Do Anomalies Exist Ex Ante?

Jin Ginger Wu*
Terry College of Business
University of Georgia

Lu Zhang†
Stephen M. Ross School of Business
University of Michigan
and NBER

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Abstract

We use the dividend discounting model and the residual income model to estimate the expected returns of anomalies-based trading strategies. Except for price momentum, the dividend discounting model delivers precise expected return estimates that are largely similar in magnitude with the ex post average returns of zero-cost portfolios formed on book-to-market equity, composite issuance, net stock issues, abnormal investment, asset growth, earnings surprises, and failure probability. The residual income model produces substantially different expected return estimates, but they are dominated by the estimates from the dividend discounting model in predicting future cross-sectional variation of expected stock returns.

*Terry College of Business, University of Georgia, 443 Brooks Hall, Athens, GA 30602. Tel: (706) 542-3638, and e-mail: jinw@terry.uga.edu.

†Finance Department, Stephen M. Ross School of Business, University of Michigan, 701 Tappan Street, R 4336, Ann Arbor MI 48109-1234; and NBER. Tel: (734) 615-4854, fax: (734) 936-0282, and e-mail: zhanglu@bus.umich.edu.

1 Introduction

We ask whether capital markets anomalies exist ex ante. Anomalies are empirical relations between average realized returns and firm characteristics not accounted for by traditional asset pricing models such as the Sharpe (1964) and Lintner (1965) Capital Asset Pricing Model. Using the average ex post return as the expected return proxy, researchers have documented many anomalies in the cross-section. Over the past two decades, anomalies have become increasingly important in asset allocation, capital budgeting, security analysis, and many other applications. And understanding the sources of anomalies has become one of the more important questions in financial economics. Clearly, checking that these anomalies exist ex ante is important.

Instead of using the average realized return, we construct expected return estimates from the dividend discounting model and the residual income model. Under the dividend discounting model, the expected return is the expected dividend yield plus the expected rate of capital gain. Suppose the dividend-to-price ratio is stationary, meaning if the sample period is long, the long-term dividend growth rate converges to the rate of capital gain. Therefore, an expected return estimate is given by the sum of the expected dividend yield and the expected long-term dividend growth (e.g., Fama and French (2002)). Under the residual income model, the expected return is calculated as the internal rate of return that equates the present value of expected future residual incomes to the current stock price (e.g., Gebhardt, Lee, and Swaminathan (2001)).

Our central result is that the expected return estimates from the dividend discounting model are largely similar in magnitude with the ex post average returns for a wide range of anomalies-based trading strategies with price momentum being a notable exception. From 1965 to 2007, the expected returns of the high-minus-low quintiles are 6% per annum for the Fama and French (1993) book-to-market portfolios, 1.4% for the Chan, Jegadeesh, and Lakonishok (1996) earnings surprise portfolios, −8.2% for the Campbell, Hilscher, and Szilagyi (2008) failure probability (a measure of financial distress) portfolios, −3.3% for the Titman, Wei, and Xie (2004) abnormal corporate investment portfolios, -5.5% for the Cooper, Gulen, and Schill (2008) asset growth portfolios, -3.2% for the Daniel and Titman (2006) composite issuance portfolios, and -2.6% for the Fama and French (2008) net stock issues portfolios. However, the winner-minus-loser price momentum quintile from Jegadeesh and Titman (1993) earns an expected return of -0.3% per annum, in contrast to the average ex post return of 7.1% ($t = 4.4$). Further tests show that the results are not affected by changes in payout policy documented by, for example, Fama and French (2001) and Grullon and Michaely (2002).

From the residual income model, the expected value premium is 5.4% per annum with a standard error of 0.3%, and the expected winner-minus-loser return is -1.4% with a standard error of 0.1%, consistent with the estimates from the dividend discounting model. However, the estimates for all the other anomalies suggest that these anomalies either are not reliable ex ante or even if they are, their magnitudes are much smaller than those of the ex post average returns. Motivated from the differences, we evaluate the relative quality of the two types of expected return estimates through their associations with future realized returns. In direct horse races, the estimates from the dividend discounting model seem to dominate the estimates from the residual income model in explaining the future cross-sectional variation of expected stock returns in cross-sectional regressions.

Our work adds to the literature that uses valuation models to estimate expected stock returns in finance and accounting. Most of these studies calculate the expected returns from analyst forecasts of earnings under the residual income model (e.g., Claus and Thomas (2001), Gebhardt, Lee, and Swaminathan (2001), Pastor, Sinha, and Swaminathan (2008), and Chava and Purnanandam (2008)). Francis, LaFond, Olsson, and Schipper (2004) and Brav, Lehavy, and Michaely (2005) use Value Line analysts' expectations to estimate expected returns. We instead follow Blanchard (1993), Fama and French (2002), and Chen, Petkova, and Zhang (2008) to estimate the expected returns under the dividend discounting model. Different from Blanchard and Fama and French, who focus on the equity premium, we study the ex ante existence of anomalies. Chen et al. estimate the expected value premium from the dividend discounting model. In contrast, our scope is much broader.

The rest of the paper is organized as follows. Section 2 describes our sample and details variable definitions. Section 3 presents the expected return estimates from the dividend discounting model. Section 4 presents the estimates from the residual income model. Section 5 evaluates the quality of the two types of expected return estimates. Section 6 concludes.

2 Data

The monthly data on stock returns, stock prices, and number of shares outstanding are obtained from the Center for Research in Security Prices (CRSP). We obtain annual value-weighted returns with and without dividend for all NYSE, Amex, and Nasdaq stocks from CRSP. We use nonfinancial firms (excluding firms with four-digit SIC codes between 6000 and 6999) listed on the CRSP monthly stock return files and the Compustat annual industrial files from 1965 through 2007. (The sample size varies for some anomaly variables due to data availability.) Only firms with ordinary common equity are included, meaning that we exclude ADRs, REITs, and units of beneficial interest.

We examine a wide array of anomalies. To facilitate comparison with prior studies, we closely follow the prior literature in defining the anomaly variables. The value anomaly says that stocks with high book-to-market equity earn higher average returns than stocks with low book-to-market equity (e.g., Rosenberg, Reid, and Lanstein (1985) and Lakonishok, Shleifer, and Vishny (1994)). We follow Fama and French in measuring book-to-market equity. The book value is the stockholders' equity (item 216), minus preferred stock, plus balance sheet deferred taxes and investment tax credit (item 35) if available, minus post-retirement benefit asset (item 330) if available. If stockholder's equity value if missing, we use common equity (item 60) plus preferred stock par value (item 130). We measure preferred stock as preferred stock liquidating value (item 10) or preferred stock redemption value (item 56) or preferred stock par value (item 130) in that order of availability. If these variable are missing, we use book assets (item 6) minus liabilities (item 181). Book-to-market equity is the book value divided by the market value at the end of the fiscal year.

The momentum anomaly includes price momentum and earnings momentum. Price momentum says that stocks that perform well in the recent six to twelve months continue to earn higher average returns in the future six to twelve months than stocks that perform poorly in the recent six to twelve months (e.g., Jegadeesh and Titman (1993)). Earnings momentum says that stocks with high earnings surprises earn higher average returns than stocks with low earnings surprises (e.g., Ball and Brown (1968), Bernard and Thomas (1989), and Chan, Jegadeesh, and Lakonishok (1996)). Earnings surprises or the Standardized Unexpected Earnings (SUE), for stock i in month t is defined as:

$$SUE_{it} = \frac{e_{iq} - e_{iq-4}}{\sigma_{it}} \tag{1}$$

where e_{iq} is the most recent quarterly earnings per share as of month t for stock i, e_{iq-4} is earnings per share four quarters ago, and σ_{it} is the volatility of $e_{iq} - e_{iq-4}$ over the prior eight quarters.

