rate Ranks (Portfolios Formed by the Implied Cost of Equity Capital Estimated by the OJN Model and Forecasted Earnings Growth Rate)**

| Forecasted Earnings Growth Rate Rank | Forecasted Earnings Growth Rate | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0677 | 13.53 | 0.1045 | 0.0594 | 0.0451 |
| 2 | 0.1134 | 15.16 | 0.0919 | 0.0595 | 0.0324 |
| 3 | 0.1500 | 19.09 | 0.0821 | 0.0562 | 0.0259 |
| 4 | 0.2082 | 26.00 | 0.0559 | 0.0367 | 0.0191 |
| 5(High) | 0.3929 | 48.97 | 0.0206 | 0.0082 | 0.0124 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the OJN model ranks and then by five forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. In Table 13, the initial sort criterion is the implied cost of equity capital estimated by the GLS model, and in this table, the initial sort criterion is the implied cost of equity capital estimated by the OJN model. Since the initial sort criterion is different, stock components in forecasted earnings growth rate ranks in Table 13 are different from stock components in the same forecasted earnings growth rate ranks in table 14. The forecasted earnings growth rate in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same forecasted earnings growth rate rank. Each forecasted earnings growth rate rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

**Table 17: PE Ratios of Portfolios Sorted on the Implied Cost of Equity Capital Estimated by the OJN Model and Forecasted Earnings Growth Rate**

| Forecasted Earnings Growth Rate | Implied Cost of Equity Capital Rank | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | 16.19 | **12.17** | **12.53** | **12.39** | **14.37** |
| 2 | 19.46 | **14.23** | **14.53** | **13.45** | **14.16** |
| 3 | 22.58 | 18.18 | 19.29 | 18.88 | 16.53 |
| 4 | 25.00 | 29.74 | 29.37 | 25.24 | 20.63 |
| 5(High) | **63.11** | **69.56** | **50.71** | **37.73** | 23.76 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the OJN model ranks and then by five forecasted earnings growth rate ranks. The table reports average PE ratios of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. PE ratios of portfolios are average PE ratios.

**Table 18: Realized Returns of Portfolios Sorted on the Implied Cost of Equity Capital Estimated by the OJN Model and Forecasted Earnings Growth Rate**

| Forecasted Earnings Growth Rate | Implied Cost of Equity Capital Rank | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | 0.0987 | **0.0768** | **0.1000** | **0.0994** | **0.1025** |
| 2 | 0.0562 | **0.0648** | **0.0780** | **0.0954** | **0.0861** |
| 3 | 0.0403 | 0.0578 | 0.0726 | 0.0933 | 0.0812 |
| 4 | 0.0208 | 0.0387 | 0.0528 | 0.0431 | 0.0911 |
| 5(High) | **(0.0039)** | **(0.0010)** | **0.0125** | **0.0369** | 0.0400 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the OJN model ranks and then by five forecasted earnings growth rate ranks. The table reports average returns of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. Returns of portfolios are value-weighted realized returns. The numbers in the parentheses are negatives.

**Table 19: Example to Demonstrate the Research Design and Main Table Layouts**

| | |
|---|---|
| Stock Price at Time 0 | 100 |
| EPS at Time 0 | 5 |
| P/E Ratio at Time 0 | 20 |
| Stock Price at Time 1 | 150 |
| EPS at Time 1 | 6 |
| P/E Ratio at Time 1 | 25 |
| Capital Gain Yield | $(150 - 100)/100 = 50\%$ |
| EPS Growth | $(6 - 5)/5 = 20\%$ |
| Growth in PE Ratio | $(25 - 20)/20 = 25\%$ |
| Interaction | $20\% \times 25\% = 5\%$ |
| Sum | $20\% + 25\% + 5\% = 50\%$ |
| Dividend Yield | $(6 \times 60\%)/100 = 3.6\%$ |
| Holding Period Return | $50\% + 3.6\% = 53.6\%$ |

Note: Stock price and EPS in this table are made-up numbers to help readers better understand the research design and main table layouts. I assume that the company in Table X has a dividend payout ratio of 60%. The interaction in the first column is the product of EPS growth multiplied by growth in PE ratio. The sum in the first column is the total of EPS growth, growth in PE Ratio, and interaction and equals capital gain.

