First Draft: September 2001
This draft: July 2004
Not for quotation
Comments welcome

Profitability, Growth, and Average Returns

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Abstract

Valuation theory says that controlling for book-to-market equity (B_t/M_t) and expected growth, firms with higher expected profitability have higher expected stock returns, and (ii) given B_t/M_t and expected profitability, faster expected growth implies lower expected returns. These predictions are confirmed when lagged profitability, growth, and accruals are used as simple proxies for expected profitability and growth. But the results are weaker, rendering inferences problematic, when the tests use what seem like better proxies for expected profitability and growth.

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In the standard dividend discount model the value of a firm's equity is the present value of expected dividends to current shareholders,

$$(1) \qquad M_t = \sum_{\tau=1}^{\infty} E(D_{t+\tau})/(1+r)^{\tau},$$

where M_t is the time t market value of equity, $E(D_{t+\tau})$ is the expected dividend in period $t+\tau$, and r is the average expected stock return, or more precisely, the internal rate of return on expected dividends.

Ohlson (1995) shows that the dividend discount model can be re-expressed as,

$$(2) \qquad M_t = B_t + \sum_{\tau=1}^{\infty} E(Y_{t+\tau} - rB_{t+\tau-1})/(1+r)^{\tau},$$

or equivalently,

$$(3) \qquad \frac{M_t}{B_t} = 1 + \frac{\sum_{\tau=1}^{\infty} E(Y_{t+\tau} - rB_{t+\tau-1})/(1+r)^{\tau}}{B_t},$$

where B_t is book equity at time t, $Y_{t+\tau}$ is equity earnings for $t+\tau$, $Y_{t+\tau} - rB_{t+\tau-1}$ is what Ohlson (1980) calls residual income (the difference between earnings and the opportunity cost of equity capital), and r is again both the discount rate for expected residual income and (approximately) the long-term average expected stock return.

The advantage of the Ohlson framework (3) is that it yields predictions about how expected stock returns vary with the book-to-market equity ratio, expected profitability, and expected growth. Thus, (3) says that, controlling for expected earnings and expected book equity (both measured relative to current book equity), a higher book-to-market ratio, B_t/M_t, implies a higher expected stock return, r. This, of course, is the motivation for using book-to-market as a proxy for expected returns. Equation (3) also says that firms with the same book-to-market ratio but different expected residual incomes must have different expected returns. Given B_t/M_t, firms with higher expected residual income (relative to current book equity) have higher expected stock returns. Breaking residual income into its two components, equation (3) implies that controlling for B_t/M_t and the expected growth in book equity, more profitable firms –

specifically, firms with higher expected earnings relative to current book equity – have higher expected returns. And given B_t/M_t and expected earnings relative to book equity, firms with higher expected equity investments (growth in book equity) have lower expected stock returns.

We test for the book-to-market, profitability, and growth effects in expected returns predicted by the valuation equation (3). This, of course, is not virgin territory. Indeed, though our methods are different, our work can be viewed as confirming and providing a unifying perspective on the many papers that link book-to-market equity and proxies for expected profitability and growth to future stock returns.

For example, there is much evidence that, as predicted by (3), firms with higher book-to-market ratios have higher average stock returns (Rosenberg, Reid, and Lanstein, 1985, Chan, Hamao, and Lakonishok, 1991, Fama and French, 1992, Capaul, Rowley, and Sharpe, 1993, Lakonishok, Shleifer, and Vishny, 1994). Haugen and Baker, 1996, and Cohen, Gompers, and Vuolteenaho, 2002, find that controlling for book-to-market equity, average returns are positively related to profitability. Fairfield, Whisenant, and Yohn, 2002, and Richardson and Sloan, 2003, document a negative relation between average returns and growth. All of these results are in line with (3). Initiated by Sloan (1996), there is an extensive literature in accounting documenting that (i) accruals are positively related to future growth, (ii) they are negatively related to future profitability, and higher accruals predict lower stock returns. (See also Chan, Chan, Jegadeesh, and Lakonishok, 2001, Xie, 2001, Richardson, Sloan, Soliman, and Tuna, 2004a, 2004b, and Fairfield, Whisenant, and Yohn, 2003.) These accrual results likewise confirm the predictions of (3). Working within the confines of the valuation equation (2), Abarbanell and Bushee (1998), Frankel and Lee (1998), Dechow, Hutton, and Sloan (2000), Lee, Ng, and Swaminathan (2003), and others combine analyst forecasts of earnings with assumptions about future growth to estimate expected residual income. The general result is that higher expected residual income relative to current market value forecasts higher stocks returns – as predicted by (3). Finally, Piotroski (2000) and Griffin and Lemmon (2002) show that composite measures of firm strength, which are clear proxies for expected residual income, are positively correlated with future stock returns.

In this earlier work, evidence that the book-to-market ratio, expected profitability, and expected growth are related to future stock returns is typically interpreted as evidence of market inefficiency. But as usual, irrational pricing is not the only possibility. With rational pricing the book-to-market, profitability, and growth effects in expected returns implied by the valuation equations are due to differences in risk: controlling for other variables, more profitable firms and firms with higher book-to-market ratios must be more risky, and faster-growing firms must be less risky. We take no stance on whether the patterns in average returns observed here are rational or irrational.

What do we add to earlier work? Most existing papers look for book-to-market, or profitability, or growth effects in average returns and treat them as isolated "anomalies." At a minimum, our analysis emphasizes that all this evidence is complementary, fitting nicely within the confines of valuation theory. More ambitiously, however, we systematically explore the implications of the valuation equations for book-to-market, profitability, and growth effects in average returns. Working explicitly within the confines of valuation theory makes it clear that appropriately identifying book-to-market, or profitability, or growth effects in average returns requires that one controls for all three. In the end, then, we hope to provide an overall perspective on how all three effects contribute, separately and together, to the cross section of average stock returns.

Out tests proceed as follows. Section I uses cross-section regressions to develop proxies for expected growth and profitability. We find that lagged values of many variables, including size, accounting fundamentals, stock returns, analyst earnings forecasts, and two measures of firm strength help forecast profitability and growth. Section II then uses cross-section return regressions to test whether various proxies for expected growth and profitability (including the fitted values from the regressions of section I) add to the explanation of expected returns provided by size and book-to-market equity. These cross-section return regressions for individual firms are potentially subject to influential observation problems. As a check, section III tests whether the profitability and growth effects in average returns identified in the regressions are general phenomena within portfolios formed on size and book-to-market equity. The final step, section IV, is to test whether the profitability and growth effects in average returns are captured by the three-factor model of Fama and French (1993).

Our return results are easily summarized. Both the cross-section return regressions and the portfolio tests show that simple proxies for expected profitability and growth – lagged profitability, growth, and accruals – are related to average returns in the manner predicted by equation (3). The composite measures of firm strength of Piotroski (2000) and Ohlson (1980), which are proxies for expected residual income, also help explain differences in average returns in the way predicted by (3). And none of these patterns in average returns are captured by the three-factor model.

Our return tests also produce an unsolved puzzle. The cross section profitability and growth regressions of section I say that many variables have information about expected profitability and growth beyond that in lagged values of the variables. But in the return tests, the proxies for expected profitability and growth provided by the fitted values from the regressions of section I do not work as well as lagged profitability and growth in identifying profitability and growth effects in average returns. The regression estimates of expected profitability tend to confirm that there is a profitability effect in average returns, but the evidence is stronger for the simple proxy, lagged profitability. And although there is a relation between lagged growth and average returns, the growth effect becomes elusive when we expand the expected growth proxy to include what section I says is apparently important information beyond that in lagged growth.

