The Firm Characteristics of the Fundamental Value to Price Anomaly

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Abstract

This paper addresses the firm characteristics of the fundamental value to price anomaly. Frankel and Lee (1998) have demonstrated that the estimation of a firm value based on analysts' earnings forecasts is more appropriate, and a strategy based on fundamental value to price (hereafter, VP) has the power to predict future returns. In an effort to understand the characteristics of the VP anomaly, I explore the differences between high VP and low VP firms with regard to firm-specific characteristics, security market characteristics, and information environments over the three years following portfolio formation. I find that firms with a high VP ratio are associated with good financial performance, high stock volatility, and a poor information environment. Specifically, firms with high VP ratios are more likely to have higher sales, earnings, core earnings, cash flow, total accruals, and research and development expenditures (R&D). Additionally, the standard deviations of these performance variables are much higher for the extreme VP portfolios than for the middle portfolios. Given the mean and variance criteria as an investment strategy, high VP stocks are more likely to have outstanding performance, but also tend to be riskier.

Keywords: Fundamental Value to Price Anomaly; Information Environment; Mean and variance criterion.

I. Introduction

This paper examines information environments for firms with high fundamental value to price (hereafter, VP) ratios. The VP ratio is an estimated fundamental value that is measured by the residual income valuation model divided by the actual stock price. In previous studies, it has been asserted that the characteristics of the information environment influence price formation (Collins et al. 1987; Freeman 1987; Piotroski and Roulstone, 2004). In those studies, it was demonstrated that market-level, industry-level, and firm-specific information are reflected in an individual firm's stock price, thus suggesting that variables associated with firm-specific information environments influence the estimation of a firm's fundamental value at price formation. Whereas a number of papers have reported that the VP anomaly is driven mainly by mispricing rather than omitted risk factors, there is currently little evidence to suggest a relationship between a firm's information environment and the VP anomaly.

Using various measurements related to financial performance, security market, and information environment, this paper finds that firms with high VP ratios are associated with good financial performance, high stock return volatility, and poor information environment. This paper also finds that the standard deviations of these performance variables are much higher for the extreme VP portfolios than for the middle portfolios. This result suggests that high VP stocks are more likely to experience outstanding performance, but are also riskier. In the three years following the VP portfolios, the most extreme VP firms have the highest sales growth, earnings, cash flows, and research and development expenses (R&D). With regard to the information environment, firms in the bottom and top VP portfolios have lower analyst coverage, higher dispersion, and greater forecast error. Additionally, firms in the extreme portfolios tend to be younger and have higher volatile return-on-asset, cash flow, return, and turnover.

The number of zero returns, however, has an almost monotonic pattern with the VP ratio. This pattern remains constant over the three years after the formation of the VP portfolio.

Regression results demonstrate that the abnormal future return from a trading strategy predicated on the VP ratio significantly declines if attention is restricted to firms with a poor information environment. This result appears inconsistent with the market-mispricing explanation that high arbitrage or transaction costs inhibit the process of convergence to the fundamental value, and result in greater subsequent abnormal returns. Rather, this finding demonstrates that the VP anomaly has different characteristics than are seen in other overvaluation anomalies, such as accrual anomaly. High VP firms that are strong performers and risky, along with the substantial VP effect observed in a good information environment, both lead to the conclusion that although a high VP firm evidences favorable financial performance in the present and future, it is difficult to assess undervalued stock in a bad information environment. This explanation is consistent with the findings of Brav and Heaton (2006) that the undervaluation anomaly is greater for low arbitrage costs.

Since the studies of Ohlson (1995) and Feltham and Ohlson (1996), there has been a great deal of controversy among researchers and investment managers as to whether a firm’s fundamental value determined using the residual income model is actually reflective of a firm’s intrinsic value. A series of empirical studies has been undertaken to evaluate the predictability of the fundamental value (Frankel and Lee 1998; Lo and Lys 2000; Kothari 2001; Beaver 2002). These studies determined that the VP ratio is a good predictor of long-term cross-sectional returns. They also counsel caution as to whether the VP effect may reflect temporary mispricing by the market. Accordingly, Ali et al. (2003) examined two competing explanations for the VP anomaly and provided a supporting result for the mispricing explanation.

Although we have evidence to suggest that a market-mispricing is the cause of the VP anomaly, there remains room for alternative interpretations of this phenomenon. Although a variety of risk measures have been utilized to explain the VP anomaly, little research has thus far attempted to determine the manner in which the information environment might affect the magnitude of the VP effect. In particular, although we assume that the current price of high VP firms is undervalued as compared to a firm's intrinsic value, there is some limited direct evidence suggesting the existence of a relationship between a firm's future performance and the VP effect. Therefore, without viewing the ex-post performance, we are unable to ascertain whether or not the stock price accurately reflects a firm's fundamental value or not. Furthermore, given the empirical evidence suggesting that a firm's information environment affects information asymmetry between insiders and outsiders in a firm, the identification of the firm-specific characteristics of the VP anomaly is worth testing.

The findings of this paper reveal that firms with high VP ratios show healthier financial performance over three years than those with low VP ratios; this finding supports the mispricing explanation. With regard to information environments, this paper finds that the VP effect is greater for firms with good information environments than for firms with poor information environments.

This study contributes to the relevant literature in several ways. First, direct evidence is provided for the causes of the VP anomaly, via an examination of firm characteristics in the extreme VP portfolio over three years. The difference between high-VP and low-VP firms in terms of earning, core earnings, cash flow, and sales appears to result in abnormal future returns. However, investors often fail to recognize the true intrinsic value of a firm at the decision-making stage due to the high intrinsic volatility of these variables. This finding indicates that the market does not efficiently incorporate public information.

Second, the findings regarding the high variance of stock returns as well as financial performance in the extreme VP portfolio suggest that greater volatility of information deters investors from understanding a firm's fundamental value. Previous studies have focused only on the mean value of stock returns, ignoring variances in the stock. However, the variance in a strategy may help to answer the question as to why investors have failed to assess a firm's fundamental value.

Finally, by identifying circumstances that affect the VP anomaly, this paper provides more useful information to investors. Additionally, findings regarding the firm-specific characteristics of high (low)-VP firms provide relevant information to investors for firm valuation, and also help to promote future academic research into market valuation.

The remainder of the paper is structured as follows. Section 2 describes the previous literature related to the value to price anomaly and the role of information in this context, and also provides arguments for the existence of a relationship between them. Section 3 explains the research methodology of the study, including the definition of variables, methods to determine the fundamental value (V) using analysts' forecast data, and a regression model. Section 4 presents the results of tests that examine the association between the VP ratio and a variety of information environments. Section 5 discusses the sensitivity tests, and Section 6 provides the summary and concluding remarks.

II. Related Literature and Research Motivation

2.1 Fundamental Value to Price Anomaly

The standard valuation approach indicates that stock prices should be driven by information that signals the future fundamental values. A large body of evidence suggests that measures of fundamental value to market value ratio are associated strongly with stock prices and returns (Fama and French 1992; Lakonishok et al. 1994; Fama and French 1995; Abarbanell and Bushee 1997;

1998; Frankel and Lee 1998; Dechow, Hutton and Sloan 1999). These studies argue that investors can earn abnormal returns by trading on various signals of fundamental information, as the market has failed to fully incorporate a firms' fundamental value in historical financial data into prices in a timely manner.

Among the variety of proxies for a firm's fundamental value, the fundamental value calculated by the residual income valuation model tends to be more useful for the estimation of firm value without reference to price (Bernard 1994). The residual income model is quite useful in terms of providing an accounting information-based method for the assessment of a firm's value. Although the assumptions of clean surplus relation and specific linear information dynamic remain debatable, it is clear that the residual income model is both simple and reliable. Accordingly, the residual income valuation model has been utilized extensively to estimate the value of a firm (Lee 1999; Lo and Lys 2000). Previous empirical research has revealed that it is generally possible to earn abnormal profits on the stock market by applying the VP ratio strategy (Frankel and Lee 1989; Dechow et al. 2001; Ali et al. 2003). Since the study conducted by Frankel and Lee (1998), many researchers have reported that the VP ratio has predictive ability for up to three years. However, even though there is some agreement that VP strategies have generated superior returns, the reason why the VP strategy exhibits abnormal returns remains controversial. The explanations for the long-run predictability of the VP anomaly fall under three categories: (a) risk-based explanations that argue that high VP firms earn high returns because they are riskier, (b) mispricing explanation, and (c) measurement errors. Measurement errors have always been a concern of empirical researchers, and this is reflected in the relevant literature. In particular, serious potential research design problems of tests have been identified in market efficiency studies. Kothari et al. (2005) demonstrated that passive deletion can yield findings of systematic mispricing. Kraft et al. (2006) determined that portfolio returns to an accruals-based strategy are sensitive to robustness tests, including trimming. In order to eliminate such biases, researchers should consider whether their findings are robust against data snooping and selection bias issues.

Assuming that measurement error does not influence the results, a common competing explanation is the debate surrounding mispricing versus the risk proxy of VP. Although Frankel and Lee (1998) controlled for known risks associated with beta, firm size, and book-to-market ratio, Ali *et al*. (2003) suggest that there was a possibility that high VP firms might still be riskier than low VP firms in certain other circumstances. They attempted to determine whether the VP effect was attributable to market mispricing or omitted risk factors. Their findings demonstrated that the VP continues to evidence a significant positive association with future returns after controlling for an extensive set of risk proxies, thus suggesting that the VP effect can be attributed to mispricing. Xie (2004) confirmed that the VP effect was related more profoundly to the mispricing explanation than to the risk explanation. He found that only a small subsample of stocks within the extreme VP quintiles evidenced price convergence to a fundamental value, and that returns to VP strategies are driven principally by this subsample.

Meanwhile, Fama and French (2006) have argued that the book-to-market, profitability, and investment effects on a valuation can influence the expected returns, and thus controlling for the other two variables is required when we identify each effect. They also reported that we are unable to determine whether the three effects in average stock returns are attributable to rational (risk explanation) or irrational (mispricing) pricing. Consequently, they concluded that the test of valuation cannot, by itself, tell us whether the investors' forecast profitability and investments--which determine the price--are rational or irrational. Therefore, the debate surrounding the features of the VP anomaly remains unresolved.

Additionally, without evidence regarding present and future firm performance, we are unable to determine whether or not investors can properly assess a firm's fundamental value. Intuitively, if undervalued stocks are associated with poor future performance, it is not an issue of mispricing, even in cases in which the VP ratio is high. By way of contrast, if undervalued stocks are associated with good future performance, these stocks would seem to have been priced improperly. However, little progress has been made thus far in identifying the characteristics of the VP anomaly. Thus, attempting to determine the relevant characteristics of high (low) VP firms, and why investors fail to react properly to high (low) VP firms, will help us to understand the features of the VP anomaly.