The financial distress anomaly says that more distressed firms earn abnormally lower average returns than less distressed firms (e.g., Dichev (1998), Griffin and Lemmon (2002), and Campbell, Hilscher, and Szilagyi (2008)). Campbell et al. measure a firm's failure probability (F-prob) as $1/[1 + \exp(-\text{Distress}_t)]$, in which the distress measure is constructed as:

$$\begin{aligned}\text{Distress}_t &= -9.164 - 20.264\, NIMTAAVG_t + 1.416\, TLMTA_t - 7.129\, EXRETAG_t \\ &+1.411\, SIGMA_t - 0.045\, RSIZE_t - 2.132\, CASHMTA_t + 0.075\, MB_t - 0.058\, PRICE_t \quad (2)\end{aligned}$$

in which

$$NIMTAAVG_{t-1,t-12} \equiv \frac{1-\phi^2}{1-\phi^{12}}(NIMTA_{t-1,t-3} + ... + \phi^9 NIMTA_{t-10,t-12})$$
$$EXRETAVG_{t-1,t-12} \equiv \frac{1-\phi}{1-\phi^{12}}(EXRET_{t-1} + ... + \phi^{11} EXRET_{t-12})$$

The coefficient $\phi = 2^{-1/3}$ means that the weight is halved each quarter. $NIMTA$ is net income (Compustat quarterly item 69) divided by the sum of market equity and total liabilities (item 54). The moving average $NIMTAAVG$ is designed to capture the idea that a long history of losses is a better predictor of bankruptcy than one large quarterly loss in a single month. $EXRET =$

$\log(1+R_{it}) - \log(1+R_{S\&P500,t})$ is the monthly log excess return on each firms equity relative to the $S\&P500$ index. The moving average $EXRETAVG$ is designed to capture the idea that a sustained decline in stock market value is a better predictor of bankruptcy than a sudden stock price decline in a single month. $TLMTA$ is the ratio of total liabilities divided by the sum of market equity and total liabilities. $SIGMA$ is the volatility of each firm's daily stock return over the past three months. $RSIZE$ is the relative size of each firm measured as the log ratio of its market equity to that of the S&P500 index. $CASHMTA$, used to capture the liquidity position of the firm, is the ratio of cash and short-term investments divided by the sum of market equity and total liabilities. MB is the market-to-book equity. $PRICE$ is the log price per share of the firm. We also winsorize the market-to-book ratio and all other variables in the construction of F-prob at the 5th and 95th percentiles of their pooled distributions across all firm-months. Finally, we winsorize $PRICE$ at \$15.

The abnormal investment anomaly says that firms with abnormally high corporate investment earn lower average returns than firms with abnormally low corporate investment (e.g., Titman, Wei, and Xie (2004)). Following Titman et al., we measure abnormal corporate investment that applies for the portfolio formation year t, as:

$$\text{Abnormal investment}_{t-1} \equiv \frac{CE_{t-1}}{(CE_{t-2} + CE_{t-3} + CE_{t-4})/3} - 1 \tag{3}$$

in which CE_{t-1} is capital expenditure (Compustat annual item 128) scaled by its sales in year $t-1$. The last three-year average capital expenditure aims to project the benchmark investment at the portfolio formation year. Using sales as the deflator assumes that the benchmark investment grows proportionately with sales. In economic terms, abnormal investment is the deviation of the current year investment from the benchmark investment as the past three-year moving average investment.

The asset growth anomaly says that firms with high asset growth earn lower average stock returns than firms with low asset growth (e.g., Cooper, Gulen, and Schill (2008)). Asset growth for the portfolio formation year t is defined as the percentage change in total assets (Compustat annual item 6) from fiscal year ending in calendar year $t-2$ to fiscal year ending in calendar year $t-1$:

$$\text{Asset growth}_{t-1} \equiv \frac{\text{Total Assets}_{t-1} - \text{Total Assets}_{t-2}}{\text{Total Assets}_{t-2}} \tag{4}$$

The external finance anomalies say that firms that issue new equity underperform, and firms that buyback shares outperform, matching firms with similar characteristics in the future three to five years (e.g., Ritter (1991), Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), Lakonishok and Vermaelen (1990), Ikenberry, Lakonishok, and Vermaelen (1995), Michaely, Thaler, and Womack (1995), and Peyer and Vermaelen (2008)). To capture these anomalies, we use the five-year composite issuance measure from Daniel and Titman (2006) and the net stock issues measure from Fama and French (2008). The five-year composite issuance measure from Daniel and Titman is defined as:

$$\iota(t-\tau) = \log\left(\frac{ME_t}{ME_{t-\tau}}\right) - r(t-\tau, t) \tag{5}$$

where $r(t-\tau, t)$ is the cumulative log return on the stock from the last trading day of calendar year $t-6$ to the last trading day of calendar year $t-1$ and ME_t ($ME_{t-\tau}$) is total market equity on the last trading day of calendar year t ($t-6$) from CRSP. In economic terms, $\iota(t-\tau)$ measures the part of firm growth in market equity that is due to stock returns. This measure is not affected by corporate decisions such as splits and stock dividends. However, issuance activities such as new equity issues, employee stock options, or any other actions that trade ownership for cash or services increase the composite issuance. In contrast, repurchase activities such as open market share repurchases, dividends, or any other action that pays cash out of a firm decrease the composite issuance.

The net stock issues are the annual change in the logarithm of the number of real shares outstanding, which adjusts for distribution events such as splits and rights offerings. Following Fama and French (2008), we construct the net stock issues measure using the natural log of the ratio of the split-adjusted shares outstanding at the fiscal year end in $t-1$ divided by the split-adjusted shares outstanding at the fiscal year end in $t-2$. The split-adjusted shares outstanding is shares outstanding (Compustat annual item 25) times the adjustment factor (item 27). If the Compustat shares or adjustment factors for calculating net stock issues are missing, we set the measure to be zero. Net stock issues calculated in this way can be positive or negative. We use the sample consisting of firms with only positive net stock issues. Doing so allows us to focus on the new issues puzzle of Ritter (1991) and Loughran and Ritter (1995). In contrast, the composite issuance measure in equation (5) captures both the new issues puzzle and the buyback anomaly of Ikenberry, Lakonishok, and Vermaelen (1995) and Peyer and Vermaelen (2008).

Table 1 reports descriptive statistics for all the anomaly variables in our sample. To maximize the sample size in our tests, we do not impose the restriction that firms have all the anomaly variables at a given point of time. Panel A reports the results for the sample used to estimate expected returns from the dividend discounting model. The time series average of the number of firms in the 1965–2007 sample for constructing the book-to-market portfolios is 4,247. The mean book-to-market equity is 3.34, and the median is 0.79. The average number of firms in the composite issuance sample is only 1,648. The reason is that calculating the measure requires firms to have valid data for the past five years. The average number of firms in the abnormal investment sample is 2,051 because its calculation requires firms to have valid data for the past three years. Panel B reports the descriptive statistics for the sample used to estimate expected returns from the residual income model. Because doing so requires analysts earnings forecast data from Institutional Brokers' Estimate System (IBES), the sample size is in general smaller than that in Panel A.

In June of each year t, all NYSE stocks on CRSP are sorted on book-to-market equity, composite issuance, net stock issues, abnormal investment, and asset growth. The sample for all these portfolios is from January 1965 to December 2007. We use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into one-way quintiles. Annual value-weighted returns from July of year t to June of year $t+1$ for the portfolios are calculated. Firms with negative book equity for the fiscal year ending in calendar year $t-1$ are excluded from the sample.

Following Jegadeesh and Titman (1993), for each month from July 1965 to June 2007, we sort all NYSE stocks on CRSP on the prior six-month returns and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five groups. We hold the portfolios for six months, and calculate the value-weighted returns with and without dividends. Following Chan, Jegadeesh, and Lakonishok (1996), for each month from January 1977 to December 2007, we sort all NYSE stocks on their most recent SUEs. We use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five groups. We again hold the resulting portfolios for six months, and calculate the value-weighted returns with and without dividends. As in Chan et al., the sample for earnings surprises portfolios starts from January 1977 due to the availability of quarterly earnings data.

Following Campbell, Hilscher, and Szilagyi (2008), for each month from January 1975 to December 2007, we sort all NYSE, Amex, and Nasdaq stocks on CRSP on failure probability into five groups. For each portfolio, we calculate the one-year value-weighted returns of stocks with and without dividends. The starting period of the sample is determined by the availability of quarterly data on total liabilities required in the construction of the failure probability.

3 Estimates from the Dividend Discounting Model

Section 3.1 discusses our estimation procedure based on the dividend discounting model. Section 3.2 reports the unconditional expected return estimates for the anomalies-based portfolios. Section 3.3 conducts subsample analysis to account for possible nonstationarity of dividends.

