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Accounting Anomalies, Risk, and Return

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ABSTRACT: This paper investigates whether so-called anomalous returns predicted by accounting numbers reflect normal returns for risk or abnormal returns. It does so via a model showing how accounting numbers inform about normal returns if pricing were rational. The model equates expected returns to expectations of earnings and earnings growth, so that any variable that forecasts earnings and earnings growth also indicates the required return if the market prices those outcomes as risky. The empirical results confirm that many accounting anomaly variables (such as accruals, asset growth, and investment) forecast forward earnings and growth, and in the same direction in which they forecast returns. While the lack of an agreed-upon asset pricing model for required returns rules out definitive conclusions, the paper provides both a framework and supporting empirical results indicating that the observed "anomalous" returns associated with accounting numbers are consistent with rational pricing.

Keywords: *accounting anomalies; abnormal stock returns; risk and return*.

I. INTRODUCTION

In numerous studies, accounting variables, such as earnings-to-price, book-to-price, accruals, sales growth, and asset growth, consistently forecast returns. The predictable returns have been designated "anomalies," presumably because they cannot be understood in terms of standard models that link risk to expected returns. More boldly, some researchers have nominated the observed returns as "abnormal returns" due to market mispricing, and investors reportedly develop anomaly trading strategies under the mantra of "accounting arbitrage." Others have attempted to explain the returns as normal returns for risk borne (Fama and French 1996; Zhang 2007; Khan 2008; Guo and Jiang 2010; Wu, L. Zhang, and X. Zhang 2010). A modifying view attributes the

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returns to limits in the ability to arbitrage (Shleifer and Vishny 1997; Mashruwala, Rajgopal, and Shevlin 2006; Li and Sullivan 2011).[1]

As long recognized in Fama (1970, 1991), among others, the attribution of "abnormal returns" and the associated inference of market inefficiency can only be made with a valid asset pricing model that sets the benchmark for the expected return for risk borne. A generally accepted model is not available. However, this paper utilizes a model that connects accounting variables to expected returns and facilitates an answer to the question: Do the accounting variables that predict the so-called anomalous returns exhibit features that one associates with risk?

The model equates expected returns to expectations of earnings and earnings growth, so that any variable that forecasts earnings and earnings growth also forecasts expected returns if the market prices those outcomes as risky. The empirical analysis based on the model shows that a number of accounting variables that predict returns also forecast future earnings and earnings growth, and in the same direction as they predict stock returns. These include accruals, asset growth, profitability, investment, net share issuance, and external financing. Accordingly, the observed "anomalous" returns associated with these accounting numbers are consistent with rational pricing.

Our model is not a model of equilibrium expected return for risk, so we cannot be definitive (and such an asset pricing model is elusive). Our conclusion is that the returns to anomaly variables are consistent with rational pricing in the sense that the returns are those one would expect if the market were efficient in its pricing. That is, the returns are not "anomalous" in the sense that we cannot explain them; rather, they can be logically explained as indicating expected returns for risk borne. The analysis in the paper thus raises the bar for researchers or investors who maintain that the market is inefficient with respect to the identified accounting information; they would have to show that the observed returns, although consistent with rational pricing, are otherwise.

II. THE MODEL

To give a sense of our approach, consider the predictable returns associated with earnings-to-price that have been reported by Basu (1977, 1983) and many others. The returns have been designated as "anomalous," and have been exploited in contrarian investment strategies with the presumption that they are due to market mispricing. However, Ball (1978) made the straightforward conjecture that earnings-to-price is a yield (a return on price) which, like a bond yield, might be related to risk. That conjecture would be more persuasive with a formal model of how the earnings yield relates to risk and return. For a bond, a model is available in the form of a bond "pricing model" that supplies the expected bond yield that indicates the expected return via an internal-rate-of-return calculation. That yield, in turn, equals the expected earnings yield, earnings-to-price, under the effective interest method of accounting. This yield is widely accepted as an indication of risk and as a rough approximation of the associated required return. It would be difficult to claim that bond returns predicted by bond yields and credit spreads are generally anomalous, even though the standard bond pricing model is not "a generally accepted equilibrium asset pricing model" for the required return.

For equities, the issue is more difficult, for three reasons. First, equities do not involve fixed contractual payments, so reconciling expected payoffs to price via an internal rate-of-return calculation is more problematic. Second, unlike a bond yield, the earnings yield also reflects anticipated earnings growth, so an internal rate-of-return calculation must involve a growth forecast.

[1] Richardson, Tuna, and Wysocki (2010) review anomalies research and Dechow, Khimich, and Sloan (2011) provide a commentary on the accrual anomaly that promotes the market inefficiency view. Zacks (2011) reviews the anomaly research in detail with a focus on executable trading strategies.

However, forecasts of long-term growth are elusive. Third, earnings is an accounting measure that depends on how the accounting is done and there is no guarantee that the GAAP earnings yield captures risk and return. The expected earnings yield on a bond equals the expected bond yield under the effective interest method, but the accounting for equity earnings in no way guarantees a correspondence.

The model of expected returns in this paper accommodates these three issues. The model adapts the characteristic return model of Penman, Reggiani, Richardson, and Tuna (2013) to identify how accounting anomaly variables relate to expected returns. With some exceptions—notably the Fama and French (1993) three-factor model with its book-to-price factor—asset pricing models do not bring accounting attributes directly to the modeling of expected returns, and it is this difficulty that we attempt to handle.

A Model of Expected Returns Explained by the Forward Earnings Yield and Anomaly Variables

By the clean-surplus accounting operation for equity, $d_{t+1} = Earnings_{t+1} - (B_{t+1} - B_t)$ where d is the net dividend to common equity, *Earnings* is the comprehensive earnings available to common equity, and B is the book value of common equity. Substituting for dividends in the stock return, with firm subscripts omitted:

$$E\left(\frac{P_{t+1} + d_{t+1} - P_t}{P_t}\right) = E(R_{t+1}) = \frac{E(Earnings_{t+1})}{P_t} + E\left(\frac{P_{t+1} - B_{t+1} - (P_t - B_t)}{P_t}\right). \quad (1)$$

This identity has long been recognized, for example in Easton, Harris, and Ohlson (1992) and Shroff (1995), although to explain contemporaneous returns rather than expected future returns. If there is no expected change in the price premium over book value, then Equation (1) shows that the expected rate-of-return is equal to the expected earnings yield, $\frac{E(Earnings_{t+1})}{P_t}$, as Ball (1978) conjectured. This benchmark case is the case for a mark-to-market bond, where the expected change in premium, and the premium, is zero. However, earnings are determined by accounting principles that do not necessarily produce a constant premium; only a particular accounting measurement that equates earnings to returns satisfies the zero expected change in premium condition. The identity shows that any alternative measurement of earnings relative to this benchmark induces a change in the expected premium. Earnings add to book value so if expected earnings are depressed below the level that would indicate the expected return, as in the case of expensing R&D expenditures, then prices are expected to increase more than book value due to the low earnings added to book value. Accordingly, the expected change in premium must be accommodated in forecasting the expected return, and any variable that predicts the change in premium will add to the explanation of the expected return. The model thus explains the expected return by the forward earnings yield adjusted for information that forecasts the change in premium.

The picture becomes more concrete with an appreciation of what a change of premium captures. An increase in the price premium over book value means that price increases more than book value. Because earnings increase book value by the clean-surplus relation, an expected increase in the premium for $t+1$ means that price is expected to increase more than earnings in $t+1$.[2] But lower earnings for $t+1$ for a given price, P_t, means higher earnings after $t+1$; P_t anticipates the

[2] Book value and price are also affected by dividends. Dividends reduce the book value, one-to-one, by the clean surplus equation. But, if dividends also reduce price one-to-one, as they do under Miller and Modigliani assumptions, then they do not affect the difference between price and book value or the change in that difference. If dividends reduce price less than dollar-for-dollar because of tax effects, then premiums will expand. Our results, however, are not affected with a control for the dividend yield.

total stream of life-long earnings, so lower expected t+1 earnings means higher earnings in the future by the property of accrual accounting that allocates total, life-long earnings to periods. In short, an expected change in premium captures expected earnings growth subsequent to t+1. Penman et al. (2013) provide examples.[3]

Accounting that allocates earnings to periods might make the allocation between forward earnings and subsequent growth on the right-hand side of Equation (1) without any necessary effect on the expected return on the left-hand side. The deflation by P_t is thus important for connecting expectations of forward earnings and subsequent growth to risk and the expected return. The deflation expresses the left-hand side as an expected rate-of-return, but also discounts the right-hand side for both expectations in price at t and for the discount in that price for risk and the price of risk. Thus, if prices appropriately discount for risk, then forward earnings for period t+1 are relative to the expectation of those earnings at time t, discounted for the risk, rendering a risk-adjusted yield, as with a bond. Any expected growth is similarly discounted, so only a forecast of growth that is discounted in the price for the risk of not realizing the expected growth will add to the expected return.[4] Accordingly, with the deflation by price, only expected growth that is deemed risky will add to the required return.

Expected earnings growth is risky. If forward earnings are at risk, as in the forward earnings yield, then the subsequent expected earnings that yield the growth must also be risky. Considerable empirical accounting research, beginning with Ball and Brown (1968), indicates stock prices settle up against earnings realizations that differ from expectation. In "long-window" returns-earnings regressions, such as Easton et al. (1992), the observed R^2s are quite high, indicating that stock returns over the long run are driven by earnings realizations; long-run expected earnings are at risk, so earnings outcomes over the long term determine outcomes to equity investing. Further, an accounting principle that allocates earnings to periods connects risk to growth. Under uncertainty, accrual accounting defers earnings to the future until the uncertainty has largely been resolved, and deferred earnings means expected earnings growth. Whether the risk associated with such earnings growth is a priced risk is an open question, but that pricing is imbedded in the price deflator in Equation (1). Penman and Reggiani (2013) show empirically that higher expected earnings growth is associated with higher uncertainty as to outcomes and, correspondingly, with higher average stock returns.

From Equation (1):

$$E(R_{t+1}) = \frac{E(Earnings_{t+1})}{P_t} + \frac{B_t}{P_t} + E\left(\frac{P_{t+1} - B_{t+1}}{P_t}\right) - 1. \tag{1a}$$

This expression identifies book-to-price ratio (B/P) as a variable that may predict a change in premium and thus potentially predict growth related to risk. This is the focus in Penman et al. (2013), which shows that B/P forecasts both risky earnings growth and returns, validating B/P as a risk attribute in Fama and French (1992). Ellahie, Katz, and Richardson (2013) have taken the model to the aggregate level, where they show that given the forward earnings yield (E/P), B/P forecasts differences in risky earnings growth across countries and those differences explain differences in average stock returns across those countries. The model and the empirical results in these papers also show that the Fama and French model omits the expected earnings yield. Therefore, if so-called anomaly variables forecast the forward earnings yield, as we show, then they may proxy for an omitted variable in the Fama and French model. Significantly, that model is often

[3] Ohlson (2008) presents a permanent income growth model where the earnings growth rate corresponds to the risk premium, one-for-one, and premiums increase with the growth rate.

[4] The point is made in Berk (1995): Any variable that relates to expected payoffs is priced lower the more risky the expected payoff.

used as a benchmark for assessing abnormal returns in anomaly papers, but it would not be appropriate if anomaly variables proxy for the omitted factor in the model.

