Accounting Anomalies, Risk and Return

Stephen H. Penman*

Columbia Business School

shp38@columbia.edu

Julie Zhu

Boston University

juliezhu@bu.edu

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Abstract. This paper investigates the question of whether so-called anomalous returns predicted by accounting numbers are normal returns for risk or abnormal returns. It does so via a model that shows 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 forecasts required returns if the market prices those outcomes as risky. The empirical results indicate that many accounting anomaly variables forecast forward earnings and growth, and in the same direction in which they forecast returns. These variables include accruals, asset growth, profitability, investment, net share issuance, and external financing. In short, the observed "anomalous" returns associated with these accounting numbers are consistent with the rational pricing.

Accounting Anomalies, Risk, and Return

Numerous studies have documented predicable returns associated with accounting numbers; earnings-to-price, book-to-price, accruals, sales growth, and asset growth, to name a few, predict stock returns in the data, and quite consistently so. The predictable returns have been designated "anomalies" (presumably meaning we don't understand them) or, more boldly, "abnormal returns" due to market mispricing. 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 (in Fama and French 1996, Zhang 2007, Khan 2008, Guo and Jiang 2010, and Wu, Zhang, and Zhang 2010, for example). A modifying view attributes the returns to limits in the ability to arbitrage (in Shleifer and Vishny 1997, Mashruwala, Rajgopal, and Shevlin 2006, and Li and Sullivan 2011).[1]

As long recognized (in Fama 1970 and 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 normal return for risk borne. In this spirit, many of the predictable returns have been compared to normal returns supplied by asset pricing models such as the CAPM and a variety of multi-factor models, most commonly the Fama and French (1993) three-factor model and it variants. But these models fail to be validated, so the documented returns indeed remain "anomalous."

Even without a generally accepted asset pricing model, one would be assisted in the attribution task with a model that supplies an understanding of how accounting numbers inform about expected (normal) returns if pricing were rational. Our paper supplies such a model. 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. Couching returns in terms of earnings outcomes is particularly

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[1] Richardson, Tuna, and Wysocki (2010) review anomalies research and Dechow, Khimich and Sloan (2011) provide a recent commentary on the accrual anomaly that promotes the market inefficiency view. A recent book Zacks (2011), with contributions from a number of authors, goes through the anomaly research in detail with a focus on executable trading strategies.

pertinent to an investigation of accounting anomalies, for these involve accounting numbers that presumably forecast earnings in the future.

The model connects so-called anomaly variables to rational forecasting and thus to rational expectations that are at the heart of rational pricing. The empirical results indicate that the observed "anomalous" returns associated with many accounting numbers are consistent with the rational pricing of those numbers. These include accruals, asset growth, profitability, investment, net share issuance, and external financing. But note up front that our model is not a model of equilibrium expected returns for risk, so we cannot be conclusive (and such a model is, of course, elusive). Our conclusion that the returns are "consistent with" rational pricing is weak: Our analysis indicates that the returns associated with accounting anomalies are those you'd expect to see if the market were efficient in its pricing. That is, measures involving accounting numbers, like earnings-to-price, book-to-price, and accruals logically indicate normal rather than abnormal returns. The analysis thus places a higher bar for the researcher or investor to maintain otherwise; those maintaining that the market is inefficient with respect to the identified accounting information would have to show that the observed returns, though consistent with a rational pricing, are otherwise. We are undecided on the issue ourselves, but the analysis does revise our estimates of the likelihood that anomalous returns are due to market inefficiency (downwards) and we expect the probabilities of the reader to be so affected.

To give a sense of our approach, consider the predictable returns associated with earnings-to-price that have been reported (by Basu 1977 and 1983 and many others) with the attribution of "anomalous returns." The predictable returns are exploited in contrarian and value versus growth investment strategies with the presumption that they are due to market mispricing. However, Ball (1978) made the straight-forward 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: a bond "pricing model" directs the internal-rate-of-return calculation that supplies the expected yield. The yield is readily accepted as an indication of risk and the associated required return (as a rough cut); it would be considered quite brazen to claim, as a generality, that bond returns predicted by credit spreads are anomalous, even though the standard

2

bond pricing model is not "a generally accepted equilibrium asset pricing model" for the required return.[2]

For the equity earnings yield 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 in more problematical. 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. But forecasts of (long-term) growth are elusive. Indeed, growth may be related to risk.[3] Third, earnings is an accounting measure—it depends of 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. Significantly, the model incorporates the earnings yield but also identifies book-to-price as a part of the rational assessment of normal returns, a measure that robustly predicts returns and one on which Fama and French have built a pricing model. Further, accounting features such as accruals, growth in assets, and return on assets (that are said to yield anomalous returns) are also identified as indicating the required return. These are the very variables which (in previous studies) indicate additional returns over the benchmark Fama and French returns. By using the Fama and French benchmark return to indicate anomalies, previous studies have in effect documented the incompleteness of the Fama and French model in explaining how accounting numbers relate to expected returns.

1. **The Model**

The model adapts the characteristic return model of Penman, Reggiani, Richardson, and Tuna (2011) to identify how accounting variables relate to expected returns. As indicated, the model does not explain equilibrium expected returns in the cross-section (like a formal pricing model

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[2] This is so, even though the implied bond yield is a rough measure of risk premium: it ignores the term structure and the stochastic nature of the term structure.

[3] Considerable research attempts to estimate the required return (or the "implied cost of capital") from estimates of the forward earnings yield and assumptions about growth, but has had difficulty validating the estimates against actual average realized returns. For a review, see Easton (2007).

does). With some exceptions (notably the Fama and French 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.

1.1 *A Model of Expected Returns Explained by the Adjusted Forward Earnings Yield*

The model expresses expected rates-of-return for period t+1 in terms of forecasts of the forward earnings yield, the current (time t) book-to-price ratio, and additional "anomaly" variables to be identified by empirical analysis. By the clean-surplus accounting operation for equity, $d_{t+1} = Earnings_{t+1} + B_t - B_{t+1}$ where d is the net dividend to common equity, *Earnings* are (comprehensive) earnings available to common, and B is the book value of common equity. Substituting for dividends in the (undeflated) stock return (with firm subscripts omitted),

$$E(P_{t+1} + d_{t+1} - P_t) = E[Earnings_{t+1} + P_{t+1} - B_{t+1} - (P_t - B_t)]. \tag{1}$$

Dividing through by P_t to yield expected rate-of-return,

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

The identity in Eq.1 has long been recognized, for example in Easton, Harris, and Ohlson (1992) and Shroff (1995). If there is no expected change in the premium over book value, Eq. 1a shows that the expected rate-of-return is equal to the expected earnings yield, as Ball (1978) conjectured. This benchmark case is the case for a mark-to-market bond (where the expected change in premium, and indeed the premium, is zero). However, equity earnings are determined by accounting principles that do not necessarily produce a constant premium, and only a particular accounting measurement—permanent earnings—satisfies the zero expected change in premium condition.[4] The identity instructs that any alternative measurement of earnings to this benchmark induces an expected change in premium. If expected earnings are depressed below that which would indicate the expected return (by accounting that expenses R&D expenditures, for example), there must be an expected change in premium: book value increases with the

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[4] It can be shown that the constant premium case corresponds to earnings being sufficient to forecast future earnings (with no other information required) such that $Earnings_{t+1} = (1+r)Earnings_t - rd_t + \varepsilon_{t+1}$, with ε_{t+1} mean zero (and so at all points in time). This measure of earnings is often designated "permanent earnings."

earnings but prices are expected to increase more than book value because low earnings are 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 deflation by P_t is not incidental. Indeed it is important. The deflation expresses the left-hand side as an expected rate-of-return, but also discounts right-hand side variables by the expectation in price at t and for the risk (and the price of risk) that discount expectations. Thus forward earnings (for t+1) are relative to the expectation of those earnings at time t, discounted for the risk, rendering a risk-adjusted yield. Any expected change in premium is similarly discounted, so only a forecast of a change in premium over and above that forecast in current price adds to the expected return, and that forecast must pertain to a discount for the risk in the growth expectation that is imbedded in the current price.[5] Thus, to the extent that prices appropriately discount for risk, the model incorporates rational pricing; the model builds in rational pricing without the need to specify an asset pricing model.