2.2 Anomalies and Firm Characteristics

The explanation of the existence of abnormal returns is a classic issue in the asset pricing model[1]. As non-systematic risk is not priced in an efficient market, empirical results regarding anomalies remain something of a puzzle. In an effort to understand which firms exhibit anomalous returns, a substantial number of studies have documented the manner in which other anomalies--such as book-to-market, accrual, and post-earnings-announcement drift--vary with the characteristics of the firm. Nevertheless, there is currently insufficient data for an unambiguous understanding of the firm characteristics of the VP anomaly. That is, no factors that might affect the long-term VP anomaly have been probed thus far, with the exception of the risk proxies. The results of previous studies have suggested that the properties of firm-specific information influence the expected returns (Merton 1987; Amihud and Mendelson 1986; Diamond and Verrecchia 1991; Brennan et al. 1998; Admati 1985). In particular, Leuz and Verrecchia

[1] Note that this paper does not explain why the VP anomaly arises in the first place. My focus is on explaining under which circumstances the VP anomaly is not arbitraged away, or more precisely on why the mispricing persists for three years rather than just a few days or a few months.

(2000) have documented the role of performance reports in aligning firms and investors with regard to capital investments. Poor-quality reporting impairs the coordination between firms and their investors with regard to the firm's capital investment. The results of previous theoretical studies also suggest that market reactions are dependent on the precision or quality of previously released information, including earnings (Holthausen and Verrecchia 1988; Kim and Verrecchia 1991).

In an effort to determine which information results in price corrections over the next few years, I consider an extensive set of firm characteristics that influence a firm's fundamental value. That is, earnings, core earnings, sales, cash flow, total accrual, research and development expense (R&D), and long-term forecasts are utilized as proxies to determine the information regarding future profitability. These fundamental characteristics are most readily obtained from historical financial statements.

Earnings are considered by investors to be the most powerful, useful, and interesting of data. In general, investors are most concerned about earnings, and change their prior beliefs as new earnings information becomes available. As a consequence, the reporting of earnings that do not reflect the underlying economic performance of a firm inflicts losses on individual investors, employees, other companies, and the economy as a whole. On the other hand, reported earnings consistently suffer from suspicions of earnings management, and the misrepresentation or masking of actual economic performance. As special items have been used commonly for manipulation and have been shown to be highly transitory (Lipe 1986; Fairfield et al. 1996), the current paper sees core earnings as being more important than comprehensive earnings. Managers also have incentives to manipulate real activities, and these activities affect cash flow and in some cases, sales (Roychowdhury 2006). Additionally, the majority of the evidence regarding real activities management centers around the opportunistic reduction of R&D expenditures in order to reduce reported expenses. Bens *et al*. (2002) found evidence to suggest that managers may partially finance these repurchases by reducing R&D. Dechow and Sloan (1991) determined that CEOs reduce spending on R&D toward the end of their tenure in order to increase short-term earnings. Baber *et al*. (1991) and Bushee (1998) also found evidence consistent with a reduction of R&D expenditures to fulfill earnings benchmarks.

Since the study of Sloan (1996), a great deal of research has attempted to evaluate the impact of accruals in the capital market (Dechow *et al*. 1996; Bradshaw *et al*. 2001; Richardson *et al*. 2002). The essential consensus of these papers is that firms reporting earnings with large accruals are more likely to be subject to SEC enforcement actions and earnings restatements, thereby suggesting that the magnitude of accruals is a good indicator of earnings quality. Following the research of Richardson (2003), this paper regarded the total accruals as a proxy for the earnings quality level.

In addition to the aforementioned variables, this paper focused on accounting for fundamental variables including leverage, R&D expenditures, and long-term forecasts. Liu and Thomas (2000) demonstrated that the analysts' long-term forecasts deliver the fundamental value, while the short-term forecasts anticipate temporary earnings. If firms with higher long-term earnings forecast have a high V/P ratio and consequently higher future returns, analysts' forecasts should be considered reliable and relevant information.

2.3 Anomalies and Information Environment

The information environment is broadly defined to include all sources of information relevant to firm value assessments. It includes government reports regarding macroeconomic conditions, industry reports and trade association publications, firm-specific news in the financial press, and reports issued by analysts and brokerage houses, as well as accounting reports, and vertical and intra-industry information transfers conducted via sales and industry reports (Collins and Kothari, 1989). Differences in the information environment influence the extent to which price changes anticipate earnings changes (Collins *et al.* 1987; Freeman 1987).

In previous studies, it has been asserted that information environment characteristics influence price formation. It has also been demonstrated that market-level, industry-level, and firm-specific information are reflected by an individual firm's stock price, thus suggesting that variables associated with firm-specific information environments may influence the estimation of a firm's fundamental value at price formation. The effect of the firm-specific information environment on stock price has been addressed thoroughly in many studies. For example, Piotroski and Roulstone (2004) investigated the trading effects of informed market participants. They found that analyst forecasting activities affect the firm's information environment, and that this effect further increases stock synchronicity.

In this paper, I broadly employ nine variables as proxies for the richness of a firm's information environment: analyst coverage, dispersion in analyst forecast, forecast error, firm age, return-on-asset volatility, cash flow volatility, stock volatility, average daily turnover, and the number of zero return frequency.

First, I utilize variables associated with analyst forecasts. The majority of the relevant analyst forecast literature maintains that the characteristics of analyst forecasts are related closely to a firm's information environment (Brown *et al*. 1987; Imhoff and Lobo 1992; Lang and Lundholm 1996; Wiedman 1996; Elgers et al. 2001; Diether et al. 2002; Liang 2003; Zhang 2006; Garfinkel and Sokobin 2006). Besides, Hong et al. (2000) has documented reduced price momentum in stocks followed by more analysts, thereby suggesting that analysts may increase the speed of diffusion of firm-specific information across market participants. In accordance with the findings of Lys and Soo (1995) and Lang et al. (2003), this paper argues that limitations on managers' abilities to communicate with market participants tend to be more severe for firms with low analyst coverage, high dispersion, and large forecast error.

The next proxy is firm age, which was also used by Jiang et al. (2005) and Zhang (2006). Firms with a long history tend to have more information available to the market (Barry and Brown 1985).

Return-on-asset volatility and cash flow volatility variables are associated with the unpredictability of a firm's financial performance. A more volatile performance results in greater unpredictability of future earnings (Ali et al. 2003; Zhang 2006a). With regard to price volatility, Durnev et al. (2003) and Zarowin (2003) have suggested that firms with high return volatility are associated with stronger correlations between stock returns and future earnings. Malkiel (2003) has determined that a generally positive association exists between a firm's return volatility and earnings growth. These findings verify the association between a firm's return volatility and firm-specific disclosure.

The results of previous studies have demonstrated that trading volume is a crucial determinant of transaction costs (Kyle 1985; Bhushan 1991; Lee and Swaminathan 2000; Hong and Stein 2003). Investors in poor information environments have heterogeneous beliefs, and this results in greater transactions. Barron (1995) reported evidence of a positive general relationship between trading volume and aspects of disagreement, including dispersion in prior beliefs and belief jumbling.

Finally, this paper considers the number of zero return frequencies. Lesmond et al. (1999) has argued that a security with high transaction costs exhibits more frequent daily returns of zero than does a security with low transaction costs. If a firm's information is difficult to interpret, transactions are generally less likely to be implemented quickly due to increased transaction costs and information costs.

III. Research Design

3.1 Sample Selection and Variables Measurement

The sample of this study is retrieved from COMPUSTAT, the Center for Research in Security Prices (CRSP), and I/B/E/S. I follow a similar methodology as described by Fankel and Lee (1998)[2] in order to calculate the fundamental value (V). In order to compute the future earnings, book value, and terminal value forecasts, I require firms to meet the COMPUSTAT data requirements (for B_{t-1}, B_{t-2}, NI_{t-1}, and DIV_{t-1}) and to have the necessary CRSP stock prices and shares outstanding data. I also require firms to have a one-year-ahead and a two-years-ahead earnings-per-share (EPS) forecast from I/B/E/S. I further constrain the sample to firms with fiscal-year-ends between June and December, inclusively. Because I use I/B/E/S forecasts issued in May, this constraint ensures that the forecasted earnings correspond to the correct fiscal year.

I remove firms with negative book values and firms with FROEs greater than 100%, as these firms cannot be interpreted in economic terms. Additionally, I delete observations with a stock price of under $1 as of the end of June of year t. These stocks not only have smaller analyst coverage and unstable and less meaningful VP, but they also incur greater transaction costs owing to their poor market liquidity. After applying these data requirements, the final sample

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[2] Calculating the fundamental value (V) using analyst forecasts may serve to reduce the number of samples as compared with the ratio calculated from the COMPUSTAT earnings data. However, Livnat and Mendenhall (2006) have suggested that different sources of anomalies may capture somewhat different forms of mispricing. In addition, bearing in mind that the mean estimated value is, on average, 20 to 40 percent less than the stock prices when historical earnings or statistical proxies are utilized to estimate the RI time series, using analyst forecasts as an expected future firm value tends to be more appropriate (Frankel and Lee 1998; Dechow et al. 1999; Myers 1999). Doyle et al. (2006) examined the earnings surprise using both the I/B/E/S-based earnings surprise and time-series measure of surprise. They showed that the correlation between the two variables was only 0.22, which suggests that the analyst forecast information differs significantly from the time-series-based information. Therefore, in this paper, I employ the analyst forecast-based method for the estimation of the fundamental value (V).

consists of all domestic nonfinancial companies and 39,055 firm-years from 1976 to 2001[3.]

3.2 Fundamental Value Based on a Residual Income Model

A firm's fundamental equity value in the residual income valuation model is expressed as its current book value plus an infinite sum of discounted expected residual income, in which residual income is the investors' expected income minus the required income, which is equal to the forecasted book equity at the beginning of each period, multiplied by the cost of equity capital (Ohlson 1995; Feltham and Ohlson 1995). The empirical application of the residual income model requires forecasts of future earnings, future book values, and cost of equity capital. Even though the residual income model is theoretically an infinite model, the practical implementation of the residual income model can be conducted only in a finite horizon, and thus requires a terminal value estimate.

Considering the assumption of clean surplus accounting[4], the residual income model could revert into the traditional dividend discount model. Specifically, Frankel and Lee (1998) operationalized the residual income model via the application of a short-horizon earnings forecast of up to three years, as follows. This formulation of the residual income model assumes that the forecasted residual income in year t+2 continues in perpetuity.

$$V_t = B_t + \frac{(FROE_t - r)}{(1+r)} B_t + \frac{(FROE_{t+1} - r)}{(1+r)^2} B_{t+1} + \frac{(FROE_{t+2} - r)}{re(1+r)^2} B_{t+2}$$

V_t represents the stock's fundamental value estimated at time t, and B_t

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[3] Since I/B/E/S began in 1976, the sample starts in 1976. And the sample ends in year 2001 because the three-year-ahead buy-and-hold return is used as dependent variable in future return regression.

[4] Clean surplus accounting requires that the change in the book value of common equity from time t-1 to t derives only from the income minus dividends during period t, i.e., Bt=Bt-1+Nit-DIVt.

represents the book value of equity per share at the beginning of year t+i. The book value of year t+i is estimated under the assumption that the clean surplus relation holds. Specifically, $B_t = B_{t-1}$ (1+FROE (1-k)), where k is the dividend payout ratio defined as the ratio of dividends over earnings, and FORE is defined below. If a firm has negative earnings, then k is equal to the ratio of dividends over six percent of the total assets[5]. $FROE_t$ indicates the forecasted return on equity in year t. FROE is computed as the year t consensus forecast, divided by the average book value per share for year t-1. $FROE_t$ is equal to $FY_t/(B_t+B_{t-1})/2$. *r* represents the estimated cost of equity capital. Specifically, the cost ofequity is estimated as an industry-specific rate using the three-factor industry risk premiums described by Fama and French (1997) plus the average rate of one month T-bill over sample period[6].

