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ABSTRACT

We estimate accounting-based expected returns to zero-cost trading strategies formed on a wide array of anomaly variables in capital markets research, including book-to-market, size, composite issuance, net stock issues, abnormal investment, asset growth, investment-to-assets, accruals, standardized unexpected earnings, failure probability, return on assets, and short-term prior returns. The results are striking: the inferences vary dramatically across different expected return estimates, which in turn frequently differ from their average realized returns. The evidence suggests that either most anomalies do not exist ex ante, or that the current generation of expected return models leaves much to be desired.

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1 Introduction

Capital markets anomalies are empirical relations between average returns and firm characteristics not explained by standard asset pricing models such as the Sharpe (1964) and Lintner (1965) Capital Asset Pricing Model. Over the past two decades, anomalies have become increasingly important in asset allocation, capital budgeting, security analysis, and many other applications. Understanding the sources of anomalies has become one of the most important questions in finance and accounting.

We use the dividend discounting model and the residual income model to estimate expected returns for zero-cost trading strategies formed on a comprehensive list of anomaly variables in capital markets research. The list includes book-to-market, size, composite issuance, net stock issues, abnormal investment, asset growth, investment-to-assets, accruals, standardized unexpected earnings, failure probability, return on assets, and short-term prior returns.

Under the dividend discounting model, the expected return is the expected dividend yield plus the expected rate of capital gain. If the dividend-to-price ratio is stationary, the compounded rate of dividend growth should converge to the compounded rate of capital gain in a long sample period. The sum of the expected dividend yield and the expected dividend growth provides an estimate for the expected return (e.g., Fama and French (2002)).

Under the residual income model, the expected return can be 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)). Because the baseline residual income model relies on analysts earnings forecasts that are limited to a small sample of firms and that are likely even biased, we also modify Gebhardt et al.'s procedure for estimating the expected returns. In particular, instead of using analysts earnings forecasts, we forecast future returns on assets using cross-sectional regressions similar to those in Fama and French (2006) (see also Hou, Dijk, and Zhang (2009)).

In addition to the implied costs of equity estimation, we also implement the residual income model using the methods developed in Easton, Taylor, Shroff, and Sougiannis (2002), Easton (2006), and Easton and Sommers (2007). These papers criticize the implied costs of equity on the ground that the assumed growth rates beyond the short forecast horizon can be inconsistent with the growth rates in the data. They also propose methods that can estimate the expected returns and the implied growth rates for a portfolio simultaneously. The key built-in assumption underlying these methods is that the residual earnings grow at a constant rate as in a perpetuity.

Our central message is that the inferences vary dramatically across different expected return estimates, which in turn often differ from average return estimates. For the dividend discounting model, expected return spreads across anomalies-based portfolios have magnitudes that are close to average return spreads. However, unlike the mostly significant average return spreads, the expected return spreads are mostly insignificant. As such, the expected returns are even more imprecise than average returns. For example, the high-minus-low net stock issues quintile has an average return of -6.8% per annum, which is almost four standard errors from zero. However, although this zero-cost quintile earns an expected return of -5.9%, it is only 1.6 standard errors from zero. From subsample analysis, dividend nonstationarity affects the expected return estimates. The estimates in early sample are higher in magnitude than those in the more recent sample, in which none of the zero-cost strategies have significant expected returns.

For the implied costs of equity, the value premium estimates vary from 6.3% to 8.5% per annum, which are all more than eight standard errors from zero. These expected return estimates are close to the average return estimate of 5.2% (t = 2.2). However, for the remaining anomaly variables, the average return and the expected return estimates differ greatly both in terms of economic magnitude and statistical significance. In particular, the expected return estimates for the high-minus-low quintiles formed on standardized unexpected earnings, failure probability, return on assets, and prior six-month returns all have the opposite sign as their average return estimates.

For the methods that estimate expected returns and implied growth rates simultaneously, we find that these methods often predict growth rate spreads across the testing portfolios that go in the opposite direction as the growth rate spreads observed in the data. For example, in the data value firms have higher dividend growth rates than growth firms. The spread is 5.6% per annum, which is significant. In contrast, the methods in question all predict counterfactually that value firms have significantly lower growth rates than growth firms. As a result, these methods all predict expected return spreads across the testing portfolios that go in the opposite direction as their average return spreads. The counterfactual prediction on the implied growth rates casts doubt on the validity of these methods for estimating expected returns.

We also evaluate the relative quality of different expected return estimates through their associations with future realized returns (e.g, Easton and Monahan (2005); Guay, Kothari, and Shu (2005)). However, the evidence from Fama-MacBeth (1973) cross-sectional regressions does not give a clear-cut ranking of different estimates. The associations between dividend discounting estimates and future returns are significantly positive, but the associations between the other estimates and future returns are mostly insignificant. However, the other estimates forecast future returns with higher cross-sectional R^2s than the dividend discounting estimates.

Our work contributes to the anomalies literature. The literature has developed almost exclusively with average realized returns as the expected return proxy. Despite its popularity, this approach is potentially problematic. First, Fama and French (1997) show that expected return estimates from average realized returns are imprecise because of large standard errors in estimating factor loadings and factor risk premiums. Second, in finite samples average returns might not converge to expected returns, and inferences based on average returns might not apply to expected returns (e.g., Elton (1999)). Finally, the time-variation in expected returns often works against the convergence of average realized returns to the expected return (e.g., Campello, Chen, and Zhang (2008)). As a fundamental departure from the bulk of the anomalies literature, we provide the first comprehensive study of ex ante expected returns for anomalies-based trading strategies.

Our work also expands the literature that uses valuation models to estimate expected returns in finance and accounting. Many studies calculate expected returns from analysts earnings forecasts under the residual income model (e.g., Claus and Thomas (2001); Gebhardt, Lee, and Swaminathan (2001); Pastor, Sinha, and Swaminathan (2008); Chava and Purnanandam (2008)). As noted, Easton, Taylor, Shroff, and Sougiannis (2002), Easton (2006), and Easton and Sommers (2007) implement the residual income model by estimating the expected returns and the implied growth rates simultaneously at the portfolio level. Francis, LaFond, Olsson, and Schipper (2004) and Brav, Lehavy, and Michaely (2005) use Value Line analysts expectations to estimate expected returns. We complement these studies by examining the expected returns to anomalies-based trading strategies using a variety of popular estimation methods in the literature.

The rest of the paper is organized as follows. Section 2 describes our data. Section 3 delineates expected return models. Section 4 presents our empirical results. Finally, Section 5 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 2008. The sample size varies across 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.

2.1 Anomaly Variables

We examine a wide array of anomaly variables. To facilitate comparison, we closely follow the prior literature in defining these variables (see Appendix A for detailed variable definitions).

Book-to-market (B/M). High B/M stocks earn higher average returns than low B/M stocks (e.g., Rosenberg, Reid, and Lanstein (1985); Fama and French (1993); Lakonishok, Shleifer, and

Vishny (1994)). We follow Fama and French in measuring this anomaly variable.

Size (ME). Small firms earn higher average returns than big firms (e.g., Banz (1981)). ME is the market equity (price per share times shares outstanding) from CRSP.

Firms that issue new equity underperform, and firms that buy back shares outperform matching firms with similar characteristics in the future three to five years (e.g., Ritter (1991); Loughran and Ritter (1995); Ikenberry, Lakonishok, and Vermaelen (1995); Michaely, Thaler, and Womack (1995)). The next two variables summarize the external financing anomalies.

Composite issuance (CI). From Daniel and Titman (2006), CI measures the part of firm growth in market equity that is not due to stock returns.

Net stock issues (NSI). From Fama and French (2008), NSI measures the annual change in the logarithm of the number of real shares outstanding, which adjusts for distribution events such as splits and rights offerings.

Abnormal investment (AI). Titman, Wei, and Xie (2004) show that firms with abnormally high investment earn lower average returns than firms with abnormally low investment. AI is the deviation of the current year's investment from the benchmark investment, which is defined as the past three-year moving average of investment.

Asset growth (AG). Cooper, Gulen, and Schill (2008) show that firms with high asset growth earn lower average returns than firms with low asset growth. AG is measured as the annual percentage change in total assets.

Investment-to-assets (I/A). Lyandres, Sun, and Zhang (2008) show that high I/A firms earn lower average returns than low I/A firms. We measure I/A as the annual change in gross property, plant, and equipment (Compustat annual item PPEGT) plus the annual change in inventory (item INVT) divided by the lagged total assets (item AT).

Accruals (AC). Sloan (1996) shows that high AC firms earn lower average returns than low AC

firms. Following Sloan, we measure AC as changes in non-cash working capital minus depreciation expense scaled by average total assets.

Standardized Unexpected Earnings (SUE). High SUE stocks earn higher average returns than low SUE stocks (e.g., Ball and Brown (1968); Bernard and Thomas (1989); Chan, Jegadeesh, and Lakonishok (1996)). The definition of SUE for stock i in month t is $(e_{iq} - e_{iq-4})/\sigma_{it}$, where e_{iq} is the most recently announced quarterly earnings per share (Compustat quarterly item EPSPIQ) as of month t for stock i, e_{iq-4} is earnings per share announced four quarters ago, and σ_{it} is the volatility of $e_{iq} - e_{iq-4}$ over the prior eight quarters.

Failure probability (FP). The financial distress anomaly says that more distressed firms earn abnormally lower average returns than less distressed firms (e.g., Dichev (1998); Campbell, Hilscher, and Szilagyi (2008)). Following Campbell et al., we measure distress as a linear function of the ratio of earnings over the market value of the firm, monthly excess return relative to the S&P 500 index, market leverage, stock return volatility, relative size, the ratio of cash over the market value of the firm, market-to-book equity, and log price per share.

Return-on-assets (ROA). We measure return-on-assets, ROA, as income before extraordinary items (Compustat quarterly item IBQ) divided by last quarterly's assets (item ATQ).

Momentum (MOM). Jegadeesh and Titman (1993) show 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. Following Jegadeesh and Titman, we measure momentum as prior six-month returns.

2.2 Portfolio Construction

We construct one-way quintile portfolios based on the anomaly variables. In June of each year t from 1965 to 2008, we sort all NYSE stocks on CRSP on book-to-market, size, composite issuance, net stock issues, abnormal investment, asset growth, investment-to-assets, and accruals. We use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into one-way quintiles, and calculate annual value-weighted returns from July of year t to June of year $t+1$. Firms with negative book equity for the fiscal year ending in calendar year $t-1$ are excluded.

For each month from January 1977 to December 2008, we sort all NYSE stocks on their most recent SUEs, 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 value-weighted returns. The sample 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 2008, we sort all NYSE, Amex, and Nasdaq stocks on CRSP on failure probability into five groups. We use Compustat accounting data for a fiscal quarter in portfolio sorts in the months immediately after the quarter's public earnings announcement dates (Compustat quarterly item RDQ). For example, if the earnings for the fourth quarter in year t are announced on March 5 (or March 25) of year $t+1$, we use year t fourth quarter's accounting data to form portfolios at the beginning of April of year $t+1$. We calculate the one-year buy-and-hold value-weighted returns of stocks with and without dividends for each portfolio. The starting period of the sample is restricted by the availability of quarterly data on total liabilities in the definition of failure probability.

To construct the ROA quintiles, we sort NYSE stocks based on the ranked values of quarterly ROA, and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into quintiles. We use quarterly earnings in portfolio sorts only in the months immediately after the most recent earnings announcement (Compustat quarterly item RDQ). For example, if the earnings for the fourth fiscal quarter in year t are announced on March 5 (or March 25) of year $t+1$, we use the announced earnings to calculate ROA to form portfolios at the beginning of April and to calculate the resulting portfolio returns over April of year $t+1$. In particular, monthly value-weighted returns on the quintiles are calculated for the current month, and the portfolios are rebalanced monthly.

Finally, Following Jegadeesh and Titman (1993), for each month from July 1965 to June 2008, 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 quintiles. We hold the portfolios for six months, and calculate the value-weighted returns with and without dividends.

3 Methods for Estimating Expected Returns

We describe expected return estimation methods: the dividend discounting model, the implied costs of equity, and the methods for estimating expected returns and implied growth rates simultaneously.

3.1 The Dividend Discounting Model

The basic idea is based on the dividend discounting model (e.g., Williams (1938)). The average return is the average dividend yield plus the average rate of capital gain:

$$A[R_{t+1}] = A[D_{t+1}/P_t] + A[G^P_{t+1}], \tag{1}$$

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

$$E[R_{t+1}] = A[D_{t+1}/P_t] + A[G_{t+1}], \tag{2}$$

in which $E[R_{t+1}]$ is the expected return and $G_{t+1} = (D_{t+1} - D_t)/D_t$ is the dividend growth.[1]

We measure portfolio dividend growth using returns with and without dividends, following Hansen, Heaton, and Li (2005). Consider portfolios that are annually rebalanced. To describe our procedure precisely, we introduce additional notations: 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; $P_{t,t+1}$

[1] Fama and French (2002) use equation (2) to estimate the equity premium, and Chen, Petkova, and Zhang (2008) use the conditional version of the equation to estimate the value premium. We use this equation to estimate unconditional expected returns for a broad set of anomalies-based trading strategies.