The picture is more concrete with an appreciation of what a change of premium means. The intuition is easy to grasp. Price is the expectation of future earnings and a change in price is a change in that expectation (for a constant discount rate). The change is book value is determined by earnings so, if price is expected to increase more than earnings, the market is anticipating higher earnings in the future (after year t+1) than the t+1 earnings that update book value.[6] That is, a change in premium is forecasted by information that forecasts earnings growth subsequent to t+1 earnings.[7] Again earnings measurement creates the change in premium and the

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[5] This is the point in Berk (1995) that any variable that relates to expected payoffs is priced lower the more risky the expected payoff.

[6] Book value is 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, dividends 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, premiums will expand. Results are not affected with a control for the dividend yield, however. See Penman, Reggiani, Richardson, and Tuna (2011).

[7] More formally, by substituting $d_{t+\tau} = Earnings_{t+\tau} - \Delta B_{t+\tau}$ from the clean-surplus equation into the dividend discount model of the price for all future periods, t+τ, the expected premium at any point, t+τ, is given by

5

expected growth implied: Price anticipates total life-long earnings so, for a given price, lower forward earnings means higher earnings in the future by the property of accrual accounting that allocates total (life-long) earnings to periods.

With the deflation by current price, only expected growth that is deemed risky will add to the required return. Growth that represents predictable earnings not related to risk will be reflected in a higher P_t and thus cancelled by the deflator, P_t. It is not difficult to understand why growth might be at risk. If forward earnings are at risk, as indicated by the forward earnings yield, so must subsequent expected earnings that yield the growth. Growth firms are shocked in recessions and correspondingly do well in good times. Financing leverage adds expected earnings growth but also adds risk.[8] Operating leverage (fixed costs to variable costs), typically

$$E(P_{t+\tau} - B_{t+\tau}) = \frac{E(Earnings_{t+\tau+1} - rB_{t+\tau})}{r - g}$$

with a constant expected growth rate, g, and a constant required return, r, for simplicity. (This, of course, is the standard residual earnings model.) Accordingly, Eq. 1a can be expressed as

$$E(R_{t+1}) = \frac{E(Earnings_{t+1})}{P_t} + \frac{E[Earnings_{t+2} - rB_{t+1} - (Earnings_{t+1} - rB_t)]}{(r - g)P_t}$$

$$= \frac{E(Earnings_{t+1})}{P_t} + \frac{gE(Earnings_{t+1} - rB_t)}{(r - g)P_t}$$

Strictly, the growth is residual earnings growth but, for a given B_t, and r, an expected change in the t+1 premium results from expected earnings growth over the forward year. Feltham and Ohlson (1995) show that residual earnings growth induces a change in premium. With $E(R_{t+1})$ equal to the required return, r, the required return appears on both sides here (albeit with a denomination by price that discounts fro risk). The formulation is merely to show that expected earnings growth induces a change in premium. As $Earnings_{t+1} - rB_t - (Earnings_t - rB_{t-1}) = Earnings_{t+1} + rd_t - (1+r)Earnings_t$, one can refer to the growth as abnormal (cum-dividend) earnings growth that explains the P/E ratio, as in Ohlson and Juettner-Nauroth (2005). Abnormal earnings growth is thus (cum-dividend) earnings forecasted in excess of the "permanent earnings" prediction in the preceding footnote (and that forecast corresponds to the case of no expected change in premiums).

[8] It is always the case that $g_t^E = g_t^{OI} + ELEV_{t-1}[g_t^{OI} - g_t^{Int}]$ where g_t^E is the growth rate for (bottom-line) earnings, g_t^{OI} is the growth rate in operating income (income before net interest), g_t^{Int} is the growth rate in net interest expense on debt and $ELEV_{t-1} = Net\ Interest_{t-1} / Earnings_{t-1}$ measures leverage in the income statement. So, provided leverage is favorable such that $[g_t^{OI} - g_t^{Int}] > 0$, leverage levers up the growth in earnings. See Penman (2011), Chapter 4.

seen as risky, levers earnings growth with good sales outcomes but magnifies downside outcomes. Indeed, the basic economic principle of risk and return suggests that growth is risky: one cannot have more earnings without taking on more risk, on average. And accounting operates to connect risk to growth: under uncertainty, accrual accounting defers earnings to the future and deferred earnings yields expected earnings growth, as highlighted in Penman and Reggiani (2010). Whether the risk associated with earnings growth is priced risk is an open question, of course, but that is taken care of in the price deflator.

From Eq. 1a,

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

This expression identifies the book-to-price ratio, B/P, as a contender for a variable that predicts a change in premium and thus potentially growth related to risk. Stating this equation on an ex-post (realized return) basis and adding accounting variables as A_j, $j = 1, 2, \ldots, N$ that further predict growth, we specify a cross-sectional regression equation to take to the data that is free to fit intercept and slope coefficients such that ε_{t+1} is mean zero:

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

For the case of no expected change in premium (no growth), $b_1 = 1$ and the other b coefficients are equal to zero. This is the case for a mark-to-market (and a constant-rate) bond: the expected earnings yield indicates the expected return. This benchmark suggests that forward E/P is the primary variable for expected returns, with B/P and other variables adding to expected returns only if they predict growth that is associated with differential risk in the cross-section. Note, however, that in a cross-sectional regression, forward E/P could be correlated with the growth and so it could be that $b_1 \neq 1$.[9] Note also that there is no necessity for a linear model, though many return prediction papers run linear regressions. Nor is it necessary that coefficients on

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[9] Such would be the case under the permanent income growth model of Ohlson (2008) where all growth is priced as risky. (The permanent income model with growth implies that no information other earnings, along with a growth parameter, is relevant to valuation).

variables be the same for all firms in the cross section. These might be issues for further investigation. Here the issue is merely whether the results from anomalies research can be explained by fitting a model of expected returns like Eq. 1c.

Fama and French include a B/P factor in their asset pricing model but with little explanation as to why B/P might indicate risk and expected return.[10] The model here provides an explanation: B/P indicates expected return for risk if it forecasts growth that is priced as risky. Penman and Reggiani (2010) elaborates. Both Penman and Reggiani (2010) and Penman, Reggiani, Richardson, and Tuna (2011) show that B/P indeed predicts earnings growth empirically. Further, higher B/P is also associated with higher variation in growth outcomes.

The analysis shows that the Fama and French model omits the earnings yield which is shown here to be primary.[11] So, clearly, if so-called anomaly variables such as accruals and growth in assets forecast the forward earnings yield in the cross-section, they may be proxying for an omitted variable in the Fama and French model (and accordingly that model would not be a satisfactory benchmark for assessing abnormal returns). That observation leads to the following.

A Model of Expected Returns Explained by the Adjusted Current Earnings Yield

The forward earnings yield is not observable, of course; the expectation must be developed from current information.[12] A good starting point for forecasting is current earnings. Current earnings are sufficient for forecasting in the benchmark case of no change in premiums, so one can start with current earnings and ask what information forecasts that forward earnings differ from current earnings. Replacing forward earnings in Eq. 1c with current earnings,

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[10] Conjectures about B/P and risk include "distress risk," the "risk of assets in place," and the risk of "growth options."

[11] Fama and French (1992) claim that book-to-price "subsumes" the earnings yield, but this claim is doubtful in light of the Penman and Reggiani (2008) results. See also papers where profitability (earnings relative to book value) adds to returns predicted by B/P.

[12] Sell-side analysts' forecasts of forward earnings are available, but studies have shown that they do not capture the financial statement information completely. See, for example, Bradshaw, Richardson, and Sloan (2006) and Wahlen and Wieland (2011).

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

As in Eq. 1c, variables A_j, j = 1, 2, …, N take on a non-zero coefficient if they forecast risky growth but now additional variables, A_j, j = N+1, N+2, …, NN add to the forecast of returns if they forecast that forward earnings will be different that indicated by current earnings (and B/P).[13]

Considerable research indicates that accounting numbers add to current earnings in forecasting forecast forward earnings. Ou and Penman (1989, 1991), the early papers on forecasting returns from financial statement information, were in fact explicitly designed to predict returns with accounting numbers that forecast that forward earnings will be different from current earnings. It would appear that 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. As $Earnings_t$ = Cash from operations + accruals (in the way that accruals are defined in this line of work), specifying an A_j as accruals effectively decomposes current earnings in regression (1d), $Earnings_t$, into cash flow and accrual components, so entertains the idea that current cash flow and accruals have different implications for forecasts of forward earnings (and thus for expected returns). It is this difference in "persistence" of cash flows and accruals that Sloan (1996) conjectures is the reason for the market's misunderstanding that yields abnormal returns, but recognition of such difference is part of a rational forecast of forward earnings and the expected return.[14] Similarly (ignoring taxes), $Earnings_t$ – Net Interest$_t$ = 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 implications for forward earnings. Indeed Penman and Zhang (2006) find that ΔNOA is a primary earnings forecasting variable, just as it is the primary return forecasting variable in

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[13] The "earnings yield" here is earnings divided by end-of-period price, the reciprocal of the current (trailing) P/E, not the current earnings yield on beginning-of-period price.