Regression Models

We now introduce anomaly variables that are the focus of this study. Stating Equation (1a) on an *ex post* realized return basis and adding accounting variables as A_j, $j = 1, 2, \ldots, N$, we specify a cross-sectional regression equation that is free to fit intercept and slope coefficients such that ε_{t+1} is mean zero:

$$R_{t+1} = a + b_1 \frac{E(Earnings_{t+1})}{P_t} + b_2 \frac{B_t}{P_t} + \sum_{j=1}^{N} b_{2+j} A_j + \varepsilon_{t+1}. \qquad (1b)$$

For the case of no expected change in premium (no growth), $b_1 = 1$ and the other b coefficients are equal to 0. This is the case for a mark-to-market bond for which the expected earnings yield indicates the expected return. For equities that involve growth, b_1 can take on a value different from 1, depending on the correlation of the expected earnings yield with expected earnings growth in the disturbance. B/P and the A_j variables add to expected returns only if they predict growth that is associated with differential risk in the cross-section.

The forward earnings yield in Equation (1b) is not observable; the expectation must be developed from current information. The forecast can start with current earnings and ask if the anomaly variables predict that forward earnings will differ from current earnings. Replacing forward earnings in Equation (1b) with current earnings:

$$R_{t+1} = a + b_1 \frac{Earnings_t}{P_t} + b_2 \frac{B_t}{P_t} + \sum_{j=1}^{N} b_{2+j} A_j + e_{t+1}. \qquad (1c)$$

As in Equation (1b), variables A_j, $j = 1, 2, \ldots, N$ take on a non-zero coefficient if they forecast risky growth, but now they also play a role if they forecast that forward earnings will be different from that indicated by current earnings and B/P.

Considerable research indicates that accounting numbers add to current earnings in forecasting forward earnings. The early papers on forecasting returns from financial statement information (Ou and Penman 1989, 1991) were explicitly designed to predict returns with accounting numbers that forecasted that forward earnings would be different from current earnings. The primary accounting variables in anomaly research, accruals in Sloan (1996), and growth in net operating assets (ΔNOA) in Fairfield, Whisenant, and Yohn (2003) are candidates for explaining expected returns in this framework. Because $Earnings_t$ = Cash from operations + Accruals, specifying an A_j as accruals effectively decomposes current earnings in Regression (1c), $Earnings_t$, into cash flow and accrual components, a relevant decomposition if cash flow and accruals have different implications for forecasts of forward earnings and thus for expected returns. While Sloan (1996) conjectures that this difference in "persistence" of cash flows and accruals is the reason for the market's misunderstanding that yields abnormal returns, our model makes clear that recognition of such a difference is part of a rational forecast of forward earnings and the expected return.[5] Similarly ignoring taxes, $Earnings_t$ + Net interest expense$_t$ = Operating income$_t$ = Free cash flow$_t$ − ΔNOA_t by the clean surplus equation for operating activities, so designating ΔNOA_t as an A_j variable also decomposes the operating component of earnings into components that may have different implications for forward earnings. Penman and Zhang (2006) find that ΔNOA is a primary

[5] The theme of the market failing to understand earnings persistence is maintained in Xie (2001), Barth and Hutton (2004), and Richardson, Sloan, Soliman, and Tuna (2005), among many other papers.

earnings forecasting variable, just as it is the primary return forecasting variable in Fairfield et al. (2003). The prediction of growth is less clear, but ΔNOA, which includes accruals, is itself a growth variable.

Comparison with Other Frameworks

Our approach differs from the model in Mishkin (1983) that is commonly applied in anomaly studies to identify mispricing. That model equates forecasting parameters for forecasting forward earnings to those for forecasting returns. That is appropriate for the no-growth case in Equation (1) with no expected change in the premium, where expected returns equal expected earnings and earnings evolve in parallel with returns. This holds for the case of a bond, and the original Mishkin (1983) paper indeed applied the model to the bond market where the no-growth condition is satisfied. However, the test is not appropriate for equities with growth unless variables that forecast growth are included. Significantly, many of the omitted variables identified by Kraft, Leone, and Wasley (2007) in their criticism of the use of the Mishkin test are similar to those we identify in this paper as indicating both growth and expected returns.

The modeling in this paper would appear to be similar to that in Fama and French (2006), which connects expected returns to accounting features via the clean-surplus equation, as does Equation (1). However, their modeling is quite different from our paper and reaches different conclusions. Substituting for dividends via the clean-surplus equation, they show that:

$$\frac{P_t}{B_t} = \frac{\sum_{\tau=1}^{\infty} E\Big(Earnings_{t+\tau} - (B_{t+\tau} - B_{t+\tau-1})\Big)/(1+r)^{\tau}}{B_t},$$

which is a restatement of the residual income model familiar to accounting researchers. They refer to expected earnings relative to book value, $\frac{\sum_{\tau=1}^{\infty} E(Earnings_{t+\tau})}{B_t}$, as profitability or the rate of return on book value, and refer to the change in book value, $\frac{B_{t+\tau}-B_{t+\tau-1}}{B_t}$, as growth in investment. With this equation reverse-engineered to express the expected return, r, in terms of the other variables, they conclude that the expected return is increasing in B/P holding the expected book rate of return and expected investment growth constant, increasing in the expected book rate of return holding B/P and expected investment growth constant, and decreasing in expected investment growth holding B/P and expected book rate of return constant.

Our framework differs. First, in the treatment of growth, Fama and French (2006) focus on investment growth whereas we focus on earnings growth. They posit that expected returns are negatively related to investment growth, whereas they are positively related to earnings growth in our framework. Second, with the infinite summation over expected future earnings in their model, the earnings expectation relative to current book value is for life-long earnings, with no allocation to periods. Our model, in contrast, focuses on the allocation of earnings to short-term versus long-term and thus introduces expected earnings growth. Third, their framework makes no mention of E/P while our model introduces E/P as the starting point. We show that in the absence of expected growth, the required return equals E/P and B/P is irrelevant as in the case for a bond. Fourth, in the Fama and French (2006) framework, expected returns are increasing in B/P, holding profitability and investment growth constant, and *vice versa*. But, in the no-growth case, $E/P = E/B \times B/P$, where E/B is profitability and E/P equals the expected return. Therefore, the expected return can neither be increasing in B/P, holding profitability constant, nor *vice versa*, because a higher E/B means a lower B/P and *vice versa* with no effect on the expected return. This reflects the accounting property that profitability and B/P are a mirror image of each other with no growth. A high book rate of return for a given price reflects low book value in the balance sheet due to conservative accounting, as modeled in Feltham and Ohlson (1995). The relationship between *E/P*, *B/P*, and profitability is laid out in Penman (1996), which also reports that, while the correlation between profitability and *B/P* is strong, that between profitability and *E/P* is not; the Fama and French (2006) profitability attribute is not the same as the *E/P* in our paper. Fifth, Fama and French (2006) do not apply their framework to link specific anomaly variables to risk and return.

These points do not necessarily imply that the empirical results in the two papers are contradictory, only that they come from different starting points and that introduces different predictions. However, the comparative statics in the Fama and French (2006) framework are inconsistent with actual accounting relations. As indicated above, one cannot vary *B/P* while holding book rate of return (profitability) constant, because book rate of return reflects the accounting for book value. High book return means low *B/P*, *ceteris paribus,* by construction of the accounting. For example, pharmaceutical firms have both a high book rate of return and high *P/B* due to missing R&D assets from the balance sheet, as does a brand company such as The Coca Cola Company. Further, growth in investment reduces book rate of return with conservative accounting, yet Fama and French (2006) hold book rate of return constant while looking at the effect of investment growth. Feltham and Ohlson (1995), Zhang (2000) and Rajan, Reichelstein, and Soliman (2007) demonstrate these conservative accounting properties.

III. IDENTIFICATION OF ADDED ACCOUNTING VARIABLES

Our tests investigate whether the accounting numbers that have been identified in the literature as predicting "anomalous" returns fit into the set A_j, $j = 1, 2, \ldots, N$ in Equation (1c). The modeling indicates that the variables can enter in two ways, either because they predict growth that is priced as risky or because they add to current earnings and book values as a forecast of forward earnings. Therefore, our empirical analysis first asks whether the accounting numbers associated with anomalous returns forecast forward earnings and subsequent growth in the same way as they forecast returns.

Growth Forecasts

The following model serves to identify variables that forecast growth after the forward year. Because any forecast beyond two years ahead is subject to significant survivorship bias, we focus on forecasts of earnings growth two years ahead. With a starting point of the current *E/P* and *B/P*:

$$\frac{\Delta Earnings^{a}_{t+2}}{Earnings_{t+1}} = \alpha + \beta_1 \frac{Earnings_t}{P_t} + \beta_2 \frac{B_t}{P_t} + \beta_3 \frac{\Delta Earnings^{a}_{t}}{P_t} + \beta_4 \frac{\Delta Sales_t}{Sales_{t-1}} + \sum_{j=1}^{N} \beta_{4+j} A_j + u_{t+2}. \qquad (2)$$

Earnings is earnings per share and $Earnings^{a}_{t+2} = Earnings_{t+2} + (r_{ft+2} \times d_{t+1})$, where d_{t+1} is dividend per share in t+1 and r_{ft+2} is the yield on the one-year T-bill for year t+2. So:

$$\Delta Earnings^{a}_{t+2} = Earnings^{a}_{t+2} - Earnings_{t+1} = Earnings_{t+2} + (r_{ft+2} \times d_{t+1}) - Earnings_{t+1}.$$

$\Delta Earnings^{a}_{t}$ is similarly defined. The reinvestment of dividends recognizes that dividends reduce earnings growth (or, alternatively put, dividends can be reinvested to earn more earnings). The left-hand-side growth rate is calculated as:

$$\frac{\Delta Earnings^{a}_{t+2} \times 2}{|Earnings^{a}_{t+2}| + |Earnings_{t+1}|},$$

which ranges from −2.0 to +2.0. This measure produces a growth rate that is quite close to the standard measure with positive base earnings in t+1 but accommodates the case where the base is negative, as well as compressing outliers when the growth rate is on a very small base.

The inclusion of the time t earnings change and sales growth in the regression equation incorporates the current earnings growth and sales growth in the growth forecast. They are included as a test of whether they subsume the information in anomaly variables, that is, whether anomaly variables are proxies for these summary attributes. But, for the evaluation of the anomaly variables, their inclusion is not important; the issue is whether the anomaly variables predict earnings growth, conditionally or unconditionally. We estimate the model with and without these two variables, with little difference in the results for the anomaly variables.

Forecasts of the Forward Earnings Yield

The following model is applied to forecast the forward earnings yield:

$$\frac{Earnings_{t+1}}{P_t} = \alpha + \delta_1 \frac{Earnings_t}{P_t} + \delta_2 \frac{B_t}{P_t} + \delta_3 \frac{\Delta Earnings_t}{P_t} + \sum_{j=1}^{N} \delta_{3+j} A_j + \omega_{t+2}. \quad (3)$$

The addition of $\Delta Earnings_t$ adds a time-series benchmark to the cross-sectional one. The inclusion or exclusion of this variable has little effect on the results for the anomaly variables.