In estimating FROE, I utilize the I/B/E/S *mean* forecast from the May statistical period of year t. In order to estimate $FROE_t$ and B_t, firms are required to have both forecasts, that is, one-year-ahead I/B/E/S consensus EPS forecast (FY1) and two-year-ahead I/B/E/S consensus EPS forecasts (FY2). In order to estimate FROE and B in year t+1, a long-term earnings growth estimate (Ltg) variable is necessary. When firms are not available Ltg, I use $FROE_{t+1}$ to proxy for $FORE_{t+2}$, in accordance with the study of Frankel and Lee (1998).

3.3 Variables Measurement

Since Shumway (1997) and Shumway and Warther (1999) implicated the delisting return bias, many studies have asserted the importance of delisting

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[5] This procedure follows that of Frankel and Lee (1998). Six percent reflects the average long-run return on assets.

[6] Throughout this paper, I use the average rate over sample period when V is estimated, instead of the one month T-bill rate. Alternatively, I use the one-month T-bill rate as sensitive check and get a similar result. Frankel and Lee (1998) use five alternatives to proxy for the cost of capital: three constant discount rates (11%, 12%, or 13%) and two industry-based discount rates derived by Fama-French (1997). They report that the empirical results are insensitive to the choice of the discount rates. Abarbanell and Bernard (2000) also support the insensitivity of the choice of discount rates on a cross-sectional setting.

firms when the stock returns are calculated. Recently, Beaver, McNichols, and Price (2007) have indicated that dropped delistings are concentrated in extreme deciles for all of the anomaly variables and thus, the exclusion of dropped delistings is likely to significantly affect the results, owing to uneven distribution across deciles. By taking this problem into consideration, I apply the following method when the stock returns were estimated: the stock return replaces delisting returns when the return is missing, and code zero when the stock return represents 'B'.[7] Using monthly CRSP, I calculate the size-adjusted return, which equals the raw return minus the corresponding CRSP size-decile index returns where the size decile is based on the size-decile cutoffs for all NYSE, AMEX, and NASDAQ firms.

The firm's financial performance variables in the study are calculated from Compustat database. Earnings (*E*) are defined as the operating income after deprecation (data item #178). Core earnings (*CE*) are the operating income prior to depreciation (data item #13) according to the definition of McVay (2006). This definition is selected because it excludes non-recurring items including extraordinary items, discontinued operations, special items, and non-operating income. These non-recurring items are problematic because Compustat does not provide the information necessary to decompose them into underlying cash and accrual components. The exclusion of these items from the empirical tests thus allows for unambiguous assessments of the persistence of the cash and accrual components of income from continuing operations.

Total accrual and current accrual are calculated in accordance with the work

[7] Beaver et al. (2007) suggest that using multiple value rather than single value for the delisting return is more proper. However, CRSP Delisting Returns (2001) published by CRSP state that the return may not be very different from returns calculated with just one single-replacement value for all missing delisting returns even using multiple single-replacement values based on the combination of delisting stock exchange and individual delist codes. For simplicity, I use a single-replacement value for delisting stock.

of Desai et al. (2004)[8]. I defined total accrual (*TA*) as the change in current assets minus the change in cash minus the change in current liabilities plus the change in short-term debt plus the change in taxes payable minus the depreciation expense. With reference to Compustat, total accruals=(Δdata4-Δdata1)-(Δdata5-Δdata34-Δdata71)-data14. The working capital accrual (*CA*) is the total accruals plus depreciation expense. Cash flow from operation (*CFO*) is measured by the operating income minus the total accruals. Sales (*SALE*) is data item #12. Leverage (*LEV*) is measured by the sum of long-term debt and debt in current liabilities. Research and development expense (*RND*) is data item #46 and is coded zero when this variable is missing. Variables are deflated by the market value of equity at the end of June of year t for comparison with VP.

In order to assess the effect of the information environment that would have affected investors' perception at the time at which the VP ratios were estimated, I calculate a variety of information environment variables at the end of June of year t. The coverage (*COV*) is measured by the number of analysts' one-year-ahead estimates, as follows: the dispersion (*DIS*) in analyst earnings forecasts is the standard deviation of the one-year-ahead analyst consensus earnings forecasts divided by the absolute value of the one-year-ahead analyst consensus earnings forecast. Forecast error (*AFE*) is the absolute value of analysts' forecast error in year t. The forecast error is measured as I/B/E/S actual earnings minus earnings forecast scaled by the prior year-end stock price, where the earnings forecast is made in May of year t.

In accordance with the work of Jiang et al. (2005) and Lee and Zhang (2005), the return volatility (*IRISK*) is defined as the standard deviation of daily returns of the past one year, and the trading volume (*TURN*) is defined as the average

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[8] The SEC required the presentation of the statement of cash flows for fiscal years ending after July 15, 1988. However, some firms adopted this standard in early 1987. As the sample period of this paper begins in 1976, I use a balance sheet approach to calculate accrual and cash flow, because the availability of operating cash flows restricts the sample to the post-1986 period.

daily turnover in percentage over the past one year, where the daily turnover is the ratio of the number of shares traded each day to the number of shares outstanding at the end of the day. As a practical measure of transaction cost, I estimate the number of zero returns (ZFR) in accordance with the example of Lesmond et al. (1999). Less predictable earnings and greater earnings variability might deter investors from fairly pricing invested stocks and result in greater earnings information risks. The standard deviations of return-on-assets (*SROA*) and of cash flow (*SCFO*) over the prior five years are measured as proxies for information uncertainty. I treat SCFO as missing if only one or two years of data were available. Cash flow from operations is calculated the operating income minus the total accruals. Although the cash flow measure is calculated indirectly from financial statements, it is more likely to capture the underlying volatility because it is influenced by a firm’s information system.

IV. Empirical Results

4.1 Descriptive Statistics

Table 1 reports annual summary statistics of the interesting variables. The number of observations over time is similar to that shown in previous studies. The average dividend payout ratio ranges from a high of 34 and a low of 14, and the average return-on-equity ranges between 9% and 18%. The average VP ratio decreases over time as the average book value per share decreases. These results corroborate the reliability of the sample and the stability of the key parameters over the sample period. Table 2 provides descriptive statistics of variables that are utilized for financial performance and information environment analyses. The mean value of the VP ratio is 0.994, which suggests that the firm value, on average, is close to the priced value. The book value explains 63% of stock price, on average. The size range has a broad spread, from 9 to 64,435 million. Most financial performance variables are distributed normally. On average, a firm has eight analysts following, is at least 16 years old, and has positive future returns. I begin my analysis by replicating the study of Frankel and Lee (1998). I divide the samples into ten groups based on the level of VP ratio in each year and estimated the differences of buy-and-hold (size-adjusted) returns between the extreme groups, which equal the raw returns minus the corresponding CRSP size-decile index returns[9].

<INSERT TABLE 1 HERE>

Even after controlling for the size effect on the future return, the D10-D1 portfolio generates size-adjusted returns of 4.9 percent, 15.0 percent, and 19.9 percent over holding periods of one, two, and three years, respectively. One finding that differs from the results of Frankel and Lee (1998) is the trend of ME over VP deciles. This difference may derive from the differences in the sample periods. Overall, the VP effect in this study is consistent with what has been documented in prior studies.

4.2 Firm Characteristics across VP Deciles[10]

In this section I attempt to determine why the market is so inefficient with regard to extreme VP, and which firm characteristics and information environment characteristics are associated with these extreme returns. Table 4

[9] Frankel and Lee (1998) present the average buy-and-hold return of quintiles portfolios on the basis of the V/P ratios. However, since the study of Fama and French (1993), a number of studies have provided evidence suggesting that the size factor significantly explains individual returns. Ali *et al.* (2003) presented size-adjusted returns as well as raw returns of V/P portfolios to control for the effects of size. I also calculated the size-adjusted buy-and-hold returns, and reported the differences in means between the top and bottom deciles.

[10] As the majority of abnormal returns are driven by the extreme VP portfolios (Xie 2004; Nam 2007), understanding the firm-specific characteristics in the top and bottom groups in VP portfolios contributes richer evidence to the literature.

provides the answer to the first question. The standard deviation across decile groups increases dramatically. The variance of the high VP portfolio (1.290) is approximately nine times that of the low VP portfolio (0.143). With regard to future returns, the highest VP portfolio evidences the highest variance in future returns. This result implies that investors must take the mean-variance criterion into account when they make decisions regarding investments.

There is, thus far, little literature investigating the manner in which the VP anomaly varies with the characteristics of a firm. Previous studies have focused on investigating whether the abnormal returns from VP strategy originate from behavior bias or returns for risky stocks. Considering that investors price securities as the present value of expected cash flow, if investors under-price a firm's value even if the firm's expected cash flow is high at the time of portfolio formation, then the stock is regarded as inefficiently priced. To determine whether investors do or do not incorporate a firm's historical information, I documented financial performances and analyst forecast characteristics at the time and in the three years after portfolio formation.

Table 5 reports the financial characteristics for each of the 10 VP portfolios[11]. Panel A presents the descriptions of financial characteristics divided by the market value of equity. As the market value of equity already reflects the effects of each financial performance, I additionally report the mean (median) value of financial characteristics divided by the total assets in Panel B. To begin, I note that the mean (median) sales increase almost monotonically across VP decile portfolios. Portfolio 10 has the largest sales (mean 2.62, median 1.45) whereas portfolio 1 has the lowest sales (mean 0.12, median 0.60). Besides, the largest mean sales in portfolio 10 is more than 20 times that of the lowest mean sales. Next, earnings as a percentage of market value is far higher for high VP

[11] I report the mean and median value of each financial variable, because there were some extreme values that heavily influenced the means.

portfolios than for low VP portfolios.

<INSERT TABLE 4 HERE>

However, core earnings and cash flow are the highest in the middle VP portfolios that are close to one. Additionally, total accruals and current accruals, as measured via the method of Desai *et al*. (2004), are much higher for the top portfolio. The most interesting finding in this regard is that the level of leverage is highest in the higher VP portfolios than in the lower VP portfolios. The results from financial variables scaled by total assets evidence a similar pattern, namely that firms in the top VP portfolios exhibit financial performance superior to that of firms in the bottom VP portfolios.

Table 6 reports the changes in financial performance over the next three years following the formation of VP portfolios[12]. The median (mean) change[13] in sales increases over the next three years, suggesting that the sales in year t+1, t+2, and t+3 as a percentage of market value improve incrementally as compared with the current value. Sales in the highest portfolio were 1.78 in year t+3 while sales in the highest portfolio exhibit a value of 1.57 in year t+1. However, other financial performance factors, including earnings, core earnings, and cash flow, show the highest values in the middle portfolios that are close to one, not the highest portfolio. This means that firms with high earnings, core earnings, and cash flow are generally more likely to converge with the market value. In other words, investors appear to construct their beliefs in a firm's fundamental value using historical financial performance.

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[12] Table 6 reports the results from financial performance divided by the market value of equity. I also estimated the change in financial performance using total assets as a scale factor in the unta-bulated table and the results were identical.

[13] To calculate change in each variable over the next one, two, and three years, I estimated each variable in year t+1, t+2, and t+3, respectively, scaled by the market value of equity in year t. I also used the market value of equity in year t as a scale factor to observe incremental changes in the financial variables, conditional on the current performance.