[14] 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 papers.

Fairfield, Whisenant, and Yohn (2003). The prediction of growth is less clear, but ΔNOA (of which accruals are a part) is itself a growth variable.[15]

The Expected Return and the Required Return

The inference that added variables explain required returns for risk presumes that the price deflator in Eq. 1a represents rational expectations and discount for risk. That is, the market price is efficient. However Eq. 1a and subsequent expressions also hold for inefficient prices. If so, the expected return is simply that from buying at the current market price rather than the required return for risk. Accordingly, estimation of regression equation (1d) could merely be documenting market inefficiency and the prediction of abnormal returns rather than normal returns. Thus it would appear that the formulation helps little in the attribution of accounting anomalies to rational or irrational pricing.

However, a model that predicts that E/P, B/P and other accounting variables are appropriate indicators of normal returns (if the market is efficient) must surely bear on the conversation: Given this model, observed predictable returns are what we would expect if the market were efficient. So why would one leap to a conclusion that the returns are anomalies or indicate market inefficiency? More so given the significant persuasion in economic theory for (approximate) efficient markets and no competing compelling theory for the alternative. That is the scientific method. As Richardson, Tuna, and Wysocki (2010) point out, anomaly research needs to offer a credible alternative hypothesis. To invoke Popper, science progresses with falsification of hypotheses. Conjectures abound as to why the market *might* be inefficient—and credible behavioral theories about investors' over- and under-reaction to accounting information (in aggregate) may well emerge—but at the moment, the analysis here suggests there is no imperative for a scientist to ascribe returns to accounting numbers in the set, $A_j, j = 1, 2, …, NN$, to irrational pricing. For example, the conjecture that the accrual anomaly is because investors fail to understanding how accruals and cash flows have different "persistence" for forecasting forward earnings is challenged by the model, for the model says that an understanding of how

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[15] The set-up here differs from the Mishkin model that anomaly studies apply to identify mispricing. That model equates forecasting parameters for forecasting forward earnings to those for forecasting returns. It is appropriate for a permanent earnings accounting where unexpected returns equals unexpected earnings but not for the case of earnings that differ from returns because of expected growth. That is, it is appropriate for the case of no expected change in premiums in Eq. 1a. That is the case for a bond, and the original Mishkin papers indeed applied the model to the bond market where the (no-growth) conditions are satisfied.

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. (And the conjecture is unsubstantiated, remaining just a conjecture). If, empirically, the so-called anomaly variables that predict returns also predict forward earnings and growth, a condition for their being identified as risk variables would be satisfied. Necessity is not to be implied, however, for the variables could be predicting earnings and growth that are not anticipated by (inefficient) prices.

A demonstration of significant returns (after transaction costs and other limits to arbitrage) to a zero-investment, riskless hedge position from a strategy based on a particular accounting number would, of course, be definite. But (again) in absence of a valid pricing model, the determination of "riskless" is elusive. Documentation of historical returns to such a trading strategy, reporting no negative returns over time, would be persuasive but it would have to be a long period of time where the risk of the strategy taking a hit (such as in the recent financial crisis) could be observed. Anomaly studies typically document average returns in the order of 9 - 10 percent per year with zero net investment positions, but to attribute these returns to abnormal returns seems a bit of a stretch. Can so much money be left on the table? The sample periods typically cover the "good years," post-1960 and pre-2000, where the payoffs to risk were likely to be positive. Indeed, this was a period where the gamble on growth paid of handsomely for U.S. stocks. Fama and French (2008) document that most anomalies are observed consistently over various partitions of the data, indicating that something systematic is in play.

In summary, the model revises ones 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, for validation requires a valid asset pricing model, but in absence of a valid pricing model we accept the yield as serving us well.[16] The model here is simply the yield adjusted for expected growth, as befits an equity investment. Nevertheless, there is room for bond arbitrage (apparently), though that seems like hard work, reportedly earning nickels and dimes. In the same way, there is presumably also room for equity arbitrage (and accounting arbitrage) for

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[16] It is often pointed out that the expected yield on a bond is not necessarily the same as the required return implied by an asset pricing model.

someone who has an alternative (perhaps behavioral) model of how accounting numbers forecast abnormal returns rather than normal returns.[17] But that arbitrageur might well entertain the notion that, just like a bet on earnings yield involves risk, he or she could be taking on risk in exploiting accounting anomalies. One is hoping and praying.

The model has the following implications: First, for any variable that predicts returns but also forward earnings and/or growth, the "abnormal return" or even "anomalous" designation is doubtful: the variable looks like it is related to required returns. Second, if one could identify a variable that fails to forecast forward earnings and growth (given E/P and B/P), that variable should not predict returns (in effect, one would have a placebo to administer). Third, if one found a variable that forecasts returns but not earnings and growth, the efficient market hypothesis is challenged; following Popper, one would have a basis for falsification. Our empirical work deals with first point.

Identification of Added Accounting Variables

Out tests investigate whether the accounting numbers that have been nominated in the literature as predicting "anomalous" returns fit into the set A_j, $j = 1, 2, \ldots,$ NN in Eq. 1d. The modeling indicates that the variables can enter in two ways. First, variables A_j, $j = 1, 2, \ldots,$ N enter because they predict growth that is priced as risky. Second, variables A_j, $j = N+1, N+2, \ldots,$ NN enter as a correction to the forecast of forward earnings from current earnings. (A given variable could forecast both.)

Growth Forecasts

The following model serves to identify variables that forecast growth after the forward year. With any forecast beyond two years ahead 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,

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

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[17] One could argue that the pricing of equities is much more speculative than bonds (where the contractual payoffs are clear), so more subject to behavioral biases. As often pointed out, those biases would have to operate at the aggregate level of investors.

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 $\Delta Earnings^a_{t+2} =$

$Earnings^a_{t+2}$ - $Earnings_{t+1} = Earnings_{t+2} + (r_{ft+2} \times d_{t+1}) - Earnings_{t+1}$. The reinvestment of

dividends recognizes that dividends reduce earnings growth (or, alternatively put, dividends can

be reinvested to earn more earnings). To deal with negative denominators and to suppress

outliers, the forecast variable is calculated as

$$\frac{\Delta Earnings^a_{t+2} \times 2}{\left|Earnings^a_{t+2}\right| + \left|Earnings_{t+1}\right|}$$

which ranges from -2.0 to +2.0. $\Delta Earnings^a_t$ is similarly defined. The inclusion of the time-t

earnings change and sales growth incorporates the current earnings growth and sales growth in

the forecast.

Forecasts of Forward Earnings Yield

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

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

The addition of $\Delta Earnings_t$ adds a time-series benchmark to the cross-sectional one.

Empirical Work

Data and Variables

Our sample covers all U.S. firms with common stock listings on Compustat files for any of the

years, 1962-2009, and which 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 from 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 (1d), (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 are those that feature prominently in the literature (the main papers are referenced in the notes to the table), and are calculated as in the earlier papers.[18] The first four anomaly variables—accruals (ACCR), growth in net operating assets (ΔNOA), return on assets (ROA), and investment (INVEST)—involve accounting numbers to do with the business operations. Net share issuance (NSI) and external financing (EXTFIN) concern financing activities but also involve interaction with capital markets and thus might have an element of market timing. The momentum variable (sometime referred to as Winners vs. Losers) is a price variable. It is sometimes attributed to market over- or under-reaction to information, though 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. (The one month lag deals leaves out the short-term reversal phenomenon that has been documented). 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% of observations each year eliminated, except for returns.

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[18] The Chen, Novy-Marx, and Zhang (2010) ROA measure is not exactly the ROA measure of text books because it does not add back interest in earnings in the numerator (and accordingly is not entirely unlevered measure of profitability. We use the label "anomaly" (meaning the phenomenon is not entirely understood) with some hesitation, for some papers (such as the Chen, Novy-Marx, and Zhang paper) do offer theories for the phenomenon. Other anomaly variables were considered in the empirical analysis, most just a variation in the calculation of variables in Table 1.