The concluding section VI discusses the implications of these results. In a nutshell, we argue that although our first stage profitability and growth regressions identify a broad range of variables that have information about expected profitability and growth, the regression fitted values have substantial measurement error as proxies for expected profitability and growth. As a result, simpler proxies – lagged profitability, growth, and accruals – turn out to be more powerful in explaining average returns.

I. Expected Profitability and Growth

The first step is to develop proxies for expected profitability and growth. The more complicated proxies are fitted values from cross-section regressions to predict profitability, $Y_{t+\tau}/B_t$, and asset growth, $dA_{t+\tau}/A_t = (A_{t+\tau}-A_t)/A_t$, one, two, and three years ahead ($\tau = 1, 2, 3$). The explanatory variables, measured at the end of fiscal year t, are (i) various accounting fundamentals, (ii) the firm's stock return for fiscal year t and its combined return for years t-1 and t-2, (iii) analyst earnings forecasts for t+1, and (iv) the composite measures of firm strength developed by Piotroski (2000) and Ohlson (1980). We use the estimates of expected profitability and growth provided by the fitted values from these first stage regressions as explanatory variables in second stage cross-section return regressions that test for profitability and growth effects in average returns (section II).

The accounting fundamentals used as explanatory variables in the proxies for expected profitability and growth include lagged values of (i) the ratio of book equity to market equity (B_t/M_t), (ii) a dummy variable for negative earnings, (iii) profitability (Y_t/B_t) for firms with positive earnings, (iv) accruals relative to book equity for firms with positive ($+AC_t/B_t$) and negative ($-AC_t/B_t$) accruals, (v) growth (dA_t/A_{t-1}), (vi) a dummy variable for firms that do not pay dividends (No D_t), and (vii) the ratio of dividends to book equity (D_t/B_t). The book-to-market ratio is known to be negatively related to profitability and growth (firms with lower B_t/M_t tend to be more profitable and to grow more rapidly), and profitability and growth are known to be persistent (for example, Penman, 1991, Lakonishok, Shleifer, and Vishney, 1994, Fama and French, 1995). It also seems reasonable that current profitability is related to future growth, and future growth is related to current profitability. There is lots of evidence, such as Fairfield, Whisenant, and Yohn (2003), and Richardson, Sloan, Soliman, and Tuna (2004a, 2004b), that accruals forecast profitability and growth. Similarly, previous work shows that dividend paying firms tend to be more profitable but to grow more slowly (for example, Fama and French, 2001). We also include firm size (the log of M_t) among the fundamental variables because smaller firms tend to be less profitable (Fama and French, 1995). The precise definitions of the variables are in the Appendix.

Consistent with the logic of the valuation equations, all accounting variables are on a per share basis. Size, however, is measured as the log of total market cap (ln M_t). Throughout the paper, the dating convention is that year t includes the accounting data for all fiscal year ends in calendar year t. For consistency, the lagged returns and ln M_t used in the profitability and growth regressions are also measured at the end of a firm's fiscal year. Finally, the valuation equation (3) calls for equity investment, $B_{t+\tau}/B_t$, but we measure investment as asset growth, $dA_{t+\tau}/A_t$, which we judge is less subject to the quirks of accounting and so gives a better picture of investment. And we call $Y_{t+\tau}/B_t$ profitability, but it is clear that for $\tau > 1$, it is a mix of profitability and earnings growth.

The explanatory variables used in the first stage regressions to develop proxies for expected profitability and growth also include (i) I_t/B_t, the I/B/E/S consensus forecast of earnings per share one year ahead (as available at the end of a firm's fiscal year) divided by book equity per share at t, (ii) PT_t, the composite measure of firm strength used by Piotroski (2000) to predict stock returns, and (iii) OH_t the probability of debt default developed by Ohlson (1980) and used by Griffin and Lemmon (2002) to forecast stock returns. Piotroski (2000) assigns firms binary scores, 0 (bad) and 1 (good) each year on nine accounting fundamentals (including measures of profitability and past earnings growth). PT_t is the sum of a firm's scores on the nine variables at the end of fiscal year t, with higher values indicating stronger past performance. OH_t is the fitted value from Ohlson's (1980) cross-section logit regression (Model 1) that uses accounting fundamentals for year t to assess the probability of default on debt, with higher values implying weaker firms. From the construction of PT_t and OH_t (details in the Appendix), it is clear that the two variables can be viewed as proxies for expected residual income in (3). Finally, I/B/E/S earnings forecasts begin in 1976, and PT_t requires data from the cashflow statements of firms, which are not available on Compustat until 1971. The tests that use I/B/E/S forecasts or PT_t are limited to the periods of data availability (versus 1963-2003 for tests that do not use PT_t or I/B/E/S).

Tables 1 and 2 show average slopes and their t-statistics for year-by-year cross-section profitability and growth regressions, estimated in the manner of Fama and MacBeth (1973). We drop firms from the tests for several reasons. First, we exclude financial firms (SIC codes between 6000 and

6999) here and throughout. To be included in the sample for calendar year t (predicting profitability and growth for t+1, t+2, and t+3 in Tables 1 and 2, and predicting returns for July of t+1 to June of t+2 in Tables 3 and 4, presented later), a firm must also have book equity, earnings before extraordinary items, dividends, shares outstanding and accruals for t, assets for t and t-1 from Compustat, and market equity (price times shares outstanding, from CRSP) for the last fiscal yearend in t, December of t, and June of t+1. We exclude firms with negative book equity in year t. Firms are also deleted from specific regressions if they do not have other data, such as PT_t, OH_t, and I_t/B_t, required for that regression. To avoid influential observation problems, we delete a firm from the profitability and growth regressions if an explanatory variable in the regression is outside the 0.5 or 99.5 percentile for that variable in year t. (We consider only the upper or lower bound for one-sided variables, such as $+AC_t/B_t$, $-AC_t/B_t$, and D_t/B_t.) To avoid undue influence of small firms, those with total assets less than $25 million or book equity less than $12.5 million in year t are also excluded. (Using $5 million and $2.5 million as the cutoffs produces similar results.)

When the forecast horizon is more than a year ahead, there is overlap in the dependent variables in the year-by-year profitability and growth regressions. This can produce autocorrelation of the slopes that affects the standard errors of the average slopes. Inspection of the autocorrelations (not shown) in the asset growth regressions suggests little evidence of a problem. The autocorrelations of the slopes in the multiyear profitability regressions are more often positive, but not systematically large. Given the large standard errors of the autocorrelations, we are reluctant to impose corrections that may not be warranted. Moreover, there is no overlap in the year-by-year regressions that forecast profitability and growth one year ahead, and the results from the one-year and multiyear regressions are always generically similar.

The multiple regressions to forecast profitability and growth that provide our proxies for expected profitability and growth are in Table 2. Table 1 is background. It summarizes preliminary regressions to show that, used alone or in natural subgroups, all variables in the multiple regressions of Table 2 forecast profitability or growth, and typically both. Our discussion largely focuses on the evidence about marginal explanatory power provided by the multiple regressions of Table 2.