IV. DATA AND DESCRIPTIVE STATISTICS

Our sample covers all U.S. firms that are available on Compustat files for any of the years 1962–2010, and have stock price and returns for the corresponding years on CRSP files. Financial firms (in SIC codes 6000–6999) and utility firms (in SIC codes 4900–4949) are excluded, as is common in anomaly studies. Firms were deleted for any year in which Compustat reports a missing number for book value of common equity, income before extraordinary items, common shares outstanding, or total assets. Firms with negative book value for common equity or a per-share value of less than 50 cents were also eliminated. Prices (P_t in the denominator of the regressions above) were observed on CRSP four months after each fiscal year, by which time the annual accounting numbers (for fiscal year t) should have been reported. Returns (R_{t+1}), also observed on CRSP, are annual buy-and-hold annual returns after this date, calculated as compounded monthly returns. Results are similar with the return period beginning three months after fiscal year-end.

Table 1 reports selected percentiles, calculated from data pooled over firms and years, for variables in the analysis. The notes to the table detail how these variables were calculated. The columns in the table group the target variables in regression Equations (1c), (2), and (3), then the basic forecast variables, followed by anomaly variables. Basic forecast variables are those in the regression equations before adding the anomaly variables, but they also involve the main summary numbers from the accounting system, earnings, book values, and sales.

The anomaly variables selected for investigation feature prominently in the literature in the main papers referenced in the notes to the table, and are calculated as in the earlier papers.[6] The first four anomaly variables—accruals (*ACCR*), growth in net operating assets (ΔNOA), return on assets (*ROA*), and investment (*INVEST*)—involve accounting numbers reflecting business operations. Net share issuance (*NSI*) and external financing (*EXTFIN*) concern not only financing activities, but also involve interaction with capital markets and thus might have an element of market timing. The momentum variable (*MOM*), sometimes referred to as Winners versus Losers, is a price variable. It is sometimes

[6] The Chen, Novy-Marx, and Zhang (2010) *ROA* measure is not exactly the *ROA* measure of textbooks because it does not add back interest in earnings in the numerator and accordingly is not an entirely unlevered measure of profitability. We use the label "anomaly," meaning the phenomenon is not entirely understood, with some hesitation, because some studies, such as Chen et al. (2010), do offer theories for the phenomenon. Other anomaly variables were considered in the empirical analysis, most of them being variations on the calculation of variables in Table 1.

TABLE 1
Distribution of Variables

Panel A: Target Variables and Basic Forecast Variables

	Target Variables			Basic Forecast Variables			
Percentile	$Return_{t+1}$	$\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$	$\frac{Earnings_{t+1}}{P_t}$	$\frac{Earnings_t}{P_t}$	$\frac{B_t}{P_t}$	$\frac{\Delta Earnings^a_t}{P_t}$	$\frac{\Delta Sales_t}{Sales_{t-1}}$
1	−0.882	−2.000	−0.738	−1.451	0.036	−0.960	−0.648
5	−0.666	−2.000	−0.264	−0.393	0.106	−0.261	−0.275
10	−0.519	−1.620	−0.133	−0.175	0.165	−0.122	−0.149
20	−0.323	−0.550	−0.030	−0.038	0.263	−0.040	−0.039
30	−0.181	−0.173	0.015	0.012	0.354	−0.012	0.019
40	−0.063	0.023	0.036	0.032	0.452	0.001	0.063
50	0.045	0.128	0.051	0.046	0.562	0.007	0.104
60	0.160	0.217	0.064	0.059	0.694	0.013	0.148
70	0.294	0.343	0.080	0.073	0.860	0.022	0.208
80	0.481	0.594	0.105	0.095	1.106	0.038	0.303
90	0.830	1.351	0.150	0.135	1.555	0.085	0.525
95	1.255	2.000	0.197	0.174	2.037	0.170	0.878
99	2.704	2.000	0.323	0.274	3.524	0.657	3.261
Mean	0.150	0.042	0.026	−0.002	0.731	−0.009	0.173
Std. Dev.	0.744	0.988	0.138	0.219	0.611	0.158	0.413

Panel B: Anomaly Variables

Percentile	*ACCR*	*ΔNOA*	*ROA*	*INVEST*	*NSI*	*EXTFIN*	*MOM*
1	−0.347	−0.527	−0.850	−0.345	−0.162	−0.256	−0.818
5	−0.188	−0.201	−0.333	−0.113	−0.048	−0.118	−0.620
10	−0.136	−0.104	−0.155	−0.049	−0.019	−0.073	−0.488
20	−0.093	−0.034	−0.033	−0.003	0.000	−0.035	−0.310
30	−0.068	0.000	0.009	0.016	0.000	−0.015	−0.177
40	−0.050	0.026	0.028	0.036	0.001	−0.003	−0.065
50	−0.034	0.052	0.045	0.059	0.004	0.003	0.042
60	−0.017	0.082	0.061	0.085	0.010	0.018	0.156
70	0.002	0.120	0.080	0.120	0.019	0.046	0.294
80	0.030	0.180	0.104	0.171	0.045	0.099	0.486
90	0.081	0.305	0.146	0.278	0.145	0.229	0.863
95	0.137	0.464	0.191	0.414	0.259	0.413	1.346
99	0.291	0.887	0.330	0.963	0.613	0.960	3.122
Mean	−0.031	0.078	0.014	0.090	0.034	0.048	0.144
Std. Dev.	0.090	0.187	0.159	0.158	0.095	0.161	0.630

This table reports summary statistics of the distribution of variables used in the analysis, from data pooled over firms and the years 1962–2010. For the calculation of means and standard deviations, the top and bottom percentile of firms each year were dropped from the calculation. Accounting data are from Compustat and returns and price data from CRSP. Financial firms and utilities are excluded. There is a maximum of 168,638 firm-years in the calculations (and 165,641 firms-years for the calculation of means and standard deviations), although fewer for some variables.

Share prices, P_t, are prices four months after year-end for fiscal year t. $Return_{t+1}$ is the buy-and-hold return for 12 months after that point, calculated from CRSP monthly returns. For firms that are delisted during the return period, the remaining return for the period was calculated by first applying CRSP's delisting return and then reinvesting any remaining proceeds in the size-matched portfolio (where size is measured as market capitalization at the start of the return

(continued on next page)

TABLE 1 (continued)

accumulation period). This mitigates concerns about potential survivorship bias. Firms that are delisted for poor performance (CRSP delisting codes 500 and 520–584) frequently have missing delisting returns; a delisting return of −100 percent is applied in such cases.

$\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}} = \frac{\Delta Earnings^a_{t+2} \times 2}{|Earnings^a_{t+2}| + |Earnings_{t+1}|}$ is the cum-dividend earnings per share growth rate two years after fiscal year t (with dividends for year t+1 reinvested at the prevailing yield on the ten-year Treasury note). The calculation, that yields a number between 2 and −2, is designed to handle negative earnings. *Earnings* is calculated in the same way as earnings for the current year (below).

$\frac{Earnings_{t+1}}{P_t}$ is the realized forward earning yield (for year t+1). *Earnings* is calculated in the same way as earnings for the current year (below).

$\frac{Earnings_t}{P_t}$ is current earnings-to-price for year t, calculated as earnings before extraordinary items (Compustat item IB) and special items (item SPI), minus preferred dividends (item DVP), with a tax allocation to special items at the prevailing Federal statutory corporate income tax rate for the year. Earnings and prices are on a per-share basis, with prices observed four months after fiscal year-end adjusted for stock splits and stock dividends during the four months after fiscal year-end. Basu (1977, 1983) documents the "P/E anomaly."

$\frac{B_t}{P_t}$, the book-to-price ratio, is book value of common equity at the end of the current fiscal year t, divided by price at t. Book value is Compustat's common equity (item CEQ) plus any preferred treasury stock (item TSTKP) less any preferred dividends in arrears (item DVPA). Book value and prices are on a per-share basis, with prices (observed four months after fiscal year-end) adjusted for stock splits and stock dividends during the four months after fiscal year-end. The relation between book-to-price and returns is documented in Rosenberg, Reid, and Lanstein (1985), Fama and French (1992), and Lakonishok et al. (1994).

$\frac{\Delta Earnings^a_t}{P_t}$ is the change (growth) in earnings per share (as measured above) for fiscal year t relative to price, with dividends for year t−1 reinvested at the prevailing yield on the ten-year Treasury note.

$\frac{\Delta Sales_t}{Sales_{t-1}}$ is the sales growth rate for fiscal year t (plus 1).

ACCR is accruals divided by average assets, as in Sloan (1996) and Fairfield et al. (2003). Accruals is defined as the sum of change in accounts receivable (item RECT), change in inventory (item INVT), and change in other current assets (item ACO), minus the sum of change in accounts payable (item AP) and change in other current liabilities (item LCO), minus depreciation and amortization expense (item DP). Missing ACO, AP, LCO, and DP are set to 0.

ΔNOA is change in net operating assets divided by average assets, as in Fairfield et al. (2003). Net operating assets is defined as the sum of accounts receivable (item RECT), inventory (item INVT), other current assets (item ACO), property, plant, and equipment (item PPENB), intangible assets (item INTAN), and other long-term assets (item AP), minus the sum of accounts payables (item AP), other current liabilities (item LCO), and other long-term liabilities (item LO). A similar measure, the percentage change in total assets, is associated with future returns in Cooper, Gulen, and Schill (2008). Missing ACO, AP, LCO, INTAN, and LO are set to 0.

ROA is income before extraordinary items (IB) divided by lagged assets, as in Chen et al. (2010). Haugen and Baker (1996) also report returns associated with a profitability measure (return on equity).

INVEST is investment calculated as (change in gross property, plant, and equipment (item PPEGT) + change in inventory (item INVT))/lagged assets, as in Lyandres, Sun, and Zhang (2008) and Chen et al. (2010). Similar investment measures are associated with future returns in Titman, Wei, and Xie (2004) and Liu, Whited, and Zhang (2009).

NSI is net share issuance, calculated as the natural log of the ratio of split-adjusted shares outstanding at the end of fiscal year t to shares outstanding at the end of the previous fiscal year-end at t−1, as in Fama and French (2008). Loughran and Ritter (1995), Daniel and Titman (2006), and Pontiff and Woodgate (2008) also document a negative relation between net share issues and subsequent stock returns. Ikenberry, Lakonishok, and Vermaelen (1995) show that stock repurchases are positively related to returns. Data for net share issuance are available only for 1971 onward.

EXTFIN is the external financing measure of Bradshaw et al. (2006), calculated as the change in debt plus the change in equity scaled by average assets. Change in debt is measured as the cash proceeds from the issuance of long-term debt (item DLTIS) less cash payments for long-term debt reductions (item DLTR) plus the net changes in current debt (item DLCCH). Change in equity is measured as the proceeds from the sale of common and preferred stock (item SSTK) less cash payments for the purchase of common and preferred stock (item PRSKC) less cash payments for dividends (item CDVC). Data to calculate the *EXTFIN* measure are available only from 1971 onward. Missing variables are set to 0 for year 1971 onward.

MOM is momentum, measured as the buy-and-hold return over the 12 months prior to one month before point t. Jegadeesh and Titman (1993) document momentum in stock returns (with momentum measured over six months prior to point t).