Table 2 reports correlations between selected variables, with Spearman rank correlations above the diagonal and Pearson correlations below. The correlation coefficients are means over time of estimates from the cross-section for each year. Some observations are relevant to the tests that follow. It is clear that current earnings-to-price, $E/P = \dfrac{Earnings_t}{P_t}$, is a strongly correlated with forward earnings-to-price, $\dfrac{Earnings_{t+1}}{P_t}$ (the realized forward earnings yield), with a Spearman correlation of 0.629. Book-to-price is also correlated with forward earnings-to-price (a Spearman correlation if 0.155). Current E/P is negatively correlated with two-year-ahead earnings growth, $\dfrac{\Delta Earnings_{t+2}^a}{Earnings_{t+1}}$ (a Spearman correlation of -0.127), as expected for the reciprocal of the P/E ratio which is typically is seen as indicating growth. Book-to-price has a small positive correlation with two-year-ahead earnings growth (0.072).

The four anomaly variables in the table that involve business operations (ACCR, ΔNOA, 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 0.185), indicating that the momentum price change is also due, at least in part, to 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 (though small), however. The correlation of all anomaly variables with momentum is low (with the exception of ROA), but it is positive.[19] If investors misprice accounting information—the persistence of accruals, for example—one would expect this to feed the contemporaneous momentum (that is often characterized as over- or under-reaction to information).

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

The anomaly variables, other than the financing variables, are positively correlated with the (realized) forward earnings yield, but of course they are also positively correlated with 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 relative to issues when earnings and expectations of forward earnings are high relative to the current price.

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 and 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, though 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). Note that, 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 and 2008) are indeed mixed. In Chen, Novy-Marx, and Zhang (2010), ROA is correlated with returns in conjunction with investment, and we consider them together in our analysis.[20] The hedge return to momentum (based on twelve months of returns) is 0.027 somewhat lower that typically reported.[21]

Estimation of Models for Growth and the Forward Earnings Yield

Our first empirical task is to document how 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-sq are means from estimates of annual OLS cross-sectional regressions (Fama and MacBeth style), with the rejection of the top and bottom percentiles of explanatory variables each year.[22] The t-statistics on coefficient estimates are the mean coefficients relative to their estimated standard errors, as described in the notes to the 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 not 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 thus can be viewed within our framework as indicating the required return for risk. Most of the forecasting results in Tables 4 and 5 will come as little surprise to

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[20] Other profitability variables related to ROA have been investigated in the literature. Novy-Marx (2010) documents that gross profits-to-assets is positively correlated with subsequent returns. Interestingly, the gross profits measure is advocated as a better forecast of future earnings than "bottom-line" earnings, consistent with the perspective in this paper.

[21] Taking 2002 and 2008 out of the analysis, the hedge return is 0.060. For the 1965-1989 period covered by the Jegadeesh and Titman (1993) paper, 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.

[22] Results were similar after rejecting the top and bottom two percent and five percent of observations each year and when running regressions adding 1.0 to each variable and taking logs.

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 Eq. 1a and thus the expected stock return. Two-year-ahead growth is of course only a small part of long-term growth and, being realized growth, is likely to be affected by transitory earnings in either t+1 or t+2. So clearly this is a feeble attempt to develop a forecast, and the R^2 in Table 5 are indeed low.[23] In contrast, the forward earnings regressions in Table 4 report R^2 in the range of 35% to 38%.

We first consider the forecast models with E/P and B/P alone, before adding the anomaly variables. It is clear in Table 4 that the current E/P is a strong indicator of the forward earnings yield, which of course should come as no surprise: current earnings forecasts future earnings. Our model informs 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 and 1983) and others that 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 1.0, 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 (in Freeman Ohlson, and Penman 1982 and Fama and French 2000, for example) that the book rate-of-return is persistent.[24]

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

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[23] 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-square 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).

[24] Put another way, price aggregates more information than book value but forecasts long-run earnings. Thus the coefficient on E/P forecasts mean reversion in the long run, but B/P differentiates sustained earnings in the near term. 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.

characteristic so prominent in asset pricing models, is strongly positively correlated with growth: given E/P, B/P forecasts growth but in a direction that is opposite to the common dictum. Penman and Reggiani (2010) elaborate on how E/P and B/P work together to indicate growth and provide further documentation that the growth forecasted by the two is indeed risky: higher expected growth indicated by E/P and B/P has higher variation around it and is subject to more extreme shocks. Penman, Reggiani, Richardson, and Tuna (2011) further investigate both the unconditional and conditional (upon E/P) relationship between B/P and subsequent growth.

The current change in earnings in Table 4 has a negative sign indicating the well-documented transitory nature of earnings changes. The earnings change and sales growth add little to forecasting growth in Table 5 so we drop them for the reporting here; results for the anomaly variables were little different with them included.[25]

E/P and B/P are dictated by our framework as the starting point for forecasting earnings, growth, and returns. Adding the anomaly variables asks whether forecasts are improved over those involving these "bottom-line" accounting numbers. Tables 4 and 5 indicate the answer is in the 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, ΔNOA, ROA, and INVEST, the sign 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 tends 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 ΔNOA and investment (INVEST) that previous studies have shown are negatively correlated with future earnings changes.[26] ROA takes on a positive coefficient in

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[25] 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 a realization of earlier expected growth and that resolution of uncertainty reduces risk and the required return.

[26] See Fairfield, Whisenant, and Yohn (2003) and Penman and Zhang (2006) who add explanations for the phenomena. ΔNOA increases current earnings (as expenses that would otherwise be charged to earnings are added

the prediction of forward earnings. The measure (earnings before extraordinary items over lagged assets) is simply a refinement of the earnings and book values already in the regression that unlevers book values (in its denominator); the result indicates that this partial unlevering (and 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.[27]

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. 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 of course is the standard signaling story). Albeit, 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—though 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 market rationally forecasting an earnings increase with information beyond current earnings and book value. 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

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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 (2011).

[27] The observation that, 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 relationship between ROA and growth reflects an accounting property: increasing investment with conservative accounting reduces current ROA but adds to future earnings growth. Growing R&D expenditure is an example: expensing R&D under conservative accounting reduces current earnings and ROA but adds to expected future earnings (growth).

be realized in the forward year, subsequent growth is lower. And, if growth is priced as risky, 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.[28]

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 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 with the exception of investment. In the growth regressions, the average R-sq increases but accruals and ΔNOA add little to the forecast of growth given the other variables. [29] [30]

Estimation of Models for the Forward Return

We now tie those same variables that forecast forward earnings and growth to forward stock returns. Table 6 is laid out in the same way as 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, 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.

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[28] Results are similar when the momentum variable is measured over six months rather than 12 months. Results were also similar in the two subperiods, 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).

[29] Results for the growth regression were similar when the current sales growth variable, $\frac{\Delta Sales_t}{Sales_{t-1}}$, 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.)

[30] 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.

The results in Table 6 with E/P and B/P alone confirm that E/P and B/P jointly forecast returns (in sample), 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 (2010) and for the characteristic regression model of Penman, Reggiani, Richardson, and Tuna (2011). Given E/P and B/P, the anomaly variables additionally forecast returns, with the exception of ROA and momentum. Remarkably, the signs on the coefficients here are the same for those in the earnings yield regressions in Table 4 and for all except the momentum and ROA in the growth regressions in Table 5.

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." And so with an increase in raw material inventory that indicates that expected sales realizations are imminent (or a drop in investment in raw materials than indicates uncertainty about sales ahead). The accounting for deferred tax assets (that add to accruals and asset growth) is based on a determination that it is "more likely than not" that they asset will be recovered, and a write-down of an asset resolves uncertainty as to whether expected earnings will be materialize.[31] The predictor interpretation and realization interpretation for the accounting variables reconcile: for given growth expectations in the denominating price, P_t,

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[31] 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 "assets in place," and assets in place are less risky than unexercised growth options. 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.

realizations of growth imply lower future growth (as the coefficients in the forecasting regressions in Table 5 indicate).

These points aside, as a matter of correlation, 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.[32]

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-sq 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 not marginally relative to each other. This is not surprising. Under a strict clean-surplus accounting system, ΔNOA = investment + operating accruals (Penman and Zhang 2006).[33] These variables have a lot in common.[34]

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[32] 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.

[33] Richardson, Tuna, and Wysocki (2010) provide an appendix that shows how various measures are related deterministically to each other by accounting relations.