= 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; $G^P_{t,t+1}$ = 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 can be 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:

$$\frac{D_{t,t+1}}{P_t} = R_{t,t+1} - G^P_{t,t+1}. \tag{3}$$

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 portfolio dividend growth rates as:

$$G_{t+1} = \left(\frac{D_{t,t+1}/P_t}{D_{t-1,t}/P_{t-1}}\right)\left(G^P_{t-1,t}+1\right) - 1. \tag{4}$$

Because the right-hand side of equation (4) equals $\left(\frac{D_{t,t+1}/P_t}{D_{t-1,t}/P_{t-1}}\right)\left(\frac{P_{t-1,t}}{P_{t-1}}\right) - 1$, the equation says 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 embedded in equation (4), $P_{t-1,t}/P_{t-1}$, is important: high $P_{t-1,t}/P_{t-1}$ means more dollars to invest at t and higher dividend growth rates.

For monthly rebalanced momentum, SUE, and ROA 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 (3) and (4) on the aggregated annual returns with and without dividends to construct annual dividend growth rates for the portfolios. Aggregating over monthly returns with and without dividends to obtain annual returns with and without dividends alleviates the effect of dividend seasonality on the calculation of portfolio dividend growth rates. For the failure probability portfolios, monthly observations of returns are already one-year buy-and-hold returns. As such, we apply equations (3) and (4) directly on the monthly observations of returns to construct dividend growth rates for these portfolios.

3.2 Implied Costs of Equity Methods

These methods originate from Gebhardt, Lee, and Swaminathan (2001, GLS hereafter), who calculate the cost of equity as the internal rate of return that equates the present value of expected future cash flows from the residual income model to the current stock price.

3.2.1 The Baseline Estimation Procedure

In the baseline estimation we follow the GLS procedure. Analysts earnings forecasts from Institutional Brokers' Estimate System (IBES) are used as the proxy for the market's earnings expectations. We compute a finite horizon estimate of equity value for each firm:

$$P_t = B_t + \frac{FROE_{t+1} - E_0[R]}{1 + E_0[R]} B_t + \frac{FROE_{t+2} - E_0[R]}{(1 + E_0[R])^2} B_{t+1} + TV, \tag{5}$$

in which $E_0[R]$ is the expected return estimate from the baseline residual income model. B_t is the book value from the most recent financial statement divided by the number of shares outstanding in the current month. $FROE_{t+\tau}$ is forecasted return on equity (ROE) for period $t+\tau$. For the first three years, we compute it as $FEPS_{t+\tau}/B_{t+\tau-1}$, in which $FEPS_{t+\tau}$ is the mean forecasted earnings per share (EPS) for year $t+\tau$ from IBES, and $B_{t+\tau-1}$ is the book value per share for year $t+\tau-1$.

We use the mean analysts' one-year and two-year ahead earnings forecasts ($FEPS_{t+1}$ and $FEPS_{t+2}$, respectively) and the long-term growth rate estimate (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. To calculate the industry median ROE, we sort all stocks into the 48 industries classified by Fama and French (1997). The industry median ROE is the ten-year (at least five-year) moving median of past ROEs of all firms in the industry. Loss firms are excluded from the calculation of the industry median.

Book equity per share is $B_{t+\tau} = B_{t+\tau-1} + FEPS_{t+\tau} - FDPS_{t+\tau}$, in which $FDPS_{t+\tau}$ is the forecasted dividend per share for year $t+\tau$, estimated using the current dividend payment ratio ($k =$ dividends for the most recent fiscal year divided by earnings over the same time period, $0 \leq k \leq 1$), i.e., $FDPS_{t+\tau} = k \times FEPS_{t+\tau}$. For firms with negative earnings we divide the dividends by 0.06 times total assets to derive an estimated payout ratio. Payout ratios of less than zero are assigned a value of zero, and payout ratios greater than one are assigned a value of one. We forecast earnings up to 12 future years and estimate a terminal value TV for cash flows beyond year 12:

$$TV = \sum_{i=3}^{T-1} \frac{FROE_{t+\tau} - E_0[R]}{(1+E_0[R])^i} B_{t+\tau-1} + \frac{FROE_{t+T} - E_0[R]}{E_0[R](1+E_0[R])^{T-1}} B_{t+T-1}. \tag{6}$$

We estimate the implied cost of equity, $E_0[R]$, for each firm in each month by substituting the forecasted future earnings, book values, and terminal values into equation (5) and solving for $E_0[R]$ from the resulting nonlinear equation. For portfolios that are annually rebalanced at the end of June of year t, we value-weight $E_0[R]$ 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 means that 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 per Fama and French (1993) to allow accounting information to be released to the market.

For the monthly rebalanced momentum portfolios, for each month 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 quintiles. We hold the portfolios for six months and value-weight the expected returns across firms in a given portfolio for each month. Although $E_0[R]$ is available monthly because P_t and $FEPS_t$ are updated monthly, $E_0[R]$ is the expected future one-year return. The procedure for the SUE portfolios is similar. For each month we sort all NYSE stocks on their most recent past SUE, and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into quintiles. We hold the resulting portfolios for six months and calculate the value-weighted $E_0[R]$ estimated for each month. For the monthly rebalanced ROA portfolios, we use NYSE breakpoints to sort all stocks into quintiles based on the most recent ROA at the beginning of each month. For the FP quintiles, we sort all NYSE, Amex, and Nasdaq stocks on the most recent FP into quintiles in each month. We calculate the value-weighted $E_0[R]$ for each portfolio in each month.

3.2.2 Two Modified Estimation Procedures

The baseline estimation of the implied costs of equity uses analysts earnings forecasts from IBES as expected earnings. There are two potential issues with this procedure in our application. First, analysts earnings forecasts tend to be overly optimistic (e.g., O'Brien (1988)), and as a result, expected return estimates implied by these forecasts tend to be upward biased (e.g., Easton and Sommers (2007)). If this bias varies systematically with anomaly variables (for example, analysts might be more optimistic toward growth firms, high accrual firms, and firms that issue equity), the estimates of expected returns to zero-cost strategies will also be biased. Second, because analysts tend to follow larger, more visible stocks, expected return estimates are limited to a small sample of stocks that have analysts coverage. This limitation can affect the results for anomalies-based trading strategies that often involve stocks that are not followed by analysts.

To address these issues, we use two modified procedures for implied costs of equity. The baseline approach uses analysts earnings forecasts in forming forecasted return on equity, $FROE_{t+\tau}$. In the modified procedures, we instead forecast future one-, two-, and three-year ahead ROEs using cross-sectional regressions similar to those in Fama and French (2006). Specifically, we estimate Fama-MacBeth (1973) cross-sectional regressions of future realized $ROE_{t+\tau} = Y_{t+\tau}/B_{t+\tau-1}$, in which $\tau = 1, 2, 3$, and $Y_{t+\tau}$ is τ-year ahead realized earnings per share. (Fama and French forecast $Y_{t+\tau}/B_t$, but we forecast $Y_{t+\tau}/B_{t+\tau-1}$ to provide inputs into the implied costs of equity estimation.)

In the first modified procedure, we use Fama and French's (2006) full specification, including the logarithm of book-to-market, the logarithm of market equity, a dummy variable that is one for firms with negative earnings for fiscal year t (zero otherwise), Y_t/B_t, $-AC_t/B_t$ with $-AC_t$ being accruals per share for firms with negative accruals (zero otherwise), $+AC_t/B_t$ with $+AC_t$ being accruals per share for firms with positive accruals (zero otherwise), asset growth for fiscal year t, a dummy variable that is one for firms that pay no dividends for fiscal year t, and the ratio of dividends to book equity. The full list of predictors imposes data requirements such that the resulting sample size is similar to that in the baseline procedure. To enlarge the sample size, in the second modified procedure we use a simplified list of predictors to forecast ROE, including only the log book-to-market, the log market equity, the negative earnings dummy, Y_t/B_t, and the current asset growth. To avoid look-ahead bias, we use ten-year rolling windows (at least five years) up to year t to forecast future ROE.

Because we forecast ROE directly, as opposed to earnings per share, the baseline estimation of the implied costs of equity needs to be adjusted accordingly. To compute future book equity per share, we still use the clean surplus relation: $B_{t+\tau} = B_{t+\tau-1} + (1-k) \times FEPS_{t+\tau}$, in which k is the dividend payout ratio. However, the forecasted earnings per share $FEPS_{t+\tau}$ is calculated as $FROE_{t+\tau} \times B_{t+\tau-1}$, in which $FROE_{t+\tau}$ with $\tau = 1, 2, 3$ is the forecasted ROE from the cross-sectional regressions. All other aspects of the estimation procedure remain the same as in the baseline procedure. Our modified procedures are in the same spirit as Hou, Dijk, and Zhang (2009), who use cross-sectional regressions to forecast the earnings of individual firms. However, because earnings might appear nonstationary, we opt to forecast ROE directly.

Comparing the expected return estimates from the baseline procedure and those from the two modified procedures can shed light on the following question: Is there any bias in the expected returns to anomalies-based trading strategies derived from bias in analysts earnings forecasts?

3.3 Estimating Expected Returns and Expected Growth Rates Simultaneously

In a stream of influential articles, Easton, Taylor, Shroff, and Sougiannis (2002, ETSS hereafter), Easton (2006, 2007), and Easton and Sommers (2007) criticize the baseline GLS procedure on the ground that the assumed growth rates beyond the short forecast horizon in the procedure can be inconsistent with the growth rates in the data. These authors propose methods that can estimate the expected returns and the implied growth rates of the residual income simultaneously for a given portfolio. These methods provide expected return estimates (and implied growth rate estimates) only for portfolios of stocks. However, this aspect befits our applications because we use the Fama-French (1993) portfolio approach to study capital markets anomalies to begin with.

To describe these methods, we start with the residual income model:

$$V_{it} = B_{it} + \sum_{\tau=1}^{\infty} \frac{Y_{it+\tau} - r_i \times B_{it+\tau-1}}{(1+r_i)^{\tau}} \tag{7}$$

in which V_{it} is the intrinsic value per share of firm i at time t, B_{it} is book value per share, Y_{it} is earnings per share, and r_i is the cost of equity. ETSS operationalize the residual income model by assuming that (starting from the period from t to $t+1$) the residual earnings as a perpetuity grows at a constant annual rate of g_i. This assumption means that we can reformulate equation (7) as:

$$P_{it} = B_{it} + \frac{Y_{it+1}^{IBES} - r_i \times B_{it}}{r_i - g_i} \tag{8}$$

in which P_{it} is price per share of firm i at time t, Y_{it+1}^{IBES} is the IBES analysts forecasts (known at time t) of earnings for time $t+1$, and g_i is the expected growth rate in residual income beyond time $t+1$ required to equate $P_{it} - B_{it}$ and the present value of the infinite residual income stream.

Some algebra shows that equation (8) is equivalent to:

$$\frac{Y_{it+1}^{IBES}}{B_{it}} = g_i + \frac{P_{it}}{B_{it}}(r_i - g_i) \tag{9}$$

We follow ETSS and implement this equation using Fama-MacBeth (1973) cross-sectional regressions across all the firms within a given portfolio:

$$\frac{Y_{it+1}^{IBES}}{B_{it}} = \gamma_0 + \gamma_1 \frac{P_{it}}{B_{it}} + \mu_{it} \tag{10}$$

where $\gamma_0 = g$ with g being the implied (average) growth rate for the portfolio, and $\gamma_1 = r - g$ with r being the expected return for the portfolio. We call this procedure the baseline ETSS estimation.

It is important to recognize the implicit assumptions underlying the cross-sectional regression in equation (10). The estimation assumes that there are measurement errors in Y_{it+1}^{IBES} and P_{it}/B_{it} and specification errors in equation (9). Specification errors can arise from two sources. First, the residual earnings might not be a perpetuity that grows at a constant rate. Second, P_{it}/B_{it} and $r_i - g_i$ might be correlated cross-sectionally, so that the average of $r_i - g_i$ cannot be treated as a constant slope in the cross-sectional regression. The ETSS procedure assumes that all these errors have a mean of zero, so that equation (9) can be estimated using linear cross-sectional regressions.

Following the same idea as in the modified procedures for estimating implied costs of equity, we also replace the left-hand side of equation (10) with the forecasted one-year ahead ROE from the Fama-French (2006) ROE forecasting regressions. Doing so includes the sample observations not covered by analysts and avoids potential bias in analysts forecasts. We call this procedure the modified ETSS estimation. We use the forecasted ROE from the full Fama-French profitability regressions. Using the simplified specification yields similar results (not tabulated).

O'Hanlon and Steele (2000) and Easton (2006) reformulate equation (7) in a different way:

$$P_{it} = B_{it} + \frac{(Y_{it} - r_i \times B_{it-1})(1 + g_i')}{r_i - g_i'} \tag{11}$$

in which g_i' is the perpetual growth rate starting from the current period's residual income for the period from $t-1$ to t. (In contrast, g_i in equation (8) is the implied perpetual growth rate starting from the next period's residual income from t to $t+1$.) The implied growth rate, g_i', produces a residual income stream such that the present value of this stream equals the difference between P_{it} and B_{it}.