3.1 Estimation Procedure

The basic logic of the expected return estimation is based on Gordon's (1962) dividend discounting model. The average return is the average dividend yield plus the average rate of capital gain:

$$E[r_{t+1}] = E[D_{t+1}/P_t] + E[r^P_{t+1}] \tag{6}$$

in which D_{t+1} is the dividend for year t, P_t is the price at the beginning of year t, $r^P_{t+1} \equiv (P_{t+1} - P_t)/P_t$ is the rate of capital gain, and $E[\cdot]$ is the unconditional average. Fama and French (2002) point out that, suppose the dividend-to-price ratio is stationary, then the compounded rate of dividend growth should converge to the compounded rate of capital gain in a long sample period. This logic gives rise to the following expected return estimate:

$$r^{DD} = E[D_{t+1}/P_t] + E[g_{t+1}] \tag{7}$$

in which r^{DD} is the expected return from the Gordon model and $g_{t+1} = (D_{t+1} - D_t)/D_t$ is the dividend growth. Fama and French use equation (7) to estimate the unconditional equity premium.

Blanchard (1993) derives the conditional version of equation (7). Solving $1 + r_{t+1} = (D_{t+1} + P_{t+1})/P_t$ recursively forward to get P_t (assuming the dividend-to-price ratio is stationary) as the present discounted value of future dividends. Dividing both sides by D_t, taking conditional expectations at time t, and linearizing yield the expected return at time t as:

$$r^{DD}_t = E_t[D_{t+1}/P_t] + E_t[Ag_{t+1}] \tag{8}$$

in which r^{DD}_t is the (time-varying) conditional expected return from the dividend discounting model, and Ag_{t+1} is the long-run dividend growth rate defined as the annuity of future dividend growth:

$$Ag_{t+1} \equiv \left[\frac{\bar{r} - \bar{g}}{1 + \bar{r}}\right] \sum_{j=0}^{\infty} \left[\frac{1 + \bar{g}}{1 + \bar{r}}\right] g_{t+j+1} \tag{9}$$

$\bar{g}$ and $\bar{r}$ are the average growth rate of dividend and the average stock return, respectively, and g_{t+j+1} is the realized growth rate of dividend from $t + j$ to $t + j + 1$. Equation (8) says that the expected return is the expected dividend yield plus the expected long-run dividend growth. Chen, Petkova, and Zhang (2008) use this equation to estimate the expected value premium.

We measure portfolio dividend growth using returns with and without dividends, following Hansen, Heaton, and Li (2005) and Chen, Petkova, and Zhang (2008). Consider first annually rebalanced portfolios. To describe our procedure precisely, we introduce additional notation as follows:

P_t = market equity value at the end of June for year t of the stocks allocated to the portfolio when formed at the end of June for year t;

$P_{t,t+1}$ = market equity value at the end of June for year $t+1$ of the stocks allocated to the portfolio at the end of June for year t;

$D_{t,t+1}$ = dividends paid between portfolio formation of year t and $t+1$ on the stocks allocated to the portfolio at year t;

$r_{t,t+1}$ = return with dividends at the end of June of year $t+1$ on a portfolio formed in year t;

$r^P_{t,t+1}$ = return without dividends (rate of capital gain) observed at the end of June for year $t+1$ on a portfolio formed in year t.

When there are two time subscripts on a variable, the first subscript indicates the time when the portfolio is formed and the second subscript gives the time when the variable is observed. P_t is a shorthand for $P_{t,t}$ as the market value of equity of a portfolio when formed in year t.

For each portfolio, we construct the dividend yield, $D_{t,t+1}/P_t$, from the value-weighted realized portfolio returns with and without dividends:

$$D_{t,t+1}/P_t = r_{t,t+1} - r^P_{t,t+1} \tag{10}$$

Because monthly total returns are compounded to get annual returns in CRSP, the dividend yield includes dividends and the reinvestment returns earned from the time a dividend is paid to the end of the annual return period. We measure the portfolio dividend growth rate as:

$$g_{t+1} = \left(\frac{D_{t,t+1}/P_t}{D_{t-1,t}/P_{t-1}}\right)\left(r^P_{t-1,t} + 1\right) - 1 \tag{11}$$

The right-hand side of equation (11) is $\left(\frac{D_{t,t+1}/P_t}{D_{t-1,t}/P_{t-1}}\right)\left(\frac{P_{t-1,t}}{P_{t-1}}\right) - 1$, meaning that the dividend growth rate is (dividends at $t+1$ per dollar invested at t multiplied by dollars invested at t)/(dividends at

t per dollar invested at $t-1$ multiplied by dollars invested at $t-1$). The reinvested capital gain, $P_{t-1,t}/P_{t-1}$, is important: high $P_{t-1,t}/P_{t-1}$ (from $t-1$ to t) means more dollars to invest at t and higher dividend growth rates given the dividend yields.

For the monthly rebalanced price and earnings momentum portfolios, we aggregate monthly portfolio returns with and without dividends from July of year t to June of year $t+1$ to annual returns with and without dividends for year t. We then apply equations (10) and (11) on the aggregated annual returns with and without dividends to construct annual dividend growth rates for the price and earnings momentum portfolios. Aggregating over monthly returns with and without dividends to obtain annual returns with and without dividends helps alleviate the effect of dividend seasonality on the calculation of portfolio dividend growth rates. For the monthly rebalanced F-prob portfolios, the monthly observations are one-year buy-and-hold returns. As such, we directly apply equations (10) and (11) on these observations to construct portfolio dividend growth rates.

We calculate the long-term dividend growth rate, Ag_{t+1}, based on equation (9), in which we estimate $\overline{r}$ as the sample average of the realized stock returns and $\overline{g}$ as the sample average of the dividend growth rates. To implement Ag_{t+1} as an infinite sum of future dividend growth rates, we use a finite sum of 100 years of future growth. We assume that future dividend growth rates beyond 2007 equal the in-sample average dividend growth rate. Annual predictive regressions of Ag_{t+1} and D_{t+1}/P_t are performed on a set of conditioning variables. The fitted values provide the time series of $E_t[Ag_{t+1}]$ and $E_t[D_{t+1}/P_t]$, the sum of which provides the expected return estimates.

Following Chen, Petkova, and Zhang (2008), we include the following conditioning variables: the aggregate dividend yield, computed as the sum of dividend payments accruing to the CRSP value-weighted market portfolio over the previous 12 months divided by the contemporaneous level of the index; the default premium, defined as the yield spread between Moody's Baa and Aaa corporate bonds from the monthly database of the Federal Reserve Bank of Saint Louis; the term premium, defined as the yield spread between long-term and one-year Treasury bonds from Ibbotson

Associates; and the one-month Treasury bill rate from CRSP.

3.2 Expected Return Estimates

For each set of testing portfolios, Table 2 reports the averages of realized returns, expected return estimates from the dividend discounting model, the dividend yield, and the dividend growth. For zero-cost high-minus-low strategies, we report the means and the standard errors testing that the means are zero. The meat of the paper is the difference between the average realized returns and the average expected returns, both in economic magnitude and in statistical significance. To preview the results, except for price momentum, the average realized returns and the average expected returns have largely similar magnitudes, but the expected returns are estimated much more precisely.

From Panel A, the growth portfolio earns lower average returns than the value portfolio: 11.2% vs. 16.4% per annum, and the difference of 5.2% is more than 2.5 standard errors from zero. The expected return of the growth portfolio also is lower than that of the value portfolio: 9.4% vs. 15.4% per annum, and the difference of 6.0% is estimated precisely with a small standard error of 0.1. This expected return spread consists of an expected dividend yield spread of 2.7% and an expected dividend growth spread of 3.3%, both of which are estimated quite precisely. The evidence verifies in our sample the central result of Chen, Petkova, and Zhang (2008).

Panel B of Table 2 reports a sharp contrast between the ex post and the ex ante momentum profits. Ex post, the winner quintile earns on average higher returns than the loser quintile: 15.7% vs. 8.6% per annum, and the spread of 7.1% is more than 4.4 standard errors from zero. In contrast, the expected return estimates show an inverse U-shape across the momentum quintile with the expected return of the winner portfolio being slightly smaller than that of the loser portfolio: 8.3% vs. 8.6%. This pattern arises because the winner portfolio has a lower expected dividend yield than the loser portfolio, but the expected dividend growth is similar across the two portfolios.