[34] Results in Table 6 were similar in the two subperiods, 1962-1986 and 1986-2009. The findings are consistent over large-cap, medium-cap, and small-cap firms, though not as strong (in terms of t-statistics and overall R-sq) 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 dependant: Results were similar after rejecting the top and bottom two percent and five percent of observations on the explanatory variables each year and when running regressions adding 1.0 to each variable and taking logs. (The coefficient on ROA was reported with a significant positive coefficient in the log regressions, however).

The final table, Table 7, runs the same regression as in Table 6, but now with the

dependent variable as $Return_{t+1} - \dfrac{Earnings_{t+1}}{P_t}$, that is, the difference between the forward return

and the realized forward earnings yield.[35] This serves two purposes. First, Eq. 1a informs that a

variable will 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, effectively the realized change in premium, isolates the

latter. Second, taking out the effect of realized forward earnings engages the contention that

anomaly variables forecast returns because investors fail to appreciate their implication for future

earnings—so anomaly investors are rewarded as the market corrects itself when those earnings

are realized.[36]

The results 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, and that part of the return has to do with growth. Significantly, while 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.

But, given the realization of the forward earnings yield, E/P is negatively related. And that is the

relation that E/P has with subsequent growth (in Table 5), and predictable growth explains the

required return if growth is risky.

A number of studies (for example, Bernard, Thomas, and Wahlen 1997) report that the

returns to anomaly investing come around subsequent earnings announcements and interpret this

finding as confirmation that the market fails to forecasts earnings appropriately. The Table 7

results cast some doubt on this interpretation, for the regressions there control for realized

earnings. But further, if earnings and earnings growth are at risk, earnings announcements

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[35] Here the 12-month return period begins 3 months after the end of fiscal-year t to bracket 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 4 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).

[36] The realized earnings yield also controls (somewhat) for the variation in returns that is due to unexpected earnings ("cash-flow news" in the parlance of finance papers). Further, as the earnings yield is related to the required return (in Eq. 1), it may also control (somewhat) for "discount-rate news." Indeed, the R-sq numbers in Table 7 are higher than those in Table 6.

periods (where there is resolution of the uncertainty) are periods of particularly high risk, and these periods indeed exhibit higher average returns (in Beaver 1968, Penman 1987, Chari, Jagannathan, and Ofer 1988, and Ball and Kothari 1991, for example). It follows that one expects higher average returns around earnings announcements for firms where the anomaly variables indicate higher risk in expected earnings and earnings growth. And the sample period in these studies is one of exceptional growth, where growth paid off handsomely ex post: one should observe higher returns to expected growth when the payoff to growth risk is favorable.

Conclusion

Empirical research has documented that many variables forecast stock returns, including accounting variables like accruals, growth in assets, investment, external financing, and net share issue. 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: accruals, growth in assets, investment, external financing, and net share issuance forecast the forward earnings yield and growth, and in the same direction as the direction in which 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, for rational expectations are at the core of rational pricing. However, the words, "consistent with" in our conclusion are weak. As often stated, one cannot differentiate normal and abnormal returns without "a generally accepted asset pricing model" for benchmarking normal returns, and that we do not have. So it is important to state our qualification again: there is no necessity that the evidence in the paper demands that one conclude 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 the anomaly variables serve to identify the poor forecasting.

Indeed, there is evidence (in Bradshaw, Richardson, and Sloan 2001 and Wahlen and Wieland 2011, for example) that sell-side analysts do not evaluate detailed financial statement information well. There is also experimental evidence (in Bloomfield and Hales 2002, for example, using MBA students) 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. So these findings must be balanced against papers (Collins, Gong, and Hribar 2003 and Ali, Chen, Yao, and Yu 2008, for example) 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 don't cover (but also within the limits to arbitrage that individual investors face).

However, the stark question must be faced: if one observes correlations that are consistent with a model of rational pricing, as in this paper, why would one jump to the conclusion of irrational pricing without some persuasive alternative theory for doing so? 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. Alternative explanations, against which the economic rationality model might be tested, are of course essential to pursue, but one has to admit that the behavioral conjectures offered to date are tentative, even conjectural, at the aggregate level of the market as a whole. The returns that have been documented by anomaly studies—8 percent to 10 percent as an annual average with zero 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, about 1960-2000. 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.

Capital market research in accounting has documented two types of correlations: accounting numbers are correlated both with contemporaneous returns and with subsequent returns. The contrasting correlations have always been a puzzle but the typical explanation is that the market sees the "information content" in reported accounting numbers but under- or over-reacts to the information such that the accounting numbers forecast future returns. This paper suggests another interpretation that reconciles the two observations. Realizations of earnings and its components are realizations of expectation of payoffs that move prices. So a positive earnings realization (say) adds to the price. But realizations of expectations (of both earnings and earnings

growth) also change expected return going forward, for they are resolve uncertainty. So, a positive earnings realization (or a positive accrual in added credit sales, for example) indicates success that makes the firm less risky. That is, accounting realizations reflect both "cash flow news" and "discount rate news" (in the parlance of finance), implying that accounting realizations forecast subsequent average returns. This paper suggests so.

References

Ali, A., X. Chen, T. Yao, and T. Yu. 2008. Do mutual funds profit from the accruals anomaly? *Journal of Accounting Research* 46, 1-26.

Balachandran, S., and P. Monahram. 2011. Using residual income to refine the relationship between earnings growth and stock returns. *Review of Accounting Studies*, forthcoming.

Ball, R. 1978. Anomalies in relationships between securities' yields and yield-surrogates. *Journal of Financial Economics* 6, 103-126.

Ball, R., and P. Brown. 1968. An empirical evaluation of accounting income numbers. *Journal of Accounting Research* 6, 159-177.

Ball, R., and S. Kothari. 1991. Security returns around earnings announcements. *The Accounting Review* 66, 718-738.

Barth, M., and A. Hutton. 2004. Financial analysis and pricing accruals. *Review of Accounting Studies* 9, 59-96.

Basu, S. 1977. Investment performance of common stocks in relation to their price-earnings ratios: a test of the efficient market hypothesis. *The Journal of Finance* 32, 663-682.

Basu, S. 1983. The relationship between earnings yield, market value, and return for NYSE stocks: further evidence. *Journal of Financial Economics* 12, 129-156.

Beaver, W. 1968. The information content of annual earnings announcements. *Journal of Accounting Research* 6 (Supplement), 67-92.

Berk, J. 1995. A critique of size-related anomalies. *Review of Financial Studies* 8, 275-286.

Berk, J., R. Green, and V. Naik. 1999. Optimal investment, growth options, and security returns. *Journal of Finance* 54, 1153-1608.

Bernard, V., J. Thomas, and J. Wahlen. 1997. Accounting-based stock price anomalies: Separating market inefficiencies from risk. *Contemporary Accounting Research* 14, 89-136.

Bloomfield, R., and J. Hales. 2002. Predicting the next step of a random walk: experimental evidence of regime-shifting beliefs. *Journal of Financial Economics* 65, 397-414.

Bradshaw, M., S. Richardson, and R. Sloan. 2006. The relation between corporate financing activities, analysts' forecasts, and stock returns. *Journal of Accounting and Economics* 42, 53-85.

Chari, V., R. Jagannathan, and A. Ofer. 1988. Seasonalities in Security Returns: The case of earnings announcements. *Journal of Financial Economics* 21, 101-121.

Chen, L., R. Novy-Marx, and L. Zhang. 2010. An alternative three-factor model. Unpublished paper, Washington University in St. Louis, University of Chicago, and University of Michigan.

Cochrane, J. 1991. Production-based asset pricing and the link between stock returns and economic fluctuations. *Journal of Finance* 46, 209-237.

Cochrane, J. 1996. A cross-sectional test of an investment-based asset pricing model. *Journal of Political Economy* 104, 572-621.

Colins, D., G. Gong, and P. Hribar. 2002. Investor sophistication and the mispricing of accruals. *Review of Accounting Studies* 8, 251-276.

Cooper, M., H. Gulen, and M. Schill. 2008. Asset growth and the cross-section of stock returns. *Journal of Finance* 63, 1609-1651.

Daniel, K., and S. Titman. 2006. Market reaction to tangible and intangible information. *Journal of Finance* 61, 1605-1643.

Dechow, P., N. Khimich, and R. Sloan. 2011. The accrual anomaly. Unpublished paper, University of California, Berkeley.

Easton, P. 2007. Estimating the cost of capital implied by market prices and accounting data. *Foundations and Trends in Accounting* 2, 241-364.