Some algebra shows that equation (11) is equivalent to:

$$\frac{Y_{it}}{B_{it-1}} = r_i + \frac{r_i - g_i'}{1 + g_i'} \frac{P_{it} - B_{it}}{B_{it-1}} \tag{12}$$

We follow O'Hanlon and Steele (2000) and Easton (2006) and implement this equation with the following cross-sectional regression for a portfolio of stocks:

$$\frac{Y_{it}}{B_{it-1}} = \delta_0 + \delta_1 \frac{P_{it} - B_{it}}{B_{it-1}} + \mu_{it} \tag{13}$$

where $\delta_0 = r$ with r being the portfolio-level expected return and $\delta_1 = (r - g')/(1 + g')$ with g' being the expected growth rate for the portfolio. We call this estimation the O'Hanlon-Steele procedure.

There are again strong assumptions underlying the cross-sectional regression in equation (13). In particular, specification errors can arise from three sources. First, the residual earnings might not be a perpetuity that grows at a constant rate. Second, $(P_{it} - B_{it})/B_{it-1}$ and $(r_i - g_i')/(1 + g_i')$ might be correlated cross-sectionally, so that the average of $(r_i - g_i')/(1 + g_i')$ cannot be treated as a constant slope in the cross-sectional regression. Third, because $(r_i - g_i')/(1 + g_i')$ is nonlinear in r_i and g_i', Jensen's inequality means that the average of $(r_i - g_i')/(1 + g_i')$ cannot be replaced with $(r - g')/(1 + g')$. The O'Hanlon-Steele procedure assumes that all these errors have a mean of zero, so that equation (12) can be transformed into the cross-sectional regression in equation (13).

We estimate annual value-weighted Fama-MacBeth (1973) cross-sectional regressions in each period using the Weighted Least Squares with the weights given by market capitalization. We use value-weights to facilitate comparison with the results from the dividend discounting model and implied costs of equity estimation. We implement the estimation procedures for all testing quintile portfolios. To test whether a given high-minus-low quintile has an average return of zero, we estimate the cross-sectional regressions for the two extreme quintiles in question jointly, and test the null hypothesis using the Fama-MacBeth standard errors for the implied expected returns of the high-minus-low quintile. The test on whether a given high-minus-low quintile has an implied growth rate of zero is defined analogously.

Implementing these methods allows us to answer several open questions. First, ETSS show that their baseline procedure gives similar estimates of the equity premium as in Fama and French (2002). Does the same conclusion hold for the anomalies-based portfolios in the cross-section of returns? Comparing the results from the ETSS estimation with those from the dividend discounting model can shed light on this issue. Second, is there any bias in the assumed growth rates in the implied costs of equity estimation on the anomalies? Comparing the results from the GLS estimation with those from the ETSS estimation can address this issue. Third, without making the implied growth rate assumption, is there any bias in the expected return estimates for the anomalies-based portfolios derived from bias in analysts earnings forecasts? Comparing the results from the baseline ETSS procedure with those from the modified ETSS procedure and those from the O'Hanlon-Steele procedure addresses this issue.

4 Empirical Results

Sections 4.1, 4.2, and 4.3 present estimates from the dividend discounting model, the implied costs of equity estimation, and the methods for estimating expected returns and implied growth rates simultaneously, respectively. Section 4.4 evaluates the relative quality of different estimates.

4.1 Estimates from the Dividend Discounting Model

Panel A of Table 1 reports the descriptive statistics for all the anomaly variables in the sample for estimating expected returns from the dividend discounting model. To maximize the sample size, we do not require firms to have all the anomaly variables in a given period. For example, the average number of firms in the 1965–2008 sample for constructing the book-to-market portfolios is 4,575. The mean book-to-market ratio is 1.68, and the median is 0.78. The average number of firms in the composite issuance sample is only 1,756 because its calculation requires firms to have valid data for the past five years. The average number of firms in the abnormal investment sample is 2,234 because its calculation requires firms to have valid data for the past three years.

4.1.1 Full Sample Estimates

For each set of testing portfolios, Table 2 reports the means of realized returns, $A[R]$, expected return estimates from the dividend discounting model, $E[R]$, the dividend yield, D/P, and the dividend growth, G. For high-minus-low portfolios we report the means and the t-statistics testing that a given mean is zero. Our focus is on the difference between $A[R]$ and $E[R]$, in terms of both economic magnitude and statistical significance. Expected return spreads have magnitudes that are close to average return spreads. However, unlike the average return spreads that are for the most part significantly different from zero, the expected return spreads are mostly insignificant.

Panel A reports the value premium results. The growth quintile earns a lower average return than the value quintile: 10.6% versus 16.2% per annum, and the difference of 5.6% is 2.9 standard errors from zero. The expected return also is lower for the growth quintile: 8.5% versus 16.1% per annum, and the difference of 7.5% is significant ($t = 2.9$). The dividend yield difference of 1.9% between value and growth quintiles is also significant. Consistent with Hansen, Heaton, and Li (2005) and Chen, Petkova, and Zhang (2008), the value quintile has a higher average growth rate than the growth quintile: 11.6% versus 5.9%. The difference of 5.6% is 2.2 standard errors from zero. Overall, average returns and expected returns offer similar inferences for the value premium.

From Panel B, the average return spread is also similar to the expected return spread for the size quintiles. Small firms earn higher average returns than big firms. The average return spread is 4.6% per annum, which is within 1.5 standard errors of zero. The expected return spread is somewhat smaller in magnitude, 3.3%. Small firms have lower dividend yields than big firms: 2.1% versus 3.5%, but this shortfall is more than compensated by the higher dividend growth rates for small firms than for big firms: 10.7% versus 6.0%. From Panel E, the average return spread is also similar to the expected return spread for the abnormal investment (AI) quintiles. The high-minus-low spreads are -3.6% and -3% per annum, respectively, both of which are insignificant. The low AI quintile has higher dividend yield and dividend growth than the high AI quintile, but the differences are small.

The similarity between average and expected returns ceases to exist for the remaining anomaly variables. From Panels C and D, the average return spreads across the CI and NSI quintiles are at least three standard errors from zero. However, their expected return spreads (−3.0% and −5.9% per annum, respectively) are both within 1.7 standard errors of zero. The main culprit is that the dividend growth component of the expected returns is imprecisely estimated. The evidence for an ex ante asset growth anomaly is also weak. The high-minus-low AG quintile earns an average return of −4.4% per annum ($t = -2.4$) but an insignificant expected return of −2% ($t = -0.5$). High I/A quintile earns lower average returns than low I/A quintile, 11% versus 15.1%, and the difference of −4.1% is significant. However, although the expected return spread of −5% is slightly larger in magnitude, it is only marginally significant ($t = -1.9$). The expected return spread is derived mostly from the dividend growth spread. The expected return of the high-minus-low accrual quintile is insignificant, although its magnitude is similar to the average return.

From Panel I, high SUE stocks earn higher average returns than low SUE stocks: 15.8% versus 11.4% per annum. The difference of 4.4% is more than five standard errors from zero. The difference in expected returns has a small magnitude of 1.1%, which is within 0.5 standard errors of zero. This expected return derives mostly from the dividend growth spread, 1.2%, albeit insignificant. Low FP quintile earns higher average returns than high FP quintile: 13.8% versus 8.3%. The average return of the high-minus-low quintile, −5.5%, is more than 3.5 standard errors from zero. In contrast, the expected return of the high-minus-low quintile is positive, 1.9%, but is within one standard error of zero. Most of the expected return spread comes from the dividend growth spread.

From Panel K, high ROA quintile earns higher average returns than low ROA quintile, 15.7% versus 9% per annum, and the difference of 6.7% is 3.5 standard errors from zero. Although the expected return to the high-minus-low ROA quintile is 4.5%, it is only 1.5 standard errors from zero. The momentum results are largely similar. From Panel L, winners earn higher average returns than losers: 16% versus 7.5%, and the difference of 8.5% is more than five standard errors from zero. Although winners ex ante earn higher expected returns than the losers: 16.4% versus 10.5%, the difference of 5.9% is only 1.5 standard errors from zero. Most of the ex ante momentum comes from the dividend growth spread across the extreme quintiles, 6.3% ($t = 1.6$).

4.1.2 Subsample Estimates

In the past three decades the propensity of firms paying dividends has declined and the stock repurchases have increased steadily (e.g., Fama and French (2001); Grullon and Michaely (2002)). As pointed out by Fama and French (2002), this change in payout policy can cause problems for the 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 expected returns by underestimating both the dividend yield and the dividend growth.

To study the impact of the payout policy change, we conduct subsample analysis by splitting the full sample into two equal-length subsamples and comparing how the expected return estimates vary across the subsamples. We find that the expected return estimates in early sample are higher in magnitude than those in the more recent sample.

Panel A of Table 3 reports the results for the earlier half of the sample. The expected return to the value-minus-growth quintile is 11.6% per annum ($t = 3.6$). This estimate is even higher in magnitude than the average return of 7.4% ($t = 2.9$). The dividend yield contributes 2.4% to the expected return, and the remaining 9.3% per annum is from the dividend growth. From Panel B, the expected return estimate for the value premium is not stable over time. In the second half of the sample, the expected return estimate declines to 3.6%, which is only one standard error from zero. The reason is that the dividend growth component has declined from 9.3% in the first half of the sample to only 2.2% in the second half of the sample.

More generally, dividend nonstationarity affects the expected return estimates. None of the high-minus-low strategies have significant expected returns in the second half of the sample. The estimates are also lower in magnitude than those in the early subsample. The expected return of the high-minus-low I/A quintile is -10.4% per annum ($t = -2.8$) in the first half of the sample and 0.2% ($t = 0.1$) in the second half of the sample. The expected return of the high-minus-low ROA quintile is 6.5% ($t = 2.4$) in the first half of the sample, but declines to 2.7% ($t = 0.5$) in the second half of the sample. The expected returns to all the other high-minus-low portfolios are insignificant.

4.2 The Implied Costs of Capital Estimates

Panel B of Table 1 reports the descriptive statistics for the sample used in the baseline implied costs of equity estimation. Because doing so requires analysts earnings forecasts from IBES, the sample size is smaller than that in Panel A. The average numbers of firms in the cross-section for the $B/M, CI$, and AI quintiles reduce to 2,201, 1,393, and 1,513, respectively. Panel C reports the descriptive statistics for the sample used in the implied costs of equity estimation in which we use the full ROE forecasting regressions from Fama and French (2006). Although predicting ROE with cross-sectional regressions is not subject to analysts forecasting bias, the sample size is comparable with that based on IBES. In particular, the average numbers of firms in the cross-section for the $B/M, CI$, and AI quintiles are 2,091, 1,134, and 1,540, respectively. The reason is that the full Fama-French specification requires firms to have nonmissing observations for many forecasting variables simultaneously. To increase the sample size, we also implement the simplified Fama-French ROE forecasting regressions with a shorter list of variables. Panel D shows that doing so substantially increases the sample size relative to that in Panel C. The average numbers of firms in the cross-section for the $B/M, CI$, and AI quintiles increase to 2,893, 1,534, and 2,025, respectively.

4.2.1 Forecasting Profitability

Table 4 reports the average slopes and their t-statistics for annual cross-sectional profitability forecasting regressions using the Fama-MacBeth (1973) methodology. We report the regression results from the full sample. (Although as noted, we use ten-year rolling windows to estimate the cross-sectional regressions when estimating implied costs of equity.)

Lagged ROE is the strongest predictor of future ROE. In the full specification, the average slope on lagged ROE for one-year ahead ROE is 0.63, which is more than 18 standard errors from zero. The evidence shows considerable persistence in the ROE. The slope decays to 0.39 in forecasting three-year ahead ROE, and is more than 13 standard errors from zero. The evidence from the short specification is similar. The average slope on lagged ROE for one-year ahead ROE is 0.61, which is more than 18 standard errors from zero. Size forecasts future ROE with significantly positive slopes, meaning that big firms are more profitable than small firms. For the most part, B/M forecasts ROE with significantly negative slopes. As such, growth firms are more profitable than value firms. Firms that do not pay dividends are less profitable than firms that do pay dividends. Firms with high dividends to book equity ratios are more profitable than firms with low dividends to book equity ratios. The evidence is largely consistent with Fama and French (2006).

4.2.2 Expected Return Estimates

Table 5 reports the expected returns for all the testing portfolios from the implied costs of equity estimation. Because the sample for the baseline estimation is substantially smaller than that used to implement the dividend discounting model, we report the average returns for the testing portfolios for comparison. Despite the fact that the IBES sample tilts more toward small firms, the magnitudes of the anomalies measured with average returns in the IBES sample are similar to those in the broad sample used in the dividend discounting model (see Table 2). However, except for the value premium, there are dramatic differences between average return estimates and expected return estimates, both in terms of economic magnitude and statistical significance.

Panel A of Table 5 shows that the expected value premium estimates from different implied costs of equity estimation methods are similar in magnitude, and are all significantly positive. In the baseline procedure the value quintile earns a higher expected return than the growth quintile: 14.9% versus 8.6% per annum, and the spread of 6.3% is 12 standard errors from zero. The precision of this estimate is substantially higher than that of the average return. The estimates of the expected value premium are 8.5% in the modified procedures, and are also similar to the average return.