**Table 20: Decompose Holding Period Returns of Portfolios by Analyst's One-year Earnings Growth Forecast Ranks**

| **Analyst's One-year Earnings Growth Forecast Ranks** | 1 (Low) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (High) |
|---|---|---|---|---|---|---|---|---|---|---|
| Analysts' One-year Earnings Growth Forecasts at Time 0 | -0.9311 | -0.7829 | -0.6215 | -0.4694 | -0.3183 | -0.1319 | 0.0708 | 0.2749 | 0.7254 | 35.6517 |
| EPS at Time 0 | 20.12 | 8.71 | 5.76 | 4.30 | 3.33 | 2.63 | 2.15 | 1.72 | 1.17 | 0.51 |
| Price at Time 0 | 16.77 | 19.04 | 22.77 | 25.33 | 27.35 | 29.61 | 30.39 | 29.60 | 27.27 | 63.20 |
| PE Ratio at Time 0 | 0.92 | 3.35 | 5.73 | 7.61 | 9.68 | 12.13 | 14.97 | 18.50 | 25.50 | 151.37 |
| EPS at Time 1 | 17.98 | 7.87 | 5.13 | 3.99 | 3.34 | 2.63 | 2.23 | 1.98 | 1.67 | 1.06 |
| Price at Time 1 | 18.93 | 21.32 | 25.21 | 27.87 | 29.49 | 31.65 | 31.71 | 30.31 | 27.56 | 62.08 |
| PE Ratio at Time 1 | 1.15 | 4.16 | 7.27 | 8.69 | 10.14 | 12.35 | 14.30 | 15.59 | 16.82 | 68.68 |
| Capital Gain | 0.1626 | 0.1508 | 0.1348 | 0.1204 | 0.0950 | 0.0806 | 0.0489 | 0.0233 | 0.0109 | -0.0098 |
| EPS Growth | -0.1047 | -0.0936 | -0.1086 | -0.0542 | 0.0155 | 0.0178 | 0.0581 | 0.1820 | 0.4878 | 1.2080 |
| Growth in PE Ratio | 0.3158 | 0.2828 | 0.3055 | 0.2033 | 0.0899 | 0.0788 | 0.0188 | -0.1140 | -0.2977 | -0.5149 |
| Interaction | -0.0485 | -0.0385 | -0.0621 | -0.0287 | -0.0105 | -0.0160 | -0.0280 | -0.0448 | -0.1793 | -0.7029 |
| Sum | 0.1626 | 0.1508 | 0.1348 | 0.1204 | 0.0950 | 0.0806 | 0.0489 | 0.0233 | 0.0109 | -0.0098 |
| Dividend Yield | 0.0911 | 0.0697 | 0.0516 | 0.0465 | 0.0369 | 0.0277 | 0.0265 | 0.0215 | 0.0171 | 0.0071 |
| Holding Period Return | 0.2538 | 0.2205 | 0.1864 | 0.1669 | 0.1320 | 0.1083 | 0.0754 | 0.0447 | 0.0280 | -0.0027 |

Note: I sort the stocks into ten portfolios by analysts' one-year earnings growth forecasts at the end of each June from 1980 to 2017. Time 0 is the end of June when I form portfolios, and time 1 is the end of next June. The table reports average EPS, price, PE ratios, and returns of portfolios. The ranks in the first row are analyst's one-year earnings growth forecast ranks. Rank 1 is the lowest analyst's one-year earnings growth forecast rank, and rank 10 is the highest analyst's one-year earnings growth forecast rank. The numbers in the second row are means of value-weighted analysts' one-year earnings growth forecasts at time 0 of portfolios within the same analyst's one-year earnings growth forecast rank. EPS, price, PE ratios, and returns reported in the table are means of value-weighted corresponding values of portfolios within the same analyst's one-year earnings growth forecast rank. The interaction in the first column is the product of EPS growth and growth in PE ratio. The sum in the first column is the total of EPS growth, growth in PE Ratio, and interaction and equals capital gain.