Easton, P, T. Harris, and J. Ohlson. 1992. Aggregate accounting earnings can explain most of security returns: the case of long event windows. *Journal of Accounting and Economics* 15 (June-September), 119-142.

Fairfield, P., J. Whisenant, and T. Yohn. 2003. Accrued earnings and growth: implications for future profitability and market mispricing. *The Accounting Review* 78, 353-371.

Fama, E. 1970. Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25, 383-417.

Fama, E. 1991. Efficient capital markets: II. *Journal of Finance* 45, 1575-1617.

Fama, E., and K. French. 1992. The cross-section of expected stock returns. *Journal of Finance* 47, 427-465.

Fama, E., and K. French. 1993. Common risk factors in the returns of stocks and bonds. *Journal of Financial Economics* 33, 3-56.

Fama, E., and K. French. 1996. Multifactor explanations of asset pricing anomalies. *Journal of Finance* 51, 55-84.

Fama, E., and K. French. 2000. Forecasting profitability and earnings. *Journal of Business* 73, 161-175.

Fama, E., and K. French. 2006. Profitability, investment and average returns. *Journal of Financial Economics* 82, 491-518.

Fama, E., and K. French. 2008. Dissecting Anomalies. *Journal of Finance* 63 (August), 1653-1678.

Feltham, G., and J. Ohlson. 1995. Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research*, 12 (Spring), 689-731.

Freeman, R., J. Ohlson, and S. Penman. 1982. Book rate-of-return and prediction of earnings changes: An empirical investigation. *Journal of Accounting Research* X, 639-653.

Gomes, J., L. Kogan, and L. Zhang. 2003. Equilibrium cross-section of returns. *Journal of Political Economy* 111, 693-732.

Guo, H., and X. Jiang. 2010. Accruals and the conditional equity premium. *Journal of Accounting Research*, forthcoming.

Haugen, R., and N. Baker. 1996. Commonality in the determinants of expected stock returns. *Journal of Financial Economics* 41, 401-439.

Harris, T., and D. Nissim. 2006.The differential value implications of the profitability and investment components of earnings. Unpublished paper, Columbia University.

Ikenberry, D., J. Lakonishok, and T. Vermaelen. 1995. Market underreaction to open market share repurchases. *Journal of Financial Economics* 39, 181-208.

Jegadeesh, N., and S. Titman.1993. Returns to buying winners and selling losers: Implications for stock market efficiency. *Journal of Finance* 48, 65-91.

Khan, M. 2008. Are accruals mispriced? Evidence from tests of an intertemporal capital asset pricing model. *Journal of Accounting an Economics* 45, 55-77.

Lakonishok, J., A. Shleifer, and R. Vishny. 1994. Contrarian investment, extrapolation, and risk. *Journal of Finance* 49, 1541-1578.

Lev, B., and D. Nissim. 2006. The persistence of the accruals anomaly. *Contemporary Accounting Research* 23 (Spring), 1-34.

Li, L., D. Livdan, and L. Zhang. 2009. Anomalies. *Review of Financial Studies* 22, 4301-4334.

Li, X., and R. Sullivan. 2011. The limits to arbitrage revisited: The accrual and asset growth anomalies. *Financial Analysts Journal* 67, 50-66.

Liu, L., T. Whited, and L. Zhang. 2009. Investment-based expected stock returns. *Journal of Political Economy* 117, 1105-1139.

Liu, L., and L. Zhang. 2011. Investment-based momentum profits. NBER working paper 16747.

Lyandres, E., L. Sun, and L. Zhang. 2008. The new issues puzzle: Testing the investment-based explanation. *Review of Financial Studies* 21, 2825-2855.

Mashruwala, C., S. Rajgopal, and T. Shevlin. 2006. Why is the accrual anomaly not arbitraged away? The role of idiosyncratic risk and transactions costs. *Journal of Accounting and Economics* 42, 3-33.

Novy-Marx. R. 2010. The other side of value: good growth and the gross profitability premium. Working paper, University of Chicago and NBER.

Ohlson, J. 2008. Risk, growth, and permanent earnings. Unpublished paper, New York University Stern School of Business.

Ohlson, J., and B. Juettner-Nauroth. 2005. Expected EPS and EPS growth as determinants of value, *Review of Accounting Studies* 10, 349-365.

Ou, J., and S. Penman. 1989. Financial statement analysis and the prediction of stock returns. *Journal of Accounting and Economics* 11, 295-329.

Ou, J., and S. Penman. 1991. Accounting measurement, P/E ratios, and the information content of security prices. *Journal of Accounting Research* (Supplement), 111-144.

Penman,S. 1987. The Distribution of Earnings News Over Time and Seasonalities in Aggregate Stock returns. *Journal of Financial Economics* (June), 199-228.

Penman, S. 2011. *Accounting for Value*. New York: Columbia University Press.

Penman, S., F. Reggiani, S. Richardson, and İ Tuna. 2011. A Characteristic Model for Asset Pricing. Working paper in progress.

Penman, S., and F. Reggiani. 2010. Returns to buying earnings and book value: accounting for growth and risk. Forthcoming, *Review of Accounting Studies*.

Penman, S., and X. Zhang. 2006. Modeling Sustainable earnings and P/E ratios with financial statement analysis. At http://papers.ssrn.com/sol3/papers.cfm?abstract_id=318967.

Pontiff , J., and A. Woodgate. 2008. Share issuance and cross-sectional returns. *Journal of Finance* 63, 921-945.

Richardson, S., R. Sloan, M. Soliman, and İ. Tuna. 2005. Accrual reliability, earnings persistence, and stock prices. *Journal of Accounting and Economics* 39, 437-485.

Richardson, S., İ Tuna, and P. Wysocki. 2010. Accounting anomalies and fundamental analysis: a review of recent research advances. *Journal of Accounting and Economics* 50, 410-454.

Rosenberg, B., K. Reid, and R. Lanstein. 1985. Persuasive evidence of market inefficiency. *Journal of Portfolio Management* 11, 9-17.

Shleifer, A., and Vishny, R. 1997. The limits of arbitrage. *Journal of Finance* 52, 35-55.

Shroff, P. 1995. Determinants of the returns-earnings correlation. *Contemporary Accounting Research* 12 (Fall), 41-55.

Sloan, R. 1996. Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review* 71, 289-315.

Titman, S., K. Wei, and F. Xie. 2004. Capital investment and stock returns. *Journal of Financial and Quantitative Analysis* 39, 677-700.

Thomas, J., and H. Zhang. 2002. Inventory changes and future returns. *Review of Accounting Studies* 7, 163-187.

Wahlen, J., and M. Weiland. 2011. Can financial statement analysis beat analysts' recommendations? *Review of Accounting Studies* 16, 89-115.

Wu, J., L. Zhang, and X. Zhang. 2010. The q-theory approach to understanding the accrual anomaly. *Journal of Accounting Research* 48, 177-223.

Xie, H. 2001. The mispricing of abnormal accruals. *The Accounting Review* 76, 357-373.

Zacks, L. (ed). 2011. The Handbook of Equity Market Anomalies. Hoboken, NJ: John Wiley & Sons.

Zhang, X. 2007. Accruals, investment, and the accrual anomaly. *The Accounting Review* 82, 1333-1363.

Table 1

Distribution of Variables

This table reports features of the distribution of variables used in the analysis, from data pooled over firms and the years, 1962-2009. 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 are excluded. There is a maximum of 167,348 firm-years in the calculations (and 164,001 firms-years for the calculation of means and standard deviations), though less for some variables.