All accounting measures are annual numbers. Measures with negative denominators are not included in the calculations.

attributed to market over- or under-reaction to information, although the accounting literature also interprets it as information in price that leads future earnings. It is measured here as the stock return over the 12 months prior to one month prior to the return period, where the one-month lag excludes the documented short-term reversal phenomenon. Momentum studies often use a six-month period but we wish to align the price change with the period over which the accounting information, that might also forecast earnings, growth, and returns, becomes available. Results are similar with momentum measured over six months. Means and standard deviations are reported below the percentiles, with the top and bottom 1 percent of observations each year eliminated, except for returns.

Table 2 reports correlations between selected variables, with Spearman rank correlations above the diagonal and Pearson correlations below. The correlation coefficients are the average of cross-sectional coefficients estimated each year. Some observations are relevant to the tests that follow. It is clear that current earnings-to-price, $E/P = \frac{Earnings_t}{P_t}$, is strongly correlated with forward earnings-to-price, $\frac{Earnings_{t+1}}{P_t}$ (the realized forward earnings yield), with a Spearman correlation of 0.628. Book-to-price is also correlated with forward earnings-to-price (a Spearman correlation of 0.147). Current *E/P* is negatively correlated with two-year-ahead earnings growth, $\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$ (a Spearman correlation of −0.129), as expected for the reciprocal of the P/E ratio that is typically viewed as indicating growth. Book-to-price has a small positive correlation with two-year-ahead earnings growth (0.074).

The four anomaly variables in the table that involve business operations (*ACCR*, Δ*NOA*, *ROA*, and *INVEST*) are moderately positively correlated with *E/P* but negatively with *B/P*. The correlation of these anomaly variables with two-year-ahead earnings growth is negative, in the same direction as the correlation with returns, except for *ROA*. These variables are positively correlated with each other, and all except *ROA* with external financing (*EXTFIN*) and with net share issuance (*NSI*). Momentum (*MOM*) is positively correlated with both *E/P* and the contemporaneous change in earnings, indicating that some of the price change is associated with the earnings reported over the momentum period. Significantly, even though momentum goes into the denominating price of the forward earnings yield, momentum is positively correlated with the forward earnings yield (a Spearmen correlation of 0.173), indicating that the momentum price change is associated, at least in part, with information about future earnings. This is consistent with studies that show that price leads earnings. The correlation of momentum with two-year-ahead earnings growth is negative but small, however. The correlations of all anomaly variables with momentum are low (with the exception of *ROA*), but they are positive.[7] If investors price on the basis of accounting information—the persistence of accruals, for example—then one would expect this to feed the contemporaneous momentum.

Most of the anomaly variables, other than the financing variables, are positively correlated with the contemporaneous *E/P* that forecasts the forward earnings yield. All accounting anomaly variables are negatively related to two-year-ahead earnings growth, in the same direction as they predict returns, although the correlations are quite low. Of course, the issue in our analysis is how these anomaly variables predict forward earnings and growth conditional on *E/P* and *B/P*. The two financing variables, *NSI* and *EXTFIN*, are negatively correlated with both the forward earnings yield and current *E/P*, consistent with firms repurchasing more shares or debt relative to issuances when earnings and expectations of forward earnings are high relative to the current price.

[7] The mean Spearman correlation between momentum measured over six months and 12 months is 0.667, and the mean Pearson correlation is 0.608.

TABLE 2
Correlations between Variables

Panel A: Target Variables and Basic Forecast Variables

	Target Variables			Basic Forecast Variables			
	$Return_{t+1}$	$\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$	$\frac{Earnings_{t+1}}{P_t}$	$\frac{Earnings_t}{P_t}$	$\frac{B_t}{P_t}$	$\frac{\Delta Earnings^a_t}{P_t}$	$\frac{\Delta Sales_t}{Sales_{t-1}}$
$Return_{t+1}$	1	0.192	0.381	0.141	0.091	0.035	−0.033
$\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$	0.140	1	−0.209	−0.129	0.074	−0.100	−0.079
$\frac{Earnings_{t+1}}{P_t}$	0.228	−0.245	1	0.628	0.147	0.238	0.041
$\frac{Earnings_t}{P_t}$	0.042	−0.119	0.562	1	0.235	0.339	0.101
$\frac{B_t}{P_t}$	0.066	0.074	−0.054	−0.007	1	−0.094	−0.293
$\frac{\Delta Earnings^a_t}{P_t}$	0.009	−0.092	0.218	0.419	−0.151	1	0.313
$\frac{\Delta Sales_t}{Sales_{t-1}}$	−0.033	−0.059	0.014	0.064	−0.208	0.182	1
ACCR	−0.039	−0.039	0.057	0.176	−0.085	0.108	0.236
ΔNOA	−0.055	−0.048	0.019	0.129	−0.164	0.065	0.381
ROA	0.023	−0.108	0.317	0.493	−0.255	0.246	0.140
INVEST	−0.052	−0.043	0.011	0.103	−0.188	0.040	0.414
NSI	−0.053	−0.007	−0.118	−0.099	−0.075	−0.010	0.164
EXTFIN	−0.083	−0.012	−0.141	−0.105	−0.134	−0.025	0.262
MOM	0.012	−0.081	0.166	0.133	−0.289	0.249	0.122

Panel B: Anomaly Variables

	ACCR	*ΔNOA*	*ROA*	*INVEST*	*NSI*	*EXTFIN*	*MOM*
$Return_{t+1}$	−0.040	−0.066	0.064	−0.059	−0.077	−0.109	0.029
$\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$	−0.049	−0.053	−0.147	−0.050	−0.005	−0.009	−0.088
$\frac{Earnings_{t+1}}{P_t}$	0.033	−0.013	0.311	−0.004	−0.173	−0.180	0.173
$\frac{Earnings_t}{P_t}$	0.161	0.115	0.534	0.116	−0.158	−0.148	0.100
$\frac{B_t}{P_t}$	−0.081	−0.192	−0.365	−0.222	−0.155	−0.148	−0.323
$\frac{\Delta Earnings^a_t}{P_t}$	0.107	0.059	0.284	0.036	−0.025	−0.063	0.327
$\frac{\Delta Sales_t}{Sales_{t-1}}$	0.279	0.438	0.319	0.481	0.172	0.251	0.178
ACCR	1	0.568	0.267	0.320	0.072	0.210	0.060
ΔNOA	0.464	1	0.305	0.687	0.128	0.370	0.054
ROA	0.223	0.239	1	0.314	−0.062	−0.076	0.289
INVEST	0.265	0.656	0.217	1	0.135	0.379	0.061
NSI	0.054	0.104	−0.125	0.110	1	0.233	−0.097
EXTFIN	0.166	0.334	−0.186	0.378	0.192	1	−0.055
MOM	0.024	0.059	0.214	0.056	−0.064	−0.014	1

This table reports mean cross-sectional correlation coefficients for the period 1962–2010. Reported correlations are the average of cross-sectional correlation coefficients for each year in the period. Spearman correlations are presented in the upper diagonal and Pearson correlations in the lower diagonal. Pearson correlations are estimated after rejecting the top and bottom 1 percent of observations on each variable each year, except for returns.
Variables are defined in Table 1.

TABLE 3

Mean Annual Year-Ahead Returns for Portfolios Formed on Various Firm Characteristics

Portfolio	$\frac{Earnings_t}{P_t}$	$\frac{B_t}{P_t}$	*ACCR*	*ΔNOA*	*ROA*	*INVEST*	*NSI*	*EXTFIN*	*MOM*
1	0.155	0.071	0.173	0.199	0.118	0.205	0.199	0.201	0.141
2	0.111	0.110	0.180	0.194	0.167	0.185	0.167	0.210	0.150
3	0.114	0.123	0.169	0.182	0.177	0.171	0.164	0.208	0.147
4	0.125	0.133	0.179	0.186	0.175	0.189	0.143	0.208	0.153
5	0.139	0.135	0.162	0.166	0.173	0.161	0.151	0.202	0.149
6	0.144	0.152	0.177	0.155	0.166	0.163	0.172	0.184	0.158
7	0.170	0.173	0.152	0.149	0.160	0.160	0.170	0.154	0.174
8	0.188	0.180	0.172	0.135	0.158	0.141	0.145	0.150	0.158
9	0.196	0.207	0.120	0.120	0.144	0.121	0.130	0.118	0.166
10	0.231	0.250	0.105	0.082	0.146	0.081	0.081	0.040	0.159
High-Low	0.077	0.179	−0.068	−0.117	0.028	−0.123	−0.118	−0.160	0.017

This table reports mean buy-and-hold stock returns over the subsequent 12 months for portfolios formed four months after fiscal year-end on characteristics (indicated at the head of each column) observed at that date. Portfolios are formed each year, 1962–2010, and mean returns over all years are reported in the table. Ten portfolios are formed each year from a ranking on the relevant characteristic, with decile cut-offs for the portfolios determined from the ranking in the previous year.
The calculation of returns and other variables is explained in the notes to Table 1. Portfolio 1 contains firms with lowest amount of the characteristic and portfolio 10 the firms with the highest. The return for High-Low is the mean return difference, over years, from investing in portfolios 10 and 1.
Variables are defined in Table 1.

Unconditional Correlation with Returns

The correlation of the variables with one-year-ahead returns, summarized by correlation coefficients in Table 2, is elaborated upon in Table 3. The table reports average returns for ten portfolios formed from ranking firms each year on the anomaly variables, and on *E*/*P* and *B*/*P*. Unlike most of the earlier anomaly studies, the return period covers the recent financial crisis with its downside return realizations.

E/*P* is positively related to year-ahead stock returns, monotonically except for the lowest *E*/*P* portfolio, which contains loss firms. This is the Basu (1977, 1983) finding, documented many times since and apparently employed in many contrarian trading strategies. Our model suggests that this finding could indicate added return for added risk. The returns for *B*/*P*, like those documented in Fama and French (1992), are also fairly monotonic in the level of *B*/*P*. The spread of returns is the highest of any in the table, presumably the reason why returns to book-to-price have been identified as a leading anomaly.

The returns associated with the anomaly variables in Table 3 are similar to those in the original papers, although some do not appear to be as strong as previously reported, possibly due to the inclusion of the financial crisis years. Like those papers, the return from going long on the high portfolio (10) with a cancelling short position in the low portfolio (1) each year is reported. The cases with negative hedge returns are those where the direction of the long and short goes the other way. This so-called "hedge return" is often attributed to mispricing, particularly when it survives against return benchmarks from popular asset pricing models, rendering the inference that it is a riskless zero-net-investment return and thus pure arbitrage. For many of the anomaly variables, the return differences are in the extremes, with not much variation over portfolios 3 to 7 or even portfolios 2 to 9 in some cases. The hedge return to *ROA* is not large, and the findings on profitability variables in Fama and French (2006, 2008) are indeed mixed. In Chen et al. (2010), *ROA* is correlated with returns in conjunction with investment; we consider them together in our analysis.[8] The hedge return to momentum based on 12 months of returns is 0.017, somewhat lower than that typically reported.[9]

V. ESTIMATION OF MODELS FOR FORECASTING THE FORWARD EARNINGS YIELD AND GROWTH

The first step in our empirical analysis examines whether anomaly variables predict forward earnings and subsequent growth. Tables 4 and 5 report the results from estimating the forward earnings yield Regression (3) and the earnings growth Regression (2). Coefficients and adjusted R^2 are means from estimates of annual OLS cross-sectional regressions (Fama and MacBeth 1973), with the rejection of the top and bottom percentiles of explanatory variables each year.[10] The t-statistics on coefficient estimates are the mean coefficients relative to their estimated standard errors, as described in the notes to Table 4. Models are estimated first with just the basic forecast variables, then adding anomaly variables one at a time, and finally all together. Our purpose here is neither to build the best forecasting model, nor do we maintain that the linear form is appropriate. We merely endeavor to investigate whether those variables that are correlated with forward returns in the existing research also predict the forward earnings yield and subsequent growth and can thus be viewed within our framework as indicating the required return for risk. Most of the results in Tables 4 and 5 will come as little surprise to those familiar with the typical dynamics of accounting numbers: Persistence is evident but with some mean reversion.