Different from price momentum, earnings momentum is profitable ex ante. Panel B shows that earnings winners have an expected return of 12.1% per annum, which is higher than the expected return of earnings losers, 10.7%. The expected return spread of 1.4% is more than 6.5 standard errors from zero. The spread arises from a similar spread in the expected dividend growth: the spread in the expected dividend yield across the extreme earnings surprises portfolios is close to zero. However, the expected return spread of 1.4% per annum is only about one third in magnitude compared to the average return spread of 3.9%, which is in turn more than 4.8 standard errors from zero.

Consistent with Campbell, Hilscher, and Szilagyi (2008), Panel C shows that the least distressed low F-prob portfolio earns higher average returns than the most distressed high F-prob portfolio: 14.4% vs. 7.5% per annum. The average return of the high-minus-low portfolio, -6.9%, is economically meaningful, and is more than 3.6 standard errors from zero. The expected return estimates go in the right direction as the average returns. The least distressed portfolio has a higher expected return than the most distressed portfolio: 13.4% vs. 5.2% per annum, and the spread of 8.2% is estimated precisely. The expected return spread consists of an expected dividend growth spread of 6.6% and an expected dividend yield spread of 1.6%, both of which are estimated precisely. The dividend discounting model therefore suggests that the average high-minus-low distress return can largely be accounted for by the average high-minus-low long-term dividend growth.

This evidence is interesting because it contrasts with that in Chava and Purnanandam (2008). Using the residual income model to estimate expected returns, Chava and Purnanandam report that more distressed firms earn ex ante higher expected returns than less distressed firms (we verify this evidence in Section 4). Expected returns from the dividend discounting model show the opposite pattern. We sort out the relative quality of the two types of expected return estimates in Section 5.

From Panel D, the abnormal investment anomaly exists ex ante. Ex post, the low abnormal investment quintile outperforms the high abnormal investment quintile by 3.9% per annum, which is more than two standard errors from zero. Ex ante, the low abnormal investment quintile outperforms the high abnormal investment quintile by a similar magnitude, 3.3% per annum, which is more than eight standard errors from zero. Roughly 55% of the expected return spread comes from the expected dividend yield spread, and the other 45% comes from the expected long-term dividend growth spread. The results for the asset growth portfolios are largely similar. The high-minus-low asset growth quintile earns an ex post average return of −5% per annum, which is more than 2.7 standard errors from zero. The zero-cost portfolio earns an ex ante expected return of −5.5%, which also is estimated precisely. About 70% of the expected return comes from the expected dividend growth spread, with the remaining 30% coming from the expected dividend yield spread.

From Panel E, the external financing anomalies also are reliable ex ante. Ex post, the low composite issuance quintile outperforms the high composite issuance quintile by 4.2% per annum, which is 2.8 standard errors from zero. The ex ante expected return spread is 3.2% per annum, consisting of an expected dividend yield spread of 2.4% and an expected long-term dividend growth spread of 0.8%. The low net stock issues portfolio outperforms the high net stock issues portfolio by an average ex post return of 3.4% per annum ($t = 2.3$). The ex ante expected return spread is 2.6%, all of which derives from the spread in the expected long-term dividend growth: the expected dividend yield spread is small and insignificant.

3.3 Robustness

In the past two decades the propensity of firms paying dividends has declined and the stock repurchases have increased steadily (e.g., Fama and French (2001) and Grullon and Michaely (2002)). This change in payout policy can potentially cause problems for the unconditional expected return estimates from the dividend discounting model. In a finite sample if the dividend policy does not stabilize, the dividend yield might not mean-revert and can appear nonstationary. Because dividends have declined over time, the dividend discounting model is likely to underestimate the unconditional expected returns by underestimating both the dividend yield and the long-term dividend growth.

We deal with this issue using subsample analysis. We split the full sample into two equal-length subsamples and compare how our unconditional expected return estimates vary across the subsamples. To preview the results, the expected return estimates are largely stable across the subsamples.

Tables 3 and 4 report the results for the earlier and the later half of the sample, respectively. The ex post value premium is 7.0% per annum in the first half of the sample and is 2.5 standard errors from zero. However, the ex post value premium in the second half of the sample is insignificant, 3.3% per annum, which is within 1.3 standard errors from zero. The expected value premium shows more stability: 6.4% and 5.6% across the two samples, and both are estimated precisely. The full sample inferences on price momentum also are robust. Price momentum is profitable ex post in both subsamples: 7.2% and 7.6%, both of which are more than 2.9 standard errors from zero. However, the momentum profits continue to be slightly negative ex ante.

In contrast, earnings momentum earns an expected return of 1.8% in the earlier and 1.0% per annum in the later half of the sample. And the ex post average return spread continues to be three times larger. The expected return of the high-minus-low distress quintile is −9.1% in the first subsample and −7.3% in the second subsample, again consistent with the full sample inference. The subsample results for abnormal investment, asset growth, composite issuance, and net stock issues also are largely similar to those from the full sample. It should be noted that there is no problem in the long term for the dividend discounting model, as long as dividend policy stabilizes and the dividend yield continues to mean-revert. As such, the full sample estimates of the expected returns from the dividend discounting model are reasonably reliable.

4 Estimates from the Residual Income Model

We also estimate the expected returns using the approach of Gebhardt, Lee, and Swaminathan (2001), who calculate the costs of equity as the internal rates of return that equate the present value of expected future cash flows from the residual income model to the current stock price.

4.1 Estimation Procedure

We closely follow the Gebhardt, Lee, and Swaminathan (2001) procedure. In what follows we only sketch the basic procedure and refer the reader to their original paper for details. We compute the following finite horizon estimate of equity value for each firm:

$$P_t = B_t + \frac{FROE_{t+1} - r^{RI}}{1 + r^{RI}} B_t + \frac{FROE_{t+2} - r^{RI}}{(1 + r^{RI})^2} B_{t+1} + TV \qquad (12)$$

in which r^{RI} is the expected return estimate from the residual income model. Gebhardt et al. call r^{RI} the implied cost of equity. B_t is the book value from the most recent financial statement divided by the number of shares outstanding in the current month. $FROE_{t+i}$ is forecasted return on equity (ROE) for period $t+i$. For the first three years, we compute this variable as $FEPS_{t+i}/B_{t+i-1}$, in which $FEPS_{t+i}$ is the mean forecasted earnings per share (EPS) for year $t+i$ from Institutional Brokers' Estimate System (IBES). B_{t+i-1} is the book value per share for year $t+i-1$.

We use the mean analysts' one-year and two-year ahead earnings forecasts ($FEPS_{t+1}$ and $FEPS_{t+2}$) and the long-term growth rate estimate, denoted Ltg, from IBES to compute the three-year-ahead earnings forecast as $FEPS_{t+3} = FEPS_{t+2}(1+Ltg)$. Beyond the third year, we forecast $FROE$ using a linear interpolation to the industry median ROE. We compute $B_{t+i} = B_{t+i-1} + FEPS_{t+i} - FDPS_{t+i}$, in which $FDPS_{t+i}$ is the forecasted dividend per share for year $t+i$, estimated using current dividend payment ratio (k = dividends for the most recent fiscal year divided earnings over the same time period, $0 \leq k \leq 1$), i.e., $FDPS_{t+i} = k \times FEPS_{t+i}$. We forecast earnings up to 12 future years and estimate a terminal value TV for cash flows beyond year 12 ($T = 12$) as follows:

$$TV = \sum_{i=3}^{T-1} \frac{FROE_{t+i} - r^{RI}}{(1 + r^{RI})^i} B_{t+i-1} + \frac{FROE_{t+T} - r^{RI}}{r^{RI}(1 + r^{RI})^{T-1}} B_{t+T-1} \qquad (13)$$

We estimate the expected return, r^{RI}, for each firm in each month by substituting the forecasted future earnings, book values, and terminal values into equation (12) and solving for r^{RI} from the resulting nonlinear equation. For the book-to-market, abnormal investment, asset growth, composite issuance, and net stock issues portfolios that are annually rebalanced at the end of June of year t, we value-weight r^{RI} measured at the end of December of year $t-1$ across firms in each testing portfolio to obtain portfolio-level expected returns. This timing convention is natural: we match the expected returns at the end of year $t-1$ with ex post returns from July of year t to June of year $t+1$. The six-month lag between January and June of year t is imposed as in Fama and French (1993) to allow accounting information to be released to the market.