There are two sets of profitability and growth regressions in Table 2. The first uses only lagged size and accounting fundamentals to forecast profitability and growth. The second set adds lagged returns, analyst forecasts of profitability, and the two general measures of firm strength, PT_t and OH_t, to the explanatory variables.

A. Growth

Consider the Table 2 regressions to forecast asset growth. In the first set, all accounting fundamentals are related to future growth in plausible ways. Smaller firms and more profitable firms tend to grow faster, but firms that pay more dividends grow more slowly. Firms with higher book-to-market ratios (so-called value firms) grow less rapidly than low BM firms (growth firms). Among firms with positive accruals (reported earnings exceed cash earnings from operations), larger accruals are associated with slower future growth. The relation between accruals and growth is not discernible when accruals are negative. In terms of t-statistics, B_t/M_t and D_t/B_t have the strongest explanatory power, with average slopes more than 12 standard errors from zero. Lagged growth also helps predict future growth, but in economic terms the effects are small. And without showing the details, we can report that adding more lags of growth, or replacing the first lag of growth with a three-year average, does not produce stronger evidence for the importance of lagged growth in predicting future growth.

Adding lagged returns, I/B/E/S profitability forecasts, PT_t, and OH_t to the growth regressions tends to reduce the size and precision of other slopes. Despite this collinearity, most of the other fundamentals continue to have explanatory power, with two exceptions. The average slopes on size are still negative, but now they are less than two standard errors from zero. More interesting, lagged growth loses its power to forecast future growth – a result of some import in interpreting the return regressions later. Lagged returns and OH_t have marginal forecast power in the full regressions, and I/B/E/S profitability forecasts may have explanatory power. Not surprisingly, firms with higher past returns and higher forecasted profitability tend to grow more rapidly, while firms with higher probability of default (OH_t) grow less rapidly. Used alone, there is a strong positive relation between the Piotroski measure of firm strength and future asset growth (Table 1), but in the full regressions, PT_t does not have reliable forecast power.

B. Profitability

When size and the accounting fundamentals are used to forecast profitability, $Y_{t+\tau}/B_t$, one, two, and three years ahead (τ = 1, 2, 3), lagged profitability has by far the strongest forecast power. For example, the average slope on Y_t/B_t for forecasts one year ahead, 0.79, is close to one and 34.45 standard errors from zero. Thus, (unlike growth) there is lots of persistence in profitability. But without showing the details, we can report that adding more lags of profitability, or replacing the first lag of profitability with a three-year average, does not produce stronger evidence for the importance of lagged profitability in predicting future profitability than the first lag of profitability alone.

As expected, the book-to-market ratio helps predict profitability; firms with higher B_t/M_t (value firms) tend to be less profitable. The forecast power of the ratio of dividends to book equity, which shows up clearly in the regressions of Table 1, largely disappears when placed in competition with other fundamentals in Table 2. On the other hand, the multiple regressions of Table 2 produce stronger evidence that firms that do not pay dividends are less profitable. Similarly, the negative implications of accruals for future profitability are clearer in the multiple regressions of Table 2. The reliably negative average slopes on $+AC_t/B_t$ (for firms with positive accruals) in Table 2 are close to those in Table 1, but the average slopes on $-AC_t/B_t$ become more negative and are more than two standard errors below zero when we add other fundamentals to the regressions.

The link between lagged asset growth and future profitability is interesting. In univariate regressions (Table 1), lagged growth is positively related to future profitability, but the slope turns negative in the multivariate regressions of Table 2. Thus, with controls for size and other fundamentals (especially past profitability), higher asset growth is associated with lower future profitability and growth in earnings. (We return to this finding in the concluding section VI.)

When lagged returns, I/B/E/S earnings forecasts, and the Piotroski and Ohlson measures of firm strength (PT_t and OH_t) are added to the profitability regressions, not much happens to the average slopes for book-to-market equity, the ratios of negative and positive accruals to book equity, and the ratio of dividends to book equity. But the slopes on lagged profitability fall a lot (more on this below), and the slopes on lagged asset growth are more reliably negative. When the two lagged returns are used alone to forecast profitability, their average slopes are strongly positive (Table 1), but in competition with other variables (Table 2), the slopes on lagged returns decline a lot and only the first lagged return (year t-1) shows reliable forecast power. OH_t produces strong negative average slopes when used alone to forecast profitability; higher probability of default is (not surprisingly) associated with lower future profitability. But in the multiple regressions, OH_t loses most of its explanatory power. In contrast, although the positive average slopes on the PT_t measure of firm strength are smaller when other variables are in the profitability regressions, they remain more than two standard errors from zero.

In the profitability regressions, the slopes on lagged profitability and analyst forecasts of profitability are interesting. Used alone to forecast profitability (Table 1), both variables have average slopes close to 1.0 and more than 19 standard errors from zero. Thus, differences in lagged profitability or in analyst earnings forecasts show up roughly one for one in future profitability. But in the multiple regressions that use the full set of variables to forecast profitability (Table 2), the slopes on lagged profitability and analyst forecasts fall to about half the values observed in Table 1, so the sum of the slopes is now a bit less than 1.0. And the average slopes for both variables are more than six standard errors from zero. Thus, in the multiple regressions, the two variables (correlated 0.67) split the information they share about future profitability. Moreover, many other variables help forecast profitability in the full regressions. This result confirms earlier evidence that analysts seem to ignore lots of information when making earnings forecasts. (See, for example, Ali, Klein, and Rosenfeld, 1992, Abarbanell and Bernard, 1992, Easterwood and Rutt, 1999, and Ahmed, Nainar, and Zhang, 2003.)

Spawned by Sloan (1996), there is a large accounting literature documenting that accruals result in transitory variation in earnings. The negative slopes on accruals in the profitability regressions confirm this result. Although we do not have enough precision for strong inferences, the behavior of the slopes for positive and negative accruals is interesting. The average slopes for $+AC_t/B_t$ in the one- and two-year profitability regressions of Table 2 are more negative than for $-AC_t/B_t$, but the slope for $+AC_t/B_t$ tends to become less negative for longer horizons, and the coefficient for $-AC_t/B_t$ becomes more negative. As a result, the slopes for positive and negative accruals are about equal in the three-year regressions, around -0.06. The behavior of the slopes suggests that the partial reversal of positive accruals in reported earnings occurs faster, but positive and negative accruals have comparable long-run transitory effects on earnings. The size of the reversals, however, does not seem large. The point estimates of the accruals slopes are around -0.06 at the three-year horizon, suggesting that only about six percent of accruals are reversed in subsequent reported earnings. And our estimates are similar to those in previous work.

The profitability and growth regressions differ in an interesting way. Growth is predictable at least three years ahead, but the evidence that changes in earnings are predictable beyond a year is weaker. Thus, in the growth regressions, the average slopes for variables that have forecast power almost always move further from zero when the forecast horizon is extended from one to two and then to three years. As a result, despite the increase in variance that occurs when the horizon for asset growth is extended, the average regression R^2 in Table 2 increase a bit with the forecast horizon, rising from 0.16 in the full regressions for one-year growth rates to 0.19 for second and third year growth rates. In the profitability regressions, some slopes move further from zero as the horizon is increased, but less consistently than in the growth regressions. As result, the average R^2 in the full regressions to explain profitability falls from a rather impressive 0.38 for forecasts one year ahead to 0.18 for three-year forecasts.