The forecast variable in the growth regressions in Table 5 is the realized earnings growth rate two years ahead, that is, the growth after year $t+1$ that is forecasted in predicting the $t+1$ change in premium in Equation (1) and thus the expected stock return. Two-year-ahead growth is only a small part of long-term growth and, based on realized earnings in $t+1$, is likely to be affected by realized transitory earnings in $t+1$. Clearly, this is an incomplete attempt to develop a forecast, and the R^2s in Table 5 are indeed low.[11] In contrast, the forward earnings regressions in Table 4 report R^2s in the range of 34 percent to 39 percent.

It is clear in Table 4 that the current E/P is a strong indicator of the forward earnings yield. It should come as no surprise that current earnings forecasts future earnings. Our model indicates that this feature is to be expected of a variable that indicates the required return, so the findings support the Ball (1978) conjecture that the earnings yield indicates risk and return; the findings of Basu (1977, 1983) and others that trailing E/P predicts returns can be attributed to rational pricing of risk with some justification. Given E/P, B/P adds to the forecast of the forward earnings yield in Table 4. The coefficient on E/P is less than 1, indicating the mean reversion that is typical of earnings. The negative coefficient on B/P further indicates the persistence of earnings: low (high) book value for given earnings (and price) indicates higher (lower) subsequent earnings. This accords with the standard finding as in Freeman, Ohlson, and Penman (1982) and Fama and French (2000), for example, that the book rate-of-return is persistent.[12]

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[8] Other profitability variables related to *ROA* have been investigated in the literature. Novy-Marx (2012) documents that gross profit-to-assets is positively correlated with subsequent returns. Interestingly, the gross profit measure is advocated as a better forecast of future earnings than "bottom-line" earnings, consistent with the perspective in this paper.

[9] Taking 2002 and 2008 out of the analysis, the hedge return is 0.060. For the 1965–1989 period covered by Jegadeesh and Titman (1993), the return was 0.072 compared to their (size-adjusted) return of 0.09. When momentum is measured over six months, the hedge return is 0.035.

[10] Results were similar after rejecting the top and bottom 2 percent and 5 percent of observations each year and when running regressions adding one to each variable and taking logs.

[11] Survivorship bias would presumably be overwhelming in any consideration of long-run growth. We repeated the analysis in Table 5 with earnings growth measured over two years, $t+2$ and $t+3$. Results were similar to those in Table 5, with slightly higher R^2 values, ranging from 3 percent to 4 percent. The mean Spearman correlation between the one-year forward growth measure and the two-year growth measure is 0.591 (Pearson 0.575).

[12] The change in earnings from t to $t+1$ will depend on the dividend in t (that displaces subsequent earnings because of payout). That dividend reduces price and book value (affecting both E/P and B/P). We ran Table 4 models adding $Dividend_t/P_t$, with little difference in results.

TABLE 4

Estimates for Forward Earnings Yield Regressions

	Basic Forecasting Variables Alone		Adding Anomaly Variables								
Intercept	0.034	0.036	0.034	0.041	0.037	0.043	0.042	0.047	0.030	0.041	0.043
	(12.60)	(9.04)	(8.43)	(8.87)	(9.28)	(8.80)	(10.80)	(13.05)	(7.75)	(9.68)	(11.02)
$\frac{Earnings_t}{P_t}$	0.525	0.557	0.571	0.571	0.510	0.575	0.547	0.506	0.562	0.528	0.493
	(29.95)	(21.91)	(23.95)	(26.34)	(14.87)	(23.71)	(19.26)	(35.81)	(19.82)	(17.39)	(21.97)
$\frac{B_t}{P_t}$	−0.023	−0.026	−0.026	−0.027	−0.027	−0.029	−0.029	−0.036	−0.020	−0.028	−0.031
	(−5.67)	(−4.30)	(−4.32)	(−4.57)	(−4.61)	(−4.93)	(−4.95)	(−5.52)	(−3.70)	(−4.85)	(−5.55)
$\frac{\Delta Earnings_t}{P_t}$		−0.013	−0.012	−0.014	−0.004	−0.017	−0.017	−0.040	−0.048	−0.005	−0.057
		(−0.58)	(−0.47)	(−0.55)	(−0.17)	(−0.70)	(−0.73)	(−2.48)	(−2.83)	(−0.22)	(−4.30)
ACCR			−0.069							−0.032	−0.034
			(−6.23)							(−3.02)	(−3.41)
ΔNOA				−0.057						−0.034	−0.029
				(−5.57)						(−3.76)	(−3.68)
ROA					0.061					0.087	0.060
					(3.10)					(5.09)	(3.39)
INVEST						−0.051				−0.020	−0.008
						(−6.61)				(−1.88)	(−0.85)
NSI							−0.092				−0.051
							(−7.96)				(−6.17)
EXTFIN								−0.093			−0.039
								(−12.41)			(−7.79)
MOM									0.026		0.023
									(7.99)		(8.54)
Adj. R^2	0.343	0.353	0.372	0.377	0.358	0.363	0.350	0.334	0.365	0.391	0.348
n	142,505	125,207	117,439	116,825	123,371	121,345	109,376	117,078	123,563	112,823	96,174

This table reports mean coefficient estimates for annual cross-sectional regressions of the realized forward earnings yield on selected forecasting variables. Coefficients are estimated from cross-sectional regressions for the years 1962–2010:

(continued on next page)

TABLE 4 (continued)

$$\frac{Earnings_{t+1}}{P_t} = \alpha + \delta_1 \frac{Earnings_t}{P_t} + \delta_2 \frac{B_t}{P_t} + \delta_3 \frac{\Delta Earnings_t}{P_t} + \sum_{j=1}^{N} \delta_{3+j} A_j + \omega_{t+2}$$

where A_j refers to an anomaly variable. Basic forecast variables are summary accounting variables before adding anomaly variables.
Coefficients and adjusted R^2 are means of estimates from cross-sectional regressions for each year; t-statistics on coefficients (in parentheses) are mean coefficients divided by their standard error estimated from the time-series of coefficients with a Newey-West correction for the serial correlation in the coefficient estimates. n is the number of firm-years entering the regressions estimations. The top and bottom 1 percent of the explanatory variables each year were discarded in the estimations.
Table 1 notes describe the calculation of the variables. In this table, the current change in earnings variable, $\frac{\Delta Earnings_t}{P_t}$ does not involve the reinvestment of t–1 dividends (and thus differs from $\frac{\Delta Earnings_t^a}{P_t}$ in Tables 5 and 6).
Variables not defined above are defined in Table 1.

TABLE 5

Estimates for Growth Forecasting Regressions

	Basic Forecast Variables Alone			Adding Anomaly Variables								
Intercept	0.013	0.023	0.055	0.017	0.025	0.048	0.037	0.037	0.018	0.044	0.045	0.096
	(0.52)	(0.86)	(1.99)	(0.67)	(1.05)	(1.53)	(1.58)	(1.54)	(0.68)	(1.91)	(1.59)	(3.87)
$\frac{Earnings_t}{P_t}$	−1.085	−0.959	−1.102	−1.096	−1.082	−0.910	−1.120	−1.236	−0.959	−1.045	−0.895	−0.864
	(−7.78)	(−7.89)	(−8.03)	(−5.88)	(−5.65)	(−5.98)	(−7.80)	(−7.12)	(−10.03)	(−7.47)	(−3.56)	(−7.09)
$\frac{B_t}{P_t}$	0.116	0.092	0.088	0.109	0.108	0.091	0.097	0.099	0.101	0.079	0.092	0.041
	(6.17)	(4.73)	(4.66)	(5.09)	(5.18)	(4.28)	(4.96)	(5.72)	(5.40)	(4.44)	(4.09)	(2.09)
$\frac{\Delta Earnings_t^a}{P_t}$		−0.525										
		(−2.62)										
$\frac{\Delta Sales_t}{Sales_{t-1}}$			−0.126									
			(−4.64)									
ACCR				−0.217							−0.078	−0.065
				(−3.68)							(−0.92)	(−0.63)
ΔNOA					−0.079						−0.073	0.042
					(−2.13)						(−0.89)	(0.69)
ROA						−0.408					−0.375	−0.355
						(−5.04)					(−3.02)	(−3.45)
INVEST							−0.089				−0.013	−0.132
							(−2.90)				(−0.14)	(−1.61)
NSI								−0.148				−0.203
								(−2.14)				(−3.59)
EXTFIN									−0.109			−0.095
									(−3.07)			(−2.54)
MOM										−0.110		−0.107
										(−8.21)		(−7.48)
Adj. R^2	0.030	0.030	0.030	0.018	0.024	0.030	0.030	0.029	0.026	0.034	0.024	0.035
n	127,794	112,872	111,321	106,464	105,968	112,160	110,400	99,544	105,865	125,944	102,434	87,291

(continued on next page)

TABLE 5 (continued)

This table reports mean coefficient estimates for annual cross-sectional regressions of the two-year-ahead earnings growth rate on selected forecasting variables. Coefficients are estimated from cross-sectional regressions for the years 1962–2010:

$$\frac{\Delta Earnings^{a}_{t+2}}{Earnings_{t+1}} = \alpha + \beta_1 \frac{Earnings_t}{P_t} + \beta_2 \frac{B_t}{P_t} + \beta_3 \frac{\Delta Earnings^{a}_{t}}{P_t} + \beta_4 \frac{\Delta Sales_t}{Sales_{t-1}} + \sum_{j=1}^{N} \beta_{4+j} A_j + u_{t+2}$$

where A_j refers to an anomaly variable. Basic forecast variables are summary accounting variables before adding anomaly variables.
Variables are defined in Table 1.

In the earnings growth model in Table 5, *E/P* forecasts growth negatively, again no surprise given the understanding that a P/E ratio forecasts earnings growth. *B/P*, the characteristic that features prominently in asset pricing models, is strongly positively correlated with growth: given *E/P*, *B/P* forecasts growth but in the opposite direction to the common dictum.[13] This is the result in Penman et al. (2013), which together with Penman and Reggiani (2013) shows that the growth forecasted by *B/P* is indeed risky. Higher expected growth indicated by *B/P* has higher variation around it and is subject to more extreme shocks.