Panel C in Table 5 shows a different pattern. The standard deviation of the sales is significantly higher for both the extreme VP portfolios than for the middle portfolios. Variables other than leverage show a similar pattern, suggesting that the extreme portfolios are more likely to suffer from highly unpredictable performance. The results in Table 7 show the changes in standard deviation in financial performance during the three years after the formation of VP portfolios. In terms of future financial performance, the standard deviation change in sales over the next three years was highest in the two most extreme VP portfolios. Leverage, however, has an almost monotonic pattern over the next two years.

<INSERT TABLE 5 HERE>
<INSERT TABLE 6 HERE>
<INSERT TABLE 7 HERE>

4.3 Information Environment across VP Deciles

Even though a firm generates relatively attractive performance as compared with other competitive companies, the differences in information environments affect the investor decision process. Turning our attention to the information environment, I attempt to determine whether the extent of information environments varied with the VP decile portfolios. I employ nine variables identified in prior studies as proxies for the information environment.

Table 8 shows the average values of each information environment variable across ten VP portfolios at the time of VP portfolio formation, as well as the next one, two, and three years subsequent to VP portfolio formation. The number of analysts, the standard deviation of their forecasts, and the absolute value of forecast error measured as the difference between actual earnings in I/B/E/S database and analyst forecast manifest an interesting pattern across the VP portfolios. Firms in the bottom and top VP portfolios have the lowest analyst coverage, higher dispersion, and greater forecast error. As my sample is restricted by the existence of analyst forecast, the difference in analyst coverage between the top and bottom portfolio is not large. The forecast error in the top and bottom portfolio has the highest values, at 0.032 and 0.071, respectively, whereas firms in the middle portfolio show the lowest value, at 0.017.

In addition, firms in the top and bottom portfolio are younger firms, have higher volatile returns-on-assets, have higher volatile cash flow and returns, and also exhibit higher turnover. The number of zero return frequency, however, shows an almost monotonic pattern with the VP ratio level. The results shown in Panels B, C, and D indicate similar patterns. Considered as a whole, deciles 1 and 10 are the most extreme, which is consistent with the idea that these are in fact the most neglected, highest transaction cost stocks in my sample. This finding supports my prediction that good information environment results in convergence with the stock price.

4.4 Regression Results

Jiang *et al*. (2005) has suggested that firms with high information uncertainty exhibit characteristics different from those with low information uncertainty. In order to evaluate the effects of information environment variables after controlling for the risk factors identified in previous studies, I conduct a future return regression via sub-sample on the basis of the level of information environment. Specifically, I utilize the following model for estimation[14].

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[14] I use ranked variables rather than continuous variables in Equation (3) to delete the effects of the extreme values. Following the example of Bernard and Thomas (1990), I initially assign a decile-based rank to each variable from one to ten. I then transform this rank by subtracting one and dividing by nine. Finally, I subtract 0.5 from each of these transformed ranks, such that the decile ranks ranged from -0.5 to 0.5.

$$Sret_{36} = \alpha_0 + \alpha_1 VP^{dec} + \alpha_2 BP^{dec} + \alpha_3 ME^{dec} + \alpha_4 Beta^{dec} + \alpha_5 Ltg^{dec} + \alpha_6 ALT^{dec} + \alpha_7 DM^{dec} + \alpha_8 year\ dummies + \varepsilon \quad (1)$$

In Equation (1), I use the three years size-adjusted buy-and-hold return as a dependent variable because the VP anomaly is greater three years after portfolio formation. For explanatory variables, I employ Ali *et al*.(2003)'s paper, which investigates the effects of risk factors on the VP anomaly. Equation (1) is estimated via pooled regression with year dummies.

Table 9 presents the regression results for firms with good and poor information environments, respectively. I define a firm as having good information uncertainty when the firm has the greater than the half value. Panel A shows that the coefficient on VP is significantly positive and is substantially higher than that of BP. Furthermore, the results of BP in both Panels A and B are interesting. The BP effect is insignificant for firms with less volatile performance, older firms, and good analyst forecast characteristics, whereas the BP effect in poor information environments is significant. The evidence is consistent with the findings of Ali *et al*. (2003). By way of contrast, the magnitude of VP in poor information environments becomes lower than that of VP in good information environments. For example, the coefficient of VP under low turnover conditions is 0.260, whereas VP under high turnover conditions is 0.073. For sub-sample related to the analyst forecast characteristics, the firms in poor information environments earn relatively lower future returns than those in good information environments. The magnitude of the VP effect in good information environments is approximately two-fold.

<INSERT TABLE 9 HERE>

<INSERT TABLE 10 HERE>

Table 10 confirms the previous results. I add the interaction term in Equation (1) to observe the incremental effect of the information environment. Information environment variables are dummy variables. I rank each variable into ten groups based on the level of information environment. Each variable is set to 1 when the value is higher than 5, and 0 otherwise. Therefore, the VP effect in good information environments is indicative of the coefficient of VP, whereas the VP effect in poor information environments is the sum of the intercept and the coefficient of VP*IE. Consistent with the results of Table 9, the incremental effect of poor information environments on the VP anomaly is significantly negative, thus suggesting that the VP effect is reduced in poor information environments.

Although the results are not uniformly consistent over all the proxies, the basic message from the regression analysis is that the abnormal future return of a trading strategy based on the VP ratio declines significantly if we restrict our attention to firms that have poor information environments. The regression results appear inconsistent with the market-mispricing explanation of the anomaly. That is, arbitrage or transaction costs inhibit the process of convergence to the fundamental value, and result in greater subsequent abnormal returns when these costs are high. However, my findings indicate that the VP anomaly requires a different approach. As the VP anomaly is an undervaluation anomaly, such an explanation does not work because investors can recognize undervalued stock in good information environments, as was previously asserted by Brav and Heaton (2006).

5. Sensitivity Tests

Since the sample of this paper is restricted to analyst forecast data, the firm characteristics in this paper are systematically different from what would be seen in an unrestricted sample. Generally, financial analysts are less willing to follow poor performing, low volume, and small firms (Hayes 1998; McNichols and O'Brien 1997). In addition, Hong *et al*. (2000) has stated that analyst coverage alters the information environment. In order to address the endogeneity problem that may be caused by a forecast-based approach, I employ Heckman two-stage analysis. In the first stage, I estimate a probit analyst coverage model, and compute inverse Mills ratios. In the second stage, I then re-estimate Equation (1) after adding the ratio to the equation. Given that we do not have sufficient well-defined evidence to guide us in the selection of explanatory variables for the probit analyst coverage model, I simply perform the regression as explained by Rajan and Servaes (1997):

$$VP_{dummy} = \alpha_0 + \alpha_1 ME + \alpha_2 BP + \alpha_3 Industry + \varepsilon$$

The untabulated results are practically identical to those in Tables 10 and 11. The inverse Mills ratio is statistically insignificant, thus suggesting that the endogeneity problem is not severe in the results. These findings consistently suggest that the VP effect is significantly greater for firms with good information environments than for firms with poor information environments.

6. Conclusions

By estimating the associations between VP ratio and firm-specific characteristics, security market characteristics, and information environment over three years after portfolio formation, this paper attempts to identify the possible variables that affect the VP anomaly. This paper further investigates the reasons why investors fail to react appropriately to firms with good performance. The conventional wisdom holds that investors prefer portfolios with high expected return and low risk, and this must be taken into consideration. Although a firm’s performance may be superior to that of other firms, investors are generally unwilling to invest in cases in which the stock has volatile performance, because the probability of realizing the expected return tends to be rather low.

Consistent with this prediction, I find that the standard deviation of firm performance is greater for firms with high VP portfolio than for firms with low VP portfolio. I also find that firms with high VP ratio are generally associated with good financial performance, high stock volatility, and poor information environments. With regard to information environments, firms in the bottom and top VP portfolios have poor information environments, whereas firms in the middle VP portfolio evidence good information environments. These patterns are consistently exhibited over the next one, two, and three years subsequent to VP portfolio formation. The regression results confirm that the VP effect is greater for firms with good information environment than for firms with poor information environment after controlling for several risk variables.

The findings of this paper provide evidence that the information environment is related closely to the magnitude of the VP anomaly. Furthermore, these results augment our current understanding of the VP anomaly by highlighting the critical role of the information environment in improving the profitability of a firm’s VP strategy. As financial accounting research continues to explore the nature of accounting-based market inefficiencies, investigating the process of a firm’s fundamental value formation contributes significantly to our understanding of the underlying causes of market mispricing.

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TABLE 1

Summary Statistics by Year

Year	No. Firm	ME	k	ROE	B	VP
1976	382	1,244	0.34	0.15	22.59	1.47
1977	309	1,220	0.33	0.16	24.75	1.71
1978	552	870	0.34	0.16	23.78	1.65
1979	693	822	0.31	0.18	23.74	1.76
1980	735	787	0.32	0.18	23.97	1.88
1981	849	913	0.33	0.17	23.53	1.61
1982	965	648	0.32	0.16	22.62	1.86
1983	1,038	1,028	0.33	0.13	20.86	1.12
1984	1,257	712	0.28	0.12	18.45	1.46
1985	1,254	941	0.26	0.14	17.45	1.16
1986	1,276	1,256	0.26	0.12	17.22	0.90
1987	1,310	1,251	0.24	0.11	15.87	0.88
1988	1,320	1,140	0.22	0.12	14.10	1.06
1989	1,462	1,406	0.22	0.15	14.96	1.06
1990	1,510	1,368	0.23	0.14	14.64	1.05
1991	1,507	1,488	0.24	0.13	14.17	1.01
1992	1,546	1,619	0.24	0.10	13.73	0.95
1993	1,716	1,595	0.20	0.10	12.13	0.84
1994	1,976	1,402	0.18	0.11	11.41	0.94
1995	2,350	1,607	0.18	0.12	11.61	0.85
1996	2,534	1,879	0.16	0.12	11.72	0.79
1997	2,682	2,269	0.15	0.10	11.65	0.75
1998	2,811	2,543	0.14	0.09	10.99	0.72
1999	2,573	2,949	0.14	0.09	10.84	0.77
2000	2,335	3,424	0.14	0.10	10.76	0.89
2001	2,113	3,607	0.15	0.10	11.43	0.73
All years	39,055	1,820	0.21	0.12	14.33	0.99

To compute a firm's fundamental value (V), I require firms to have non-negative book value, greater than 1$ stock value and non-financial firm. The samples without one-year ahead and two-year ahead forecasts are deleted from the merged sample. I further constrain my sample to firms with fiscal-year-ends between June and December, inclusively. From these procedures, 39,055 firm-year observations are included in this study. To control for the effects of the outliers, observations that fall below the bottom 0.5 percent or above the top 0.5 percent of the distribution of each variable are winsorized. ME is the market value of equity in millions of dollars at the end of June of year t. k is the dividend payout ratio, measured by common stock dividends divided by earnings to common shareholders. For firms with negative earnings, k is computed as common stock dividends divided by (total assets*0.06). ROE is the return on equity for year t-1 computed as net income in year t-1 divided by average book equity. B is the book value of equity in year t-1 divided by the common share outstanding. BP is the book value of equity in year t-1 divided by market value of equity at the end of June of year t. VP is the fundamental value derived using I/B/E/S consensus analyst predictions of future earnings available prior to June of year t divided by the stock price at the end of year t.