For the monthly rebalanced price momentum portfolios, for each month from July 1980 to June 2007, we sort all NYSE stocks on CRSP on the prior six-month realized returns and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five groups. We hold the portfolios for six months and value-weight the expected return, r^{RI}, across firms in a given portfolio for each month. Note that although r^{RI} is available monthly because P_t and $FEPS_t$ are updated monthly, r^{RI} is the expected future one-year return. The procedure for the earnings momentum portfolios is similar. For each month from January July 1980 to June 2007, we sort all NYSE stocks on their most recent past SUE, and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five groups. We hold the resulting portfolios for six months and calculate the value-weighted r^{RI} estimated for each month. For the monthly rebalanced F-prob portfolios, we sort all NYSE, Amex, and Nasdaq stocks on F-prob into five groups in each month from July 1980 to June 2007. We hold the portfolios for only one month and the portfolios are rebalanced monthly. For each portfolio, we calculate the value-weighted r^{RI} in each portfolio formation month.

4.2 Expected Return Estimates

Table 5 reports the estimates of the average expected returns from the residual income model for all the testing portfolios. Because the estimates require analysts earnings forecast data, the sample is smaller than that used to implement the dividend discounting model (see Tables 2 to 4). As such, we also report the average ex post returns for the testing portfolios for comparison. To preview the results, we find that except for the expected value and price momentum profits, the inferences from the residual income model differ from those from the dividend discounting model, often by a big margin.

The value premium estimate from the residual income model is reliable ex ante. The value quintile earns a higher expected return than the growth quintile: 12.9% vs. 7.5% per annum. And the expected value premium of 5.4% has a small standard error of 0.3%. The precision of the estimate contrasts with that of the average return. The value-minus-growth quintile earns an average return of 4.2% with a standard error of 2.4, meaning that the ex post value premium is only marginally significant ($t = 1.8$). This evidence is not surprising because analysts tend to follow larger, more well-known stocks and the value premium tends to be stronger in small firms.

The winner-minus-loser quintile earns an average return of 4.3% per annum, but is within 1.9 standard errors from zero. Consistent with the estimates from the dividend discounting model, the expected return of the zero-cost portfolio from the residual income model is -1.4%. As such, both valuation models suggest that price momentum does not exist ex ante. However, the two valuation models differ in their estimates of the expected earnings momentum profits. The high-minus-low earnings surprises portfolio earns an average ex post return of 3.4% per annum, which is more than three standard errors from zero. However, the expected return estimate from the residual income model is close to zero and insignificant. In contrast, this expected return from the dividend discounting model is estimated to be 1.4% per annum, which is about seven standard errors from zero.

The expected return of the distress anomaly also differs across the two valuation models. The ex post average return of the high-minus-low F-prob portfolio remains at -7.7% per annum, which is 3.5 standard errors from zero. As such, the ex post magnitude of the distress anomaly is not affected by the requirement of the analysts earnings forecast data. However, the residual income model predicts that the high distress quintile earns a higher expected return than the low distress quintile: 11.7% vs. 8.2%, and the expected return spread of 3.6% is more than 3.5 standard errors from zero. This evidence is consistent with Chava and Purnanandam (2008), who also show that more distressed firms require higher implied costs of equity than less distressed firms using the Gebhardt, Lee, and Swaminathan (2001) methods. As noted, the evidence contrasts with the estimates from the dividend discounting model (see Tables 2 to 4).

The high abnormal investment quintile continues to underperform the low abnormal investment quintile ex post by 4% per annum in the merged CRSP, Compustat, and IBES sample, and is more than 2.1 standard errors from zero. However, although going in the same direction, the implied cost of equity of the high abnormal investment quintile is lower than that of the low abnormal investment quintile by only 0.6% per annum. And the spread in the implied cost of equity is only about 15% in magnitude of the average return spread across the two extreme quintiles. In contrast, as shown in Tables 2 to 4, the expected return spreads from the dividend discounting model are comparable in magnitude with the average return spread.

The results for the asset growth, composite issuance, and net stock issues portfolios are largely similar. The average return of the high-minus-low asset growth quintile is -5.8% per annum, which is more than three standard errors from zero. However, albeit significant, the implied cost of equity of the zero-cost portfolio is -1% per annum, which is only about 17% in magnitude of the average return spread. The average return of the high-minus-low composite issuance portfolio is -4.5% per annum, and is more than four standard errors from zero. In contrast, the zero-cost portfolio has an implied cost of equity of only -0.5%, which is within 1.7 standard errors from zero and is about 11% in magnitude of the average return spread. Ex post, the high net stock issues quintile underperforms the low net stock issues quintile by 5.7% per annum, which is more than 2.5 standard errors from zero. Ex ante, however, the high net issues quintile requires an implied cost of equity that is higher than that of the low net issues portfolio by 0.1%, albeit insignificant.

5 Evaluating the Quality of Expected Return Estimates

The divergence in expected return inferences between the dividend discounting model and the residual income model rises a natural question: which model delivers expected return estimates that are more informative about future cross-sectional variation in stock returns? We evaluate the quality of an expected return proxy through its association with future realized returns. Our idea is simple. We perform Fama-MacBeth (1973) cross-sectional regressions of future realized returns on different expected return proxies and examine which proxy has stronger explanatory power of future returns, with and without additional controls. The basic idea is similar to that of Easton and Monahan (2005), but our empirical method is much simpler. To preview the results, the expected return from the dividend discount model has higher quality than that from the residual income model.

The cross-sectional regressions are conducted on 40 testing portfolios, which are one-way quintiles formed on book-to-market, prior six-month returns, earnings surprises, failure probability, abnormal investment, asset growth, composite issuance, and net stock issues. We use three separate dependent variables: monthly realized returns, annual realized returns, and three-year realized returns. In all cases we regress future returns on expected return estimates measured at the beginning of the return holding period, with and without controls that also are measured at the beginning of the holding period. Monthly realized returns are used in monthly cross-sectional regressions, but annual and three-year returns are used in annual cross-sectional regressions.

Panel A of Table 6 shows that the expected return from the dividend discounting model, r_t^{DD}, is a reliable predictor of future returns. In monthly cross-sectional regressions the slope of r_t^{DD} is 0.08, which is four standard errors from zero. The slope also is within 0.2 standard errors from 1/12, meaning that r_t^{DD} at the beginning of month t is an unbiased predictor of the average return from the beginning of month t to t+1. Controlling for size, book-to-market, and prior six-month returns does not affect the magnitude or the unbiasedness of the slope estimate. r_t^{DD} also dominates size and book-to-market, both of which have insignificant slopes, but the slope of the prior returns is positive and significant. In annual cross-sectional regressions of annual realized returns, r_t^{DD} remains significant and unbiased, meaning that its slope is not reliably different from one. r_t^{DD} continues to dominate size and book-to-market, but prior returns remain important in cross-sectional regressions. Annual cross-sectional regressions of three-year realized returns show that r_t^{DD} is biased in the sense that the slope is reliably different from three. This evidence suggests time-varying expected returns. The true expected returns are likely to vary over the course of three years. As such, lagged expected return estimates are unlikely to provide up-to-date information about realized returns.

Panel B shows that the implied cost of equity, r_t^{RI}, is largely unbiased. In monthly regressions the slope is 0.08 but with a large standard error ($t = 1.84$). Similar to r_t^{DD}, r_t^{RI} also dominates size and book-to-market in cross-sectional regressions, but short-term prior returns remain significant. Although r_t^{RI} remains unbiased in annual cross-sectional regressions with annual realized returns, the magnitude of its slope is small, 0.18, when it is used alone. Similarly, the slope in annual cross-sectional regressions with three-year realized returns is 1.70, which is much smaller than, but not reliably different from, three. The evidence suggests that r_t^{RI} is estimated less precisely than r_t^{DD}.

More important, Panel C reports horse races between the two expected return estimates in explaining the future cross-sectional variation of average stock returns. In direct bivariate horse races, the expected return from the dividend discounting model, r_t^{DD}, seems to dominate the expected return from the residual income model, r_t^{RI}. In particular, in annual cross-sectional regressions with annual realized returns, the slope of r_t^{DD} is 0.67, which is more than 3.8 standard errors from zero. In contrast, the slope of r_t^{RI} is only 0.06, which is within 0.2 standard errors from zero. However, r_t^{RI} shows some predictive power when we include additional controls into the regressions.

6 Conclusion

Using the dividend discounting model and the residual income model, we estimate the expected returns of zero-cost trading strategies based on a wide range of anomaly variables. The list includes book-to-market equity, composite issuance, net stock issues, abnormal corporate investment, asset growth, price momentum, earnings surprises, and financial distress. Our central message is that the dividend discounting model delivers precise expected return estimates that are largely similar in magnitude with average ex post returns (except for price momentum), but that the residual income model delivers substantially different estimates.