The current change in earnings in Table 4 has a negative sign indicating the well-documented transitory nature of earnings changes. Both the earnings change and sales growth add to forecasting growth in Table 5. Our interest is in the anomaly variables, so we drop these two variables when introducing the anomaly variables in the presentation in Table 5. Results for the anomaly variables were little different with them included: the anomaly variables predict growth conditionally and unconditionally. Thus, the anomaly variables are not just proxies for these summary variables.[14]

E/P and *B/P* are dictated by our framework as the starting point for evaluating anomaly variables. Adding anomaly variables asks whether forecasts are improved over those involving these "bottom-line" accounting numbers. Tables 4 and 5 indicate that the answer is affirmative. Thus, if these anomaly variables predict forward returns because they forecast forward earnings and growth, it is not because they are just capturing the forecast supplied jointly by *E/P* and *B/P*. In the case of the four anomaly variables that deal with business operations, *ACCR*, Δ*NOA*, *ROA*, and *INVEST*, the signs of the coefficients make sense giving our understanding of how accounting numbers evolve, and are consistent with previous research. For example, accruals—measured as the accrual component of earnings relative to total assets—capture components of earnings and book value already in the forecast. But the accrual components tend to reverse over more than one period, so higher (lower) accruals predict lower (higher) forward earnings and growth relative to current earnings and book values. The same pattern is evident for Δ*NOA* and investment (*INVEST*), which previous studies have shown are negatively correlated with future earnings changes.[15] *ROA* takes on a positive coefficient in the prediction of forward earnings. The *ROA* measure, calculated as earnings before extraordinary items over lagged assets, is simply a refinement of the earnings and book values already in the regression. It unlevers book value in its denominator and the result indicates that this partial unlevering, together with the consequent focus on operations, adds to the explanation of forward earnings. The coefficient on *ROA* in the growth regression is negative, again consistent with the notion that a high book value (now unlevered) relative to earnings forecasts growth.[16]

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[13] The signs on *E/P* and *B/P* in Tables 4 and 5 differ. This is the property of price multiple forecasting levels and changes differently. For example, a high *E/P* forecasts that *E/P* will be relatively higher next year in the cross-section (Table 4), while growth will be lower (Table 5) in accordance with the idea that a *P/E* ratio forecasts earnings growth positively.

[14] The same applies to the return regressions in Tables 6 and 7. While not the subject of the investigation here, the coefficient on the sales growth variable may be of interest to those (like Lakonishok, Shleifer, and Vishny 1994) who have observed that sales growth is negatively correlated with future returns. Sales growth is negatively correlated with future growth, indicating a lower expected return. Sales growth is also a realization of earlier expected growth and that resolution of uncertainty reduces risk and the required return.

[15] See Fairfield et al. (2003) and Penman and Zhang (2006) who add explanations for the phenomena. Δ*NOA* increases current earnings (as expenses that would otherwise be charged to earnings are added to the balance sheet) but decreases future earnings (when those expenses are charged to the income statement). Marginal investment adds to earnings at a declining marginal rate and conservative accounting adds to expensing in the near term. See Harris and Nissim (2006) and Balachandran and Mohanram (2012).

[16] Stating that, for a given *E/P*, *B/P* forecasts growth is equivalent to saying that, for a given price, a higher book value relative to earnings forecasts growth.

The financing variables, net share issuance (*NSI*) and external financing (*EXTFIN*), also carry negative coefficients in both Tables 4 and 5: added financing implies lower future earnings and growth.[17] Both variables are positively correlated with accruals, ΔNOA, and investment (Table 2), so that correlation could explain the result; financing variables are related to these measures by the debits and credits of accounting. On the face of it, the negative coefficients that are conditional upon E/P and B/P indicate that less net financing is associated with increasing earnings and growth. One can conjecture rational scenarios for such a correlation: increasing earnings generate more cash flow, thus less need for financing and more share repurchases and debt redemptions; lower net share issues or higher net repurchases signal higher earnings and growth, which is the standard signaling story. However, these are just conjectures.

Finally, momentum, the pure price variable, is introduced. Momentum is often seen as a mispricing variable—the market becomes too enthusiastic or too depressed about future prospects—although Liu and Zhang (2011), among others, attribute it to rational pricing. Momentum carries a positive coefficient in the forward earnings yield regression, consistent with the price increases (decreases) rationally forecasting earnings increases (decreases). The negative coefficient in the growth regressions is more difficult to interpret and may well indicate overpricing of growth prospects. But higher anticipated forward ($t+1$) earnings imply lower subsequent ($t+2$) earnings *ceteris paribus*: with some growth expected to be realized in the forward year, subsequent growth is lower. In addition, if growth is priced as risky, then resolution of uncertainty about growth because of earnings realizations implies a lower required return and thus a higher price; that is, the price change attributed to "momentum" in fact reflects positive discount rate news.[18]

Table 2 indicates that a number of the anomaly variables are correlated so the coefficient on a given variable might just be due to its correlation with others. The second-to-last column in Tables 4 and 5 reports estimates with all the accounting anomaly variables related to business operations, and the last column includes all variables. For the forward earnings yield regressions, all coefficients remain statistically significant. In the growth regressions, the average R^2 increases but accruals and ΔNOA add little to the forecast of growth given the other variables.[19]

The "forecasts" referred to in Tables 4 and 5 are in-sample, as are most of the anomaly studies. Our purpose is to document correlations, not develop forecasting models, but the out-of-sample Spearman correlation between actual and fitted values from multivariate models was 0.54 for the forward earnings yield and 0.07 for growth forecasts.

VI. ESTIMATION OF MODELS FOR THE FORWARD RETURN

We now tie those same variables that forecast forward earnings and growth to forward stock returns. Do the anomaly variables predict returns in the same direction as they forecast the forward earnings yield and growth in Tables 4 and 5?

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[17] The results for *EXTFIN* and *NSI* are for 1971–2010 because data for net share issues are available only from 1971 onward.

[18] Results are similar when the momentum variable is measured over six months rather than 12 months. Results were also similar in the two sub-periods, 1962–1986 and 1987–2009. Results were similar for large-cap, medium-cap, and small-cap firms, except that the growth forecast results were weaker for the small-caps where financing variables played no role. Small firms may be those where growth expectations take longer to realize. Large-cap firms are the highest 50 percent by market capitalization of all CRSP firms each year, and small-caps are those with the lowest 20 percent. A similar comparison is made across size groups when the same cutoffs are determined from NYSE size deciles, as in Fama and French (2008).

[19] Results for the growth regression were similar when the current sales growth variable, $\Delta Sales_t/Sales_{t-1}$, was added back into the regression and also with a dummy variable for negative current earnings. Results for the forward earnings yield regression were also similar with a dummy variable for negative current earnings. (In both cases, the coefficient of the dummy variable was highly significant.)

Table 6 is similar to Tables 4 and 5, with the same anomaly variables but now for regressions with the forward stock return on the left-hand side. *E*/*P* and *B*/*P* together forecast the forward earnings yield and growth so, within our framework, they should forecast returns. Similarly, anomaly variables add to forecasts of returns if they incrementally forecast the forward earnings yield and growth. As in Tables 4 and 5, coefficients in Table 6 are means from annual cross-sectional regressions.

The results in Table 6 with *E*/*P* and *B*/*P* alone confirm that *E*/*P* and *B*/*P* jointly forecast in sample returns, with a good deal of the loading on *B*/*P* that forecasts growth so strongly in Table 5. This is the finding of Penman and Reggiani (2013) and Penman et al. (2013). Given *E*/*P* and *B*/*P,* the anomaly variables additionally forecast returns, with the exception of *ROA* and momentum. Two features are significant. First, the addition of anomaly variables reduces the estimated coefficient on *E*/*P,* with which most of them are positively correlated in Table 2, indicating that the anomalous returns documented in previous studies are due, in part, to their correlation with *E*/*P*. Second, germane to the main issue of the paper, the signs of the coefficients on anomaly variables here are the same as those for the earnings yield regressions in Table 4 and, for all except the momentum and *ROA,* the same as those for the growth regressions in Table 5. Variables that forecast earnings and earnings growth forecast returns if those expectations have priced risk associated with them and the findings here indicate that so-called anomaly variables do so.

The anomaly variables in Tables 4 and 5 were identified as predictors, but now another attribution can be made. As well as being predictors, accruals, ΔNOA, and investment are *realizations* of growth expectations—or expectations of investment opportunities—formed in the past. The realizations of higher earnings through accruals, higher asset growth, and higher investment resolve uncertainty about risky growth and thus lower the required return as the negative coefficients indicate. This would be the case of added receivables that resolve the risk of whether a firm can grow sales, more so of "extreme accruals" from a large increase in credit sales. An increase in investment in plant is a realization of "investment opportunities" and a fulfillment of "growth opportunities" previously seen as uncertain. Similarly, an increase in raw material inventory indicates that expected sales realizations are imminent and a drop in investment in raw materials indicates uncertainty about sales ahead.[20] The predictor interpretation and realization interpretation for the accounting variables reconcile because, for given growth expectations in the denominating price, P_t, realizations of growth imply lower future growth, as the coefficients in the forecasting regressions in Table 5 indicate, and thus lower expected returns.

These points aside, as a matter of correlation and as a feature of the data, the relationships stand; the important point is that those variables that predict the earnings yield and growth also predict returns and in the same direction. That is the characteristic of a variable that indicates the required return for risk under our model.

ROA does not add to the prediction of forward returns in Table 6. But the numerator of *ROA* (as measured) is the same as earnings in the *E*/*P* measure already in the regression, with the denominator a variant of the book value in *B*/*P*. *ROA* does forecast the earnings yield and growth incrementally to *E*/*P* and *B*/*P* in Tables 4 and 5 but in different directions for reasons suggested earlier. Momentum also reports an insignificant coefficient but this variable also has coefficients of different signs in Tables 4 and 5.[21]

[20] The negative returns to asset growth and investment have been attributed to a change in required returns in other papers, indeed in a way that ties investment to growth: investment is an exercise of risky growth options, converting them to less risky "assets in place." It also has been argued that firms make more investments when discounts rates (and hurdle rates) are lower. See Cochrane (1991, 1996), Berk, Green, and Naik (1999), and Gomes, Kogan, and Zhang 2003. Li, Livdan, and Zhang (2009) explain the returns associated with financing variables in a similar way. Of course, it may also be that the firm characteristics in the regression are simply attributes that identify with an (unspecified) macro risk factor. The reference to raw materials inventory is because Thomas and Zhang (2002) claim that much of the accrual anomaly is due to inventory and to raw material inventory in particular.

[21] When momentum is measured over six months prior to the return period (rather than 12 months), the variable returned a mean coefficient of 0.069 with a t-statistic of 2.80.