	Target Variables			Basic Forecast Variables				Anomaly Variables						
Percentile	$Return_{t+1}$	$\dfrac{\Delta Earnings^a_{t+2}}{Earnings_{t+1}}$	$\dfrac{Earnings_{t+1}}{P_t}$	$\dfrac{Earnings_t}{P_t}$	$\dfrac{B_t}{P_t}$	$\dfrac{\Delta Earnings^a_t}{P_t}$	$\dfrac{\Delta Sales_t}{Sales_{t-1}}$	ACCR	ΔNOA	ROA	INVEST	NSI	EXTFIN	MOM
1	-0.883	-2.000	-0.744	-1.472	0.037	-0.971	-0.642	-0.356	-0.587	-0.856	-0.351	-0.161	-0.256	-0.822
5	-0.667	-2.000	-0.269	-0.398	0.107	-0.264	-0.276	-0.191	-0.218	-0.335	-0.116	-0.048	-0.117	-0.627
10	-0.522	-1.644	-0.136	-0.177	0.167	-0.123	-0.151	-0.139	-0.109	-0.156	-0.051	-0.019	-0.073	-0.496
20	-0.326	-0.557	-0.031	-0.038	0.265	-0.041	-0.040	-0.094	-0.035	-0.034	-0.003	0.000	-0.035	-0.317
30	-0.185	-0.177	0.015	0.012	0.357	-0.012	0.019	-0.069	0.000	0.008	0.017	0.000	-0.015	-0.187
40	-0.067	0.019	0.036	0.032	0.456	0.001	0.063	-0.051	0.026	0.028	0.037	0.001	-0.003	-0.075
50	0.041	0.126	0.051	0.046	0.567	0.007	0.103	-0.034	0.053	0.045	0.060	0.004	0.003	0.030
60	0.153	0.215	0.064	0.059	0.700	0.013	0.148	-0.017	0.083	0.061	0.087	0.010	0.018	0.143
70	0.287	0.339	0.081	0.074	0.870	0.021	0.207	0.002	0.122	0.080	0.121	0.020	0.047	0.278
80	0.473	0.586	0.105	0.096	1.118	0.038	0.301	0.031	0.183	0.104	0.173	0.045	0.100	0.467
90	0.820	1.328	0.150	0.136	1.567	0.083	0.521	0.082	0.310	0.145	0.281	0.145	0.230	0.833
95	1.240	2.000	0.197	0.175	2.052	0.167	0.870	0.138	0.469	0.190	0.419	0.260	0.416	1.298
99	2.690	2.000	0.323	0.273	3.545	0.658	3.196	0.293	0.892	0.321	0.969	0.615	0.963	3.000
Mean	0.144	0.035	0.025	-0.002	0.738	-0.010	0.170	-0.032	0.077	0.014	0.091	0.034	0.049	0.128
Std Dev	0.742	0.988	0.140	0.223	0.615	0.160	0.407	0.091	0.195	0.159	0.160	0.096	0.162	0.616

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 twelve 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 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% is applied in such cases.

$$\frac{\Delta Earnings_{t+2}^a}{Earnings_{t+1}} = \frac{\Delta Earnings_{t+2}^a \times 2}{\left|Earnings_{t+2}^a\right| + \left|Earnings_{t+1}\right|}$$ 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 10-year Treasury note). The calculation, that yields a number between 2 and -2, is designed to handle negative earnings. Earnings are 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 are 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 and 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, Shleifer, and Vishny (1994).

$\frac{\Delta Earnings_t^a}{P_t}$ 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 10-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, Whisenant, and Yohn (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).

ΔNOA is change in net operating assets divided by average assets, as in Fairfield, Whisenant, and Yohn (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).

ROA is income before extraordinary items divided by lagged assets, as in Chen, Novy-Marx, and Zhang (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, Novy-Marx, and Zhang (2010). Similar investment measures are associated with future returns in Titman, Wei, and Xie (2008) 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, as in Fama and French (2008). 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.

EXTFIN is the external financing measure of Bradshaw, Richardson, and Sloan (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 onwards.

MOM is momentum, measured as the buy-and-hold return over the twelve 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.

Table 2

Correlations between Variables

This table reports mean cross-sectional correlation coefficients for the period 1962-2009. 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.

	Target Variables			Basic Forecast Variables					Anomaly Variables					
	$Return_{t+1}$	$\frac{DEarnings^a_{t+2}}{Earnings_{t+1}}$	$\frac{Earnings_{t+1}}{P_t}$	$\frac{Earnings_t}{P_t}$	$\frac{B_t}{P_t}$	$\frac{\Delta Earnings^a_t}{P_t}$	$\frac{\Delta Sales_t}{Sales_{t-1}}$	ACCR	ΔNOA	ROA	INVEST	NSI	EXTFIN	MOM
$Return_{t+1}$	1	0.202	0.389	0.140	0.091	0.032	-0.037	-0.039	-0.057	0.066	-0.062	-0.082	-0.109	0.039
$\frac{DEarnings^a_{t+2}}{Earnings_{t+1}}$	0.162	1	-0.200	-0.127	0.072	-0.097	-0.077	-0.050	-0.052	-0.146	-0.051	-0.005	-0.010	-0.087
$\frac{Earnings_{t+1}}{P_t}$	0.276	-0.151	1	0.629	0.155	0.237	0.037	0.030	-0.010	0.304	-0.006	-0.171	-0.179	0.185
$\frac{Earnings_t}{P_t}$	0.069	-0.106	0.564	1	0.239	0.338	0.100	0.152	0.119	0.526	0.114	-0.155	-0.148	0.110
$\frac{B_t}{P_t}$	0.066	0.063	-0.028	0.016	1	-0.106	-0.296	-0.102	-0.186	-0.368	-0.225	-0.154	-0.152	-0.322
$\frac{\Delta Earnings^a_t}{P_t}$	0.017	-0.083	0.220	0.407	-0.156	1	0.316	0.120	0.074	0.289	0.043	-0.028	-0.062	0.340
$\frac{\Delta Sales_t}{Sales_{t-1}}$	-0.046	-0.050	0.010	0.064	-0.217	0.194	1	0.306	0.444	0.321	0.486	0.171	0.251	0.186
ACCR	-0.034	-0.040	0.055	0.167	-0.100	0.122	0.253	1	0.568	0.267	0.320	0.072	0.210	0.060
ΔNOA	-0.049	-0.038	0.018	0.135	-0.161	0.082	0.389	0.507	1	0.305	0.687	0.128	0.370	0.054
ROA	0.050	-0.097	0.305	0.475	-0.258	0.242	0.154	0.231	0.233	1	0.317	-0.059	-0.072	0.298
INVEST	-0.056	-0.036	0.010	0.101	-0.190	0.047	0.427	0.290	0.655	0.217	1	0.137	0.386	0.062
NSI	-0.068	0.001	-0.115	-0.098	-0.076	-0.009	0.167	0.056	0.102	-0.120	0.113	1	0.232	-0.104
EXTFIN	-0.081	-0.008	-0.137	-0.104	-0.136	-0.023	0.269	0.164	0.337	-0.185	0.381	0.191	1	-0.062
MOM	0.017	-0.062	0.173	0.129	-0.289	0.260	0.135	0.054	0.049	0.218	0.058	-0.066	-0.016	1

Person correlations are estimated after rejecting the top and bottom one percent of observations on each variable each year, except returns. Variables are defined in the notes to Table 1.

Table 3

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

This table reports mean buy-and-hold stock returns over the subsequent twelve 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, 1962-2009, 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 previously year.

Portfolio	$\dfrac{Earnings_t}{P_t}$	$\dfrac{B_t}{P_t}$	ACCR	ΔNOA	ROA	INVEST	NSI	EXTFIN	MOM
1	0.144	0.069	0.156	0.187	0.110	0.195	0.194	0.198	0.115
2	0.108	0.097	0.174	0.196	0.160	0.183	0.153	0.200	0.132
3	0.114	0.121	0.170	0.190	0.165	0.168	0.144	0.202	0.150
4	0.122	0.135	0.170	0.160	0.170	0.175	0.144	0.197	0.145
5	0.136	0.138	0.167	0.161	0.164	0.159	0.143	0.191	0.144
6	0.146	0.150	0.150	0.158	0.159	0.154	0.161	0.170	0.148
7	0.164	0.172	0.146	0.138	0.155	0.145	0.163	0.142	0.166
8	0.180	0.170	0.139	0.118	0.148	0.135	0.138	0.144	0.159
9	0.180	0.208	0.120	0.110	0.139	0.115	0.112	0.114	0.161
10	0.205	0.226	0.112	0.108	0.126	0.102	0.114	0.046	0.142
High-Low	0.061	0.157	-0.044	-0.079	0.016	-0.093	-0.080	-0.152	0.027

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.

Table 4

Estimates for Forward Earnings Yield Regressions

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, 1962-2009:

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

where A_j refers to an anomaly variable. Basic forecast variables are summary accounting variables before adding anomaly variables.