**Table 21: Analysts' One-year Earnings Growth Forecast Errors and Valuation Adjustments of Portfolios by Analyst's One-year Earnings Growth Forecast Ranks**

| **Analyst's One-year Earnings Growth Forecast Ranks** | 1 (Low) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (High) |
|---|---|---|---|---|---|---|---|---|---|---|
| Analysts' One-year Earnings Growth Forecasts at Time 0 | -0.9311 | -0.7829 | -0.6215 | -0.4694 | -0.3183 | -0.1319 | 0.0708 | 0.2749 | 0.7254 | 35.6517 |
| Actual EPS Growth from Time 0 to Time 1 | -0.1047 | -0.0936 | -0.1086 | -0.0542 | 0.0155 | 0.0178 | 0.0581 | 0.1820 | 0.4878 | 1.2080 |
| Analysts' One-year Earnings Growth Forecasts at Time 0 | -0.9311 | -0.7829 | -0.6215 | -0.4694 | -0.3183 | -0.1319 | 0.0708 | 0.2749 | 0.7254 | 35.6517 |
| Analyst's One-year Earnings Growth Forecast Errors at Time 0 | -0.8264 | -0.6894 | -0.5129 | -0.4152 | -0.3339 | -0.1497 | 0.0127 | 0.0929 | 0.2376 | 34.4437 |
| Analysts' One-year Earnings Growth Forecasts at Time 1 | -0.7002 | -0.3499 | -0.1132 | -0.0835 | -0.0091 | 0.3003 | 0.5424 | 0.6626 | 0.9143 | 26.0969 |
| Analysts' Adjustments in Earnings Growth Forecasts at Time 1 | 0.2309 | 0.4330 | 0.5083 | 0.3859 | 0.3092 | 0.4322 | 0.4717 | 0.3877 | 0.1889 | -9.5548 |
| Market Adjustments in PE Ratios at Time 1 (Value) | 0.23 | 0.81 | 1.54 | 1.07 | 0.46 | 0.22 | -0.67 | -2.92 | -8.67 | -82.68 |
| Market Adjustments in PE Ratios at Time 1 (Percentage) | 0.3158 | 0.2828 | 0.3055 | 0.2033 | 0.0899 | 0.0788 | 0.0188 | -0.1140 | -0.2977 | -0.5149 |

Note: I sort the stocks into ten portfolios by analysts' one-year earnings growth forecasts at the end of each June from 1980 to 2017. Time 0 is the end of June when I form portfolios, and time 1 is the end of next June. The table reports average EPS growth and valuation adjustments of portfolios. The ranks in the first row are analysts' one-year earnings growth forecast ranks. Rank 1 is the lowest analyst's one-year earnings growth forecast rank, and rank 10 is the highest analyst's one-year earnings growth forecast rank. EPS growth and valuation adjustments reported in the table are means of value-weighted corresponding values of portfolios within the same analyst's one-year earnings growth forecast rank. Analyst's one-year earnings growth forecast errors at time 0 equal analysts' one-year earnings growth forecasts at time 0 minus actual EPS growth from time 0 to time 1. Analysts' adjustments in earnings growth forecasts at time 1 equal analysts' one-year earnings growth forecasts at time 1 minus analysts' one-year earnings growth forecasts at time 0. Market adjustments in PE ratios at time 1 in percentage equal the changes in PE ratios from time 0 to time 1 divided by PE ratios at time 0.