The similarity between average return and expected return estimates ceases to exist for the rest of the anomaly variables. From Panel B, the expected return estimates of the small-minus-big quintile range from 1.8% to 3.1% per annum, and are close to the average return estimate of 3%. However, the expected return estimates are all more than five standard errors from zero, while the average return estimate is within one standard error of zero. From Panel C, the high-minus-low CI quintile earns an average return of -4.2%, which is more than 2.5 standard errors from zero. In contrast, the expected return estimates are substantially lower in magnitude, ranging from -0.1% to -1.1%. Although the estimates from the modified procedures are significant, the estimate from the baseline procedure is not. The results for the NSI, AI, and AC portfolios are largely similar. The three anomaly variables produce significant average returns for the high-minus-low portfolios, but their expected return estimates are often insignificant. From Panel F, the average return of the high-minus-low AG quintile is -5.6% per annum, which is 2.8 standard errors from zero. However, although all significant, the expected return estimates have substantially lower magnitude, ranging from -0.6% to -1.5%. The results for the I/A quintiles are similar.

The remaining four panels in Table 5 report a striking pattern. The expected return estimates for the high-minus-low portfolios formed on SUE, FP, ROA, and MOM all have the opposite sign as their average return estimates. The high-minus-low SUE quintile earns an average return of 4.9% per annum, which is 5.5 standard errors from zero. In contrast, the expected return estimate from the modified procedure with the full Fama-French ROE forecasting specification is -0.9%, which is more than 19 standard errors from zero. The average return of the high-minus-low FP quintile is -8.1%, which is five standard errors from zero. However, the baseline estimation shows that the high FP quintile earns a higher expected return than the low FP quintile: 13.1% versus 9.2% per annum. The expected return spread of 3.8% is more than 34 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 in the baseline GLS estimation. We show that their inferences are robust to their use of analysts earnings forecasts because the two modified procedures deliver largely similar results.

From Panel K, the high-minus-low ROA quintile earns an average return of 6.5% per annum ($t = 3.3$). However, the expected return estimate from the baseline procedure is -1.7%, which is 22 standard errors from zero. The estimates from the two modified procedures are largely similar. Panel L shows that the winner-minus-loser quintile earns an average return of 6.4% ($t = 3.3$). In contrast, the expected return from the modified procedure with the short Fama-French ROE forecasting specification is -2.3%, which is highly significant.

In short, Table 5 reports two insights: (i) the average return and the expected return estimates differ greatly across the testing portfolios except for the value premium; and (ii) the expected return estimates from the modified procedures are largely similar to those from the baseline procedure. As such, bias in analysts forecasts is not important for estimating expected returns at the portfolio level.

4.3 Estimating Expected Returns and Expected Growth Rates Simultaneously

Panel E of Table 1 reports the descriptive statistics for the sample for the baseline ETSS estimation. The average numbers of firms in the cross-section for the $B/M, CI$, and AI quintiles reduce to 3,026, 1,649, and 1,753, respectively. Panel F reports the descriptive statistics for the sample used in the modified ETSS estimation in which we use the full ROE forecasting regressions from Fama and French (2006). Although this estimation is not subject to analysts forecasting bias, the sample size is comparable with that based on IBES in the baseline ETSS procedure. In particular, the average numbers of firms in the cross-section for the $B/M, CI$, and AI quintiles are 2,851, 1,507, and 1,859, respectively. Panel G describes the sample for the O'Hanlon-Steele estimation. Because this procedure does not use IBES or require a long list of variables to be available to forecast ROE, the sample size is larger. In particular, the average numbers of firms in the cross-section for the $B/M, CI$, and AI quintiles increase to 3,369, 1,749, and 1,983, respectively.

4.3.1 Expected Return Estimates

Table 6 reports expected return estimates using methods that determine expected returns and growth rates simultaneously for the testing portfolios. We observe dramatic divergence between expected return and average return estimates. From Panel A, the average return of the high-minus-low B/M quintile is 4.2% per annum ($t = 1.7$) in the sample for the baseline ETSS procedure. Unlike the positive average return, the expected return estimates are all negative: -2.1% ($t = -1.0$) from the baseline ETSS estimation, -12.7% ($t = -12.2$) from the modified ETSS estimation, and -9.4% ($t = -6.0$) from the O'Hanlon-Steele estimation. The large difference in magnitude between the estimate from the baseline procedure and those from its variants suggests that bias in analysts earnings forecasts matters more for these estimates than for the implied costs of equity.

Panel B shows that the average return of the small-minus-big quintile is -2.2% per annum, which is within one standard error of zero. In contrast, the expected return estimates from the baseline and modified ETSS procedures are 6.4% and 7.5%, respectively, which are both more than 5.5 standard errors from zero. The estimate from the O'Hanlon-Steele procedure is 11.8%, which is more than 4.5 standard errors from zero. From Panel C, although the average return of the high-minus-low CI quintile is significantly negative, the expected return estimate from the baseline ETSS procedure is significantly positive, 5.2%, which is three standard errors from zero. However, the expected return estimates from the modified ETSS procedure and the O'Hanlon-Steele procedure are negative: -1.6% and -1.9%, which are both at least two standard errors from zero.

Similarly drastic differences between average returns and expected returns also are evident for the $NSI, AI, AG, I/A$, and AC quintiles. The high-minus-low AI and I/A quintiles both earn insignificantly negative average returns. However, the modified ETSS procedure and the O'Hanlon-Steele procedure both produce significantly positive expected return estimates, which are more than six standard errors from zero. The high-minus-low AG and AC portfolios both earn significantly negative average returns. However, the modified ETSS procedure and the O'Hanlon-Steele procedure both show significantly positive expected return estimates, which are more than five standard errors from zero. The baseline ETSS procedure generates insignificant expected return estimates for the high-minus-low quintiles formed on all these anomaly variables.

The remaining four panels of Table 6 show that the average return estimates also diverge from the expected return estimates for the SUE and MOM quintiles. The baseline ETSS procedure estimates the expected return of the high-minus-low SUE quintile to be 2.4% per annum, which is 7.5 standard errors from zero. Although the magnitude of the expected return estimate is smaller, the evidence is largely consistent with the average return estimate of 4.6%, which is more than 5.5 standard errors from zero. However, the modified ETSS and the O'Hanlon-Steele procedures generate significantly negative expected return estimates of -2.5% and -2.2%, which are at least eight standard errors from zero. For the high-minus-low momentum portfolio, the baseline ETSS estimate predicts a significantly positive expected return of 2.2%. However, the modified ETSS procedure estimates an insignificant expected return that is close to zero.

The expected return and the average return estimates are more consistent with each other for the FP and ROA quintiles. The average return of the high-minus-low FP quintile is -7.2% per annum, which is more than four standard errors from zero. The expected return estimates from the ETSS procedures range from -21.6% and -24.2%, which are all more than 16 standard errors from zero. Although the expected return estimates have higher magnitudes than the average return, the signs are at least consistent. The results are similar for the ROA quintiles. The average return of the high-minus-low ROA quintile is 6.2%, which is more than three standard errors from zero. The expected returns range from 11.7% to 14.5%, which are all more than 21 standard errors from zero.

4.3.2 Implied Growth Rate Estimates

To understand why the ETSS methods produce expected return estimates that are dramatically different from average return estimates, we examine the implied growth rates for all the testing portfolios estimated from these methods. We find that implied growth rate spreads across the testing portfolios often go in the opposite direction as those observed in the data. This counterfactual pattern casts serious doubt on the validity of the ETSS methods.

From Panel A of Table 7, value firms have higher (dividend) growth rates on average than growth firms in the data. The spread is 5.6% per annum, which is more than two standard errors from zero. However, the ETSS methods all predict that value firms have significantly lower growth rates than growth firms. In particular, the baseline ETSS procedure generates a negative growth rate spread of −4.9% for the high-minus-low B/M quintile, and is more than 2.5 standard errors from zero. The modified ETSS and the O'Hanlon-Steele procedures produce even larger spreads, −15.4% and −13.9%, respectively, which are at least ten standard errors from zero.

From Panel B, small firms grow faster than big firms, although the dividend growth spread of 4.7% per annum is only 1.6 standard errors from zero. However, the ETSS methods all predict that big firms grow faster than small firms. The baseline and modified ETSS procedures predict that big firms grow faster than small firms by 5% per annum, which is at least four standard errors from zero. The O'Hanlon-Steele procedure implies that big firms grow faster than small firms by 10.9%, which is about 4.5 standard errors from zero.

The dividend growth spreads are negative, small, and insignificant for the high-minus-low quintiles formed on CI, AI, and AG. However, the ETSS methods often produce significantly positive implied growth rate spreads. In particular, the high-minus-low AI quintile in the data has a dividend growth rate of −1.2% per annum, which is within 0.5 standard errors of zero. However, the modified ETSS method implies a growth rate of 8.6%, which is more than six standard errors from zero. The implied growth rate spread from the O'Hanlon-Steele method is even higher, 15.5%, which is more than nine standard errors from zero.

Although not always significant, the dividend growth spreads are negative and economically large for the high-minus-low quintiles formed on $NSI, I/A$, and AC. However, the ETSS methods again produce significantly positive implied growth rate spreads. For example, the high-minus-low

I/A quintile has a dividend growth rate of -3.7% per annum in the data, which is within 1.5 standard errors of zero. However, the baseline ETSS method implies a growth rate spread of 8% ($t = 2.2$), and the O'Hanlon-Steele method implies a growth rate spread of 7.3% ($t = 8.4$).

The implied growth rate spreads across the extreme SUE quintiles are mixed. The baseline ETSS method implies a growth rate spread of 2.2% per annum, which is more than 4.5 standard errors from zero. However, the two related methods imply growth rate spreads of -1.8% and -1.3% that are more than four standard errors from zero. For comparison, the high-minus-low SUE quintile has a positive dividend growth rate of 1.2% in the data, but is only 0.5 standard errors from zero. The high-minus-low momentum quintile has a dividend growth rate of 6.3% ($t = 1.6$). The implied growth rates for this portfolio from the ETSS methods are all positive, but the magnitudes range from 0.4% to 3.3%, which are all lower than the observed growth rate.

The high-minus-low FP quintile has a weakly positive dividend growth of 3.2% per annum, which is within 1.5 standard errors of zero. In contrast, the ETSS methods all forecast strongly negative implied growth rates around -20% that are all more than 15 standard errors from zero. The observed and the implied growth rates are most consistent for the ROA portfolios. The high-minus-low ROA quintile has a dividend growth rate of 5% in the data, albeit insignificant, while the ETSS methods forecast growth rates that range from 9.5% to 13.2%, and are highly significant.

4.4 Evaluating the Quality of Different Expected Return Estimates

The differences in inferences from different expected return models rise a natural question: Which model delivers expected return estimates that are most informative about future returns?

4.4.1 Cross-Correlations

To lay the background, for each year we calculate the cross-sectional correlations across the expected return estimates across the 60 testing portfolios (the one-way quintiles formed on the 12 anomaly variables), and report the time-series averages of these correlations. To avoid look-ahead bias we use an expanding window to calculate the estimates from the dividend discounting model.

Table 8 shows that expected return estimates from the dividend discounting model are negatively correlated with those from the implied costs of equity estimation. The baseline and modified implied costs of equity are positively correlated. The Pearson correlation between $E_0[R]$ (baseline) and $E_1[R]$ (modified with the full Fama-French ROE specification) is 0.80. The baseline ETSS, the modified ETSS, and the O'Hanlon-Steele estimates are all positively correlated. The Spearman correlation between the baseline ETSS and the O'Hanlon-Steele estimates is 0.55. Finally, the estimates from dividend discounting model and the estimates from the ETSS methods are weakly negatively correlated. The estimates from the implied costs of equity and those from the ETSS methods are strongly negatively correlated with the Pearson correlations ranging from -0.19 to -0.48.

4.4.2 Cross-Sectional Regressions

Following Easton and Monahan (2005) and Guay, Kothari, and Shu (2005), we evaluate the quality of a given expected return proxy through its association with future realized returns. We perform Fama-MacBeth (1973) cross-sectional regressions of future realized returns on different expected return proxies. The goal is to examine which proxy has the strongest explanatory power of future realized returns. The cross-sectional regressions are conducted on 60 testing portfolios, which are one-way quintiles formed on the 12 anomaly variables that we consider. 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 (also measured at the beginning of the holding period). Monthly realized returns are used in monthly cross-sectional regressions, but annual and overlapping three-year returns in annual frequency are used in annual cross-sectional regressions.

Panel A of Table 9 shows that the expected return from the dividend discounting model significantly predict future returns. In monthly cross-sectional regressions the slope is 0.03, which is 2.6 standard errors from zero. The average cross-sectional regression R^2 is 6%. Controlling for size,

B/M, and prior six-month returns does not materially affect the slope of the expected return. The expected return also dominates size, which has an insignificant slope, but the slopes of the prior returns and B/M are significantly positive. In annual cross-sectional regressions of annual and three-year realized returns, the expected return remains significant when used alone. However, the cross-sectional R^2s remain low at 4% and 7%, respectively.

Panel B shows that the implied costs of equity from the baseline estimation is weakly associated with future returns. In monthly univariate regression, the slope of the expected return is 0.03, but is insignificant ($t = 1.6$). However, the cross-sectional R^2 of 12% is higher than that in the dividend discounting model. In annual univariate regressions with annual returns and three-year returns, the slopes are 0.05 and 0.12, respectively, both of which are within one standard error of zero. The cross-sectional R^2s increase to 19% and 24%. From Panel C, the results from the modified procedure with the full Fama-French ROE specification are similar. The results from the modified estimation with the short ROE forecasting specification are also similar (not tabulated). The evidence differs from Easton and Monahan (2005) and Hou, Dijk, and Zhang (2009) because we find positive associations between implied costs of equity and future realized returns. The reason is probably that we perform the tests at the portfolio level, as opposed to the firm level as in prior studies.