TABLE 6

Estimates for Forward Returns Regressions

	E/P and *B/P* Alone	Adding Anomaly Variables								
Intercept	0.091	0.088	0.111	0.097	0.118	0.109	0.116	0.084	0.112	0.112
	(3.03)	(3.14)	(3.96)	(2.79)	(4.20)	(3.77)	(3.71)	(2.85)	(3.13)	(3.29)
$\frac{Earnings_t}{P_t}$	0.194	0.293	0.299	0.121	0.198	0.022	0.127	0.208	0.243	0.098
	(2.61)	(4.25)	(3.81)	(1.60)	(2.12)	(0.13)	(2.16)	(2.71)	(2.13)	(1.85)
$\frac{B_t}{P_t}$	0.079	0.061	0.057	0.069	0.066	0.071	0.063	0.079	0.049	0.059
	(5.03)	(3.00)	(2.83)	(3.91)	(4.22)	(4.67)	(3.57)	(5.35)	(1.93)	(3.63)
ACCR		−0.256							−0.188	−0.249
		(−2.68)							(−2.20)	(−4.14)
ΔNOA			−0.149						−0.063	0.003
			(−4.40)						(−0.86)	(0.08)
ROA				0.059					0.117	0.142
				(0.47)					(0.81)	(1.75)
INVEST					−0.157				−0.065	−0.066
					(−4.26)				(−0.75)	(−1.55)
NSI						−0.248				−0.202
						(−3.96)				(−4.68)
EXTFIN							−0.278			−0.172
							(−8.37)			(−5.77)
MOM								0.011		−0.016
								(0.45)		(−0.57)
Adj. R^2	0.022	0.032	0.027	0.027	0.028	0.027	0.029	0.029	0.042	0.045
n	159,459	131,478	130,745	138,100	135,572	121,649	131,533	156,775	125,885	106,480

This table reports mean coefficient estimates for annual cross-sectional regressions of the realized forward stock returns, R_{t+1}, on selected forecasting variables. Coefficients are estimated from cross-sectional regressions for the years 1962–2010:

$$R_{t+1} = a + b_1 \frac{Earnings_t}{P_t} + b_2 \frac{B_t}{P_t} + \sum_{j=1}^{N} b_{2+j} A_j + e_{t+1}$$

where A_j refers to an anomaly variable.
See notes to Table 4. R_{t+1} is the forward stock return as calculated in the notes to Table 1.
Variables are defined in Table 1.

In the multivariate regressions in the last two columns of Table 6, the addition of the four anomaly variables that have to do with business operations increase the mean R^2 but none of the coefficients, except for *ACCR*, are significantly different from zero. It appears that these variables are on a very flat surface such that they jointly add to the explanation of returns, but are not marginally significant relative to each other. This is not surprising. Under a strict clean-surplus accounting system, ΔNOA = investment + operating accruals (Penman and Zhang 2006).[22] These variables have a lot in common.[23]

Table 7 runs the same regression as in Table 6 with the dependent variable as $Return_{t+1} - \frac{Earnings_{t+1}}{P_t}$, that is, the difference between the forward return and the realized forward earnings yield.[24] This serves two purposes. First, Equation (1) informs that a variable will not only indicate the required return if it forecasts the forward earnings yield, but also if it forecasts the difference between the return and the yield, that is, the change in premium due to growth expectations. This target variable isolates the realized change in premium. Second, the redefined dependent variable tests the hypothesis that anomaly variables forecast returns because investors fail to appreciate their implication for future earnings. Therefore, investors earn returns as the market corrects itself when those earnings are realized. That hypothesis is supported by a number of studies. For example, Bernard, Thomas, and Wahlen (1997) report that the returns to anomaly investing are realized around subsequent earnings announcements. The dependent variable takes out the effect of the earnings realization so that, if predicable returns are associated only with predicting earnings and not the change in premium, the predictor variables in Table 7 should not predict the specified dependent variable.

The signs of the estimated coefficients in Table 7 are very similar to those in Table 6. The ability of the anomaly variables to predict returns is identified in part with that aspect of returns that are not due to earnings realizations, but due to growth. Significantly, while signs on the mean coefficients on all variables are similar to those in Table 6, the exception is the current *E*/*P*, where the sign changes from positive to negative. *E*/*P* is positively related to forward returns in Table 6 because *E*/*P* indicates the forward earnings yield (in Table 4) and thus risk and return. However, given the realization of the forward earnings yield, the *E*/*P* coefficient takes on a negative sign. That

[22] Richardson et al. (2010) provide an appendix that shows how various measures are related deterministically to each other by accounting relations.

[23] Results in Table 6 were similar in the two sub-periods, 1962–1986 and 1986–2009, and when firms with per-share prices less that \$2 were excluded. The findings are consistent over large-cap, medium-cap, and small-cap firms, although not as strong in terms of t-statistics and overall R^2 for the small firms. A similar comparison is made across size groups when the size cutoffs are determined from NYSE size deciles, as in Fama and French (2008). Thus one is assured that the results are not dominated by small firms, which are a relatively small part of the total equity market capitalization, and where more extreme values of the explanatory variables and returns are more likely. Nor are the results associated with small illiquid stocks with limits to arbitrage. The results in Table 6 are not outlier dependent: results were similar after rejecting the top and bottom 2 percent and 5 percent of observations on the explanatory variables each year and when running regressions adding one to each variable except net share issuance and taking logs. The coefficient on *ROA* was reported with a significant positive coefficient in the log regressions, however. Results were also similar when anomaly variables other than *ROA* and net share issuance were deflated by price (the same deflator as in the *E*/*P* and *B*/*P* predictors) and for the post-1987 period when accruals were defined as net income before extraordinary and special items minus cash flow from operations (as in the cash-flow statement). The regressions in Table 6 (and Tables 4 and 5) pool firms with different fiscal years (in a given calendar year); results were similar with December 31 fiscal year-end firms only where return periods are aligned in calendar time.

[24] The 12-month return period begins three months after the end of fiscal year t to include the period over which the earnings for fiscal year $t+1$ are reported (in four quarterly installments). First quarter earnings are typically reported in month 4 after the previous fiscal year-end. The annual return period in Table 6 starts four months after fiscal year-end to ensure that prior year's financial statement information is available before the beginning of the return period. Results in Table 6 were very similar with the return period beginning three months after fiscal year-end (as were the results for Table 7 with the alternative return period).

TABLE 7

Estimates for Forward Returns Relative to the Realized Earnings Yield

	E/P and B/P Alone	Adding Anomaly Variables								
Intercept	0.127	0.112	0.128	0.126	0.138	0.119	0.128	0.130	0.138	0.139
	(3.77)	(3.71)	(4.20)	(3.43)	(4.48)	(3.91)	(3.67)	(3.73)	(3.66)	(3.46)
$\frac{Earnings_t}{P_t}$	−0.724	−0.548	−0.552	−0.645	−0.653	−0.751	−0.592	−0.673	−0.645	−0.566
	(−5.09)	(−6.35)	(−6.19)	(−7.03)	(−4.99)	(−4.14)	(−7.45)	(−4.99)	(−7.17)	(−8.22)
$\frac{B_t}{P_t}$	0.042	0.033	0.031	0.037	0.036	0.048	0.039	0.024	0.025	0.017
	(2.43)	(1.64)	(1.52)	(1.95)	(2.01)	(2.76)	(2.03)	(1.54)	(1.10)	(0.93)
ACCR		−0.254							−0.094	−0.213
		(−3.78)							(−1.04)	(−3.68)
ΔNOA			−0.115						0.008	0.038
			(−4.70)						(0.13)	(0.91)
ROA				−0.100					−0.016	−0.010
				(−0.85)					(−0.13)	(−0.12)
INVEST					−0.128				−0.091	−0.093
					(−4.04)				(−1.27)	(−3.00)
NSI						−0.150				−0.134
						(−3.14)				(−3.22)
EXTFIN							−0.184			−0.151
							(−5.83)			(−4.98)
MOM								−0.064		−0.086
								(−1.90)		(−2.12)
Adj. R^2	0.029	0.029	0.029	0.034	0.034	0.035	0.036	0.037	0.040	0.056
n	142,396	118,249	117,630	124,281	122,200	110,047	117,921	140,300	113,541	96,633

This table reports mean coefficient estimates for annual cross-sectional regressions of the realized forward stock returns, R_{t+1}, minus the realized earnings yield on selected forecasting variables. Coefficients are estimated from cross-sectional regressions for the years 1962–2010:

$$R_{t+1} - \frac{Earnings_{t+1}}{P_t} = a + b_1 \frac{Earnings_t}{P_t} + b_2 \frac{B_t}{P_t} + \sum_{j=1}^{N} b_{2+j} A_j + e_{t+1}$$

where A_j refers to an anomaly variable.

See notes to Table 4. Stock returns are for the 12-month period beginning three months after fiscal year-end (to coincide with the earnings reporting period for year $t+1$). *E/P* and *B/P* are current earnings-to-price and book-to-price, respectively.

Variables are defined in Table 1.

is the relation that *E/P* has with subsequent growth (in Table 5), and predictable growth explains the required return if growth is risky.

As the regressions in Table 7 control for earnings realizations, the results cast some doubt on the hypothesis that the anomalous returns result from the market failing to forecast those earnings appropriately. The results are not definitive on the issue, merely suggestive. However, they coincide with findings that returns around earnings announcements are, on average, positive and higher than at other times, for example in Beaver (1968), Penman (1987), Chari, Jagannathan, and Ofer (1988), and Ball and Kothari (1991). That premium indicates that expected earnings are at risk, so that holding stocks during periods when the resolution of that risk is expected requires a higher return.

To summarize the findings of the paper to this point, Table 8 compares the signs of coefficients on the anomaly variables, added individually to regressions, for forecasting the forward earnings yield (Table 4), two-year-ahead earnings growth (Table 5), year-ahead returns (Table 6), and the year-ahead difference between the returns and the realized earnings yield (Table 7). For all anomaly variables, except *ROA* and momentum, the signs for forecasting returns are the same as those for forecasting the forward earnings yield and subsequent growth. *ROA* and momentum report non-significant coefficients in forecasting the returns. As explained earlier, *ROA* is based on earnings and book value already in the regression and the momentum coefficient has different signs in Tables 4 and 5. In sum, the accounting anomaly variables predict returns in the same direction as they predict forward earnings and subsequent growth, which is consistent with their indicating expected future earnings that the market deems to be at risk.

VII. REQUIRED RETURNS OR ABNORMAL RETURNS?

The model that connects accounting variables to risk and return must assume that the price deflator in Equation (1) represents rational expectations with a discount for risk. That is, the market price is efficient. However, Equation (1) and subsequent expressions also hold for inefficient prices. If prices are inefficient, then the expected return is simply that from buying at the current market price rather than the required return for risk. With this in mind, we have been careful to refer to "expected returns" rather than "required returns."

As often stated, the issue cannot be resolved without a generally accepted asset pricing model for the required return against which abnormal returns can be benchmarked (Fama 1970, 1991), which we do not have. However, a model that rationalizes *E/P, B/P,* and other accounting variables as indicators of normal returns is a step forward. The model shows that a variable is identified with the required return if it forecasts the forward earnings yield and subsequent growth, and our empirical analysis indicates that the anomaly variables investigated have this characteristic. The association with risk is further suggested by the understanding that accounting principles defer earnings recognition under uncertainty, and deferred earnings add to expected earnings growth.

Our findings simply suggest that the returns associated with anomaly variables can be interpreted as indicating risk and return. Accordingly, the label "anomalous" (in the sense that we do not understand the phenomenon) might be removed. Anomalies in science tend to promote a search for an alternative paradigm, but our findings suggest that the returns do not necessarily challenge the prevailing paradigm.

However, we provide evidence in Table 9 that expected returns estimated in Table 6 are associated with risk characteristics. For each year, 1981–2010, firms are ranked on their expected returns estimated using coefficient estimates for the model in the last column of Table 6.[25] To focus on accounting variables, we excluded price momentum. Coefficient estimates to fit the expected return are mean coefficients from the model estimated over the prior ten years on a rolling basis. The analysis is thus out-of-sample. Ten portfolios are then formed from the ranking and equally weighted portfolio values for outcomes calculated. The numbers in Table 9 are calculated from the time-series of outcomes over the 30 years. Being out-of-sample, they report the actual experience from investing on the basis of the estimated expected return.