	Basic Forecasting Variables Alone		Adding Anomaly Variables								
Intercept	0.033	0.036	0.035	0.042	0.036	0.043	0.043	0.047	0.030	0.040	0.043
	(12.09)	(8.73)	(8.65)	(8.75)	(9.03)	(8.58)	(10.84)	(12.49)	(7.72)	(9.76)	(11.45)
$\frac{Earnings_t}{P_t}$	0.532	0.562	0.581	0.583	0.520	0.580	0.540	0.509	0.566	0.543	0.494
	(27.09)	(21.22)	(24.12)	(23.82)	(13.91)	(23.39)	(22.44)	(33.92)	(19.10)	(16.13)	(21.86)
$\frac{B_t}{P_t}$	-0.023	-0.026	-0.027	-0.028	-0.027	-0.029	-0.029	-0.036	-0.020	-0.029	-0.031
	(-5.65)	(-4.23)	(-4.45)	(-4.69)	(-4.56)	(-4.85)	(-4.65)	(-5.37)	(-3.62)	(-4.90)	(-5.27)
$\frac{\Delta Earnings_t}{P_t}$		-0.015	-0.014	-0.015	-0.007	-0.021	-0.017	-0.035	-0.052	-0.011	-0.055
		(-0.69)	(-0.68)	(-0.69)	(-0.32)	(-0.91)	(-0.84)	(-2.02)	(-3.26)	(-0.59)	(-3.89)
ACCR			-0.064							-0.034	-0.033
			(-5.24)							(-3.35)	(-2.93)
ΔNOA				-0.060						-0.037	-0.029
				(-6.18)						(-4.75)	(-3.68)
ROA					0.063					0.090	0.066
					(3.18)					(5.47)	(4.15)
INVEST						-0.052				-0.024	-0.010
						(-6.35)				(-2.44)	(-0.94)
NSI							-0.093				-0.051
							(-8.47)				(-7.70)
EXTFIN								-0.093			-0.035
								(-12.74)			(-7.50)
MOM									0.029		0.026
									(8.03)		(9.19)
Adj R^2	0.347	0.356	0.363	0.367	0.362	0.366	0.351	0.332	0.367	0.380	0.350
N	139,483	122,767	119,038	118,927	120,941	119,964	107,358	114,860	121,139	114,641	94,988

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 correction for the serial correlation in the coefficient estimates. N is the number of firm-years entering the regressions estimations. The top and bottom one percent of the explanatory variables each year were discarded in the estimations.

Table 1 notes describe the calculation of 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).

Table 5

Estimates for Growth Forecasting Regressions

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, 1962-2009:

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

where A_j refers to an anomaly variable. Basic forecast variables are summary accounting variables before adding anomaly variables.

	Basic Forecast Variables Alone			Adding Anomaly Variables								
Intercept	0.001	0.007	0.040	0.008	0.022	0.033	0.023	0.019	0.019	0.036	0.042	0.090
	(0.03)	(0.27)	(1.43)	(0.30)	(0.86)	(1.02)	(0.94)	(0.78)	(0.76)	(1.54)	(1.34)	(3.39)
$\dfrac{Earnings_t}{P_t}$	-1.089	-1.021	-1.122	-1.155	-1.171	-1.039	-1.174	-1.152	-1.014	-1.027	-1.084	-0.877
	(-7.15)	(-7.84)	(-6.86)	(-6.37)	(-6.55)	(-5.69)	(-6.96)	(-5.60)	(-9.85)	(-6.94)	(-5.69)	(-7.84)
$\dfrac{B_t}{P_t}$	0.117	0.101	0.095	0.107	0.105	0.103	0.105	0.102	0.107	0.078	0.094	0.043
	(5.65)	(5.17)	(4.84)	(5.11)	(5.02)	(4.64)	(5.22)	(5.09)	(5.35)	(4.05)	(4.17)	(2.05)
$\dfrac{\Delta Earnings_t^{a}}{P_t}$		-0.416										
		(-2.38)										
$\dfrac{\Delta Sales_t}{Sales_{t-1}}$			-0.128									
			(-4.18)									
ACCR				-0.192							-0.123	-0.108
				(-3.29)							(-1.67)	(-1.27)
ΔNOA					-0.092						0.015	0.048
					(-3.23)						(0.27)	(0.77)

40

	1	2	3	4	5	6	7	8	9	10	11	12
ROA						-0.372					-0.352	-0.369
						(-4.13)					(-3.11)	(-3.96)
INVEST							-0.074				-0.076	-0.086
							(-2.56)				(-1.60)	(-1.81)
NSI								-0.160				-0.220
								(-2.72)				(-3.97)
EXTFIN									-0.111			-0.095
									(-2.89)			(-2.57)
MOM										-0.104		-0.106
										(-6.83)		(-7.55)
Adj R²	0.027	0.031	0.032	0.031	0.030	0.031	0.031	0.030	0.026	0.031	0.035	0.035
N	125,549	110,965	109,530	108,597	108,495	110,257	109,398	98,054	104,157	123,722	104,702	86,523

See notes to Table 4.

Table 6

Estimates for Forward Returns Regressions

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, 1962-2009:

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

where A_j refers to an anomaly variable.

	E/P and B/P Alone	Adding Anomaly Variables								
Intercept	0.087	0.086	0.108	0.097	0.117	0.104	0.111	0.081	0.112	0.112
	(2.93)	(3.05)	(3.89)	(2.81)	(4.04)	(3.61)	(3.46)	(2.72)	(3.07)	(3.08)
$\frac{Earnings_t}{P_t}$	0.210	0.180	0.179	0.103	0.153	0.090	0.127	0.199	0.064	0.090
	(3.42)	(1.83)	(1.95)	(1.49)	(1.43)	(0.70)	(2.39)	(3.11)	(0.77)	(1.79)
$\frac{B_t}{P_t}$	0.076	0.071	0.067	0.064	0.063	0.064	0.060	0.082	0.060	0.057
	(4.77)	(4.31)	(4.23)	(3.74)	(3.85)	(4.04)	(3.39)	(5.17)	(3.86)	(3.29)
ACCR		-0.229							-0.145	-0.235
		(-3.19)							(-1.51)	(-4.07)
ΔNOA			-0.143						-0.075	-0.007
			(-4.23)						(-1.50)	(-0.17)
ROA				0.054					0.146	0.097
				(0.43)					(1.06)	(1.29)
INVEST					-0.143				-0.066	-0.061
					(-3.50)				(-1.40)	(-1.53)
NSI						-0.256				-0.173
						(-4.44)				(-4.18)

EXTFIN							-0.256			-0.161
							(-6.88)			(-4.70)
MOM								0.029		0.007
								(1.71)		(0.34)
Adj R^2	0.022	0.027	0.026	0.025	0.027	0.027	0.029	0.027	0.036	0.045
N	154,764	132,162	132,039	134,528	133,290	118,769	128,231	152,198	126,899	104,584

See notes to Table 4. R_{t+1} is the forward stock return as calculated in the notes to Table 1.

Table 7

Estimates for Forward Returns Relative to the Realized Earnings Yield

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, 1962-2009:

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

where A_j refers to an anomaly variable.

	E/P and B/P Alone	Adding Anomaly Variables								
Intercept	0.173	0.160	0.184	0.186	0.192	0.167	0.177	0.140	0.201	0.158
	(4.64)	(4.69)	(5.30)	(4.19)	(5.48)	(4.95)	(4.47)	(4.04)	(4.33)	(3.71)
$\frac{Earnings_t}{P_t}$	-0.733	-0.693	-0.701	-0.710	-0.728	-0.757	-0.581	-0.716	-0.774	-0.560
	(-4.91)	(-4.09)	(-4.27)	(-5.86)	(-4.08)	(-4.22)	(-8.12)	(-5.39)	(-4.75)	(-8.89)
$\frac{B_t}{P_t}$	0.005	0.006	0.001	-0.005	-0.001	0.008	-0.001	0.020	-0.008	0.005
	(0.24)	(0.29)	(0.06)	(-0.25)	(-0.07)	(0.40)	(-0.05)	(1.19)	(-0.41)	(0.26)
ACCR		-0.266							-0.139	-0.269
		(-3.09)							(-1.23)	(-4.68)
ΔNOA			-0.145						-0.106	0.014
			(-4.59)						(-1.57)	(0.29)
ROA				-0.172					-0.063	-0.135
				(-1.15)					(-0.38)	(-1.33)
INVEST					-0.161				-0.049	-0.106
					(-4.18)				(-0.78)	(-3.18)
NSI						-0.264				-0.154
						(-5.60)				(-3.78)
EXTFIN							-0.230			-0.156
							(-5.98)			(-4.19)
MOM								0.043		0.015
								(1.12)		(0.30)
R-sq	0.023	0.030	0.029	0.030	0.031	0.031	0.032	0.035	0.041	0.056
N	139,374	119,903	119,789	121,853	120,847	108,029	115,703	137,315	115,419	95,466

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).