**Table 22: Risk Measurements of Portfolios by Analyst's One-year Earnings Growth Forecast Ranks**

| **Analyst's One-year Earnings Growth Forecast Ranks** | 1 (Low) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (High) |
|---|---|---|---|---|---|---|---|---|---|---|
| Analysts' One-year Earnings Growth Forecasts at Time 0 | -0.9311 | -0.7829 | -0.6215 | -0.4694 | -0.3183 | -0.1319 | 0.0708 | 0.2749 | 0.7254 | 35.6517 |
| Pooled Standard Deviation of Individual Prices at Time 0 | 4.29 | 4.83 | 5.27 | 5.33 | 5.63 | 6.21 | 6.18 | 6.43 | 6.57 | 15.92 |
| Pooled Standard Deviation of Individual Prices at Time 1 | 4.99 | 5.57 | 5.96 | 6.22 | 6.42 | 6.78 | 6.72 | 7.07 | 7.08 | 17.40 |
| Changes in Pooled Standard Deviation of Individual Prices from Time 0 to Time 1 | 0.70 | 0.74 | 0.69 | 0.89 | 0.80 | 0.57 | 0.54 | 0.64 | 0.51 | 1.48 |
| Pooled Standard Deviation of Individual Returns at Time 0 | 0.1076 | 0.1093 | 0.1112 | 0.1080 | 0.1082 | 0.1094 | 0.1092 | 0.1174 | 0.1310 | 0.1395 |
| Pooled Standard Deviation of Individual Returns at Time 1 | 0.1069 | 0.1088 | 0.1104 | 0.1091 | 0.1089 | 0.1106 | 0.1110 | 0.1191 | 0.1311 | 0.1397 |
| Changes in Pooled Standard Deviation of Individual Returns Change from Time 0 to Time 1 | -0.0008 | -0.0005 | -0.0008 | 0.0011 | 0.0007 | 0.0012 | 0.0019 | 0.0018 | 0.0001 | 0.0002 |

Note: I sort the stocks into ten portfolios by analysts' one-year earnings growth forecasts at the end of each June from 1980 to 2017. Time 0 is the end of June when I form portfolios, and time 1 is the end of next June. The table reports risk measurements of portfolios. The ranks in the first row are analyst's one-year earnings growth forecast ranks. Rank 1 is the lowest analyst's one-year earnings growth forecast rank, and rank 10 is the highest analyst's one-year earnings growth forecast rank. I calculate the pooled standard deviation following the method proposed by Cohen (2013).

# APPENDIX A

## VALUE-WEIGHTED REALIZED RETURNS OF PORTFOLIOS BY THE IMPLIED COST OF EQUITY CAPITAL RANKS (PORTFOLIOS FORMED BY THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE CT MODEL AND FORECASTED EARNINGS GROWTH RATE)

| Implied Cost of Equity Capital Rank | Implied Cost of Equity Capital | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0432 | 50.45 | (0.0138) | (0.0199) | 0.0061 |
| 2 | 0.0658 | 28.64 | 0.0459 | 0.0322 | 0.0137 |
| 3 | 0.0857 | 23.73 | 0.0741 | 0.0548 | 0.0194 |
| 4 | 0.1104 | 21.67 | 0.0840 | 0.0615 | 0.0225 |
| 5(High) | 0.1557 | 22.14 | 0.0859 | 0.0629 | 0.0229 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the CT model ranks and then by five forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. The implied cost of equity capital in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same implied cost of equity capital rank. Each implied cost of equity capital rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns. The numbers in the parentheses are negatives.

# APPENDIX B

# VALUE-WEIGHTED REALIZED RETURNS OF PORTFOLIOS BY FORECASTED EARNINGS GROWTH RATE RANKS (PORTFOLIOS FORMED BY THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE CT MODEL AND FORECASTED EARNINGS GROWTH RATE)

| Forecasted Earnings Growth Rate Rank | Forecasted Earnings Growth Rate | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0545 | 17.24 | 0.0770 | 0.0527 | 0.0243 |
| 2 | 0.0994 | 17.83 | 0.0730 | 0.0506 | 0.0224 |
| 3 | 0.1471 | 22.94 | 0.0562 | 0.0382 | 0.0180 |
| 4 | 0.2261 | 32.33 | 0.0522 | 0.0393 | 0.0129 |
| 5(High) | 0.4614 | 56.33 | 0.0179 | 0.0108 | 0.0071 |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the CT model ranks and then by five forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The forecasted earnings growth rate in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same forecasted earnings growth rate rank. Each forecasted earnings growth rate rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