Still, the average slopes for variables with explanatory power in the full profitability regressions are either further from zero or do not change much as the forecast horizon is extended. This is important since it says that the variables pick up permanent components of expected earnings that should be more important in identifying the differences in expected returns predicted by the valuation equation (3).

In sum, irrespective of how the fitted values perform as proxies for expected profitability and growth in the return tests presented next, the cross-section regressions to forecast profitability and growth are informative. Thus, many variables help predict profitability and growth. In the profitability regressions, lagged profitability, analyst forecasts, the book-to-market ratio, size, growth, accruals, not paying dividends, last year's stock return, and the PT_t measure of firm strength have forecast power. In the growth regressions, the book-to-market ratio, the ratio of dividends to book equity, the level of positive accruals relative to book equity, profitability, prior returns, and the OH_t measure of firm strength show forecast power. And except for the negative slopes on lagged growth in the profitability regressions, the slopes conform to intuition about how different variables relate to future profitability and growth.

II. Expected Returns: Cross-Section Regressions

We test for the profitability and growth effects in expected returns predicted by the valuation equation (3) in several steps. We first present cross-section regressions that explain average stock returns with lagged values of size, the book-to-market ratio, growth, profitability, accruals, and the PT_t and OH_t measures of firm strength. The goal is to examine whether the simple proxies for expected profitability and growth (lagged profitability, growth, accruals, PT_t, and OH_t) add to the explanation of average returns provided by size and B_t/M_t. We then use more complicated proxies for expected profitability and growth – the fitted values from the regressions of Table 2 – to test for profitability and growth effects in average returns. The last steps test whether the profitability and growth effects identified in the cross-section regressions are pervasive across portfolios formed on size and book-to-market equity, and whether these portfolio level returns are captured by the three-factor model of Fama and French (1993).

We estimate cross-section return regressions monthly, beginning in July 1963, with the explanatory variables updated each July. To ensure that the explanatory variables are known at the beginning of the month of the dependent returns, the accounting variables in the regressions are for fiscal years that end in the calendar year preceding the July when they are first used. Thus, we use data from fiscal yearends between January and December of year t to forecast monthly returns from July of t+1 to June of t+2. As in Fama and French (1992), market equity for the size variable is measured at the end of June of t+1, and market equity in the book-to-market ratio is for the end of December of t. To reduce the impact of outliers, we winsorize the independent variables at the 0.5 percent level when computing expected profitability and growth from the first pass regressions and when computing the return regressions. Thus, extreme values are shrunk to the 0.5 and 99.5 percentiles for year t. (Recall that we delete a firm from the profitability and growth regressions if an explanatory variable is outside the 0.5 or 99.5 percentile for that variable in year t.)

A. Baseline Tests

Confirming previous evidence, Table 3 shows that when size and the book-to-market ratio are used alone to explain returns, there is a strong positive relation between average return and B_t/M_t. The t-statistic for the average B_t/M_t slope is near three standard errors from zero. Thus, high book-to-market (value) firms have higher average returns than low book-to-market (growth) firms. As in previous work, small market cap firms have higher average returns than big firms, but the negative average size slope is only -1.18 standard errors from zero.

More interesting, simple proxies for expected profitability and growth seem to confirm the positive profitability and negative growth effects in average returns predicted by the valuation equations. When lagged profitability and growth are added to the return regressions that include size and B_t/M_t, there is a strong positive relation between profitability and average return (t = 2.49) and a stronger negative relation between average return and growth (t = -3.98). Moreover, adding lagged profitability and growth to the return regressions has almost no effect on the average slopes for size and book-to-market equity. We can also report that adding lags of profitability and growth, or replacing the first lags with averages of three years of past values does not produce reliable improvements in explanatory power.

In the profitability regressions in Tables 1 and 2 lagged accruals are negatively related to future profitability. In the sub-group regressions in Table 1, which include lagged profitability (Neg Y_t and Y_t/B_t), there is a strong negative relation between positive accruals ($+AC_t/B_t$) and future profitability. The links between negative accruals and future profitability are weaker, apparent only in the multiple regressions of Table 2. Given the evidence that accruals are negatively related to expected profitability, the valuation equation (3) predicts a negative relation between accruals and future returns, which is weaker for negative accruals. This is exactly what we see when we add accruals to the return regressions in Table 3. The coefficient on $+AC_t/B_t$ is negative and 6.75 standard errors below zero. The coefficient on $-AC_t/B_t$ is also negative, but less than one standard error from zero. These results are consistent with earlier evidence (Sloan, 1996, Collins and Hribar, 2000, Chan, Chan, Jegadeesh, and Lakonishok, 2001) that accruals predict returns. Our suggested insight is that the relation between accruals and expected returns is in line with the predictions of the valuation equation (3). In particular, (3) says that expected returns are positively related to expected profitability, and, like much previous work, we find that accruals are negatively related to expected profitability and expected returns.

Some of the information in positive accruals about future returns is related to information in lagged growth. The average correlation between $+AC_t/B_t$ and dA_t/A_t is 0.29, and adding accruals to the return regressions cuts the average slope on lagged growth in half, from -0.42 (t = -3.98) to -0.21 (t = -2.10). On the other hand, adding accruals increases the slope on lagged profitability, from 1.09 (t = 2.49) to 1.38 (t = 3.13). All this is in line with previous evidence that the accruals effect in average returns may in part proxy for a growth effect (Fairfield, Whisenant, and Yohn, 2002), and with the evidence that adding accruals helps clean up the information in lagged profitability about future profitability (Sloan, 1996). Again, our insight is that all these results are consistent with the valuation equation (3).

The PT_t and OH_t measures of firm strength are proxies for expected residual income. Thus, the valuation equation (3) implies they are candidates for identifying variation in average returns missed by size and B_t/M_t. Confirming Piotroski (2000) and Griffin and Lemmon (2002), Table 3 shows that PT_t and OH_t have explanatory power (average slopes more than 2.2 standard errors from zero) when added to return regressions that include size and B_t/M_t. Controlling for size and B_t/M_t, stronger firms (higher PT_t) have higher average returns, and firms with higher default probabilities (OH_t) have lower average returns.

Finally, adding lagged profitability, accruals, and growth to the return regressions dampens the average slopes for PT_t and OH_t a bit, from 0.06 to 0.04 (t = 2.44) for PT_t and from -0.04 to -0.03 (t = 1.60) for OH_t (Table 3). Collinearity thus takes its toll, but each of these variables – lagged profitability, growth, accruals, PT_t, and OH_t – seems to capture information about average returns missed by the others. And the information is related to average returns in the way the valuation equation (3) predicts. Inclusion of these variables also enhances the average slopes on size and book-to-market in the return regressions.

B. "Better" Proxies for Expected Profitability and Growth

The valuation equation (3) suggests that profitability, growth, accruals, PT_t, and OH_t predict returns because they have information about expected profitability and growth. If so, the fitted values from the first stage profitability and growth regressions in Table 2, which aggregate the information in these and other variables about expected profitability and growth, should forecast returns at least as well. The monthly return regressions in Table 3 that use the fitted values do not support this conclusion.