Panel D of Table 9 shows a weakly positive relation between the expected return estimates from the baseline ETSS procedure and future realized returns. In univariate regressions the slopes are all within one standard error of zero, and the cross-sectional R^2 are between 4% to 6%. From Panel E, the positive relation between the expected returns from the modified ETSS procedure and realized returns is stronger. The univariate regression slopes are within 1.4 standard errors of zero, but the cross-sectional R^2s are relatively high, ranging from 11% to 16%. Panel F shows that the results from the O'Hanlon-Steele procedure are similar as those from the modified ETSS estimation. (Because of the high correlations reported in Table 8, we do not use all the expected return estimates simultaneously in multiple regressions.)

In all, the evidence does not give a clear-cut ranking of the expected returns estimated from different methods. The estimates from the dividend discounting model predict future returns with significantly positive slopes. However, the implied costs of equity estimates, the modified ETSS estimates, and the O'Hanlon-Steele estimates forecast future returns with higher cross-sectional R^2s.

5 Summary and Interpretation

We use valuation models to estimate expected returns to zero-cost trading strategies formed on book-to-market, size, composite issuance, net stock issues, abnormal investment, asset growth, investment-to-assets, accruals, standardized unexpected earnings, failure probability, return on assets, and short-term prior returns. The central message is that inferences vary dramatically across different expected return estimates, which in turn often differ from their average realized returns.

Taken literally, our evidence means that most anomalies do not exist ex ante. If true, this interpretation invalidates the investment-based asset pricing literature that explains anomalies from the value-maximization of firms (e.g., Berk, Green, and Naik (1999); Zhang (2005); Liu, Whited, and Zhang (2009)). This literature argues that the anomaly variables are correlated with risk and expected returns. If these variables are not related to expected returns, anomalies is more likely driven by pricing errors, as hypothesized by the behavioral finance literature (e.g., Daniel, Hirshleifer, and Subrahmanyam (1998)). Lewellen and Shanken (2002) propose another possibility. Because of incomplete information in real time, even though ex post returns can appear predictable to econometricians, investors can neither perceive nor exploit this predictability.

However, the vastly different inferences across various expected return estimates suggest that the current generation of expected return models leaves much to be desired. The simple implementation of the dividend discount model per Fama and French (2002) delivers expected returns that have similar magnitudes as average returns. The expected returns also show stronger associations with future realized returns than the expected returns from the residual income model. However, the dividend discounting estimates are even more imprecise than the average returns at the portfolio level. The estimates are also affected by nonstationarity in the payout policy. While the expected return estimates from the implied costs of equity estimation are not unreasonable, these estimates do not significantly forecast future returns in cross-sectional regressions. The methods that estimate expected returns and growth rates simultaneously predict that the implied growth rate spreads across many testing portfolios have the opposite sign as the observed growth rate spreads in the data. This counterfactual prediction casts doubt on the many built-in assumptions and the validity of these methods for estimating expected returns.

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A Variable Definitions

B/M is the book equity at the fiscal yearend divided by the market equity in December. The book equity is the stockholders' equity (Compustat annual item SEQ), minus preferred stock, plus balance sheet deferred taxes and investment tax credit (item TXDITC) if available, minus post-retirement benefit asset (item PRBA) if available. If stockholder's equity value if missing, we use common equity (item CEQ) plus preferred stock par value (item PSTK). Preferred stock is preferred stock liquidating value (item PSTKL) or preferred stock redemption value (item PSTKRV) or preferred stock par value (item PSTK) in that order of availability. If these variable are missing, we use book assets (item AT) minus liabilities (item LT). The market equity (ME) is price per share times shares outstanding from CRSP.

The five-year composite issuance (CI) measure from Daniel and Titman (2006) is defined as:

$$\iota(t-\tau) = \log\left(\frac{ME_t}{ME_{t-\tau}}\right) - r(t-\tau, t), \tag{A1}$$

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 not 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 (NSI) 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 CSHO) times the adjustment factor (item ADJEX_C). If the Compustat shares or adjustment factors for calculating net stock issues are missing, we set the measure to be zero. NSI calculated in this way can be positive or negative.

Following Titman, Wei, and Xie (2004), we measure abnormal investment, AI, that applies for the portfolio formation year t, as:

$$AI_{t-1} \equiv \frac{CE_{t-1}}{(CE_{t-2} + CE_{t-3} + CE_{t-4})/3} - 1 \tag{A2}$$

in which CE_{t-1} is capital expenditure (Compustat annual item CAPX) scaled by its sales (item SALE) 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.

Asset growth, AG, for the portfolio formation year t is defined as the percentage change in total assets (Compustat annual item AT) from fiscal year ending in calendar year $t-2$ to fiscal year ending in calendar year $t-1$.

Following Sloan (1996), we measure total accruals, AC, for the last fiscal year ending in calendar year $t-1$ as changes in non-cash working capital minus depreciation expense scaled by average total assets, which is the mean of the total assets (Compustat annual item AT) for the fiscal years ending in $t-1$ and $t-2$. The non-cash working capital is the change in non-cash current assets minus the change in current liabilities less short-term debt and taxes payable.

$$TA \equiv (\triangle CA - \triangle CASH) - (\triangle CL - \triangle STD - \triangle TP) - DEP, \tag{A3}$$

in which $\triangle CA$ is the change in current assets (item ACT), $\triangle CASH$ is the change in cash or cash equivalents (item CHE), $\triangle CL$ is the change in current liabilities (item LCT), $\triangle STD$ is the change in debt included in current liabilities (item DLC), $\triangle TP$ is the change in income taxes payable (item TXP), and DEP is depreciation and amortization expense (item DP).

Campbell, Hilscher, and Szilagyi (2008, the third column in Table 4) measure a firm's failure probability (FP) as $1/[1+\exp(-\text{Distress}_t)]$, in which the distress measure is constructed as:

$$\begin{aligned} \text{Distress}_t \;\; &= \;\; -9.164 - 20.264\, NIMTAAVG_t + 1.416\, TLMTA_t - 7.129\, EXRETAG_t \\ &+1.411\, SIGMA_t - 0.045\, RSIZE_t - 2.132\, CASHMTA_t + 0.075\, MB_t - 0.058\, PRICE_t \end{aligned} \tag{A4}$$

where

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

The coefficient $\phi = 2^{-1/3}$ means that the weight is halved each quarter. $NIMTA$ is net income (Compustat quarterly item NIQ) divided by the sum of market equity and total liabilities (item LTQ). 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. $EXRET = \log(1+R_{it}) - \log(1+R_{S\&P\ 500,t})$ is the monthly log excess return on each firms equity relative to the S&P 500 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 (item LTQ) 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&P 500 index. $CASHMTA$, used to capture the liquidity position of the firm, is the ratio of cash and short-term investments (item CHEQ) 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.

Table 1 : Descriptive Statistics

This table presents descriptive statistics including the mean, standard deviation, min, 25% percentile, median, 75% percentile, and max for all the anomaly variables. We also report the sample period and average number of firms in the cross-section for each sample that corresponds to a given anomaly variable. Book-to-market (B/M) is the book equity divided by the market equity at the end of fiscal year, and the book equity is measured as in Fama and French (1993). Size (ME) is market capitalization in millions of dollars. Composite issuance (CI) is the cumulative log five-year growth rate of total market equity minus the cumulative log five-year stock return. Net stock issues (NSI) are the natural log of the ratio of the split-adjusted shares outstanding at the fiscal year ending in calendar year $t-1$ divided by the split-adjusted shares outstanding at the fiscal year ending in calendar year $t-2$. Abnormal investment (AI) is the deviation of the current year investment-to-sales ratio from the past three-year moving average investment-to-sales. Asset growth (AG) is the percentage change in total assets from the fiscal year ending in calendar year $t-2$ to the fiscal year ending in calendar year $t-1$. Investment-to-assets (I/A) is the annual change in property, plant, and equipment plus the annual change in inventory divided by lagged total assets. Accruals (AC) are changes in non-cash working capital minus depreciation expense (scaled by average total assets) as in Sloan (1996). Earnings surprise (SUE) 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 (FP, in percent) is calculated as $1/[1+\exp(-\text{Distress})]$. Return-on-assets ($ROA$) is the most recent earnings divided by one-quarter-lagged total assets. Past five-year sales growth (SG) is the sales growth from year $t-5$ to t. Prior returns (MOM) are prior six-month returns at each portfolio formation month. See Section 2 and Appendix A for detailed variable definitions.

	Sample	# Firms	Mean	Std	Min	25%	50%	75%	Max
	Panel A: The dividend discounting model								
B/M	65–08	4575	1.68	5.88	0.04	0.45	0.78	1.24	64.94
ME	65–08	4575	814.38	2790.20	1.47	26.96	98.75	408.99	27092.75
CI	65–08	1756	−0.05	0.42	−1.64	−0.22	−0.07	0.12	1.60
NSI	65–08	4139	0.04	0.12	−0.23	0.00	0.00	0.03	0.88
AI	65–08	2234	0.24	0.48	−1.04	0.04	0.17	0.34	3.48
AG	65–08	3480	0.17	0.41	−0.49	−0.01	0.08	0.21	3.19
I/A	65–08	3657	0.10	0.21	−0.47	0.01	0.07	0.14	1.50
AC	70–08	3400	−0.03	0.10	−0.42	−0.08	−0.03	0.02	0.38
SUE	77–08	3657	0.21	24.57	−209.67	−0.58	0.07	0.68	1444.74
FP	75–08	3586	0.10	0.22	0.01	0.03	0.04	0.08	4.38
ROA	77–08	4815	0.00	0.20	−1.20	0.00	0.04	0.08	0.52
MOM	65–08	4739	0.08	0.40	−0.85	−0.13	0.03	0.22	6.76

	Sample	# Firms	Mean	Std	Min	25%	50%	75%	Max
	Panel B: The baseline implied costs of equity estimation								
B/M	80–08	2201	1.51	5.48	0.07	0.40	0.66	1.01	59.67
ME	80–08	2201	2147.63	6225.35	9.53	132.02	413.53	1368.66	57017.85
CI	80–08	1393	0.00	0.41	−1.67	−0.19	−0.05	0.16	1.70
NSI	80–08	2200	0.04	0.10	−0.22	0.00	0.01	0.03	0.65
AI	80–08	1513	0.29	0.51	−0.81	0.06	0.21	0.41	3.77
AG	80–08	1812	0.18	0.36	−0.40	0.01	0.09	0.22	2.66
I/A	80–08	1912	0.10	0.17	−0.36	0.02	0.07	0.14	1.13
AC	80–08	1631	−0.03	0.08	−0.32	−0.07	−0.04	0.01	0.30
SUE	80–08	2006	−0.10	3.41	−77.89	−0.63	0.05	0.67	37.06
FP	80–08	2038	0.06	0.13	0.01	0.03	0.04	0.06	2.88
ROA	80–08	2161	0.04	0.12	−0.64	0.00	0.04	0.08	0.40
MOM	80–08	2317	0.08	0.33	−0.80	−0.10	0.05	0.22	3.79
	Panel C: The modified implied costs of equity estimation (the full Fama-French ROE forecasting regression)								
B/M	75–08	2091	1.41	3.38	0.11	0.50	0.82	1.28	34.44
ME	75–08	2091	1073.27	2792.25	3.10	45.07	174.47	723.69	22248.26
CI	75–08	1134	−0.05	0.43	−1.84	−0.22	−0.07	0.12	1.61
NSI	75–08	2091	0.03	0.10	−0.24	0.00	0.00	0.02	0.69
AI	75–08	1540	0.26	0.48	−0.77	0.04	0.18	0.37	3.58
AG	75–08	2091	0.14	0.29	−0.35	0.00	0.08	0.19	1.94
I/A	75–08	2076	0.09	0.16	−0.37	0.02	0.07	0.14	0.96
AC	75–08	1951	−0.03	0.08	−0.31	−0.07	−0.03	0.01	0.29
SUE	77–08	2119	0.48	29.41	−63.94	−0.59	0.07	0.68	1369.95
FP	75–08	2121	0.07	0.14	0.01	0.03	0.04	0.07	2.77
ROA	77–08	2268	0.04	0.12	−0.68	0.00	0.04	0.08	0.40
MOM	75–08	3108	0.09	0.34	−0.77	−0.10	0.05	0.22	4.80
	Panel D: The modified implied costs of equity estimation (the simplified Fama-French ROE forecasting regression)								
B/M	75–08	2893	1.38	3.03	0.11	0.53	0.86	1.30	30.93
ME	75–08	2893	1070.64	2811.91	3.08	44.16	167.96	705.14	22495.58
CI	75–08	1534	−0.05	0.44	−1.86	−0.23	−0.07	0.13	1.65
NSI	75–08	2891	0.03	0.10	−0.24	0.00	0.00	0.02	0.70
AI	75–08	2025	0.26	0.46	−0.73	0.04	0.19	0.37	3.40
AG	75–08	2396	0.14	0.29	−0.36	0.00	0.08	0.19	1.95
I/A	75–08	2556	0.09	0.16	−0.38	0.01	0.06	0.13	0.98
AC	75–08	2181	−0.03	0.09	−0.31	−0.07	−0.03	0.01	0.30
SUE	77–08	2844	0.29	26.57	−184	−0.58	0.08	0.69	1355.05
FP	75–08	2920	0.08	0.15	0.01	0.03	0.04	0.07	3.05
ROA	77–08	3128	0.04	0.12	−0.68	0.00	0.04	0.08	0.40
MOM	75–08	3109	0.09	0.34	−0.77	−0.10	0.05	0.22	4.67