Both valuation models agree that the value premium is reliable ex ante, but that price momentum is not. The two models disagree strongly about the ex ante profitability of the high-minus-low distress portfolio. The dividend discounting model suggests that the expected return is reliably negative, and has a magnitude similar to that of the average ex post return. But the residual income model suggests that the expected return is reliably positive, in contrast to the significantly negative average ex post return. The dividend discounting model also suggests that the ex ante profits of the trading strategies based on earnings surprises, abnormal investment, asset growth, composite issuance, and net stock issues are reliable. But the residual income model suggests that these ex ante profits are nonexistent, and that even if they do, the magnitudes are much smaller than those of the average ex post returns. Motivated from the different inferences, we conduct horse races between the two types of expected return estimates and find evidence that the estimates from the dividend discounting model dominate the estimates from the residual income model in accounting for the future cross-sectional variation of stock returns in the context of cross-sectional regressions.

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Table 1 : Descriptive Statistics

This table presents the descriptive statistics including the mean, standard deviation, min, 25% percentile, median, 75% percentile, and max for the anomaly variables. We also report the sample period and the time series average of the number of firms in the cross-section for each sample that corresponds to one anomaly variable. Book-to-market equity is the book equity divided by the market equity at the end of fiscal year, in which the book equity is measured as in Fama and French (1993). Composite issuance is the cumulative log five-year growth rate of total market equity minus the cumulative log five-year stock return. Net stock issues are the natural log of the ratio of the split-adjusted shares outstanding at the fiscal yearend in $t-1$ divided by the split-adjusted shares outstanding at the fiscal yearend in $t-2$. Abnormal investment is the deviation of the current year investment-to-sales ratio from the benchmark as the past three-year moving average investment-to-sales. Asset growth is the percentage change in total assets from fiscal yearend of $t-2$ to $t-1$. Prior returns are prior six-month returns at each portfolio formation month. Earnings surprise is the unexpected earnings defined as the most recent quarterly earnings per share minus earnings per share four quarters ago divided by the standard deviation of the unexpected earnings from the prior eight quarters. The distress measure is constructed as in Compbell, Hilscher, and Szilagyi (2008) and the failure probability (F-prob, in percent) is calculated as $1/[1+\exp(-\text{Distress})]$. Section 2 provides more detailed variable definitions.

	Sample period	Average no. of firms	Mean	Std	Min	25%	Median	75%	Max
Panel A: Sample for estimating expected returns from the dividend discounting model									
Book-to-market	1965–2007	4247	3.34	50.26	0.00	0.46	0.79	1.25	2541.86
Composite issuance	1965–2007	1648	−0.05	0.43	−3.05	−0.22	−0.08	0.11	3.00
Net stock issues	1965–2007	2458	0.08	0.18	0.00	0.00	0.02	0.07	2.93
Abnormal investment	1965–2007	2051	0.20	4.20	−163.22	0.04	0.16	0.33	54.34
Asset growth	1965–2007	3239	0.18	1.12	−0.80	−0.01	0.08	0.20	52.56
Prior returns	1965–2007	4695	0.08	0.40	−0.85	−0.13	0.03	0.22	6.72
Earnings surprises	1977–2007	3539	0.21	23.84	−203.50	−0.56	0.08	0.68	1399.23
Distress	1975–2007	3904	−7.57	0.89	−9.65	−8.20	−7.73	−7.13	−3.75
F-prob (in percent)			0.11	0.24	0.01	0.03	0.05	0.09	4.58
Panel B: Sample for estimating expected returns from the residual income model									
Book-to-market	1980–2007	2109	2.46	26.10	0.00	0.38	0.64	0.98	1012.02
Composite issuance	1980–2007	1246	−0.01	0.42	−3.32	−0.20	−0.05	0.14	2.83
Net stock issues	1980–2007	1411	0.07	0.15	0.00	0.01	0.02	0.07	2.45
Abnormal investment	1980–2007	1375	0.18	7.21	−254.06	0.07	0.22	0.41	39.45
Asset growth	1980–2007	1625	0.21	0.71	−0.66	0.02	0.10	0.23	19.41
Prior returns	1980–2007	2230	0.09	0.33	−0.80	−0.09	0.06	0.22	3.84
Earnings surprises	1980–2007	1885	−0.10	3.25	−73.17	−0.61	0.06	0.65	33.34
Distress	1980–2007	1929	−7.80	0.70	−9.55	−8.28	−7.90	−7.44	−4.13
F-prob (in percent)			0.06	0.12	0.01	0.03	0.04	0.06	2.69

Table 2 : Averages of Realized Returns, Expected Returns, Dividend Yields, and Long-Term Dividend Growth Rates, the Dividend Discounting Model, the Full Sample

We report the average realized return, $\bar{r}$, the average expected return, $E[r_t^{DD}]$, the average dividend yields, $E[D/P]$, and the average long-term dividend growth rate, $E[Ag]$, estimated with the dividend discounting model. In June of each year t, we sort all NYSE stocks on a given anomaly variable such as book-to-market equity, composite issuance, net stock issues, abnormal investment, and asset growth at the fiscal year-end of $t-1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five quintiles. Value-weighted portfolio returns are calculated from July of year t to June of year t+1. In Panel B we sort all NYSE stocks each month on the prior six-month returns (and the most recent Standardized Unexpected Earnings) and use the NYSE breakpoints to split all stocks into five groups. We hold the portfolios for six months and calculate the value-weighted returns. In Panel C we follow Campbell, Hilscher, and Szilagyi (2008) and sort all stocks on failure probability (F-prob) into five portfolios. For each portfolio we calculate the one-year value-weighted returns. Section 2 contains detailed variable definitions. "H−L" denotes the high-minus-low portfolios and "ste" denotes heteroscedasticity-and-autocorrelation-consistent standard errors. The sample for the earnings surprises portfolios is from January 1977 to December 2007, the sample for the F-prob portfolios is from July 1975 to December 2007, and the sample for all the other portfolios is from January 1965 to December 2007. All entries other than the standard errors are in annualized percent.

	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$
	Panel A: The value anomaly				Panel B: The momentum anomalies								Panel C: The distress anomaly			
	Book-to-market				Prior returns				Earnings surprises				F-prob			
Low	11.2	9.4	2.1	7.3	8.6	8.6	2.9	5.6	12.7	10.7	3.3	7.3	14.4	13.4	3.0	10.4
2	12.3	12.2	3.4	8.8	12.1	10.4	3.7	6.7	13.0	10.5	3.5	7.0	13.6	10.7	3.6	7.1
3	13.0	11.6	4.2	7.4	11.7	10.6	3.7	6.9	13.9	10.1	3.5	6.6	13.3	12.2	3.9	8.3
4	15.1	14.0	4.9	9.2	12.6	11.8	3.4	8.4	15.8	12.1	3.3	8.8	12.5	11.1	3.3	7.8
High	16.4	15.4	4.7	10.7	15.7	8.3	2.5	5.7	16.6	12.1	3.2	8.8	7.5	5.2	1.4	3.8
H−L	5.2	6.0	2.7	3.3	7.1	−0.3	−0.4	0.1	3.9	1.4	−0.1	1.5	−6.9	−8.2	−1.6	−6.6
ste	2.0	0.1	0.3	0.2	1.6	0.1	0.1	0.0	0.8	0.2	0.0	0.2	1.9	0.1	0.1	0.1
	Panel D: The investment and asset growth anomalies								Panel E: The external financing anomalies							
	Abnormal investment				Asset growth				Composite issuance				Net stock issues			
Low	14.4	13.1	4.0	9.1	15.7	14.7	3.6	11.1	14.1	12.8	5.1	7.7	11.9	11.4	3.4	8.0
2	13.8	11.9	4.6	7.3	13.0	12.4	4.1	8.3	13.5	12.1	4.1	8.0	11.8	11.8	3.1	8.7
3	13.0	11.4	4.1	7.3	12.1	10.8	3.8	7.0	11.8	10.5	3.3	7.3	14.2	9.8	2.9	6.9
4	12.2	12.5	3.2	9.3	12.6	11.8	3.1	8.8	11.8	11.2	2.6	8.5	11.0	11.1	3.2	8.0
High	10.7	9.7	2.1	7.7	10.7	9.2	2.0	7.3	9.9	9.6	2.7	6.9	8.5	8.8	3.5	5.3
H−L	−3.9	−3.3	−1.9	−1.4	−5.0	−5.5	−1.6	−3.9	−4.2	−3.2	−2.4	−0.8	−3.4	−2.6	0.1	−2.7
ste	1.9	0.4	0.2	0.2	1.8	0.2	0.1	0.1	1.5	0.2	0.2	0.1	1.5	0.1	0.2	0.2