TABLE 2

Descriptive Statistics

Variable	Mean	Std. Dev	Min	Q1	Median	Q3	Max
VP	0.994	0.816	0.000	0.519	0.799	1.205	5.952
BP	0.630	0.470	0.035	0.318	0.525	0.806	3.338
ME	1,820	6,126	9.475	104.72	320.04	1,066	64,435
k	0.208	0.245	0.000	0.000	0.123	0.354	1.000
SALE	1.135	0.900	0.000	0.497	1.045	1.520	20.480
E	0.135	0.141	-0.654	0.063	0.115	0.188	0.853
CE	0.193	0.176	-0.463	0.091	0.158	0.254	1.204
TA	-0.039	0.204	-1.365	-0.083	-0.024	0.013	1.031
CA	0.024	0.235	-1.326	-0.015	0.010	0.053	1.482
CFO	0.166	0.245	-0.906	0.052	0.128	0.241	1.666
LEV	0.629	1.189	0.000	0.051	0.245	0.680	10.118
RND	0.047	0.064	0.000	0.009	0.026	0.058	0.538
Beta	1.021	0.755	-0.897	0.529	0.946	1.389	4.232
LTG	0.177	0.310	-2.121	0.105	0.150	0.217	2.276
COV	8.354	7.527	1.000	3.000	6.000	12.000	50.000
DISP	0.154	0.466	0.000	0.023	0.047	0.107	5.000
AFE	0.029	0.089	0.000	0.001	0.005	0.019	0.891
IRISK	0.029	0.016	0.008	0.017	0.025	0.037	0.095
AGE	16.760	16.003	0.000	5.000	12.000	23.000	76.000
SCFO	0.076	0.071	0.004	0.032	0.056	0.094	0.518
SROA	0.035	0.051	0.000	0.007	0.019	0.041	0.450
TURN	0.269	0.346	0.004	0.074	0.164	0.330	2.846
ZFR	18.469	11.891	0.397	9.486	16.601	25.397	63.241
SRet12	0.021	0.519	-1.000	-0.235	-0.033	0.191	24.540
SRet24	0.044	0.765	-1.000	-0.335	-0.060	0.248	39.685
SRet36	0.038	0.735	-0.988	-0.406	-0.079	0.287	4.813

This table presents descriptive statistics for each variable. VP is the fundamental value derived using I/B/E/S consensus analyst predictions of future earnings available prior to June of year t divided by the stock price at the end of year t. BP is the book value of equity in year t-1 divided by the market value of equity at the end of June of year t. ME is the market value of equity in millions of dollars at the end of June of year t. k is the dividend payout ratio, measured by common stock dividends divided by earnings to common shareholders. For firms with negative earnings, k is computed as common stock dividends divided by (total assets*0.06). SALE is the sale in year t-1 divided by the market value of equity at the end of June of year t. E is the operating income after depreciation in year t-1 divided by the market value of equity at the end of June of year t. CE is the operating income before depreciation in year t-1 divided by the market value of equity at the end of June of year t. TA is the total accruals in year t-1 divided by the market value of equity at the end of June of year t. The total accruals are measured by the change in non-cash current assets minus the change in current liabilities excluding the current portion of long term debt and income taxes less depreciation and amortization expense. If income taxes are missing, income taxes are set to zero. CA is the current accruals in year t divided by the market value of equity at the end of June of year t. The current accruals are measured by the change in non-cash current assets minus the change in current liabilities excluding the current portion of long term debt and income taxes. If income taxes are missing, income taxes are set to zero. CFO is the cash flow from operations in year t-1 divided by the market value of equity at the end of June of year t. The cash flows from operations are measured by the operating income after depreciation in year t-1 minus the total accruals (TA). LEV is the leverage, measured by the sum of long-term debt and debt in current liabilities divided by the market value of equity at the end of June of year t. RND is the R&D intensity, measured by the R&D expenditure divided by the market value of equity at the end of June of year t. Beta is the systematic risk estimated using monthly returns over a maximum of 36 months beginning in July of year t. LTG is the long-term growth in earnings estimate in percentage forecasted in May of year t. COV is the number of analysts one-year-ahead estimates estimated included in the I/B/E/S database in May of year t. DISP is the dispersion estimated using the standard deviation in one-year-ahead analysts' consensus earnings forecasts divided by the absolute value of one-year-ahead analysts' consensus earnings forecasts in May of year t. AFE is the absolute value of analysts' forecast error in year t. the forecast error is measured as I/B/E/S actual earnings minus earnings forecast scaled by the prior year-end stock price, where the earnings forecast is made in May of year t. IRISK is the standard deviation of residuals from a market model regression estimated using daily returns over a one-year period ending in June of year t. AGE is the number of years listed on CRSP tape in year t. SCFO is the cash flow volatility, measured by the standard deviation of cash flow from operations in the past 5 years (with a minimum of 3 years), where cash flow from operation is the operating income after depreciation in year t-1 minus the total accruals scaled by average total assets. SROA is the return-on-assets volatility, measured by the standard deviation of return-on-assets in the prior five years. TURN is the average daily turnover in percentage over the past one year, where the daily turnover is the ratio of the number of shares to the number of shares outstanding each day. ZFR is the frequency of zero daily returns over year t. Sret12, Sret24, and Sret36 are the size-adjusted one-year, two-year, and three-year buy-and-hold returns beginning in July of year t, defined as raw buy-and-hold return minus the corresponding NYSE-AMEX size-decile index returns, respectively.

TABLE 3
Future Return of Portfolios formed by VP

Panel A: Firm Characteristics and Future Return by Quintile

Variables	Q1 (Low VP)	Q2	Q3	Q4	Q5 (High VP)	All firms	Q5-Q1
VP	0.328	0.634	0.848	1.114	2.069	0.998	1.740 ***
BP	0.519	0.550	0.631	0.702	0.755	0.631	0.236 ***
ME	2,122	1,912	1,936	1,611	1,523	1,821	598 ***
Beta	1.219	1.017	0.953	0.893	1.036	1.023	0.183 ***
Ret12	0.130	0.140	0.159	0.175	0.183	0.158	0.053 ***
Ret24	0.241	0.274	0.326	0.331	0.403	0.315	0.162 ***
Ret36	0.353	0.416	0.491	0.501	0.653	0.483	0.299 ***
SRet12	0.003	0.010	0.023	0.032	0.036	0.021	0.033 ***
SRet24	0.001	0.025	0.049	0.045	0.099	0.044	0.098 ***
SRet36	-0.028	0.018	0.045	0.039	0.112	0.037	0.140 ***

Panel B: Firm Characteristics and Future Return by Decile

Variables	D1 (Low VP)	D2	D3	D4	D5	D6	D7	D8	D9	D10 (High VP)	All firms	D10-D1
VP	0.212	0.444	0.579	0.688	0.792	0.904	1.030	1.198	1.483	2.656	0.998	2.444 ***
BP	0.517	0.521	0.539	0.560	0.607	0.654	0.685	0.719	0.725	0.786	0.631	0.269 ***
ME	2,138	2,107	1,898	1,926	2,023	1,850	1,807	1,415	1,565	1,482	1,821	656 ***
Beta	1.276	1.160	1.054	0.980	0.971	0.935	0.885	0.901	0.956	1.116	1.023	0.161 ***
Ret12	0.123	0.137	0.131	0.150	0.153	0.166	0.171	0.178	0.172	0.195	0.158	0.072 ***

Ret24	0.225	0.257	0.261	0.288	0.316	0.336	0.312	0.349	0.364	0.442	0.315	0.217 ***
Ret36	0.353	0.353	0.403	0.429	0.480	0.501	0.486	0.516	0.579	0.727	0.483	0.374 ***
SRet12	-0.002	0.008	0.001	0.019	0.020	0.026	0.027	0.037	0.026	0.047	0.021	0.049 ***
SRet24	-0.015	0.017	0.017	0.034	0.044	0.055	0.030	0.059	0.063	0.135	0.044	0.150 ***
SRet36	-0.043	-0.012	0.010	0.026	0.040	0.050	0.024	0.055	0.069	0.156	0.037	0.199 ***

This table presents the characteristics of quintile (decile) portfolios formed at the end of June each year by analyst-based fundamental value to price (VP). Each panel reports mean values for individual quintile characteristics. t-statistics are calculated using the Newey and West (1987) procedure. Newey-West t-statistics are used to adjust for serial correlation in portfolio returns (size-adjusted) over two and three years induced by overlapping holding periods. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed). VP is the fundamental value derived using I/B/E/S consensus analyst predictions of future earnings available prior to June of year t divided by the stock price at the end of year t. BP is the book value of equity in year t-1 divided by market value of equity at the end of June of year t. ME is the market value of equity in millions of dollars at the end of June of year t. k is the dividend payout ratio, measured by common stock dividends divided by earnings to common shareholders. For firms with negative earnings, k is computed as the common stock dividends divided by (total assets*0.06). Beta is the systematic risk estimated using monthly returns over a maximum of 36 months beginning July of year t. Ret12, Ret24, and Ret36 are the one-year, two-year, and three-year buy-and-hold return, respectively, beginning July of year t. Sret12, Sret24, and Sret36 are the size-adjusted one-year, two-year, and three-year buy-and-hold returns beginning in July of year t, defined as raw buy-and-hold return less the corresponding NYSE-AMEX size-decile index returns, respectively. For delisting returns, I apply the following method when the stock returns are estimated; the stock return replaces delisting returns when the return is missing and code zero when the stock returns represent ‘B’

TABLE 4
The Standard Deviation of VP Portfolios

Variables	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All Firms	D10-D1 F-value
VP	0.143	0.175	0.206	0.239	0.269	0.295	0.322	0.372	0.468	1.290	0.816	79.86***
BP	1.393	1.484	1.099	1.320	1.949	1.551	1.772	2.402	3.662	11.260	4.137	1.68***
Beta	0.886	0.816	0.744	0.682	0.698	0.664	0.690	0.708	0.735	0.807	0.755	1.20***
Ret12	0.653	0.601	0.560	0.503	0.467	0.507	0.594	0.658	0.562	0.748	0.591	1.31***
Ret24	1.132	0.922	0.852	0.870	0.830	0.770	0.715	0.802	0.898	1.503	0.956	1.76***
Ret36	1.690	1.019	1.072	0.988	1.058	1.132	1.331	1.070	1.542	2.074	1.346	1.51***
SRet12	0.536	0.521	0.490	0.439	0.423	0.433	0.514	0.631	0.484	0.661	0.519	1.52***
SRet24	0.820	0.733	0.730	0.709	0.647	0.616	0.599	0.643	0.706	1.240	0.765	2.29***
SRet36	0.734	0.697	0.701	0.677	0.677	0.665	0.649	0.702	0.784	0.987	0.735	1.81***

This table presents the standard deviation of decile portfolios formed at the end of June each year by analyst-based fundamental value to price (VP). Each panel reports mean values for individual decile characteristics. F-values are calculated to compare the difference in variance of the two extreme portfolios. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed).
VP is the fundamental value derived using I/B/E/S consensus analyst predictions of future earnings available prior to June of year t divided by the stock price at the end of year t. BP is the book value of equity in year t-1 divided by the market value of equity at the end of June of year t. Beta is the systematic risk estimated using monthly return over a maximum of 36 months beginning July of year t. Ret12, Ret24, and Ret36 are the one-year, two-year, and three-year buy-and-hold return, respectively, beginning July of year t. Sret12, Sret24, and Sret36 are the size-adjusted one-year, two-year, and three-year buy-and-hold returns beginning in July of year t, defined as raw buy-and-hold return less the corresponding NYSE-AMEX size-decile index return, respectively. For delisting returns, I apply the following method when the stock returns were estimated; the stock return replaces delisting returns when the return is missing and code zero when the stock return represents ‘B’