	Sample	# Firms	Mean	Std	Min	25%	50%	75%	Max
	Panel E: The baseline ETSS estimation								
B/M	80–08	3026	1.58	6.59	0.05	0.37	0.63	0.98	79.12
ME	80–08	3026	1899.10	5580.70	8.92	127.32	368.64	1195.65	50932.74
CI	80–08	1649	0.01	0.43	−1.68	−0.19	−0.04	0.18	1.76
NSI	80–08	2777	0.05	0.12	−0.22	0.00	0.01	0.04	0.80
AI	80–08	1753	0.32	0.58	−1.05	0.06	0.22	0.43	4.37
AG	80–08	2296	0.22	0.46	−0.42	0.01	0.10	0.25	3.58
I/A	80–08	2415	0.11	0.19	−0.36	0.02	0.07	0.15	1.32
AC	80–08	2061	−0.03	0.09	−0.33	−0.07	−0.03	0.01	0.33
SUE	80–08	2442	−0.10	3.42	−84.30	−0.63	0.05	0.66	39.43
FP	80–08	2222	0.07	0.15	0.01	0.03	0.04	0.06	3.41
ROA	80–08	2560	0.04	0.12	−0.80	0.00	0.04	0.08	0.40
MOM	80–08	2710	0.08	0.34	−0.82	−0.11	0.05	0.22	4.13
	Panel F: The modified ETSS estimation (the full Fama-French ROE forecasting regression)								
B/M	75–08	2851	1.43	3.73	0.10	0.48	0.79	1.24	40.52
ME	75–08	2851	959.22	2509.42	2.64	46.09	164.44	645.51	20150.88
CI	75–08	1507	−0.05	0.45	−1.87	−0.22	−0.06	0.14	1.72
NSI	75–08	2850	0.04	0.12	−0.24	0.00	0.01	0.04	0.79
AI	75–08	1859	0.27	0.53	−0.88	0.03	0.18	0.38	3.90
AG	75–08	2851	0.17	0.35	−0.38	0.00	0.09	0.22	2.36
I/A	75–08	2824	0.10	0.17	−0.39	0.02	0.07	0.15	1.15
AC	75–08	2654	−0.03	0.09	−0.34	−0.07	−0.03	0.02	0.33
SUE	77–08	2579	0.31	25.18	−76.97	−0.61	0.06	0.68	1334.37
FP	75–08	2337	0.09	0.18	0.01	0.03	0.04	0.07	3.56
ROA	77–08	2564	0.00	0.16	−0.88	0.00	0.04	0.08	0.40
MOM	75–08	2805	0.09	0.37	−0.79	−0.12	0.04	0.23	4.64
	Panel G: The O'Hanlon-Steele estimation								
B/M	65–08	3369	1.55	5.14	0.04	0.48	0.79	1.22	64.94
ME	65–08	3369	973.60	3049.27	1.54	39.13	139.05	559.04	27092.75
CI	65–08	1749	−0.05	0.41	−1.64	−0.22	−0.07	0.12	1.60
NSI	65–08	3369	0.04	0.11	−0.23	0.00	0.01	0.03	0.88
AI	65–08	1983	0.25	0.47	−1.04	0.04	0.17	0.35	3.48
AG	65–08	2825	0.17	0.39	−0.49	0.00	0.09	0.21	3.19
I/A	65–08	2973	0.10	0.20	−0.47	0.02	0.07	0.14	1.50
AC	70–08	2431	−0.02	0.09	−0.41	−0.07	−0.03	0.02	0.37
SUE	77–08	3311	0.20	23.56	−195.56	−0.60	0.07	0.69	1341.16
FP	75–08	2975	0.09	0.19	0.01	0.03	0.04	0.08	3.89
ROA	77–08	3310	0.00	0.16	−1.00	0.00	0.04	0.08	0.40
MOM	65–08	3765	0.08	0.38	−0.84	−0.12	0.04	0.22	5.94

Table 2 : Realized Returns, Expected Returns, Dividend Yields, and Dividend Growth Rates, the Dividend Discounting Model

We report the averages of realized returns ($A[R]$), expected returns ($E[R]$), dividend yields ($A[\frac{D}{P}]$), and dividend growth rates ($A[G]$) from the dividend discounting model for one-way quintiles. We only report results for Low, 3, and High quintiles to save space. In June of each year t, we sort all NYSE stocks on book-to-market (B/M), market equity (ME), composite issuance (CI), net stock issues (NSI), abnormal investment (AI), asset growth (AG), investment-to-assets (I/A), accruals (AC) for the fiscal year ending in calendar year $t-1$, 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 (MOM) and earnings surprises (SUE), and use the NYSE breakpoints to split all stocks into five groups. We hold the portfolios for six months and calculate their value-weighted returns. Each month we use NYSE/Amex/Nasdaq breakpoints to sort all stocks on Campbell, Hilscher, and Szilagzi's (2008) failure probability measure (FP) into five portfolios, and calculate one-year value-weighted returns for each portfolio. Each month we also use NYSE breakpoints to sort all stocks on quarterly return-on-assets (ROA) and calculate value-weighted returns for the current month. Earnings and other Compustat quarterly accounting data for a fiscal quarter are used in portfolio sorts in the months immediately after its public earnings announcement month (Compustat quarterly item RDQ). Section 2 and Appendix A contain detailed variable definitions. "H−L" denotes the high-minus-low portfolios. The t-statistics ($[t]$) are adjusted for heteroscedasticity and autocorrelations. The entries other than t-statistics are in annualized percent.

	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$
	Panel A: B/M				Panel B: ME				Panel C: CI				Panel D: NSI			
Low	10.6	8.5	2.6	5.9	15.7	12.8	2.1	10.7	13.9	11.8	5.1	6.8	15.2	14.6	3.7	10.9
3	13.7	12.6	4.1	8.5	13.5	11.8	3.0	8.7	11.6	9.6	3.2	6.4	11.6	12.1	3.1	9.0
High	16.2	16.1	4.5	11.6	11.1	9.5	3.5	6.0	9.6	8.9	2.7	6.2	8.3	8.7	3.4	5.3
H−L	5.6	7.5	1.9	5.6	−4.6	−3.3	1.4	−4.7	−4.3	−3.0	−2.4	−0.6	−6.8	−5.9	−0.4	−5.5
[t]	2.9	2.9	7.7	2.2	−1.3	−1.1	5.4	−1.6	−3.0	−1.2	−8.8	−0.2	−3.9	−1.6	−1.8	−1.5

	Panel E: AI				Panel F: AG				Panel G: I/A				Panel H: AC			
Low	13.8	12.0	3.9	8.1	14.9	14.4	3.6	10.8	15.1	14.7	3.4	11.3	14.0	14.9	3.0	11.8
3	12.4	12.2	4.1	8.1	11.6	9.9	3.7	6.1	11.8	10.8	3.7	7.2	14.2	12.9	3.1	9.8
High	10.4	9.0	2.0	6.9	10.5	12.4	2.0	10.4	11.0	9.7	2.2	7.6	10.8	10.9	1.9	9.0
H−L	−3.6	−3.0	−1.8	−1.2	−4.4	−2.0	−1.6	−0.4	−4.1	−5.0	−1.2	−3.7	−3.2	−3.9	−1.1	−2.8
[t]	−1.8	−1.0	−7.3	−0.4	−2.4	−0.5	−8.9	−0.1	−2.3	−1.9	−7.8	−1.4	−3.1	−1.4	−7.8	−1.0

	Panel I: SUE				Panel J: FP				Panel K: ROA				Panel L: MOM			
Low	11.4	10.3	3.3	7.0	13.8	13.8	3.0	10.8	9.0	8.5	3.0	5.5	7.5	10.5	2.9	7.6
3	13.1	10.0	3.5	6.5	12.1	12.3	3.9	8.5	12.3	9.1	4.1	5.0	10.8	9.8	3.6	6.1
High	15.8	11.4	3.2	8.2	8.3	15.7	1.7	14.0	15.7	13.0	2.5	10.5	16.0	16.4	2.5	13.9
H−L	4.4	1.1	−0.1	1.2	−5.5	1.9	−1.3	3.2	6.7	4.5	−0.5	5.0	8.5	5.9	−0.4	6.3
[t]	5.1	0.4	−1.6	0.5	−3.7	0.9	−15.6	1.5	3.5	1.5	−3.0	1.6	5.4	1.5	−2.3	1.6

Table 3 : Realized Returns, Expected Returns, Dividend Yields, and Dividend Growth Rates, the Dividend Discounting Model, Subsample Analysis

We report the averages of realized returns ($A[R]$), expected returns ($E[R]$), dividend yields ($A[\frac{D}{P}]$), and dividend growth rates ($A[G]$) from the dividend discounting model. We only report results for Low, 3, and High quintiles to save space. In June of each year t, we sort all NYSE stocks on book-to-market (B/M), market equity (ME), composite issuance (CI), net stock issues (NSI), abnormal investment (AI), asset growth (AG), investment-to-assets (I/A), accruals (AC) for the fiscal year ending in calendar year $t-1$, and use the NYSE breakpoints to split NYSE-Amex-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 (MOM) and earnings surprises (SUE), and use the NYSE breakpoints to split all stocks into quintiles. We hold the portfolios for six months and calculate value-weighted returns. Each month we use NYSE/Amex/Nasdaq breakpoints to sort all stocks on Campbell, Hilscher, and Szilagzi's (2008) failure probability (FP) into quintiles and calculate one-year value-weighted returns for each portfolio. Each month we also use NYSE breakpoints to sort all stocks on quarterly return-on-assets (ROA) and calculate value-weighted returns for the current month. Earnings and other Compustat quarterly accounting data for a fiscal quarter are used in portfolio sorts in the months immediately after its public earnings announcement month (Compustat quarterly item RDQ). Section 2 and Appendix A contain detailed variable definitions. "H−L" denotes the high-minus-low portfolios. The t-statistics ($[t]$) are adjusted for heteroscedasticity and autocorrelations. The entries other than t-statistics are in annualized percent. The sample periods are described in Table 1.

Panel A: The first half of the sample

	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$
	B/M				ME				CI				NSI			
Low	10.8	9.4	3.3	6.1	20.5	12.5	2.8	9.6	15.2	14.2	6.5	7.7	16.1	15.9	4.8	11.1
3	14.1	14.6	5.2	9.3	16.7	14.1	4.0	10.1	11.7	12.7	4.4	8.3	10.5	10.6	3.8	6.8
High	18.2	21.1	5.7	15.4	10.8	11.5	4.3	7.2	8.6	7.4	3.3	4.1	9.6	11.7	4.5	7.2
H−L	7.4	11.6	2.4	9.3	−9.7	−1.0	1.5	−2.5	−6.5	−6.7	−3.2	−3.5	−6.5	−4.2	−0.3	−3.9
[t]	2.9	3.6	6.5	3.0	−2.0	−0.2	4.1	−0.6	−2.9	−1.5	−10.6	−0.8	−6.9	−1.5	−0.7	−1.4
	AI				AG				I/A				AC			
Low	15.1	13.6	5.2	8.4	16.8	16.8	4.6	12.2	18.6	20.1	4.2	15.9	16.1	19.8	4.3	15.5
3	12.6	15.5	5.4	10.2	11.8	11.4	4.8	6.6	12.0	13.2	4.7	8.5	13.4	17.3	4.4	13.0
High	10.1	8.3	2.6	5.7	10.7	11.6	2.5	9.1	11.4	9.7	2.8	6.9	13.1	13.9	2.8	11.2
H−L	−5.3	−5.4	−2.6	−2.8	−6.0	−5.2	−2.1	−3.1	−7.2	−10.4	−1.4	−9.0	−3.0	−5.8	−1.6	−4.3
[t]	−1.4	−1.1	−11.4	−0.6	−2.1	−1.3	−13.5	−0.8	−2.9	−2.8	−6.4	−2.4	−1.4	−1.9	−21.3	−1.4
	SUE				FP				ROA				MOM			
Low	14.5	12.0	4.7	7.3	15.5	15.3	4.2	11.2	10.9	7.1	4.3	2.8	9.4	12.6	3.9	8.7
3	15.3	13.3	5.0	8.3	14.0	14.2	5.3	8.8	15.5	13.1	6.0	7.1	10.6	11.4	4.6	6.8
High	18.5	14.2	4.6	9.6	11.8	14.5	2.7	11.9	17.6	13.5	3.5	10.1	18.2	19.1	3.3	15.8
H−L	4.0	2.2	−0.2	2.3	−3.6	−0.8	−1.5	0.7	6.7	6.5	−0.8	7.3	8.8	6.5	−0.6	7.1
[t]	2.9	0.8	−1.0	0.9	−2.1	−0.4	−10.3	0.3	2.4	2.4	−3.5	2.8	3.9	1.1	−2.1	1.2