Table 3 : Averages of Realized Returns, Expected Returns, Dividend Yields, and Long-Term Dividend Growth Rates, the Dividend Discounting Model, Subsample Analysis Based on the First Half of the Sample

We report the average realized return, $\bar{r}$, the average expected return, $E[r_t^{DD}]$, the average dividend yields, $E[D/P]$, and the average long-term dividend growth rate, $E[Ag]$, estimated with the dividend discounting model. In June of each year t, we sort all NYSE stocks on a given anomaly variable such as book-to-market equity, composite issuance, net stock issues, abnormal investment, and asset growth at the fiscal year-end of $t{-}1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five quintiles. Value-weighted portfolio returns are calculated from July of year t to June of year $t{+}1$. In Panel B we sort all NYSE stocks each month on the prior six-month returns (and the most recent Standardized Unexpected Earnings) and use the NYSE breakpoints to split all stocks into five groups. We hold the portfolios for six months and calculate the value-weighted returns. In Panel C we follow Campbell, Hilscher, and Szilagyi (2008) and sort all stocks on failure probability (F-prob) into five portfolios. For each portfolio we calculate the one-year value-weighted returns. Section 2 contains detailed variable definitions. Section 2 contains detailed variable definitions. "H−L" denotes the high-minus-low portfolios and "ste" denotes heteroscedasticity-and-autocorrelation-consistent standard errors that test a given moment for H−L is zero. The sample for earnings surprises portfolios is from January 1977 to June 1991, the sample for F-prob portfolios is from July 1975 to June 1990, and the sample for all the other portfolios is from January 1965 to December 1986. All table entries other than the standard errors are in annualized percent.

	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$
	Panel A: The value anomaly				Panel B: The momentum anomalies								Panel C: The distress anomaly			
	Book-to-market				Prior returns				Earnings surprises				F-prob			
Low	11.1	10.2	2.5	7.7	9.7	9.5	4.0	5.5	14.5	11.5	4.7	6.8	15.5	14.1	4.1	10.0
2	11.8	12.9	4.3	8.6	11.9	11.7	4.8	6.9	14.2	11.4	5.0	6.3	15.5	12.0	4.9	7.1
3	12.8	12.5	5.4	7.1	11.2	11.6	4.7	6.9	15.4	11.3	5.0	6.3	14.2	13.1	5.4	7.7
4	15.3	15.0	6.2	8.9	13.4	12.6	4.3	8.3	17.1	12.8	4.7	8.2	14.5	12.3	4.8	7.5
High	18.1	16.6	5.8	10.8	16.9	9.0	3.4	5.7	18.7	13.4	4.6	8.7	9.6	4.9	2.2	2.7
H−L	7.0	6.4	3.3	3.1	7.2	−0.5	−0.7	0.2	4.2	1.8	−0.1	1.9	−5.9	−9.1	−1.9	−7.2
ste	2.8	0.1	0.5	0.4	2.2	0.2	0.1	0.0	1.4	0.2	0.1	0.2	2.3	0.1	0.1	0.1
	Panel D: The investment and asset growth anomalies								Panel E: The external financing anomalies							
	Abnormal investment				Asset growth				Composite issuance				Net stock issues			
Low	14.7	14.8	5.2	9.6	17.3	15.7	4.6	11.1	13.8	14.1	6.2	7.9	10.3	12.2	4.3	7.9
2	14.5	13.8	5.9	7.9	12.5	14.0	5.2	8.9	13.5	13.4	5.2	8.2	11.4	12.4	3.7	8.7
3	12.7	12.5	5.3	7.2	12.1	11.9	4.8	7.1	11.1	11.3	4.3	7.1	13.5	10.5	3.7	6.8
4	11.2	12.9	4.1	8.8	12.0	12.3	3.9	8.4	10.7	11.7	3.4	8.2	11.8	11.6	4.1	7.5
High	9.9	10.2	2.7	7.5	10.7	9.7	2.6	7.1	8.7	10.1	3.3	6.8	9.0	10.0	4.6	5.4
H−L	−5.4	−4.6	−2.5	−2.1	−6.7	−6.1	−2.0	−4.0	−5.1	−4.0	−2.9	−1.1	−1.3	−2.2	0.4	−2.6
ste	3.4	0.2	0.1	0.1	2.9	0.2	0.1	0.1	2.4	0.2	0.1	0.1	1.6	0.1	0.2	0.3

Table 4 : Averages of Realized Returns, Expected Returns, Dividend Yields, and Long-Term Dividend Growth Rates, the Dividend Discounting Model, Subsample Analysis Based on the Second Half of the Sample

We report the average realized return, $\bar{r}$, the average expected return, $E[r_t^{DD}]$, the average dividend yields, $E[D/P]$, and the average long-term dividend growth rate, $E[Ag]$, estimated with the dividend discounting model. In June of each year t, we sort all NYSE stocks on a given anomaly variable such as book-to-market equity, composite issuance, net stock issues, abnormal investment, and asset growth at the fiscal year-end of $t-1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five quintiles. Value-weighted portfolio returns are calculated from July of year t to June of year t+1. In Panel B we sort all NYSE stocks each month on the prior six-month returns (and the most recent Standardized Unexpected Earnings) and use the NYSE breakpoints to split all stocks into five groups. We hold the portfolios for six months and calculate the value-weighted returns. In Panel C we follow Campbell, Hilscher, and Szilagyi (2008) and sort all stocks on failure probability (F-prob) into five portfolios. For each portfolio we calculate the one-year value-weighted returns. Section 2 contains detailed variable definitions. "H−L" denotes the high-minus-low portfolios and "ste" denotes heteroscedasticity-and-autocorrelation-consistent standard errors that test a given moment for H−L is zero. The sample for earnings surprises portfolios is from January 1991 to December 2007, the sample for F-prob portfolios is from January 1990 to December 2007, and the sample for all the other portfolios is from January 1987 to December 2007. All table entries other than the standard errors are in annualized percent.

	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$	$\bar{r}$	$E[r_t^{DD}]$	$E[D/P]$	$E[Ag]$
	Panel A: The value anomaly				Panel B: The momentum anomalies								Panel C: The distress anomaly			
	Book-to-market				Prior returns				Earnings surprises				F-prob			
Low	11.4	8.6	1.7	6.9	6.9	7.7	1.9	5.8	10.9	9.8	2.0	7.8	13.5	12.7	1.9	10.8
2	12.7	11.6	2.5	9.1	11.9	9.2	2.7	6.5	11.7	9.6	2.0	7.6	11.7	9.5	2.3	7.2
3	13.2	10.7	3.1	7.7	11.8	9.6	2.8	6.9	12.4	9.0	2.0	6.9	12.4	11.3	2.4	8.9
4	14.9	13.0	3.5	9.5	11.5	11.0	2.6	8.5	14.5	11.4	1.9	9.5	10.7	10.0	1.9	8.1
High	14.7	14.2	3.7	10.6	14.5	7.6	1.8	5.8	14.5	10.8	1.8	8.9	5.7	5.4	0.6	4.8
H−L	3.3	5.6	2.0	3.6	7.6	−0.1	−0.1	0.0	3.6	1.0	−0.1	1.1	−7.8	−7.3	−1.3	−6.0
ste	2.7	0.1	0.3	0.2	2.6	0.1	0.1	0.0	1.0	0.1	0.0	0.1	3.0	0.1	0.1	0.1
	Panel D: The investment and asset growth anomalies								Panel E: The external financing anomalies							
	Abnormal investment				Asset growth				Composite issuance				Net stock issues			
Low	14.2	11.4	2.8	8.6	14.0	13.7	2.6	11.1	14.5	11.5	4.0	7.5	13.6	10.7	2.6	8.1
2	13.3	10.1	3.4	6.7	13.4	10.8	3.1	7.7	13.5	10.9	3.1	7.9	12.1	11.1	2.4	8.7
3	13.3	10.4	3.0	7.4	12.0	9.7	2.8	6.9	12.4	9.7	2.3	7.5	15.0	9.2	2.1	7.1
4	13.2	12.2	2.4	9.8	13.2	11.4	2.2	9.2	12.9	10.7	1.8	8.8	10.2	10.6	2.2	8.4
High	11.5	9.3	1.5	7.8	10.7	8.8	1.4	7.4	11.2	9.0	2.0	7.0	8.1	7.6	2.4	5.3
H−L	−2.7	−2.1	−1.3	−0.7	−3.3	−4.9	−1.3	−3.7	−3.3	−2.5	−2.0	−0.5	−5.5	−3.0	−0.2	−2.8
ste	2.1	0.3	0.1	0.1	2.1	0.1	0.2	0.1	1.7	0.2	0.1	0.1	2.3	0.1	0.1	0.1