When lagged accounting fundamentals (including profitability, growth, and accruals) are used along with size and B_t/M_t to construct proxies for expected profitability and growth, there is a reliably positive relation between expected profitability and average return. The t-statistics for the average slopes on expected profitability in the return regressions are 2.01 (in the regressions that use expected profitability and expected growth one year ahead) and 2.37 (in the regressions that use forecasts two and three years ahead). Moreover, the average slopes on expected profitability, which range from 1.60 to 2.07, are larger than the slopes on lagged profitability, 1.03 to 1.51. Contrary to the predictions of the valuation equation, however, the return regressions of Table 3 produce positive average slopes on the Table 2 regression proxies for expected growth. The positive slopes are inconsistent with the valuation equation, but they are not reliably different from zero.

Table 2 says that adding lagged returns, analyst profitability forecasts, PT_t, and OH_t to the first stage profitability and growth regressions that include size, B_t/M_t, and lagged accounting fundamentals enhances the forecast power of the first stage regressions. But Table 3 says that this enhanced forecast power does not result in stronger evidence of profitability and growth effects in average returns. In fact, when the fitted values from the enhanced profitability and growth regressions are used in the second stage return regressions, the evidence for profitability effects in average returns actually becomes weaker, and there is still no evidence of growth effects.

The failure of the fitted values from the first stage profitability and growth regressions in the second stage return regressions may be caused by collinearity. We use the same explanatory variables in the first stage profitability and growth regressions. Many variables affect the two fitted values in similar ways. The coefficients on B_t/M_t, Neg Y_t, $+AC_t/B_t$, and No D_t are negative in both sets of regressions in Table 2, and the coefficients on Y_t/B_t are positive. As a result, the fitted values from the first stage regressions are highly correlated. For example, the average of the annual correlations between the one-year-ahead fitted values from the comprehensive first pass profitability and growth regressions is 0.76.

The fitted values from the first stage profitability and growth regressions are also correlated with the size and book-to-market variables in the second stage return regressions. B_t/M_t is a powerful explanatory variable in the first stage growth regressions; the correlation between the estimates of expected growth and B_t/M_t ranges from -0.80 to -0.85. Since B_t/M_t is also an explanatory variable in the second stage return regressions, this collinearity may obscure the growth effects in average returns.

Both size and B_t/M_t have strong slopes in the first stage profitability regressions and, as a result, they are correlated with the regression fitted values. The correlation of the estimates of expected profitability with size ranges from 0.45 to 0.49, and the correlation with B_t/M_t is between -0.65 and -0.67. These links are not as tight as those between B_t/M_t and the estimates of expected growth, but they do make it harder to identify the marginal relation between expected profitability and expected return in the second stage return regressions.

The return regressions in Table 3 provide modest support for this collinearity story. In particular, the average slopes on the fitted values from the first stage profitability regressions tend to be as large or larger than the slopes for lagged profitability. But the t-statistics are smaller when we use the fitted values because the standard errors of the estimates are larger – a symptom of collinearity.

A cynic might counter that the fitted values from the first stage profitability regressions show some power to forecast returns because they are correlated with lagged profitability, not because they are good proxies for expected profitability. Lagged profitability dominates the first stage profitability regressions; its correlation with the fitted values for expected profitability is about 0.95 in the regressions that use size, B_t/M_t and accounting fundamentals to forecast profitability. Thus, it is almost impossible to distinguish between lagged profitability and the fitted values from these profitability regressions in the second stage return regressions. The correlation falls to about 0.85 in the profitability regressions that add lagged returns, analyst forecasts, PT_t, and OH_t. Perhaps this lower correlation with lagged profitability explains why the fitted values from these comprehensive first stage regressions produce weaker profitability effects in the second stage return regressions. In the same spirit, perhaps the fitted values from the first stage growth regressions produce little evidence of growth effects in the second stage return regressions because lagged growth has only a minor role in the first stage growth regressions, and it is lagged growth, not expected growth, which is related to expected returns. The returns for portfolios formed on the fitted values from the second stage return regressions, examined next, provide more perspective on the marginal information in our proxies for expected growth and profitability.

III. Expected Returns: Portfolio Tests

Cross-section return regressions for individual firms may be subject to influential observation problems. To check that the profitability and growth effects in average returns observed in the regressions are pervasive, the next step is to examine whether they show up in a general way in portfolios formed on size and book-to-market equity. We examine portfolios formed on size and B_t/M_t since the regressions basically test for variation in expected returns related to expected profitability and growth that is not explained by size and B_t/M_t.

The size-B_t/M_t portfolios are those used in the construction of the SMB (small minus big market cap) and HML (high minus low B_t/M_t) returns of the three-factor model of Fama and French (1993). In June of each year beginning in 1963, the NYSE, AMEX, and Nasdaq firms in our sample are allocated to two size groups, small (S) and big (B), according to whether their market cap is below or above the NYSE median. Firms are also allocated to three book-to-market groups depending on whether their B_t/M_t

is in the bottom 30% (L), middle 40% (M), or top 30% (H) of B_t/M_t for NYSE firms. Intersecting the size and B_t/M_t groups produces six portfolios, SL, SM, SH, BL, BM, and BH.

Each month, we compute predicted returns on individual stocks using the average monthly slopes for the full sample period from the return regressions in Table 3. We then allocate the stocks in each of the six size-B_t/M_t groups to high and low expected return portfolios based on whether their predicted returns (fitted values) for the month are above or below their group's median. For each return regression in Table 3 and for each of the six size-B_t/M_t groups, Table 4 shows the difference between average value-weight predicted high and low returns and the difference between average value-weight actual high and low returns. Simple averages of the value-weight return spreads across the six portfolios are also shown. Comparing the average actual return spreads with the predicted spreads for the six size-B_t/M_t groups provides perspective on which groups deliver the variation in average returns predicted by the regressions. This, in turn, provides information about whether the regressions are well-specified in different size-B_t/M_t groups

The first stage profitability and growth regressions of Table 2 examine forecast horizons of one, two, and three years. Table 3 uses these forecasts in three separate sets of regressions to explain the cross-section of returns. We have estimated the high minus low return spreads in Table 4 using the Table 3 regressions for each of the three forecast horizons. The results for different forecast horizons are near identical. To save space, Table 4 shows only the predicted and actual return spreads based on the Table 3 return regressions that use forecasts of profitability and growth one year ahead.

Since all the cross-section return regressions include size and B_t/M_t as explanatory variables, it is useful to know how much of the return spreads observed within the size-B_t/M_t groups is due to these two variables, rather than to proxies for expected profitability and growth. The high minus low return spreads from the return regressions that use only size and B_t/M_t as explanatory variables provide this baseline information. There is substantial within-group variation in average predicted and actual returns related to size and B_t/M_t. The average across the six groups of the spread in fitted values within groups is 0.18% per month; the average spread in actual returns is 0.17% (t = 3.04).