TABLE 5
Current Characteristics of Firms in VP

Panel A: Financial characteristics divided by market value of equity at time of VP portfolio formation

VP Portfolio	Mean VP	SALE/M		E/M		CE/M		CFO/M		TA/M		CA/M		LEV/M		RND/M	
		Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Medi an	Mean
1	0.21	0.60	0.12	0.05	0.06	0.09	0.11	0.07	0.11	-0.02	-0.06	0.00	0.00	0.14	0.50	0.02	0.05
2	0.44	0.69	1.23	0.07	0.09	0.11	0.14	0.09	0.13	-0.02	-0.05	0.01	0.01	0.15	0.49	0.03	0.04
3	0.58	0.77	1.27	0.09	0.11	0.13	0.16	0.11	0.13	-0.02	-0.03	0.01	0.02	0.18	0.49	0.02	0.04
4	0.69	0.83	1.30	0.10	0.12	0.14	0.17	0.12	0.15	-0.03	-0.03	0.01	0.02	0.21	0.55	0.02	0.04
5	0.79	0.94	1.54	0.12	0.14	0.16	0.19	0.13	0.17	-0.03	-0.04	0.01	0.02	0.25	0.64	0.03	0.04
6	0.90	1.09	1.65	0.13	0.15	0.18	0.21	0.15	0.18	-0.03	-0.04	0.01	0.02	0.29	0.66	0.03	0.04
7	1.03	1.15	1.70	0.14	0.16	0.19	0.23	0.17	0.19	-0.03	-0.04	0.01	0.03	0.36	0.73	0.03	0.04
8	1.19	1.26	1.92	0.15	0.17	0.21	0.24	0.18	0.21	-0.04	-0.04	0.02	0.03	0.36	0.74	0.03	0.05
9	1.47	1.33	2.12	0.15	0.18	0.19	0.24	0.16	0.21	-0.02	-0.04	0.02	0.03	0.29	0.71	0.03	0.05
10	2.64	1.45	2.62	0.14	0.17	0.19	0.25	0.14	0.19	-0.01	-0.02	0.03	0.06	0.28	0.76	0.04	0.06
Total	0.99		1.13		0.13		0.19		0.17		-0.04		0.02		0.63		0.05

TABLE 5 (Continued)

Panel B: Financial characteristics divided by total asset at time of VP portfolio formation

VP Portfolio	Mean VP	SALE/A		E/A		CE/A		CFO/A		TA/A		CA/A		LEV/A		RND/A	
		Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
1	0.21	0.88	0.97	0.06	0.06	0.11	0.10	0.11	0.09	-0.04	-0.04	0.01	0.01	0.17	0.21	0.06	0.09
2	0.44	0.99	1.07	0.09	0.10	0.14	0.14	0.13	0.13	-0.03	-0.03	0.01	0.02	0.17	0.21	0.05	0.07
3	0.58	1.03	1.10	0.10	0.10	0.15	0.15	0.14	0.13	-0.03	-0.03	0.01	0.02	0.18	0.21	0.04	0.06
4	0.69	1.04	1.09	0.10	0.11	0.15	0.15	0.14	0.14	-0.03	-0.02	0.01	0.02	0.17	0.21	0.03	0.06
5	0.79	1.04	1.10	0.10	0.11	0.14	0.15	0.13	0.13	-0.03	-0.02	0.01	0.02	0.19	0.22	0.03	0.06
6	0.90	1.05	1.13	0.10	0.10	0.14	0.15	0.13	0.13	-0.03	-0.02	0.01	0.02	0.21	0.23	0.03	0.06
7	1.03	1.00	1.10	0.10	0.11	0.14	0.15	0.14	0.13	-0.03	-0.02	0.01	0.02	0.24	0.25	0.03	0.05
8	1.19	1.04	1.15	0.10	0.11	0.15	0.15	0.14	0.14	-0.03	-0.02	0.01	0.02	0.26	0.26	0.03	0.06
9	1.47	1.16	1.27	0.11	0.12	0.16	0.17	0.14	0.14	-0.02	-0.01	0.02	0.03	0.23	0.25	0.03	0.06
10	2.64	1.21	1.37	0.11	0.11	0.16	0.16	0.13	0.11	-0.01	0.00	0.03	0.05	0.23	0.26	0.04	0.07
Total	0.99		1.13		0.10		0.14		0.13		-0.02		0.02		0.23		0.06

Panel C: The standard deviation of each variable at time of VP portfolio formation

VP Portfolio	VP	SALE	E	CE	CFO	TA	CA	LEV	RND
1	0.143	2.110	0.159	0.195	0.429	0.423	0.386	1.382	0.084
2	0.175	2.009	0.161	0.210	0.588	0.626	0.614	1.714	0.058

3	0.206	1.768	0.113	0.165	0.333	0.317	0.280	1.140	0.059
4	0.239	1.754	0.134	0.158	0.308	0.289	0.269	1.497	0.098
5	0.269	2.428	0.176	0.190	0.271	0.209	0.193	1.328	0.057
6	0.295	2.026	0.130	0.162	0.378	0.378	0.376	1.362	0.057
7	0.322	1.883	0.173	0.198	0.395	0.375	0.370	1.731	0.060
8	0.372	2.347	0.228	0.260	0.347	0.256	0.245	2.212	0.072
9	0.468	2.810	0.196	0.232	0.369	0.357	0.339	1.768	0.082
10	1.290	4.656	0.259	0.310	0.531	0.472	0.454	2.266	0.084

This table presents the mean (median) value of each variable at time of VP portfolios formation. In Panel A, financial characteristics variables (SALE, E, CE, CFO, TA, CA, LEV, RND) are deflated by the market value of equity. In Panel B, financial characteristics variables (SALE, E, CE, CFO, TA, CA, LEV, RND) are deflated by the total assets. Panel C reports the standard deviation of each variable across VP deciles portfolios. Observations that fall below the bottom 0.5 percent or above the top 0.5 percent of the distribution of each variable are winsorized. SALE is the sale in year t-1 divided by the market value of equity at the end of June of year t. E is the operating income after depreciation in year t-1 divided by the market value of equity at the end of June of year t. CE is the operating income before depreciation in year t-1 divided by the market value of equity at the end of June of year t. TA is the total accruals in year t-1 divided by the market value of equity at the end of June of year t. The total accruals are measured by the change in non-cash current assets minus the change in current liabilities excluding the current portion of long term debt and income taxes less depreciation and amortization expenses. If income taxes are missing, income taxes are set to zero. CA is the current accruals in year t divided by the market value of equity at the end of June of year t. The current accruals are measured by the change in non-cash current assets minus the change in current liabilities excluding the current portion of long term debt and income taxes. If income taxes are missing, income taxes are set to zero. CFO is the cash flows from operations in year t-1 divided by the market value of equity at the end of June of year t. The cash flows from operations are measured by the operating income after depreciation in year t-1 minus the total accruals (TA). LEV is the leverage, measured by the sum of long-term debt and debt in current liabilities divided by the market value of equity at the end of June of year t. RND is the R&D intensity, measured by the R&D expenditure divided by the market value of equity at the end of June of year t. Beta is the systematic risk estimated using monthly returns over a maximum of 36 months beginning July of year t.

TABLE 6
Future Characteristics over Three Years Subsequent to VP portfolio Formation

Panel A: Financial characteristics in year t+1 subsequent to VP formation

VP Portfolio	SALE		E		CE		CFO		TA		CA		LEV		RND	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
1	0.696	1.310	0.068	0.068	0.110	0.130	0.087	0.118	-0.026	-0.064	0.004	0.002	0.170	0.580	0.027	0.053
2	0.789	1.330	0.084	0.097	0.126	0.156	0.103	0.148	-0.026	-0.062	0.008	0.001	0.186	0.570	0.030	0.048
3	0.867	1.358	0.100	0.111	0.142	0.168	0.118	0.149	-0.026	-0.052	0.009	0.011	0.215	0.562	0.027	0.047
4	0.936	1.444	0.116	0.133	0.160	0.186	0.131	0.153	-0.029	-0.040	0.009	0.023	0.241	0.655	0.027	0.046
5	1.069	1.684	0.126	0.146	0.176	0.206	0.150	0.184	-0.036	-0.055	0.010	0.016	0.307	0.741	0.030	0.048
6	1.225	1.813	0.135	0.152	0.190	0.217	0.161	0.194	-0.040	-0.058	0.010	0.013	0.336	0.746	0.033	0.053
7	1.275	1.866	0.147	0.168	0.209	0.238	0.183	0.213	-0.047	-0.059	0.009	0.017	0.412	0.879	0.032	0.051
8	1.391	2.093	0.155	0.178	0.219	0.255	0.195	0.234	-0.051	-0.067	0.010	0.015	0.429	0.899	0.033	0.057
9	1.520	2.332	0.150	0.169	0.204	0.249	0.177	0.234	-0.041	-0.073	0.012	0.011	0.361	0.862	0.034	0.057
10	1.578	2.804	0.129	0.139	0.184	0.230	0.154	0.220	-0.035	-0.085	0.015	0.008	0.347	0.903	0.042	0.066

Panel B: Financial characteristics in year t+2 subsequent to VP formation

VP Portfolio	SALE		E		CE		CFO		TA		CA		LEV		RND	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
1	0.820	1.439	0.084	0.091	0.131	0.159	0.102	0.139	-0.030	-0.063	0.005	0.008	0.198	0.643	0.031	0.056
2	0.886	1.439	0.098	0.116	0.143	0.180	0.119	0.178	-0.032	-0.075	0.006	-0.005	0.215	0.605	0.035	0.053
3	0.955	1.472	0.110	0.126	0.156	0.187	0.133	0.166	-0.035	-0.055	0.006	0.013	0.240	0.633	0.031	0.052
4	1.067	1.601	0.126	0.148	0.177	0.207	0.145	0.181	-0.037	-0.053	0.008	0.015	0.277	0.736	0.031	0.049
5	1.211	1.840	0.137	0.161	0.193	0.227	0.163	0.192	-0.044	-0.053	0.007	0.023	0.349	0.843	0.033	0.052
6	1.377	1.959	0.144	0.166	0.206	0.236	0.175	0.208	-0.052	-0.060	0.007	0.019	0.377	0.822	0.036	0.054

7	1.391	2.010	0.158	0.182	0.225	0.260	0.204	0.240	-0.057	-0.075	0.006	0.009	0.458	0.977	0.034	0.053
8	1.504	2.262	0.165	0.192	0.236	0.276	0.213	0.261	-0.061	-0.083	0.008	0.005	0.484	1.001	0.036	0.059
9	1.623	2.476	0.155	0.184	0.222	0.273	0.196	0.254	-0.054	-0.080	0.007	0.013	0.396	0.948	0.037	0.062
10	1.662	2.851	0.133	0.155	0.196	0.248	0.176	0.252	-0.053	-0.105	0.006	-0.009	0.370	0.904	0.046	0.069