Panel B: The second half of the sample

	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$	$A[R]$	$E[R]$	$A[\frac{D}{P}]$	$A[G]$
	B/M				ME				CI				NSI			
Low	10.3	7.7	1.9	5.8	11.2	13.1	1.4	11.7	12.9	9.8	3.8	6.0	14.3	13.4	2.7	10.6
3	13.3	10.7	3.0	7.7	10.5	9.5	2.1	7.4	11.5	7.0	2.2	4.7	12.6	13.6	2.5	11.1
High	14.2	11.3	3.4	7.9	11.4	7.5	2.6	4.9	10.5	10.1	2.1	8.0	7.1	5.8	2.3	3.6
H−L	3.9	3.6	1.5	2.2	0.2	−5.6	1.2	−6.8	−2.4	0.3	−1.7	2.0	−7.1	−7.5	−0.5	−7.1
$[t]$	1.4	1.0	6.2	0.6	0.1	−1.3	3.8	−1.7	−1.5	0.2	−7.8	1.0	−2.1	−1.1	−3.5	−1.0
	AI				AG				I/A				AC			
Low	12.7	10.5	2.8	7.8	13.1	12.1	2.6	9.5	11.8	9.6	2.6	7.0	12.8	12.0	2.2	9.7
3	12.2	9.3	2.9	6.3	11.3	8.4	2.7	5.7	11.6	8.5	2.7	5.8	14.6	10.3	2.3	8.0
High	10.6	9.5	1.5	8.0	10.2	13.1	1.4	11.7	10.7	9.8	1.6	8.3	9.4	9.2	1.4	7.7
H−L	−2.1	−1.0	−1.2	0.2	−2.9	1.0	−1.2	2.2	−1.1	0.2	−1.1	1.3	−3.4	−2.8	−0.8	−2.0
$[t]$	−1.0	−0.3	−4.6	0.1	−1.3	0.2	−5.0	0.4	−0.5	0.1	−4.8	0.4	−3.1	−0.7	−5.7	−0.5
	SUE				FP				ROA				MOM			
Low	8.5	8.8	2.0	6.8	12.2	12.3	1.9	10.5	7.2	9.9	1.8	8.1	5.6	8.4	2.0	6.5
3	10.9	7.0	2.1	4.9	10.3	10.5	2.4	8.1	9.3	5.3	2.4	2.9	11.0	8.2	2.7	5.5
High	13.2	8.8	1.8	7.0	5.0	16.8	0.8	16.0	13.9	12.5	1.6	11.0	13.9	13.9	1.8	12.1
H−L	4.7	0.0	−0.1	0.1	−7.2	4.5	−1.1	5.6	6.7	2.7	−0.2	2.9	8.3	5.4	−0.2	5.6
$[t]$	3.9	0.0	−1.2	0.0	−3.1	1.2	−14.2	1.5	2.2	0.5	−1.4	0.5	3.3	1.0	−1.3	1.0

Table 4 : Multiple Regressions to Forecast Profitability

The table shows average slopes and their Fama-MacBeth t-statistics from annual cross-sectional regressions to predict profitability, $Y_{t+\tau}/B_{t+\tau-1}$, one, two, and three years ahead ($\tau = 1, 2, 3$). Y_t, D_t, and AC_t are earnings, dividends, and accruals per share for the fiscal year ending in calendar year t. $-AC_t$ is accruals for firms with negative accruals (zero otherwise) and $+AC_t$ is accruals for firms with positive accruals (zero otherwise). B_t is book equity per share at the end of fiscal year t. ME_t is market capitalization (price times shares outstanding) at the end of fiscal year t. Neg Y_t is a dummy variable that is one for firms that have negative earnings for fiscal year t (zero otherwise), and No D_t is a dummy variable that is one for firms that pay no dividends during fiscal year t. The sample is from 1963 to 2008. Int. is the regression intercept, and the R^2 is adjusted for degrees of freedom.

τ	Int.	$\ln B_t/M_t$	$\ln ME_t$	Neg Y_t	Y_t/B_t	$-AC_t/B_t$	$+AC_t/B_t$	AG_t	No D_t	D_t/B_t	R^2
Panel A: The full Fama-French (2006) specification											
Average slopes											
1	0.01	−0.03	0.01	−0.04	0.63	−0.10	−0.03	−0.03	−0.02	0.12	0.43
2	0.00	−0.02	0.01	−0.07	0.39	−0.09	0.01	−0.05	−0.02	0.38	0.21
3	0.01	−0.01	0.01	−0.07	0.27	−0.09	0.02	−0.05	−0.02	0.52	0.13
t-statistics											
1	0.67	−4.09	3.26	−2.69	18.39	−5.80	−2.98	−4.60	−4.71	2.61	
2	0.15	−2.65	3.18	−3.59	13.45	−3.51	0.42	−6.61	−4.70	8.10	
3	0.29	−1.96	3.26	−3.27	9.67	−5.16	1.14	−5.60	−4.32	12.34	
Panel B: The simplified Fama-French specification											
Average slopes											
1	0.00	−0.02	0.01	−0.05	0.61			−0.04			0.43
2	−0.00	−0.02	0.01	−0.07	0.40			−0.06			0.20
3	0.00	−0.01	0.01	−0.06	0.31			−0.06			0.13
t-statistics											
1	0.23	−4.25	4.26	−2.88	18.33			−5.76			
2	−0.09	−2.62	4.86	−3.48	11.25			−8.06			
3	0.05	−1.78	5.15	−3.10	9.85			−8.72			

Table 5 : Average Realized Returns and Expected Returns, Implied Costs of Equity, Baseline and Modified

We report the average realized returns, $A[R]$, the implied costs of equity from the baseline residual income model that uses the forecasted earnings from IBES, $E_0[R]$, the implied costs of equity from the modified residual income model that uses the Fama-French (2006) forecasted ROE, $E_1[R]$, and the implied costs of equity from the modified residual income model that uses the simplified Fama-French forecasted ROE, $E_2[R]$. In June of each year t from 1980 to 2008, we sort all NYSE stocks on book-to-market (B/M), size (ME), composite issuance (CI), net stock issues (NSI), abnormal investment (AI), asset growth (AG), investment-to-assets (I/A), and total accruals (AC) for the fiscal year ending in calendar year $t-1$ 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 (MOM) and earnings surprises (SUE), and use the NYSE breakpoints to split all stocks into quintiles. We hold the portfolios for six months and calculate value-weighted returns. Each month we use NYSE/Amex/Nasdaq breakpoints to sort all stocks on Campbell, Hilscher, and Szilagzi's (2008) failure probability (FP) into quintiles and calculate one-year value-weighted returns for each portfolio. Each month we also use NYSE breakpoints to sort all stocks on quarterly return-on-assets (ROA) and calculate value-weighted returns for the current month. Earnings and other Compustat quarterly accounting data for a fiscal quarter are used in portfolio sorts in the months immediately after its public earnings announcement month (Compustat quarterly item RDQ). See Section 2 and Appendix A for detailed variable definitions. "H−L" is the high-minus-low portfolios and "[t]" is heteroscedasticity-and-autocorrelation-consistent t-statistics testing a given H−L moment is zero. The sample periods are described in Table 1. All entries other than [t] are in annualized percent.

	$A[R]$	$E_0[R]$	$E_1[R]$	$E_2[R]$	$A[R]$	$E_0[R]$	$E_1[R]$	$E_2[R]$	$A[R]$	$E_0[R]$	$E_1[R]$	$E_2[R]$	$A[R]$	$E_0[R]$	$E_1[R]$	$E_2[R]$
	Panel A: B/M				Panel B: ME				Panel C: CI				Panel D: NSI			
Low	12.1	8.6	7.2	7.5	15.8	12.7	10.9	11.3	15.1	10.4	10.1	10.6	16.1	10.3	9.4	10.0
3	14.8	11.0	10.1	10.8	14.2	11.1	10.0	10.4	13.4	9.8	9.1	9.5	13.1	9.8	9.0	9.5
High	17.3	14.9	15.7	16.0	12.8	9.6	8.7	9.4	10.9	10.3	9.0	9.8	8.6	10.2	8.9	9.6
H−L	5.2	6.3	8.5	8.5	−3.0	−3.1	−2.2	−1.8	−4.2	−0.1	−1.1	−0.8	−7.5	−0.1	−0.5	−0.5
[t]	2.2	12.0	8.4	9.2	−0.8	−7.6	−6.0	−5.3	−2.8	−0.2	−4.2	−2.6	−3.0	−0.4	−1.6	−1.9
	Panel E: AI				Panel F: AG				Panel G: I/A				Panel H: AC			
Low	15.0	10.0	9.1	9.4	16.1	10.2	9.6	9.8	14.2	10.5	9.6	9.9	13.9	9.9	8.9	9.1
3	14.2	9.9	9.6	10.2	13.2	9.7	9.6	10.0	13.2	9.7	9.3	9.7	14.4	9.8	9.1	9.4
High	11.1	9.9	8.1	8.9	10.5	9.6	8.1	8.5	10.8	9.9	8.6	9.1	9.1	9.8	8.4	8.8
H−L	−4.0	−0.1	−1.0	−0.5	−5.6	−0.6	−1.5	−1.2	−3.4	−0.5	−1.0	−0.9	−4.8	0.0	−0.5	−0.3
[t]	−2.4	−0.2	−2.7	−1.1	−2.8	−3.0	−5.6	−4.4	−1.8	−3.0	−5.6	−4.5	−3.6	−0.1	−3.3	−1.8
	Panel I: SUE				Panel J: FP				Panel K: ROA				Panel L: MOM			
Low	8.6	10.1	9.2	9.9	13.8	9.2	7.8	8.2	5.9	11.0	9.8	10.6	6.8	11.3	10.0	10.7
3	10.9	10.1	8.9	9.5	12.4	11.2	9.8	10.4	10.1	10.5	10.0	10.3	11.2	10.2	9.0	9.7
High	13.5	10.0	8.3	8.9	5.7	13.1	10.8	11.5	12.4	9.3	7.7	8.0	13.2	9.7	7.8	8.4
H−L	4.9	−0.1	−0.9	−1.0	−8.1	3.8	3.0	3.3	6.5	−1.7	−2.1	−2.7	6.4	−1.7	−2.2	−2.3
[t]	5.5	−3.1	−19.2	−18.5	−5.0	34.8	21.0	25.8	3.3	−22.0	−19.3	−35.1	3.3	−17.1	−23.7	−23.5

Table 6 : Average Returns and Expected Returns, the Baseline and Modified ETSS Models as well as the O'Hanlon-Steele Model

We report the average realized returns, $A[R]$, the expected returns from the baseline Easton et al. (2002) model that uses the forecasted earnings from IBES, r_0, the expected returns from the modified Easton et al. model that uses the Fama-French (2006) forecasted ROE, r_1, and the expected returns from the O'Hanlon-Steele model, r_2. In June of each year t from 1980 to 2008, we sort all NYSE stocks on book-to-market (B/M), size (ME), composite issuance (CI), net stock issues (NSI), abnormal investment (AI), asset growth (AG), investment-to-assets (I/A), and total accruals (AC) for the fiscal year ending in calendar year $t-1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into 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 (MOM) and earnings surprises (SUE), and use the NYSE breakpoints to split all stocks into quintiles. We hold the portfolios for six months and calculate value-weighted returns. Each month we use NYSE/Amex/Nasdaq breakpoints to sort all stocks on Campbell, Hilscher, and Szilagzi's (2008) failure probability (FP) into quintiles and calculate one-year value-weighted returns for each portfolio. Each month we also use NYSE breakpoints to sort all stocks on quarterly return-on-assets (ROA) and calculate value-weighted returns for the current month. Earnings and other Compustat quarterly accounting data for a fiscal quarter are used in portfolio sorts in the months immediately after its public earnings announcement month (Compustat quarterly item RDQ). See Section 2 and Appendix A for detailed variable definitions. "H−L" is the high-minus-low portfolios and "[t]" is heteroscedasticity-and-autocorrelation-consistent t-statistics testing a given H−L moment is zero. The sample periods are in Table 1. All entries other than [t] are in annualized percent.