More interesting, adding lagged profitability and growth to the return regressions increases predicted and actual high minus low returns. The average of the predicted return spreads for the six size-B_t/M_t groups jumps nine basis points, from 0.18% to 0.27% per month; the average actual spread rises from 0.17% to 0.27% (t = 4.74). Adding positive and negative accruals relative to book equity increases the average predicted return spread by an additional six basis points, to 0.33% per month; the average actual return spread is 0.34% (t = 6.32). If we use just PT_t and OH_t with size and B_t/M_t in the return regressions, the average predicted and actual return spreads, 0.26% and 0.25% per month, are close to the spreads using lagged profitability and growth but below the spreads obtained when accruals are also in the return regressions. Thus, lagged profitability, growth, and accruals seem to have more information about average returns than the combination of PT_t and OH_t. Including all eight variables (lagged size, B_t/M_t, profitability, growth, positive and negative accruals, PT_t, and OH_t) produces average predicted and actual high minus low return spreads within one basis point of those obtained without PT_t and OH_t. This result is surprising given that OH_t and especially PT_t show marginal explanatory power in the return regressions (Table 3) that include all explanatory variables. It suggests that the apparent explanatory power of PT_t and OH_t in the full return regressions may be due in part to a few influential observations.

In the return regressions of Table 3, the fitted values from the regressions to explain profitability and growth in Table 2 do not fare as well as the simple proxies for expected profitability and growth provided by lagged profitability, growth, and accruals, or the composite proxies PT_t and OH_t. We speculated that the problem may be collinearity: the fitted values from the Table 2 profitability and growth regressions are highly correlated with each other and with size and B_t/M_t. Since collinearity is not a problem for regression forecasts of returns, there is reason to hope that the fitted values from the profitability and growth regressions identify substantial variation in average predicted and actual returns.

The hope is not realized. Table 4 says that, used with size and B_t/M_t as explanatory variables in the return regressions of Table 3, the fitted values from two sets of profitability and growth regressions in Table 2 do not produce spreads in high minus low average predicted and actual returns as large as those produced by lagged profitability and growth (even without accruals) or by PT_t and OH_t. Most disappointing, the profitability and growth regressions that use the full set of apparently important explanatory variables add little to the average predicted and actual high minus low returns produced by the baseline return regressions that use just size and B_t/M_t as explanatory variables.

When the spreads between average actual high and low returns are averaged across the six size-B_t/M_t groups they are close to the corresponding average predicted spreads from the cross-section return regressions. This is not surprising since the average residuals in the return regressions are zero month by month. (Differences arise because the equal-weight average of a regression's residuals is zero, but we value weight within the size-B_t/M_t groups in Table 4.) Examining the differences between average predicted and actual return spreads for the six groups separately, however, provides interesting information about how the explanatory power of the return regressions shows up in different size-B_t/M_t groups. We concentrate on the return spreads produced by the variables that provide the most action – size, B_t/M_t, lagged profitability, growth, accruals, PT_t, and OH_t.

The baseline again is the return regression with only size and B_t/M_t as explanatory variables. Within each of the six size-B_t/M_t groups there is variation in size and B_t/M_t which produces rather large spreads (from 0.10 to 0.28% per month) in predicted high minus low average returns. But the two groups with the largest predicted spreads, BL (big growth, 0.28% per month) and SH (small value, 0.20% per month), produce two of the three smallest spreads in actual average returns (0.10% and 0.02%) per month. Thus, the substantial variation in size and B_t/M_t within the large growth and small value groups shows up only weakly in average returns. On the other hand, three groups, BM (big neutral), BH (big value), and especially SL (small growth), produce within-group spreads in average high minus low returns related to size and B_t/M_t in excess of predicted spreads. Most impressive, the average return spread for SL, 0.34% per month ($t = 3.41$), is near twice the spread predicted by the within-group variation in size and B_t/M_t, 0.18%.

Adding lagged profitability and growth to return regressions that also include size and B_t/M_t as explanatory variables creates more uniform average return spreads for the six size-B_t/M_t groups, and the actual return spread for every group moves closer to its predicted spread. Moreover, with lagged profitability and growth in the return regressions, only the smallest average return spread, 0.17% per month (t = 1.38), is less than 2.1 standard errors from zero. The correspondence between average predicted and actual return spreads suggests that the regressions that predict returns with lagged size, B_t/M_t, profitability, and growth are well-specified; they identify patterns in average returns that show up as expected within the six size-B_t/M_t groups.

Adding accruals to the return regressions that also include size, B_t/M_t, and lagged profitability and growth as explanatory variables increases the predicted high minus low return spreads for the six size-B_t/M_t groups by between 0.03% and 0.09% per month. The spread in actual average returns falls slightly for the SM (small neutral) group (from 0.23% to 0.20% per month), but the spreads increase for the remaining five groups. The increases are modest, except (again) for the small growth group (SL), where adding accruals to the return regressions causes the actual average high minus low return spread to rise from an already impressive 0.49% per month (t = 3.78) to 0.76% (t = 5.72). This is far larger than the predicted increase, from 0.41% to 0.46%. Thus, although adding accruals to the explanatory variables in the return regressions does produce small increases in average high minus low returns for most groups, much of the information about future returns in accruals seems to be concentrated among small growth stocks.

As noted earlier, adding PT_t and OH_t to return regressions that include size, B_t/M_t, profitability, growth, and accruals as explanatory variables has almost no effect on predicted and actual return spreads, averaged across the six size-B_t/M_t groups. At the group level, however, there is a hint that adding PT_t and OH_t causes the return regression to be mis-specified. Without PT_t and OH_t, and except for SL, the average predicted high minus low return spreads for the six groups line up fairly well with average actual spreads. When PT_t and OH_t are added, there is little change in predicted spreads for the six groups, but actual spreads change more, declining noticeably for BM (big neutral) and BH (big value) but increasing a lot for SM (small neutral) and (yet again) for SL (small growth). Thus, the combination of PT_t and OH_t may have marginal expected return information for small neutral and small growth stocks, but PT_t and

OH_t seem to obfuscate the information in other variables about expected returns for big neutral and big value stocks.

In sum, the combination of lagged profitability, growth, and accruals adds a lot to the information about average returns in size and B_t/M_t. When we use all these variables in the return regressions, the average of the actual high minus low return spreads for the six size-B_t/M_t groups, 0.34% per month (t = 6.32), is twice the average from the regressions that use size and B_t/M_t alone, 0.17%. And the individual average return spreads for the six groups line up fairly well with the predicted spreads. Adding PT_t and OH_t to the return regressions does not add much to average high minus low return spreads, except perhaps for the small growth and small neutral groups, and it may produce a mis-specified return regression.

Average returns on small growth stocks (SL) are hypersensitive to some of the explanatory variables in the return regressions. When size and B_t/M_t are used alone to explain returns, the spread in average actual high minus low returns for the SL group, 0.34% per month (t = 3.41), is near twice the predicted spread, 0.18%. Adding accruals to return regressions that include size, B_t/M_t, profitability, and growth increases the actual average return spread for SL, from 0.49% to an impressive 0.76% per month (t = 5.72), far in excess of the predicted increase, from 0.41% to 0.46%. Apparently there is substantial independent variation in size, B_t/M_t, and accruals among small growth stocks, and it shows up more strongly in average returns than predicted by the slopes from return regressions estimated on all stocks.

Fama and French (1993) find that small growth stocks are a big problem for their three-factor asset pricing model, and Mitchell and Stafford (2000) find that small growth stocks are influential in many high profile event study anomalies. The evidence presented here suggests that small growth stocks are also influential in the accruals anomaly, discovered by Sloan (1996), which is of great interest in the accounting literature.