# APPENDIX C

## PE RATIOS OF PORTFOLIOS SORTED ON THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE CT MODEL AND FORECASTED EARNINGS GROWTH RATE

| **Forecasted Earnings Growth Rate** | **Implied Cost of Equity Capital Rank** | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | 29.03 | **15.92** | **14.20** | **13.18** | **13.87** |
| 2 | 28.43 | 17.70 | **14.62** | **14.35** | **14.09** |
| 3 | 38.76 | 21.40 | 19.43 | 16.61 | 18.47 |
| 4 | **59.51** | 31.05 | 24.59 | 22.66 | 23.98 |
| 5(High) | **96.67** | **57.24** | **45.85** | **41.61** | **40.34** |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the CT model ranks and then by five forecasted earnings growth rate ranks. The table reports average PE ratios of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. PE ratios of portfolios are average PE ratios.

# APPENDIX D

# VALUE-WEIGHTED REALIZED RETURNS OF PORTFOLIOS SORTED ON THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE CT MODEL AND FORECASTED EARNINGS GROWTH RATE

| Forecasted Earnings Growth Rate | Implied Cost of Equity Capital Rank | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | 0.0170 | **0.0692** | **0.1002** | **0.1031** | **0.0953** |
| 2 | 0.0094 | 0.0580 | **0.0874** | **0.1025** | **0.1075** |
| 3 | (0.0277) | 0.0620 | 0.0714 | 0.0883 | 0.0871 |
| 4 | **(0.0175)** | 0.0358 | 0.0754 | 0.0776 | 0.0892 |
| 5(High) | **(0.0501)** | **0.0044** | **0.0362** | **0.0486** | **0.0501** |

Note: I sort the stocks into 25 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the CT model ranks and then by five forecasted earnings growth rate ranks. The table reports average returns of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 5 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. Returns of portfolios are value-weighted realized returns. The numbers in the parentheses are negatives.

APPENDIX E

VALUE-WEIGHTED REALIZED RETURNS OF PORTFOLIOS BY THE IMPLIED COST OF EQUITY CAPITAL RANKS (PORTFOLIOS FORMED BY THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE MPEG MODEL AND FORECASTED EARNINGS GROWTH RATE)

| **Implied Cost of Equity Capital Rank** | **Implied Cost of Equity Capital** | **PE Ratio** | **Holding Period Return** | **Capital Gain Yield** | **Dividend Yield** |
|---|---|---|---|---|---|
| 1(Low) | 0.0367 | 34.40 | 0.0426 | 0.0308 | 0.0118 |
| 2 | 0.0655 | 37.84 | 0.0559 | 0.0407 | 0.0152 |
| 3 | 0.0889 | 39.13 | 0.0626 | 0.0446 | 0.0180 |
| 4 | 0.1151 | 36.51 | 0.0742 | 0.0540 | 0.0202 |
| 5(High) | 0.1519 | 36.06 | 0.0805 | 0.0589 | 0.0216 |

Note: Due to the limited number of observations as a result of estimating the implied cost of equity capital adopting the MPEG model, I sort the stocks into 15 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the MPEG model ranks and then by three forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by five implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. The implied cost of equity capital and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same implied cost of equity capital rank. Each implied cost of equity capital rank includes 132 portfolios (that is 3 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

# APPENDIX F

## VALUE-WEIGHTED REALIZED RETURNS OF PORTFOLIOS BY FORECASTED EARNINGS GROWTH RATE RANKS (PORTFOLIOS FORMED BY THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE MPEG MODEL AND FORECASTED EARNINGS GROWTH RATE)

| Forecasted Earnings Growth Rate Rank | Forecasted Earnings Growth Rate | PE Ratio | Holding Period Return | Capital Gain Yield | Dividend Yield |
|---|---|---|---|---|---|
| 1(Low) | 0.0651 | 24.44 | 0.0847 | 0.0584 | 0.0263 |
| 2 | 0.1477 | 29.38 | 0.0705 | 0.0524 | 0.0181 |
| 3(High) | 0.3557 | 56.48 | 0.0345 | 0.0267 | 0.0078 |

Note: Due to the limited number of observations as a result of estimating the implied cost of equity capital adopting the MPEG model, I sort the stocks into 15 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the MPEG model ranks and then by three forecasted earnings growth rate ranks. The table reports average holding period returns, capital gain yields, and dividend yields of portfolios by three forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 3 is the highest forecasted earnings growth rate rank. The forecasted earnings growth rate in the second column and the PE ratio in the third column are means of value-weighted corresponding values of portfolios within the same forecasted earnings growth rate rank. Each forecasted earnings growth rate rank includes 220 portfolios (that is 5 per year multiplied by 44 years). Returns of portfolios are value-weighted realized returns.