Table 5 : Averages of Realized Returns and Expected Stock Returns, the Residual Income Model, January 1980 to December 2007

We report the average realized returns, $\bar{r}$, and the average expected stock returns estimated as the implied costs of equity from the residual income model, $E[r^{RI}]$, for all the testing portfolios. In June of each year t, we sort all NYSE stocks on a given anomaly variable such as book-to-market equity, composite issuance, net stock issues, abnormal investment, and asset growth at the fiscal year-end of $t-1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five quintiles. Value-weighted portfolio returns are calculated from July of year t to June of year $t+1$. In Panel B we sort all NYSE stocks each month on the prior six-month returns (and the most recent Standardized Unexpected Earnings) and use the NYSE breakpoints to split all stocks into five groups. We hold the portfolios for six months and calculate the value-weighted returns. In Panel C we follow Campbell, Hilscher, and Szilagyi (2008) and sort all stocks on failure probability (F-prob) into five portfolios. For each portfolio we calculate the one-year value-weighted returns. Section 2 contains detailed variable definitions. "H−L" denotes the high-minus-low portfolios and "ste" denotes heteroscedasticity-and-autocorrelation-consistent standard errors that test a given moment for H−L is zero. All table entries other than the standard errors are in annualized percent.

	Book-to-market		Prior returns		Earnings surprises		F-prob	
	$\bar{r}$	$E[r^{RI}]$	$\bar{r}$	$E[r^{RI}]$	$\bar{r}$	$E[r^{RI}]$	$\bar{r}$	$E[r^{RI}]$
Low	13.6	7.5	11.8	10.1	12.4	9.1	14.2	8.2
2	13.8	8.9	15.0	9.5	12.7	9.3	13.6	9.2
3	14.8	9.8	14.3	9.2	13.2	9.1	14.0	10.3
4	15.9	10.8	14.2	8.9	15.1	8.9	12.7	11.2
High	17.8	12.9	16.6	8.7	15.8	9.0	6.5	11.7
H−L	4.2	5.4	4.3	−1.4	3.4	−0.0	−7.7	3.6
ste	2.4	0.3	2.3	0.1	1.0	0.1	2.2	0.1
	Abnormal investment		Asset growth		Composite issuance		Net stock issues	
	$\bar{r}$	$E[r^{RI}]$	$\bar{r}$	$E[r^{RI}]$	$\bar{r}$	$E[r^{RI}]$	$\bar{r}$	$E[r^{RI}]$
Low	15.8	9.4	17.1	9.5	15.8	9.8	15.1	9.0
2	14.8	9.2	14.3	9.2	15.1	8.8	13.1	8.8
3	15.2	9.1	13.6	8.9	14.3	8.9	16.7	9.1
4	15.6	8.9	14.5	8.6	14.1	9.0	12.7	9.2
High	11.7	8.8	11.4	8.5	11.3	9.2	9.4	9.1
H−L	−4.0	−0.6	−5.8	−1.0	−4.5	−0.5	−5.7	0.1
ste	1.9	0.3	1.9	0.3	1.1	0.3	2.2	0.1

Table 6 : Fama-MacBeth Cross-Sectional Regressions of Future Realized Returns on Expected Return Estimates

We conduct cross-sectional regressions of future realized returns on expected return estimates using 40 testing portfolios including one-way quintiles on book-to-market equity, prior six-month returns, earnings surprises, failure probability, abnormal investment, asset growth, composite issuance, and net stock issues. In June of each year t, we sort all NYSE stocks on book-to-market, composite issuance, net stock issues, abnormal investment, and asset growth at the fiscal year-end of $t-1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into five quintiles. Value-weighted portfolio returns are calculated from July of year t to June of year $t+1$. We also sort all NYSE stocks each month on the prior six-month returns (and the most recent SUE) and use the NYSE breakpoints to split all stocks into five groups. We hold the portfolios for six months and calculate the value-weighted returns. We sort all stocks on failure probability (F-prob) into five portfolios, and calculate the one-year value-weighted returns for each portfolio. Section 2 contains detailed variable definitions. Monthly cross-sectional regressions of monthly realized returns are performed on the expected return estimated from the dividend discounting model, r_t^{DD} (Panel A), or the expected return estimated from the residual income model, r_t^{RI} (Panel B), or both (Panel C). Int. is the regression intercept, r^6 is prior six-month returns, $\log(B/M)$ is the logarithm of book-to-market equity, and $\log(ME)$ is the logarithm of market capitalization. R^2 is the cross-sectional regression R-squared. t is t-statistics testing that a given coefficient equals zero, and $t_{\text{Bias}=0}$ is t-statistics testing that the slope of r_t^{DD} or r_t^{RI} equals 1/12. Annual cross-sectional regressions using 12-month and 36-month future realized returns on explanatory variables measured at the beginning of the return holding period also are reported. $t_{\text{Bias}=0}$ tests that the slope of r_t^{DD} or r_t^{RI} equals one for 12-month returns and three for 36-month returns.

	Panel A: Expected return estimates from the dividend discounting model						Panel B: Expected return estimates from the residual income model						Panel C: Horse races						
	Int.	r_t^{DD}	r^6	$\log(B/M)$	$\log(ME)$	R^2	Int.	r_t^{RI}	r^6	$\log(B/M)$	$\log(ME)$	R^2	Int.	r_t^{DD}	r_t^{RI}	r^6	$\log(B/M)$	$\log(ME)$	R^2
	Monthly realized returns as the dependent variable																		
	0.00	0.08				0.11	0.00	0.08				0.09	0.00	0.06	0.07				0.11
t	0.82	4.00					0.70	1.84					−0.39	4.85	1.57				
$t_{\text{Bias}=0}$		−0.15						−0.01											
	0.00	0.06	0.01	0.00	0.00	0.32	−0.02	0.18	0.01	0.00	0.00	0.40	−0.02	0.04	0.17	0.01	0.00	0.00	0.41
t	0.76	3.63	2.79	1.07	−0.06		−1.94	4.40	1.97	−0.31	2.08		−1.96	4.22	3.94	1.24	−0.61	1.84	
$t_{\text{Bias}=0}$		−1.64						2.40											
	12-month realized returns as the dependent variable																		
	0.05	0.91				0.13	0.12	0.18				0.20	0.06	0.67	0.06				0.30
t	1.27	4.60					1.84	0.29					1.05	3.82	0.11				
$t_{\text{Bias}=0}$		−0.44						−1.37											
	0.04	0.59	0.17	0.00	0.00	0.41	−0.09	0.93	0.18	0.00	0.02	0.43	−0.08	0.48	0.67	0.11	0.00	0.01	0.46
t	0.53	3.23	4.82	−0.29	0.48		−1.11	3.60	4.17	0.28	1.81		−0.97	3.25	2.67	3.52	−1.29	1.46	
$t_{\text{Bias}=0}$		−2.23						−0.27											
	36-month realized returns as the dependent variable																		
	0.33	1.49				0.14	0.33	1.70				0.17	0.24	1.03	1.48				0.26
t	3.38	2.47					1.84	1.18					1.39	2.56	1.04				
$t_{\text{Bias}=0}$		−2.50						−0.91											
	0.52	1.03	0.44	0.00	−0.03	0.37	0.20	2.07	0.48	0.00	0.01	0.34	0.25	0.62	0.00	0.35	0.37	−0.01	
t	4.24	1.74	3.50	−0.70	−1.43		0.74	2.29	4.48	−0.47	0.20		1.06	2.98	0.00	4.27	48.02	−0.19	
$t_{\text{Bias}=0}$		−3.30						−1.03											