V. Three-Factor Regressions

Are the high minus low average returns discussed above captured by the three-factor model of Fama and French (1993)? Table 4 shows intercepts and slopes from the times-series regressions,

(3) $$R_{hit} - R_{lit} = a_i + b_i(R_{Mt} - R_{ft}) + s_i SMB_t + h_i HML_t + e_t, \qquad i = 1,\ldots,6,$$

where R_{hit} - R_{lit} is the high minus low return spread for portfolio i for month t, and R_{Mt} - R_{ft} (excess market return), SMB_t, and HML_t are the market, size, and book-to-market factors of the three-factor model. If the model explains the average return spreads, the intercepts in (3) will be indistinguishable from zero.

When size and B_t/M_t are the only variables used to construct the spread portfolios, the three-factor model does a fairly good job explaining high minus low average returns. Two of the three-factor intercepts (SL and BL, small and big growth) for the six portfolios are rather far from zero, and the F-test of Gibbons, Ross, and Shanken (GRS 1982) rejects the hypothesis that the intercepts are all zero at the 0.0471 probability level. But the average intercept for the six portfolios is 0.00% (t = 0.06). The relative success of the three-factor model here is not surprising since the model is designed to capture size and book-to-market effects in average returns.

The three-factor model has less success when the variables used to construct the spread portfolios are expanded to include lagged profitability and growth. The model reduces the average of the high minus low return spreads for the six size-B_t/M_t groups, 0.27% per month, to an intercept of 0.11%. But this decline of 0.16% is close to that observed when size and B_t/M_t are the only variables used to form the spreads. Thus, the three-factor regressions simply seem to pick up the effects of variation in size and B_t/M_t within the six groups. We infer that the average intercept observed when size, B_t/M_t, profitability, and growth are used to form the spreads, 0.11% per month (t = 2.63), is a clean summary of profitability and growth effects in average returns left rather completely unexplained by the three-factor model. And for these regressions, the GRS test rejects the zero intercepts hypothesis at the 0.0004 probability level.

Adding accruals to the cross-section return regressions used to allocate stocks to high and low predicted return groups creates further problems for the three-factor model. The average intercept for the six size-B_t/M_t groups rises from 0.11% (t = 2.63) to 0.22% (t = 5.00), and the GRS test rejects at a probability level that is zero up to five decimal places. The stronger rejection of the model occurs in part because of the larger average return spreads observed when accruals are added to the list of predictive variables, and in part because the three-factor regression slopes for the spreads actually tend to be lower than when accruals are not used. And as in the average high minus low return spreads themselves, adding PT_t and OH_t to the list of variables (size, B_t/M_t, profitability, growth, and accruals) used to allocate stocks to high and low predicted return groups does little additional damage to the three-factor model.

In sum, adding simple proxies for expected profitability and growth to the cross-section return regressions leads to high minus low return spreads for the six size-B_t/M_t groups that pose serious problems for the three-factor model. It is pertinent to note, however, that the deficiencies of the three-factor model are largely concentrated among small stocks, especially (again) small growth stocks. Small growth stocks (SL) are a problem even when size and B_t/M_t are the only variables used to predict returns, they become a more serious problem when lagged profitability and growth are added to the predictors, and they are a monumental problem when accruals are also used to separate stocks into high and low predicted return groups (an intercept of 0.70% per month, t = 7.10). The return spread for small neutral stocks (SM) is a problem for the three-factor model when either lagged profitability and growth or PT_t and OH_t are included in the cross-section regressions used to predict returns. The three-factor model also struggles with small value firms (SH), especially when the forecasting variables include accruals.

VI. Discussion and Conclusions

The valuation equation (3) says that controlling for book-to-market equity, firms with higher expected residual income have higher expected stock returns. Equation (3) also predicts that (i) given B/M and expected growth, firms with higher expected profitability have higher expected returns, and (ii) given B/M and expected profitability, firms with faster expected growth have lower expected returns.

Our evidence tends to confirm these predictions, but leaves an open puzzle. Our cross-section regressions say that the Piotroski (2000) and Ohlson (1980) measures of firm strength, which are proxies for expected residual income, are related to average returns in the manner predicted by (3). The regressions also say that lagged profitability, growth, and accruals, used as simple proxies for expected profitability and growth, are related to average returns in the manner predicted by (3).

Our puzzle is in the results obtained when the fitted values from the cross-section regressions to forecast profitability and growth are used as proxies for expected profitability and growth in the cross-section return regressions. Many variables contribute to the regression forecasts of profitability and growth. Thus, there seems to be much information about expected profitability and growth beyond that in their lagged values. Better proxies for expected profitability and growth should do a better job identifying the profitability and growth effects in average returns predicted by the valuation equations. But this is not what we seem to observe. The fitted values from the profitability regressions do identify profitability effects in average returns, but they are not as strong as those associated with lagged profitability and accruals. And there is a suspicion that the enhanced proxies for expected profitability work only because they are highly correlated with lagged profitability. The enhanced proxies for expected growth, which are not highly correlated with lagged growth, do not identify growth effects in average returns.

Do apparently better proxies for rational forecasts of profitability and growth fail because pricing is irrational, based on bad forecasts of profitability and growth? No. The arguments of Campbell and Shiller (1988) imply that, whether or not pricing is rational, the valuation equation (3) is a tautology when the expected values of profitability, growth, and returns it contains are rational. If pricing is based on irrational forecasts of profitability and growth, this affects expected returns in (3) via the book-to-market ratio. Whether differences in B_t/M_t are caused by differences in risk or mispricing, any variation in long-term average expected returns not explained by book-to-market ratios must be related to variation in rational forecasts of profitability and growth in the manner predicted by (3). Moreover, data on returns, profitability, and growth are from the true distributions of the variables, so means (conditional or unconditional) estimated from them are estimates of rationally assessed expected values. Thus, our forecasts of profitability, growth, and returns are rational.

The valuation equations do not imply that there must be variation in expected returns independent of size and B_t/M_t. Suppose differences in expected returns are perfectly explained by size and B_t/M_t. Then the best possible forecasts of Ohlson's (1995) expected residual income must be perfectly correlated with linear combinations of size and B_t/M_t, so there are no profitability and growth effects in expected returns left unexplained by size and B_t/M_t. Since the proxies for expected growth from the cross-section growth regressions are highly correlated with B_t/M_t, this story may explain why the proxies do not identify growth effects in average returns. The proxies for expected profitability from the cross-section profitability regressions are less correlated with size and B_t/M_t, which may explain why they show up more strongly in the return tests.

Another possible problem in our search for profitability and growth effects in average returns is an oversimplified implementation of the valuation equation. It calls for the expected values of all future residual incomes, but our tests relate returns to forecasts of residual income (profitability and growth) for a single year (one, two, or three years ahead). We doubt that this story explains our results, for three reasons. First, forecasts of profitability or growth (or at least our regression forecasts) one year ahead are highly correlated (0.99 or greater) with forecasts two and three years ahead, and using forecasts for one, two, or three years ahead produces similar results in all our return tests. Second, changes in profitability beyond a year ahead seem essentially unpredictable. Third, Frankel and Lee (1998) and Dechow, Hutton, and Sloan (2000) forecast stock returns with composite variables (estimates of residual income) that include forecasts of profitability and growth up to three years ahead, with not much success (no evidence of return effects in the first two years following the forecasts).