The first two columns in Table 9 show that the estimated expected returns for portfolios predict actual returns. Indeed, the actual returns vary monotonically with the expected return: investing on the basis of a high (low) expected return would have been rewarded with high (low) actual returns on average (out-of-sample). But the table also indicates that such investment would have come with

[25] The period is less than that for the earlier analysis because ten years of data are required to estimate coefficients and because data for external financing (*EXTFIN*) and net share issues (*NSI*) are not available until 1971.

TABLE 8

Comparison of Signs of Estimated Coefficients on Variables for the Predictions in Tables 4, 5, 6, and 7

Variables	Table 4 $\frac{Earnings_{t+1}}{P_t}$	Table 5 $\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$	Table 6 R_{t+1}	Table 7 $R_{t+1} - \frac{Earnings_{t+1}}{P_t}$
E/P	+	−	+	−
B/P	−	+	+	+
$ACCR$	−	−	−	−
ΔNOA	−	−	−	−
ROA	+	−	ns	ns
$INVEST$	−	−	−	−
NSI	−	−	−	−
$EXTFIN$	−	−	−	−
MOM	+	−	ns	ns

The column headings indicate the variables being predicted in respective tables. ns indicates that the t-statistic on the coefficient is not significant at the 95 percent level of confidence.
Variables are defined in Table 1.

risk. For both the actual forward earnings yield, $\frac{Earnings_{t+1}}{P_t}$ (the left-hand-side outcome in Table 4), and the actual $t+2$ earnings growth (the left-hand-side outcome variable in Table 5), the standard deviation in the earnings payoffs increases in the level of the expected return, with portfolio 10 looking particularly risky. Significantly, the interdecile range (IDR) is also increasing in the expected return. Thus, firms with a higher expected return are subjected to more extreme outcomes, that is, they experience more tail risk. In sum, buying earnings and earnings growth exposes the investor to risky earnings outcomes. Note that average realized earnings growth in $t+2$ is increasing in the expected return, confirming that one does buy more earnings growth with a higher expected return, but that the risk from buying higher expected growth is also higher, particularly in the tails.[26]

The final measure in Table 9, the beta with respect to the market portfolio, suggests that the risk observed in the earning outcomes is priced risk. The betas are those actually experienced during the portfolio holding period (not the historical betas). Those estimated under all conditions are higher for the higher expected return portfolios, particularly portfolio 10, although portfolio 1 has a higher beta than the average. Significantly, the down-market betas (estimated in years when the market return was less than −10 percent) are considerably higher for portfolios 8 to 10, indicating that firms with high expected returns have higher downside risk. Correspondingly, these portfolios exhibit higher up-market betas (estimated in years when the market return was greater than positive 10 percent). This exhibits the essence of risk: down-side risk is rewarded with up-side potential. In portfolios 1 to 3, the low down-market betas are consistent with these firms providing a hedge in bad times, a property which, under Merton asset pricing theory, means lower risk and a lower required return. While asset pricing research has had difficulty identifying observable extra-market

[26] Mean realized $Earnings_{t+1}/P_t$ is not strongly associated with the expected return. The mean value is negative for both extreme portfolios, as it is in the portfolio formation year t. This indicates that portfolio 10 contains firms with relatively low earnings that are expected to deliver growth that is realized in part in $t+2$. The median $Earnings_{t+1}/P_t$ for portfolios 1 and 10 are −0.037 and −0.009, respectively. As earnings growth in $t+2$ is affected by investment in $t+1$, we repeated the analysis with growth in residual income in $t+2$, with book value charged at the risk-free rate. Results are similar: the interdecile range of realized growth rates for portfolio 10 is 1.202 compared with 0.827 for portfolio 1.

TABLE 9

Out-of-Sample Outcomes for Expected Return Portfolios

Expected Return Portfolio	Expected Return	Actual Return			$\frac{Earnings_{t+1}}{P_t}$			$\frac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$			Market Beta		
	Mean	Mean	STD	IDR	Mean	STD	IDR	Mean	STD	IDR	All Conditions	Up Markets	Down Markets
1	0.015	0.043	0.203	0.769	−0.037	0.028	0.087	0.027	0.158	0.504	1.33	1.76	0.55
2	0.105	0.106	0.261	0.825	0.001	0.018	0.054	0.012	0.154	0.516	1.17	1.53	0.88
3	0.138	0.132	0.258	0.747	0.018	0.016	0.054	0.010	0.166	0.497	1.17	1.69	0.82
4	0.157	0.141	0.237	0.681	0.025	0.017	0.049	0.034	0.150	0.446	1.17	1.56	1.03
5	0.172	0.176	0.246	0.774	0.035	0.016	0.061	0.022	0.165	0.500	1.16	1.73	1.34
6	0.183	0.169	0.235	0.728	0.036	0.021	0.061	0.033	0.163	0.594	1.12	1.61	1.02
7	0.195	0.185	0.244	0.673	0.035	0.018	0.064	0.052	0.152	0.552	1.12	1.63	1.09
8	0.208	0.204	0.256	0.836	0.035	0.027	0.076	0.064	0.187	0.639	1.25	1.94	1.58
9	0.225	0.230	0.253	0.889	0.025	0.042	0.135	0.074	0.207	0.746	1.32	2.18	1.70
10	0.267	0.284	0.373	0.957	−0.009	0.082	0.261	0.125	0.272	0.738	1.86	3.01	2.19

For portfolios formed on estimated expected return each year, the table reports estimated expected returns, actual returns, and the mean, standard deviation (STD), and interdecile range (IDR) for the actual earnings yield in the forward-year- and two-year-ahead earnings growth. The table also reports the market beta for the portfolios.

Portfolios are formed each year, 1981–2010, based on expected returns estimated using mean coefficients estimated (as in Table 7 with all variables other than *MOM*) from cross-sectional regressions over rolling ten-year periods prior to the portfolio formation year. Portfolios amounts for each year are arithmetic means of stocks in the portfolio. All measures in the table are calculated from the time-series of annual observations for the portfolios.

$\frac{Earnings_{t+1}}{P_t}$ is the realized forward earnings yield after the portfolio formation (the left-hand-side variable in Table 5), with earnings calculated as in the notes to Table 1.

Earnings growth in t+2 in the realized growth two years after portfolio formation (the left-hand-side variable in Table 5), with earnings growth calculated as in the notes to Table 1. The results for earnings growth are for 1981–2009.

Market beta is estimated from time-series regression of annual returns earned on the portfolio on the contemporaneous value-weighted CRSP index. These betas are calculated using firms with fiscal years ending December 31 (where portfolio returns are aligned with market returns in calendar time), as are the standard deviations and interdecile range for portfolio returns. Up markets are defined as years when the value-weighted CRSP returns were greater than 10 percent and down markets as value-weighted returns less than −10 percent.

Variables are defined in Table 1.

common factors, there is a general acceptance that the market factor is relevant so these findings have some credibility.

These results present a higher hurdle for someone attributing "anomalous returns" to "abnormal returns." More so, given long-standing economic theory that predicts (approximate) efficient markets. As Richardson, Tuna, and Wysocki (2010) point out, anomaly research needs to offer a credible alternative hypothesis to efficient markets. That may well be forthcoming. Credible behavioral conjectures abound and formal models with transactions costs and other limits to arbitrage, noise traders, and investor sentiment have been offered. But the analysis in this paper challenges some of explanations for anomalous returns. For example, the conjecture that the accrual anomaly is because investors fail to understand that accruals and cash flows have different "persistence" for forecasting forward earnings is challenged by the model. The model suggests that an understanding of how accruals forecast forward earnings and growth differently is part of a rational determination of normal returns, so accruals should predict returns in an efficient market. The conjecture that investors fail to understand differential persistence in the aggregate is unsubstantiated, remaining just a conjecture. If, empirically, the so-called anomaly variables that predict returns also predict forward earnings and growth, then a condition for their being identified as risk variables is satisfied.

In summary, the model revises one's view of "accounting anomalies" but it is not definitive. It leaves us in the same state as accepting bond yields as indicating risk. This we readily do, seeing the difference between the yield on government and corporate bonds and between investment versus speculative grade bonds as appropriate risk spreads. We are not entirely sure, because validation requires a valid asset pricing model, but in absence of a valid pricing model we accept the yield as serving us well. The model here is simply the yield adjusted for expected growth, as befits an equity investment.

VIII. CONCLUSIONS

Empirical research has documented that many variables forecast stock returns, including accounting variables such as accruals, growth in assets, investment, external financing, and net share issuance. The predictive ability has been labeled "anomalous" or, in stronger terms, attributed to market mispricing. This paper shows that the required return for risk borne is indicated by variables that forecast the forward earnings yield and subsequent growth if growth is priced as risky. Accounting anomaly variables fall into this category because accruals, growth in assets, investment, external financing, and net share issuance forecast the forward earnings yield and growth, and in the same direction as they forecast returns. Accordingly, their ability to predict returns is consistent with rational pricing.

Tying the prediction of returns to rational forecasting that bears on the required return is a significant step, because rational expectations are at the core of rational pricing. However, we have observed a necessary condition for anomalies to be attributed to risk, but not a sufficient one. As often stated, that sufficient condition cannot be established without a generally accepted asset pricing model for benchmarking normal returns, which we do not have. Therefore, it is important to state our qualification once more. The evidence in this paper does not necessarily imply that the anomaly variables indicate return for risk borne. It could well be that the market misprices because it is "fixated" on earnings and book value, and that the anomaly variables serve to identify the poor forecasting.

Indeed, there is evidence, for example, in Bradshaw, Richardson, and Sloan (2006) and Wahlen and Wieland (2011), that sell-side analysts do not evaluate detailed financial statement information well. There is also experimental evidence using M.B.A. students (Bloomfield and Hales 2002) that individuals overweight past patterns in earnings in forecasting earnings. But the information-processing "mistake" would have to be at the aggregate level, and buy-side investors might arbitrage away any potential mispricing due to sell-side analysts and individuals. Therefore, these findings must be balanced against studies such as Collins, Gong, and Hribar (2002) and Ali, Chen, Yao, and Yu (2008) that show that "sophisticated" institutional investors trade expeditiously on information in accruals, although Lev and Nissim (2006) show that the accrual anomaly remains in stocks they do not cover and within the limits to arbitrage that individual investors face.

However, the results in Table 9 do indicate that investing on the basis of anomaly variables carries some risk if risk is in earnings outcomes that differ from expectation. If one observes correlations that are consistent with a model of rational pricing, as in this paper, then how can one jump to the conclusion of irrational pricing without some persuasive alternative theory? After all, the notion of rational share pricing rests on economic theory that has significant status in scientific inquiry, a theory that is appealing in a market with many participants to arbitrage prices. Embracing empirical findings predicted by formal theory is the scientific method. That being said, it is also essential to pursue alternative explanations, against which the economic rationality model might be tested.

The returns that have been documented in anomaly studies—typically 8 percent to 10 percent annually with 0 net investment—are seemingly too large to be left on the table by rational profit seekers. But they are consistent with the bet on risky growth paying off in the period covered by most of these studies, usually 1962–2000. Indeed, the actual returns to high expected return portfolios in Table 9—above 20 percent—are well above what we normally expect as reasonable returns for risk. Growth is risky, but—in this happy period of history—growth paid off handsomely. In light of this paper, that explanation, along with limits to arbitrage, seems a reasonable one.

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