# APPENDIX G

# PE RATIOS OF PORTFOLIOS SORTED ON THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE MPEG MODEL AND FORECASTED EARNINGS GROWTH RATE

| **Forecasted Earnings Growth Rate** | **Implied Cost of Equity Capital Rank** | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | **23.66** | **23.82** | **23.78** | **23.98** | **26.96** |
| 2 | 29.68 | 28.82 | 32.94 | 27.17 | 28.31 |
| 3(High) | **49.81** | **60.82** | **60.57** | **58.30** | **52.87** |

Note: Due to the limited number of observations as a result of estimating the implied cost of equity capital adopting the MPEG model, I sort the stocks into 15 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the MPEG model ranks and then by three forecasted earnings growth rate ranks. The table reports average PE ratios of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 3 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. PE ratios of portfolios are average PE ratios.

# APPENDIX H

# VALUE-WEIGHTED REALIZED RETURNS OF PORTFOLIOS SORTED ON THE IMPLIED COST OF EQUITY CAPITAL ESTIMATED BY THE MPEG MODEL AND FORECASTED EARNINGS GROWTH RATE

| **Forecasted Earnings Growth Rate** | **Implied Cost of Equity Capital Rank** | | | | |
|---|---|---|---|---|---|
| | 1(Low) | 2 | 3 | 4 | 5(High) |
| 1(Low) | **0.0736** | **0.0750** | **0.0872** | **0.0946** | **0.0929** |
| 2 | 0.0402 | 0.0708 | 0.0769 | 0.0792 | 0.0855 |
| 3(High) | **0.0142** | **0.0220** | **0.0240** | **0.0491** | **0.0632** |

Note: Due to the limited number of observations as a result of estimating the implied cost of equity capital adopting the MPEG model, I sort the stocks into 15 portfolios at the end of each June from 1970 to 2013 first by five implied cost of equity capital estimated by the MPEG model ranks and then by three forecasted earnings growth rate ranks. The table reports average returns of portfolios within the same categories. The ranks in the column are forecasted earnings growth rate ranks. Rank 1 is the lowest forecasted earnings growth rate rank, and rank 3 is the highest forecasted earnings growth rate rank. The ranks in the row are the implied cost of equity capital ranks. Rank 1 is the lowest implied cost of equity capital rank, and rank 5 is the highest implied cost of equity capital rank. Returns of portfolios are value-weighted realized returns.