Panel C: Financial characteristics in year t+3 subsequent to VP formation

VP Portfolio	SALE		E		CE		CFO		TA		CA		LEV		RND	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
1	0.926	1.580	0.092	0.110	0.147	0.184	0.120	0.151	-0.036	-0.059	0.003	0.020	0.230	0.729	0.033	0.063
2	0.987	1.576	0.106	0.135	0.154	0.204	0.133	0.161	-0.040	-0.041	0.003	0.033	0.234	0.688	0.039	0.058
3	1.043	1.590	0.119	0.140	0.170	0.205	0.147	0.187	-0.042	-0.063	0.005	0.011	0.259	0.679	0.032	0.055
4	1.162	1.742	0.135	0.165	0.191	0.231	0.160	0.198	-0.042	-0.056	0.006	0.017	0.301	0.820	0.033	0.053
5	1.325	2.009	0.149	0.182	0.212	0.254	0.180	0.231	-0.052	-0.074	0.006	0.009	0.385	0.957	0.034	0.055
6	1.495	2.108	0.155	0.181	0.221	0.260	0.193	0.225	-0.056	-0.067	0.005	0.015	0.411	0.926	0.036	0.059
7	1.513	2.171	0.166	0.198	0.241	0.283	0.218	0.276	-0.065	-0.100	0.004	-0.007	0.513	1.088	0.038	0.059
8	1.614	2.440	0.179	0.212	0.256	0.303	0.231	0.275	-0.069	-0.081	0.006	0.014	0.527	1.110	0.039	0.065
9	1.738	2.678	0.168	0.212	0.240	0.308	0.213	0.290	-0.062	-0.090	0.005	0.011	0.440	1.056	0.042	0.067
10	1.780	3.093	0.152	0.197	0.217	0.294	0.192	0.272	-0.055	-0.085	0.009	0.021	0.386	0.979	0.050	0.076

This table presents the mean (median) value of each variable during three years after portfolios formation. To calculate change in each variable over the next one, two, and three years, I estimate each variable in year t+1, t+2, and t+3, respectively, scaled by the market value of equity in year t I use the market value of equity in year t as scale factor to see incremental change of financial variables conditional on the current performance. See Table2 for details of the measurement of the variables. Observations that fall below the bottom 0.5 percent or above the top 0.5 percent of the distribution of each variable are winsorized.

TABLE 7

The Standard deviation of future characteristics in VP portfolios

Panel A: The standard deviation of each variable in year +1 subsequent to VP formation

VP Portfolio	SALE	E	CE	CFO	TA	CA	LEV	RND	LTG
1	2.096	0.196	0.223	0.515	0.505	0.480	1.486	0.082	14.707
2	1.946	0.172	0.207	0.848	0.837	0.830	1.767	0.059	11.512
3	1.640	0.146	0.158	0.307	0.294	0.295	1.225	0.064	10.662
4	1.903	0.155	0.164	0.466	0.497	0.479	1.585	0.093	10.254
5	2.299	0.176	0.190	0.354	0.339	0.321	1.457	0.057	9.468
6	2.152	0.161	0.179	0.346	0.306	0.324	1.392	0.084	9.972
7	2.026	0.204	0.221	0.431	0.388	0.378	2.019	0.069	9.915
8	2.473	0.257	0.284	0.419	0.325	0.316	2.452	0.075	10.007
9	2.969	0.215	0.252	0.410	0.353	0.329	2.001	0.089	11.160
10	4.713	0.281	0.321	0.712	0.715	0.686	2.204	0.084	13.336

Panel B: The standard deviation of each variable in year +2 subsequent to VP formation

VP Portfolio	SALE	E	CE	CFO	TA	CA	LEV	RND	LTG
1	2.159	0.207	0.243	0.580	0.582	0.562	1.612	0.079	13.135
2	2.029	0.184	0.231	0.834	0.772	0.766	1.443	0.065	12.545
3	1.685	0.165	0.196	0.314	0.277	0.257	1.327	0.072	10.627
4	2.043	0.171	0.202	0.267	0.231	0.218	1.709	0.083	9.692
5	2.492	0.192	0.212	0.359	0.361	0.357	1.625	0.061	9.325
6	2.143	0.179	0.200	0.531	0.531	0.531	1.561	0.063	9.674
7	2.091	0.237	0.260	0.629	0.590	0.590	2.356	0.063	9.873

8	2.610	0.295	0.323	0.490	0.371	0.366	2.790	0.071	9.698
9	3.063	0.252	0.286	0.416	0.370	0.348	2.240	0.088	10.323
10	3.864	0.304	0.334	0.564	0.518	0.492	2.110	0.078	13.093

Panel C: The standard deviation of each variable in year +3 subsequent to VP formation

VP Portfolio	SALE	E	CE	CFO	TA	CA	LEV	RND	LTG
1	2.432	0.241	0.269	0.755	0.752	0.739	2.016	0.098	13.135
2	2.306	0.221	0.275	1.526	1.556	1.549	2.060	0.071	12.545
3	1.807	0.200	0.214	0.341	0.306	0.326	1.400	0.071	10.627
4	2.239	0.202	0.229	0.556	0.542	0.549	1.903	0.065	9.692
5	2.744	0.210	0.235	0.450	0.419	0.408	1.911	0.066	9.325
6	2.236	0.212	0.234	0.386	0.379	0.382	1.923	0.080	9.674
7	2.340	0.280	0.305	0.607	0.508	0.518	2.656	0.073	9.873
8	2.858	0.336	0.366	0.418	0.277	0.268	3.163	0.080	9.698
9	3.335	0.304	0.344	0.455	0.360	0.342	2.590	0.099	10.323
10	4.518	0.347	0.394	0.612	0.526	0.535	2.387	0.094	13.093

This table presents the standard deviation of each variable during the three years after portfolio formation. See Table 2 for details of the measurement of the variables. Financial characteristics variables (SALE, E, CE, CFO, TA, CA, LEV, RND) are deflated by the market value of equity. Observations that fall below the bottom 0.5 percent or above the top 0.5 percent of the distribution of each variable are winsorized.

TABLE 8
Current and Future Information Environment of Firms in VP

Panel A: Information environment at time of VP portfolio formation

VP Portfolio	COV	DISP	FE	AGE	SROA	SCFO	IRISK	TURN	ZFR
1	8.143	0.348	0.032	14.617	0.049	0.084	0.034	0.371	17.683
2	8.401	0.214	0.024	15.230	0.038	0.078	0.030	0.279	17.686
3	8.465	0.163	0.021	16.490	0.032	0.073	0.028	0.248	17.878
4	8.558	0.112	0.017	17.065	0.029	0.071	0.027	0.228	18.146
5	8.753	0.124	0.021	17.355	0.028	0.070	0.026	0.237	18.027
6	8.389	0.109	0.021	17.593	0.028	0.068	0.027	0.232	18.776
7	9.053	0.100	0.023	19.155	0.027	0.067	0.026	0.234	18.704
8	8.491	0.104	0.028	18.715	0.030	0.069	0.027	0.252	19.207
9	8.160	0.122	0.034	16.908	0.037	0.080	0.030	0.267	19.291
10	7.124	0.152	0.071	14.461	0.054	0.095	0.036	0.342	19.290

Panel B: Information environment in year t+1 subsequent to VP portfolio formation

VP Portfolio	COV	DISP	FE	IRISK	SROA	SCFO	TURN	VOLU	ZFR
1	8.114	0.397	0.032	0.034	0.087	0.056	0.642	2,486	17.248
2	8.300	0.217	0.027	0.031	0.079	0.040	0.327	1,519	17.063

3	8.298	0.184	0.029	0.029	0.072	0.034	0.297	1,008	16.955
4	8.601	0.109	0.026	0.027	0.070	0.032	0.260	835	17.241
5	8.722	0.139	0.025	0.027	0.069	0.030	0.271	798	17.268
6	8.417	0.121	0.029	0.028	0.068	0.031	0.255	710	18.074
7	9.079	0.093	0.030	0.027	0.067	0.030	0.259	771	18.017
8	8.573	0.102	0.034	0.029	0.069	0.033	0.272	556	18.505
9	8.323	0.123	0.038	0.032	0.080	0.040	0.279	645	19.156
10	7.612	0.149	0.078	0.040	0.095	0.061	0.338	631	19.818

Panel C: Information environment in year t+2 subsequent to VP portfolio formation

VP Portfolio	COV	DISP	FE	IRISK	SROA	SCFO	TURN	VOLU	ZFR
1	8.241	0.255	0.027	0.035	0.086	0.060	0.664	2,151	18.066
2	8.423	0.168	0.024	0.032	0.077	0.044	0.343	1,732	17.960
3	8.416	0.135	0.021	0.030	0.071	0.037	0.305	1,155	17.528
4	8.691	0.126	0.029	0.028	0.069	0.034	0.273	947	17.681
5	8.872	0.112	0.024	0.028	0.068	0.032	0.282	930	17.715
6	8.605	0.115	0.027	0.028	0.067	0.033	0.267	842	17.902
7	9.224	0.113	0.032	0.028	0.066	0.032	0.264	939	18.332
8	8.927	0.119	0.033	0.029	0.068	0.034	0.278	709	18.616
9	8.703	0.146	0.040	0.033	0.077	0.043	0.287	799	19.197

10	8.211	0.243	0.063	0.041	0.094	0.062	0.325	798	20.234

Panel D: Information environment in year t+3 subsequent to VP portfolio formation

VP Portfolio	COV	DISP	FE	IRISK	SROA	SCFO	TURN	VOLU	ZFR
1	8.445	0.227	0.026	0.036	0.082	0.063	0.674	2,105	16.388
2	8.569	0.157	0.018	0.032	0.073	0.046	0.361	1,933	15.801
3	8.676	0.112	0.019	0.029	0.069	0.039	0.322	1,296	15.472
4	8.878	0.096	0.023	0.028	0.067	0.035	0.287	1,084	15.622
5	9.037	0.147	0.033	0.028	0.065	0.033	0.291	1,087	15.548
6	8.760	0.122	0.025	0.028	0.065	0.035	0.274	1,030	16.112
7	9.526	0.108	0.036	0.028	0.064	0.033	0.277	1,086	16.687
8	9.151	0.138	0.033	0.029	0.066	0.036	0.290	792	16.896
9	8.958	0.171	0.029	0.033	0.074	0.044	0.297	958	17.179
10	8.766	0.157	0.053	0.040	0.088	0.062	0.337	1,106	18.110

This table presents the mean value of each variable at time of V/P portfolio formation and during three years after portfolios formation. See Table 2 for details of the measurement of the variables. Information environments variables (COV, DISP, FE, IRISK, SROA, SCFO, TURN, VOLU, ZFR) are calculated at the end of June of year t except for SROA and SCFO. Observations that fall below the bottom 0.5 percent or above the top 0.5 percent of the distribution of each variable are winsorized.