	$A[R]$	r_0	r_1	r_2	$A[R]$	r_0	r_1	r_2	$A[R]$	r_0	r_1	r_2	$A[R]$	r_0	r_1	r_2
	Panel A: B/M				Panel B: ME				Panel C: CI				Panel D: NSI			
Low	12.7	10.7	18.6	19.6	15.4	4.9	5.3	5.0	15.3	8.1	12.4	14.6	17.0	10.5	12.4	13.2
3	15.2	9.9	11.7	11.8	14.1	14.0	10.8	12.6	14.1	10.5	12.1	12.5	14.2	9.3	11.7	13.8
High	16.9	8.6	5.9	7.9	13.2	11.3	12.8	16.4	12.1	13.2	10.8	14.0	9.7	11.2	10.8	14.6
H−L	4.2	−2.1	−12.7	−9.4	−2.2	6.4	7.5	11.8	−3.2	5.2	−1.6	−1.9	−7.3	0.8	−1.7	−0.2
[t]	1.7	−1.0	−12.2	−6.0	−0.6	5.6	5.6	4.7	−2.0	3.0	−2.1	−2.0	−2.7	0.7	−2.6	−0.2
	Panel E: AI				Panel F: AG				Panel G: I/A				Panel H: AC			
Low	15.0	11.8	7.2	6.7	15.9	12.1	7.8	6.6	14.4	10.9	9.1	10.7	14.3	11.7	10.3	10.7
3	14.2	10.4	11.9	12.5	13.7	10.8	12.8	13.2	13.7	10.9	12.8	13.9	14.8	12.8	12.6	14.5
High	12.5	11.2	14.2	20.8	11.7	16.7	13.3	19.9	11.9	15.5	12.8	17.4	10.7	11.1	13.4	19.0
H−L	−2.5	−0.6	6.9	12.8	−4.3	4.6	5.4	12.6	−2.5	4.6	3.7	6.2	−3.6	−0.6	3.1	8.4
[t]	−1.4	−0.2	6.4	9.7	−2.2	1.9	5.8	9.3	−1.2	1.8	6.2	7.0	−3.7	−0.3	5.1	6.9
	Panel I: SUE				Panel J: FP				Panel K: ROA				Panel L: MOM			
Low	9.2	13.9	17.0	17.1	14.3	14.8	17.0	19.1	6.6	6.8	6.7	7.0	7.2	13.7	14.2	13.8
3	10.9	15.9	14.5	13.6	12.6	15.3	13.0	14.3	10.4	13.6	13.6	12.5	11.5	15.3	15.6	14.5
High	13.9	16.3	14.6	14.9	7.2	−9.4	−4.5	−4.5	12.8	18.5	20.2	21.5	13.8	15.9	14.0	14.7
H−L	4.6	2.4	−2.5	−2.2	−7.2	−24.2	−21.6	−23.6	6.2	11.7	13.5	14.5	6.6	2.2	−0.2	0.9
[t]	5.6	7.5	−16.6	−8.1	−4.4	−16.8	−19.6	−17.0	3.4	21.9	30.8	24.9	3.4	6.6	−0.7	3.3

Table 7 : Implied Growth Rates, the Baseline and Modified Easton Models, the O'Hanlon-Steele Model

We report the estimated growth rates from the baseline Easton et al. (2002) model that uses the forecasted earnings from IBES, g_0, the growth rates from the modified Easton et al. model that uses the Fama-French (2006) forecasted ROE, g_1, and the estimated growth rates from the O'Hanlon-Steele model, g_2. For comparison, we also report the average dividend growth rates from the dividend discounting model, $A[G]$. In June of each year t from 1980 to 2008, we sort all NYSE stocks on book-to-market (B/M), size (ME), composite issuance (CI), net stock issues (NSI), abnormal investment (AI), asset growth (AG), investment-to-assets (I/A), and total accruals (AC) for the fiscal year ending in calendar year $t-1$ and use the NYSE breakpoints to split NYSE, Amex, and Nasdaq stocks into 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 (MOM) and earnings surprises (SUE), and use the NYSE breakpoints to split all stocks into quintiles. We hold the portfolios for six months and calculate value-weighted returns. Each month we use NYSE/Amex/Nasdaq breakpoints to sort all stocks on Campbell, Hilscher, and Szilagzi's (2008) failure probability (FP) into quintiles and calculate one-year value-weighted returns for each portfolio. Each month we also use NYSE breakpoints to sort all stocks on quarterly return-on-assets (ROA) and calculate value-weighted returns for the current month. Earnings and other Compustat quarterly accounting data for a fiscal quarter are used in portfolio sorts in the months immediately after its public earnings announcement month (Compustat quarterly item RDQ). See Section 2 and Appendix A for detailed variable definitions. "H−L" is the high-minus-low portfolios and "[t]" is heteroscedasticity-and-autocorrelation-consistent t-statistics testing a given H−L moment is zero. The sample periods are in Table 1. All entries other than [t] are in annualized percent.

	$A[G]$	g_0	g_1	g_2	$A[G]$	g_0	g_1	g_2	$A[G]$	g_0	g_1	g_2	$A[G]$	g_0	g_1	g_2
	Panel A: B/M				Panel B: ME				Panel C: CI				Panel D: NSI			
Low	5.9	6.3	17.5	18.6	10.7	2.2	4.8	3.9	6.8	1.6	8.2	11.3	10.9	5.2	8.9	10.3
3	8.5	5.3	10.8	10.1	8.7	13.1	8.9	11.2	6.4	6.6	8.6	9.0	9.0	5.0	9.0	11.7
High	11.6	1.4	2.2	4.7	6.0	7.4	10.0	14.8	6.2	10.9	8.6	11.9	5.3	8.8	9.4	13.4
H−L	5.6	−4.9	−15.4	−13.9	−4.7	5.1	5.2	10.9	−0.6	9.2	0.4	0.6	−5.5	3.6	0.5	3.1
[t]	2.2	−2.6	−27.1	−10.7	−1.6	4.0	5.6	4.5	−0.2	3.7	0.4	0.5	−1.5	2.1	0.8	3.6
	Panel E: AI				Panel F: AG				Panel G: I/A				Panel H: AC			
Low	8.1	8.3	3.4	4.2	10.8	10.3	5.4	4.9	11.3	6.2	5.9	8.9	14.3	8.8	8.1	9.5
3	8.1	6.1	8.5	9.2	6.1	6.8	9.7	10.6	7.2	6.9	10.0	11.6	14.8	9.3	9.9	12.0
High	6.9	8.4	12.1	19.6	10.4	15.1	11.6	18.8	7.6	14.1	11.1	16.1	10.7	8.2	11.5	17.6
H−L	−1.2	0.1	8.6	15.5	−0.4	4.8	6.2	13.9	−3.7	8.0	5.2	7.3	−3.6	−0.6	3.5	8.1
[t]	−0.4	0.0	6.1	9.7	−0.1	1.3	5.8	11.0	−1.4	2.2	7.6	8.4	−3.7	−0.2	4.9	6.5
	Panel I: SUE				Panel J: FP				Panel K: ROA				Panel L: MOM			
Low	7.0	11.2	14.8	14.6	10.8	11.5	15.3	17.6	5.5	6.2	5.9	7.4	7.6	10.7	12.2	12.0
3	6.5	12.9	12.5	11.6	8.5	12.7	11.2	12.6	5.0	10.5	11.9	11.0	6.1	11.9	13.3	12.3
High	8.2	13.3	13.0	13.3	14.0	−8.6	−3.9	−4.4	10.5	15.7	19.1	19.8	13.9	14.0	12.7	13.3
H−L	1.2	2.2	−1.8	−1.3	3.2	−20.0	−19.2	−22.0	5.0	9.5	13.2	12.5	6.3	3.3	0.4	1.4
[t]	0.5	4.7	−10.1	−4.1	1.5	−15.8	−23.2	−15.3	1.6	16.1	34.0	20.9	1.6	8.3	1.7	4.6

Table 8 : Cross-Correlation Matrix of Expected Return Estimates

We calculate cross-correlation matrix of expected return estimates for 60 testing portfolios including one-way quintiles on book-to-market equity, market equity, composite issuance, net stock issues, abnormal investment, asset growth, investment-to-assets, total accruals, earnings surprises, failure probability, return-on-assets, and prior six-month returns. The expected return estimates are from the dividend discounting model, $E[R]$, the baseline residual income model that uses IBES forecasted earnings, $E_0[R]$, the modified residual income model that uses the full Fama-French (2006) ROE forecasting specification, $E_1[R]$, the modified residual income model that uses the simplified Fama-French ROE forecasting specification, the baseline ETSS model that uses IBES forecasted earnings, r_0, the modified ETSS model that uses the Fama-French forecasted ROE, r_1, and the O'Hanlon-Steele (2000) model, r_2. For each year we calculate cross-sectional correlations of the expected return estimates, and report the time-series averages of these correlations. See Section 2 and Appendix A for detailed variable definitions and portfolio constructions. The upper triangle of the matrix reports Pearson correlations, and the lower triangle reports Spearman correlations.

	$E[R]$	$E_0[R]$	$E_1[R]$	$E_2[R]$	r_0	r_1	r_2
$E[R]$	1	−0.10	−0.03	−0.75	−0.09	0.01	−0.15
$E_0[R]$	−0.16	1	0.80	0.79	−0.25	−0.48	−0.24
$E_1[R]$	−0.02	0.57	1	0.99	−0.29	−0.41	−0.25
$E_2[R]$	−0.65	0.73	0.97	1	−0.35	−0.32	−0.19
r_0	−0.11	−0.15	−0.20	−0.28	1	0.73	0.61
r_1	0.02	−0.35	−0.41	−0.32	0.68	1	0.75
r_2	−0.15	−0.17	−0.25	−0.19	0.55	0.72	1

Table 9 : Fama-MacBeth (1973) Cross-Sectional Regressions of Future Realized Returns on Estimated Expected Returns

We conduct cross-sectional regressions of future realized returns on expected return estimates using 60 testing portfolios including one-way quintiles on book-to-market equity, market equity, composite issuance, net stock issues, abnormal investment, asset growth, investment-to-assets, total accruals, earnings surprises, failure probability, return-on-assets, and prior six-month returns. The expected return estimates are from the dividend discounting model, $E[R]$ (Panel A), the baseline residual income model that uses IBES forecasted earnings, $E_0[R]$ (Panel B), the modified residual income model that uses the Fama-French (2006) forecasted ROE (the full specification), $E_1[R]$ (Panel C), the baseline ETSS model that uses IBES forecasted earnings, r_0 (Panel D), the modified ETSS model that uses the Fama-French forecasted ROE, r_1 (Panel E), and the O'Hanlon-Steele (2000) model, r_2 (Panel F). MOM is prior six-month returns, $\ln(B/M)$ is the logarithm of book-to-market equity, and $\ln(ME)$ is the logarithm of market capitalization. R^2 is the average cross-sectional regression R-squared. t-statistics (in brackets) test that a given coefficient equals zero. Annual cross-sectional regressions using 12-month and 36-month future realized returns on explanatory variables measured at the beginning of the holding period also are reported. See Section 2 and Appendix A for detailed variable definitions and portfolio constructions.

Panel A: Dividend discounting model					Panel B: Baseline implied costs of equity					Panel C: Modified implied costs of equity				
$E[R]$	R^6	$\ln(B/M)$	$\ln(ME)$	R^2	$E_0[R]$	R^6	$\ln(B/M)$	$\ln(ME)$	R^2	$E_1[R]$	R^6	$\ln(B/M)$	$\ln(ME)$	R^2
Monthly realized returns as the dependent variable														
0.03				0.06	0.03				0.12	0.03				0.08
[2.6]					[1.6]					[1.8]				
0.02	0.06	0.03	0.02	0.31	0.03	0.05	0.05	0.05	0.35	0.05	0.05	−0.03	−0.02	0.35
[2.3]	[3.6]	[2.1]	[0.8]		[1.4]	[3.5]	[2.1]	[1.9]		[3.0]	[3.4]	[−1.2]	[−0.9]	
12-month realized returns as the dependent variable														
0.09				0.04	0.05				0.19	0.10				0.12
[2.0]					[0.5]					[1.0]				
0.08	0.08	0.15	0.16	0.33	−0.01	0.12	0.26	0.18	0.37	0.10	0.07	−0.02	−0.03	0.35
[1.9]	[1.2]	[1.9]	[3.1]		[−0.2]	[2.0]	[2.4]	[3.1]		[1.2]	[1.1]	[−0.2]	[−0.3]	
36-month realized returns as the dependent variable														
0.17				0.07	0.12				0.24	0.14				0.17
[2.8]					[0.9]					[1.1]				
0.13	0.12	0.18	0.12	0.40	0.02	0.15	0.24	0.11	0.36	0.18	0.12	−0.09	−0.11	0.36
[3.3]	[2.3]	[1.4]	[2.0]		[0.2]	[3.9]	[1.7]	[2.4]		[2.0]	[3.3]	[−0.8]	[−1.1]	

Panel D: Baseline ETSS estimation					Panel E: Modified ETSS estimation					Panel F: The O'Hanlon-Steele model				
r_0	R^6	$\ln(B/M)$	$\ln(ME)$	R^2	r_1	R^6	$\ln(B/M)$	$\ln(ME)$	R^2	r_2	R^6	$\ln(B/M)$	$\ln(ME)$	R^2
Monthly realized returns as the dependent variable														
0.01				0.06	0.03				0.16	0.02				0.13
[1.0]					[1.4]					[0.9]				
0.00	0.05	0.04	0.03	0.38	0.03	0.05	0.03	0.00	0.41	0.02	0.05	0.03	0.01	0.37
[0.3]	[3.7]	[2.1]	[1.1]		[1.5]	[3.7]	[1.5]	[0.1]		[1.3]	[3.9]	[1.8]	[0.6]	
12-month realized returns as the dependent variable														
0.04				0.04	0.09				0.15	0.04				0.17
[0.7]					[1.0]					[0.5]				
0.02	0.14	0.18	0.15	0.36	0.13	0.08	0.16	0.04	0.40	0.04	0.11	0.15	0.11	0.38
[1.1]	[2.7]	[2.2]	[2.1]		[2.2]	[1.1]	[1.9]	[0.4]		[0.7]	[2.5]	[2.0]	[1.4]	
36-month realized returns as the dependent variable														
0.03				0.06	0.06				0.11	0.03				0.16
[0.4]					[0.7]					[0.3]				
0.00	0.18	0.19	0.09	0.39	0.09	0.15	0.14	−0.02	0.39	0.06	0.15	0.20	0.05	0.43
[−0.1]	[4.2]	[1.4]	[1.2]		[1.3]	[2.4]	[0.9]	[−0.2]		[1.3]	[4.6]	[1.6]	[0.6]	