# APPENDIX I

## DECOMPOSE HOLDING PERIOD RETURNS OF PORTFOLIOS BY PE RATIO RANKS

| **PE Ratio Ranks** | 1 (Low) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (High) |
|---|---|---|---|---|---|---|---|---|---|---|
| PE Ratios at Time 0 | 0.83 | 3.10 | 5.08 | 7.23 | 9.45 | 12.47 | 15.62 | 20.19 | 29.55 | 208.12 |
| EPS at Time 0 | 21.17 | 8.77 | 5.90 | 4.26 | 3.22 | 2.43 | 2.06 | 1.62 | 1.13 | 0.38 |
| Price at Time 0 | 15.90 | 17.93 | 21.86 | 23.96 | 26.00 | 27.79 | 30.02 | 30.75 | 30.15 | 65.39 |
| PE Ratio at Time 0 | 0.83 | 3.10 | 5.08 | 7.23 | 9.45 | 12.47 | 15.62 | 20.19 | 29.55 | 208.12 |
| EPS at Time 1 | 19.04 | 7.81 | 5.46 | 4.08 | 3.14 | 2.47 | 2.18 | 1.91 | 1.53 | 0.79 |
| Price at Time 1 | 17.96 | 20.24 | 24.27 | 26.40 | 28.15 | 29.79 | 31.64 | 31.92 | 30.47 | 63.99 |
| PE Ratio at Time 1 | 1.03 | 3.85 | 5.94 | 7.98 | 10.09 | 12.42 | 14.78 | 16.93 | 20.39 | 90.53 |
| Capital Gain | 0.1649 | 0.1587 | 0.1376 | 0.1245 | 0.0966 | 0.0846 | 0.0599 | 0.0381 | 0.0077 | -0.0115 |
| EPS Growth | -0.1001 | -0.0978 | -0.0632 | -0.0246 | -0.0081 | 0.0394 | 0.0850 | 0.2100 | 0.4189 | 1.2555 |
| Growth in PE Ratio | 0.3085 | 0.3073 | 0.2357 | 0.1693 | 0.1196 | 0.0639 | -0.0029 | -0.1176 | -0.2680 | -0.5230 |
| Interaction | -0.0436 | -0.0508 | -0.0348 | -0.0201 | -0.0150 | -0.0188 | -0.0223 | -0.0543 | -0.1432 | -0.7440 |
| Sum | 0.1649 | 0.1587 | 0.1376 | 0.1245 | 0.0966 | 0.0846 | 0.0599 | 0.0381 | 0.0077 | -0.0115 |
| Dividend Yield | 0.1077 | 0.0764 | 0.0573 | 0.0483 | 0.0378 | 0.0316 | 0.0267 | 0.0207 | 0.0149 | 0.0060 |
| Holding Period Return | 0.2726 | 0.2350 | 0.1949 | 0.1728 | 0.1344 | 0.1162 | 0.0866 | 0.0588 | 0.0227 | -0.0055 |

Note: I sort the stocks into ten portfolios by PE ratios at the end of each June from 1980 to 2017. Time 0 is the end of June when I form portfolios, and time 1 is the end of next June. The table reports average EPS, price, PE ratios, and returns of portfolios. The ranks in the first row are PE ratio ranks. Rank 1 is the lowest PE ratio rank, and rank 10 is the highest PE ratio rank. The numbers in the second row are means of value-weighted PE ratios at time 0 of portfolios within the same PE ratio rank. EPS, price, PE ratios, and returns reported in the table are means of value-weighted corresponding values of portfolios within the same PE ratio rank. The interaction in the first column is the product of EPS growth and growth in PE ratio. The sum in the first column is the total of EPS growth, growth in PE Ratio, and interaction and equals capital gain.

# APPENDIX J

# ANALYST'S ONE-YEAR EARNINGS GROWTH FORECAST ERRORS AND VALUATION ADJUSTMENTS OF PORTFOLIOS BY ANALYST'S ONE-YEAR EARNINGS GROWTH FORECAST RANKS

| PE Ratio Ranks | 1 (Low) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (High) |
|---|---|---|---|---|---|---|---|---|---|---|
| PE Ratios at Time 0 | 0.83 | 3.10 | 5.08 | 7.23 | 9.45 | 12.47 | 15.62 | 20.19 | 29.55 | 208.12 |
| Actual EPS Growth from Time 0 to Time 1 | -0.1001 | -0.0978 | -0.0632 | -0.0246 | -0.0081 | 0.0394 | 0.0850 | 0.2100 | 0.4189 | 1.2555 |
| Analysts' One-year Earnings Growth Forecasts at Time 0 | -0.8761 | -0.4768 | -0.4198 | -0.3074 | 0.0073 | 0.2101 | 0.5159 | 0.6856 | 1.1640 | 32.8466 |
| Analyst's One-year Earnings Growth Forecast Errors at Time 0 | -0.7761 | -0.3789 | -0.3566 | -0.2827 | 0.0153 | 0.1707 | 0.4309 | 0.4756 | 0.7451 | 31.5911 |
| Analysts' One-year Earnings Growth Forecasts at Time 1 | -0.7372 | -0.2504 | -0.0773 | 0.0341 | 0.3796 | 0.5774 | 0.8348 | 0.9853 | 1.3970 | 23.9693 |
| Analysts' Adjustments in Earnings Growth Forecasts at Time 1 | 0.1389 | 0.2263 | 0.3425 | 0.3415 | 0.3723 | 0.3673 | 0.3189 | 0.2996 | 0.2330 | -8.8774 |
| Market Adjustments in PE Ratios at Time 1 (Value) | 0.20 | 0.75 | 0.87 | 0.75 | 0.64 | -0.05 | -0.83 | -3.26 | -9.16 | -117.59 |
| Market Adjustments in PE Ratios at Time 1 (Percentage) | 0.3085 | 0.3073 | 0.2357 | 0.1693 | 0.1196 | 0.0639 | -0.0029 | -0.1176 | -0.2680 | -0.5230 |