TABLE 9

Future Returns Regression by Sub-Sample based on the Level of Information Environment

$$Sret_{36} = \alpha_0 + \alpha_1 VP^{dec} + \alpha_2 BP^{dec} + \alpha_3 ME^{dec} + \alpha_4 Beta^{dec} + \alpha_5 Ltg^{dec} + \alpha_6 ALT^{dec} + \alpha_7 DM^{dec} + \alpha_8 year\ dummies + \varepsilon$$

Panel A: The good information environment sample

	COV	DISP	AFE	AGE	SROA	SCFO	IRISK	TURN	ZFR
Sret36	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)
VP	0.190	0.215	0.299	0.144	0.201	0.213	0.130	0.260	0.242
	(6.21)	(6.85)	(8.72)	(5.05)	(5.66)	(6.97)	(4.77)	(6.97)	(8.08)
BP	0.022	0.050	0.107	0.016	-0.018	-0.057	-0.100	-0.036	0.052
	(0.52)	(1.11)	(2.18)	(0.39)	(-0.42)	(-1.38)	(-2.55)	(-0.72)	(1.23)
ME	-0.013	0.000	-0.129	0.010	-0.027	-0.047	-0.120	-0.079	0.061
	(-0.27)	(-0.01)	(-3.37)	(0.25)	(-0.74)	(-1.39)	(-3.14)	(-2.05)	(1.54)
Beta	0.138	0.217	0.293	0.127	0.299	0.190	0.045	0.529	0.167
	(4.07)	(6.34)	(7.83)	(3.73)	(8.43)	(5.78)	(1.41)	(12.32)	(5.05)
Ltg	-0.054	-0.046	0.021	-0.021	-0.108	-0.044	0.003	0.092	-0.048
	(-1.37)	(-1.25)	(0.51)	(-0.55)	(-2.78)	(-1.27)	(0.09)	(2.09)	(-1.31)
ALT	-0.040	-0.008	-0.048	-0.017	0.004	0.006	-0.027	-0.061	-0.020
	(-1.24)	(-0.25)	(-1.37)	(-0.52)	(0.12)	(0.21)	(-0.96)	(-1.65)	(-0.59)
DM	-0.052	-0.045	-0.031	-0.029	-0.018	0.037	0.006	-0.002	-0.046
	(-1.18)	(-1.11)	(-0.65)	(-0.74)	(-0.42)	(0.90)	(0.16)	(-0.04)	(-1.09)
Intercept	0.022	0.055	0.120	0.020	0.011	0.015	0.087	0.112	0.002
	(0.68)	(1.91)	(3.48)	(0.81)	(0.38)	(0.58)	(3.40)	(3.29)	(0.08)
Year dummy	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adj.R^2	0.0141	0.0260	0.0322	0.0115	0.0292	0.0158	0.0265	0.0582	0.0196

TABLE 9 (Continued)

Panel B: The poor information environment sample

	COV	DISP	AFE	AGE	SROA	SCFO	IRISK	TURN	ZFR
Sret36	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)	Coef. (t-stat.)
VP	0.091	0.091	0.078	0.148	0.128	0.102	0.137	0.073	0.086
	(2.88)	(2.88)	(2.68)	(4.15)	(4.32)	(3.04)	(4.19)	(2.74)	(2.52)
BP	0.083	0.084	0.194	0.086	0.103	0.150	0.124	0.203	0.082
	(2.05)	(2.04)	(5.17)	(1.93)	(2.57)	(3.42)	(3.04)	(5.91)	(1.97)
ME	-0.005	-0.006	-0.069	-0.045	0.015	0.026	-0.017	0.063	0.052
	(-0.15)	(-0.15)	(-2.02)	(-1.00)	(0.43)	(0.64)	(-0.37)	(1.93)	(1.18)
Beta	0.284	0.284	0.242	0.335	0.195	0.294	0.378	0.138	0.332
	(8.37)	(8.37)	(7.83)	(9.35)	(5.70)	(8.36)	(11.28)	(4.85)	(9.34)
Ltg	-0.074	-0.075	-0.123	-0.086	-0.052	-0.076	-0.062	-0.085	-0.062
	(-2.00)	(-2.00)	(-3.59)	(-2.14)	(-1.39)	(-1.82)	(-1.60)	(-2.56)	(-1.69)
ALT	-0.000	0.000	0.001	0.013	-0.019	0.003	0.013	-0.021	0.016
	(-0.00)	(0.00)	(0.02)	(0.35)	(-0.54)	(0.09)	(0.37)	(-0.73)	(0.49)
DM	0.001	0.001	0.021	-0.019	-0.027	-0.080	-0.021	-0.044	-0.035
	(0.02)	(0.03)	(0.59)	(-0.45)	(-0.70)	(-1.88)	(-0.53)	(-1.29)	(-0.88)
Intercept	-0.057	-0.057	-0.074	-0.024	0.003	-0.010	-0.068	-0.076	0.013
	(-1.60)	(-1.76)	(-2.08)	(-0.73)	(0.11)	(-0.30)	(-2.21)	(-2.96)	(0.38)
Year dummy	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adj.R^2	0.0186	0.0186	0.0241	0.0207	0.0120	0.0186	0.0267	0.0181	0.0265

This table presents the results from the pooled regression. In the regression, I use ranked variables rather than continuous variables to delete the effect of the extreme values. Following Bernard and Thomas (1990), I first assign a decile-based rank to each variable from one to ten. Then I transform this rank by subtracting one and dividing by nine. Then I subtract 0.5 from each of these transformed ranks such that the decile ranks range from -0.5 to 0.5. t-statistics are computed by the Newey-West (1987) procedure to adjust for serial correlation. See table 2 for details of the measurement of variables.

TABLE 10
Regression with Interaction Term

Sret36	COV Coef. (t-stat.)	DIS Coef. (t-stat.)	AFE Coef. (t-stat.)	AGE Coef. (t-stat.)	SROA Coef. (t-stat.)	SCFO Coef. (t-stat.)	IRISK Coef. (t-stat.)	TURN Coef. (t-stat.)	ZFR Coef. (t-stat.)
VP	0.191	0.225	0.286	0.146	0.200	0.189	0.144	0.215	0.244
	(6.24)	(6.55)	(8.22)	(5.14)	(5.05)	(6.00)	(5.33)	(5.63)	(8.11)
BP	0.022	0.009	0.180	0.020	-0.067	-0.077	-0.076	-0.008	0.048
	(0.51)	(0.19)	(3.55)	(0.47)	(-1.34)	(-1.76)	(-1.93)	(-0.16)	(1.15)
ME	-0.001	-0.045	-0.187	0.001	-0.070	-0.065	-0.137	-0.095	0.122
	(-0.01)	(-1.25)	(-4.73)	(0.03)	(-1.65)	(-1.80)	(-3.36)	(-2.32)	(2.79)
Beta	0.138	0.177	0.314	0.126	0.253	0.176	0.051	0.587	0.180
	(4.06)	(4.84)	(8.15)	(3.69)	(6.13)	(5.03)	(1.59)	(13.24)	(5.43)
Ltg	-0.044	-0.108	0.031	-0.012	-0.087	-0.053	0.037	0.106	-0.034
	(-1.11)	(-2.74)	(0.69)	(-0.32)	(-2.00)	(-1.45)	(1.03)	(2.31)	(-0.92)
ALT	-0.039	-0.043	-0.054	-0.017	-0.015	-0.004	-0.018	-0.107	-0.016
	(-1.18)	(-1.29)	(-1.51)	(-0.53)	(-0.41)	(-0.13)	(-0.64)	(-2.83)	(-0.48)
DM	-0.050	-0.078	0.004	-0.035	-0.024	0.033	-0.011	0.027	-0.053
	(-1.14)	(-1.78)	(0.09)	(-0.87)	(-0.49)	(0.79)	(-0.28)	(0.53)	(-1.25)
IE	-0.013	-0.104	-0.505	0.048	-0.044	-0.071	-0.144	-0.591	0.142
	(-0.36)	(-4.15)	(-20.40)	(1.75)	(-1.54)	(-2.83)	(-4.22)	(-23.22)	(4.76)
VP*IE	-0.070	-0.138	-0.201	0.009	-0.064	-0.079	0.009	-0.136	-0.174
	(-1.53)	(-3.09)	(-4.57)	(0.19)	(-1.35)	(-1.74)	(0.22)	(-2.95)	(-3.90)
BP*IE	0.078	0.097	0.074	0.063	0.173	0.226	0.211	0.227	0.015
	(1.31)	(1.65)	(1.22)	(1.02)	(2.80)	(3.72)	(3.77)	(3.72)	(0.26)
ME*IE	0.021	0.019	0.040	-0.051	0.082	0.076	0.082	0.165	-0.028
	(0.31)	(0.40)	(0.80)	(-0.84)	(1.55)	(1.43)	(1.39)	(3.23)	(-0.48)
Beta*IE	0.185	0.116	-0.052	0.208	-0.055	0.125	0.330	-0.395	0.153
	(3.86)	(2.46)	(-1.11)	(4.24)	(-1.07)	(2.60)	(7.26)	(-7.76)	(3.29)

Ltg*IE	-0.032	0.039	-0.142	-0.071	0.033	-0.017	-0.094	-0.134	-0.024
	(-0.59)	(0.75)	(-2.62)	(-1.28)	(0.59)	(-0.30)	(-1.84)	(-2.43)	(-0.48)
ALT*IE	0.072	0.025	0.040	0.027	-0.006	0.007	0.021	0.068	0.040
	(1.54)	(0.55)	(0.90)	(0.56)	(-0.12)	(0.14)	(0.47)	(1.50)	(0.88)
DM*IE	0.037	0.077	0.037	0.014	-0.009	-0.122	-0.027	-0.065	0.028
	(0.62)	(1.37)	(0.65)	(0.23)	(-0.15)	(-2.09)	(-0.51)	(-1.11)	(0.50)
Intercept	0.005	-0.003	0.037	-0.003	0.032	-0.004	0.003	0.046	0.012
	(0.18)	(-0.12)	(1.46)	(-0.11)	(1.19)	(-0.14)	(0.13)	(1.86)	(0.45)
Year dummy	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R^2	0.0168	0.0183	0.0526	0.0171	0.0147	0.0168	0.0215	0.0860	0.0189

This table presents the results from the pooled regression. In the regression, I use ranked variables rather than continuous variables to delete the effect of the extreme values. Following the example of Bernard and Thomas (1990), I first assign a decile-based rank to each variable from one to ten. I then transform this rank by subtracting one and dividing by nine. Finally, I subtract 0.5 from each of these transformed ranks such that the decile ranks range from -0.5 to 0.5. VP is the fundamental value derived using I/B/E/S consensus analyst predictions of future earnings available prior to June of year t divided by the stock price at the end of June of year t. BP is the book value of equity (#60) in year t-1 divided by the market value of equity at the end of June of year t. ME is the market value of equity in millions of dollars at the end of June of year t. Beta is the systematic risk estimated using monthly returns over a maximum of 60 months ending in July of year t (minimum 36 months). Ltg is the long-term growth in earnings estimate in percentage forecasted in May of year t. ALT is the score from the Altman discriminant model: Z = 0.012 ×(working capital/total assets) + 0.014 × (retained earnings/total assets) + 0.033 × (earnings before interest and taxes/total assets) + 0.006 × (market value of equity/ total liabilities) + 0.999 × (sales/total assets), with all the variables from year t-1. DM is the book value of long-term debt (#9) in year t-1 divided by market value of equity at the end of June of year t. Information environment variables (IE) are dummy variables. I rank each variable into ten groups based on the level of information environment. Each variable is set to 1 when the value is higher than 5, and 0 otherwise. I multiply a negative one in the COV and AGE variable to match the direction with other variables. t-statistics are computed by the Newey-West (1987) procedure to adjust for serial correlations.