Note: I sort the stocks into ten portfolios by PE ratios at the end of each June from 1980 to 2017. Time 0 is the end of June when I form portfolios, and time 1 is the end of next June. The table reports average EPS growth and valuation adjustments of portfolios. The ranks in the first row are PE ratio ranks. Rank 1 is the lowest PE ratio rank, and rank 10 is the highest PE ratio rank. EPS growth and valuation adjustments reported in the table are means of value-weighted corresponding values of portfolios within the same PE ratio rank. Analyst's one-year earnings growth forecast errors at time 0 equal analysts' one-year earnings growth forecasts at time 0 minus actual EPS growth from time 0 to time 1. Analysts' adjustments in earnings growth forecasts at time 1 equal analysts' one-year earnings growth forecasts at time 1 minus analysts' one-year earnings growth forecasts at time 0. Market adjustments in PE ratios at time 1 in percentage equal the changes in PE ratios from time 0 to time 1 divided by PE ratios at time 0.

# APPENDIX K

# RISK MEASUREMENTS OF PORTFOLIOS BY ANALYST'S ONE-YEAR EARNINGS GROWTH FORECAST RANKS

| **PE Ratio Ranks** | 1 (Low) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (High) |
|---|---|---|---|---|---|---|---|---|---|---|
| PE Ratios at Time 0 | 0.83 | 3.10 | 5.08 | 7.23 | 9.45 | 12.47 | 15.62 | 20.19 | 29.55 | 208.12 |
| Pooled Standard Deviation of Individual Prices at Time 0 | 3.9246 | 4.2559 | 5.1581 | 5.1841 | 5.4048 | 5.3978 | 6.0127 | 6.5815 | 7.1892 | 16.3673 |
| Pooled Standard Deviation of Individual Prices at Time 1 | 4.5665 | 5.0674 | 5.9584 | 5.8593 | 6.0457 | 6.1225 | 6.6210 | 7.1459 | 7.7063 | 17.9067 |
| Changes in Pooled Standard Deviation of Individual Prices from Time 0 to Time 1 | 0.6419 | 0.8116 | 0.8003 | 0.6753 | 0.6409 | 0.7247 | 0.6084 | 0.5644 | 0.5171 | 1.5395 |
| Pooled Standard Deviation of Individual Returns at Time 0 | 0.1056 | 0.1078 | 0.1090 | 0.1079 | 0.1081 | 0.1096 | 0.1110 | 0.1180 | 0.1299 | 0.1429 |
| Pooled Standard Deviation of Individual Returns at Time 1 | 0.1050 | 0.1073 | 0.1094 | 0.1091 | 0.1094 | 0.1108 | 0.1128 | 0.1190 | 0.1294 | 0.1429 |
| Changes in Pooled Standard Deviation of Individual Returns from Time 0 to Time 1 | -0.0006 | -0.0005 | 0.0004 | 0.0012 | 0.0013 | 0.0011 | 0.0018 | 0.0010 | -0.0006 | 0.0000 |

Note: I sort the stocks into ten portfolios by PE ratios at the end of each June from 1980 to 2017. Time 0 is the end of June when I form portfolios, and time 1 is the end of next June. The table reports risk measurements of portfolios. The ranks in the first row are PE ratio ranks. Rank 1 is the lowest PE ratio rank, and rank 10 is the highest PE ratio rank. I calculate the pooled standard deviation following the method proposed by Cohen (2013).

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