Some of the failure of apparently better proxies for expected profitability and growth in the return regressions may be explained by another oversimplification. Although we have been calling it "the" expected return, the discount rate r in the valuation equation (3) is an internal rate of return – a weighted average of a term structure of expected returns. The return regressions focus on short horizon returns, one to twelve months ahead. This is not a problem if expected returns are persistent, so short-term expected returns are positively correlated with long-term expected returns. But it is possible that variation in expected returns related to expected profitability and growth does not show up in short-term expected returns. It seems unlikely, however, that near-term forecasts of profitability and growth are related to long-term but not near-term expected stock returns.

Another possibility is that the explanatory power of many variables in the profitability and growth regressions is an illusion, perhaps the result of data dredging for "better" models. In other words, variables other than lagged profitability, growth, and accruals just add noise to the estimates of expected profitability and growth that obscures profitability and growth effects in average returns. But we have not done much searching over models for expected profitability and growth; the regressions in Tables 1 and 2 pretty much cover what we have examined. And the explanatory power of variables beyond lagged profitability, growth, and accruals is substantial, especially in the growth regressions, where in competition with other variables, lagged growth loses most of its explanatory power and is not highly correlated with the regression estimates of expected growth. The hypothesis that lagged profitability is a good proxy for expected profitability has more merit, however, since estimates of expected profitability from the cross-section profitability regressions are highly correlated with lagged profitability.

Though we do not think our profitability (or growth) regressions are subject to a data dredging problem, the average slopes for most explanatory variables have large standard errors, so there is a substantial measurement error problem when the regression fitted values are used as explanatory variables in the cross-section return regressions. This measurement error problem is compounded by any variation through time in the underlying true regression slopes. Thus, perhaps lagged profitability and accruals (entered into the return regressions with unconstrained slopes) provide a better proxy for expected profitability than the fitted values from our profitability regressions.

We also suggest that lagged growth may show up in our return regressions with a reliably negative average slope because of the information in growth about future profitability, rather than because of its information about expected growth. Recall (Table 1) that growth is much less autocorrelated than profitability, and lagged growth is not much information about expected growth. Moreover, in the multiple regressions to forecast profitability (Table 2, where accruals and especially lagged profitability have powerful roles), higher current growth is associated with lower future profitability. This is consistent with lower expected returns for faster growing firms, especially when the return regressions also control for lagged profitability and accruals.

We lean toward the conclusion that the explanatory power of lagged profitability, growth, and accruals in the return tests is due to the profitability effects predicted by the valuation equation (3). Our regression attempts to produce better proxies for expected profitability do succeed in identifying variables beyond lagged profitability, growth, and accruals that are reliably related to expected profitability. But the regression fitted values have so much measurement error they perform no better in identifying profitability effects in average returns than lagged profitability, growth, and accruals. The fitted values from the growth regressions also flounder on the measurement error problem. And the high correlation between estimates of expected growth and the book-to-market ratio suggests that there may not be large growth effects in expected returns independent of B_t/M_t. We recognize, however, that these inferences are subject to substantial uncertainty.

Appendix: Data

The base accounting variables, from Compustat, are: A_t, total assets (Compustat data item 6); Y_t, income before extraordinary items (18); AC_t, accruals (the change in (i) current assets (4), minus (ii) cash and short term investments (1), minus (iii) current liabilities (5), plus (iv) debt in current liabilities (34)); D_t, total dividends, (dividends per share by ex date (26) times common shares outstanding (25)); and B_t, book equity (total assets (6), minus liabilities (181), plus balance sheet deferred taxes and investment tax credit (35) if available, minus preferred stock liquidating value (10) if available, or redemption value (56) if available, or carrying value (130)). The accounting variables for year t are measured at the fiscal year end that falls in calendar year t. Market equity M_t (price times shares outstanding) is from CRSP (the Center for research in Security Prices).

We compute the book-to-market ratio for year t, B_t/M_t, as book equity for the fiscal year end in calendar year t divided by market equity at the end of December of t. The market equity variable, $\ln M_t$, used to measure size in the profitability and growth regressions of Tables 1 and 2, is measured at the fiscal year end. The market equity variable, $\ln M_{t+1}$, used to measure size in the Table 3 return regressions for July of t+1 to June of t+2 and when assigning firms to the six size-B_t/M_t portfolios at the end of June of t+1 in Table 4 is for the end of June of t+1.

We compute two summary measures of firm strength. The first, OH_t, is a measure of bankruptcy risk developed by Ohlson (1980). Ignoring the constant, OH_t is defined as:

$$OH_t = -4.07 \ln A_t + 6.03\, L_t/A_t - 1.43\, (CA_t - CL_t)/A_t + 0.0757\, CL_t/CA_t - 2.37\, NI_t/A_t$$
$$+ 0.285\, Loss_t - 1.72\, NegBook_t - 0.521\, \Delta NI_t - 1.83\, Op_t/L_t,$$

where $\ln A_t$ is the natural log of assets; L_t is liabilities (Compustat item 181); CA_t is current assets (4); CL_t is current liabilities (5); NI_t is net income (172); $Loss_t$ is 1 if net income is negative in t and t-1, and 0 otherwise; $NegBook_t$ is 1 if liabilities exceed assets and 0 otherwise; ΔNI_t is the change in net income from t-1 to t divided by the sum of the absolute values of net income in t-1 and t, $(NI_t - NI_{t-1})/(|NI_{t-1}| + |NI_t|)$; and Op_t, funds from operations, is earnings before extraordinary items (18), plus income statement deferred taxes (50), if available, plus equity's share of depreciation expense, which we define as $ME_t/(A_t - B_t + ME_t)$ times total depreciation expense (14).

The second composite measure of firm strength, PT_t, is from Piotroski (2000). It is the sum of nine binary variables, each equal to 1 if a given condition holds and 0 otherwise. The nine conditions are: (i) income before extraordinary items, Y_t, is positive; (ii) cashflow from operations, CFO_t, is positive; (iii) the change in the return on assets, defined as income before extraordinary items at year end divided by assets at the beginning of the year, Y_t/B_t, is positive; (iv) cashflow from operations exceeds income before extraordinary items; (v) the change in leverage, defined as long-term debt at fiscal year end (Compustat items 9 and 44) divided by assets at year end, is negative; (vi) the change in liquidity, defined as current assets divided by current liabilities, is positive; (vii) the change in the gross margin ratio, defined as one minus the ratio of the cost of goods sold (41) to sales (12), is positive; (viii) the change in turnover, defined as sales divided by beginning of year assets, is positive; and (ix) the company has a positive cashflow from the sale of common and preferred (108). The changes are measured from year t-1 to t. If the Compustat format code for the statement of cashflows (310) indicates the company does report a statement of cashflows (format code 7), cashflow from operations, CFO_t, is net cash from operating activities (308). If the company reports a statement of working capital (format code 1), CFO_t is funds from operations, Op_t, minus other changes in working capital (236, if available). For other format codes, CFO_t is funds from operations, Op_t, plus other changes in working capital (if available). Since each binary variable is 0 if a condition does not hold, PT_t increases with firm strength.

Analyst earnings forecasts are from Thomson Financial's I/B/E/S database. I_t is the median forecast of earnings per share for fiscal year t+1 that is available at the end of fiscal year t. (Using the forecasts for year t+2 or t+3 does not change the results materially.) I_t/B_t is the median forecast at the end of fiscal year t times the I/B/E/S split factor for that month (to reverse adjustments I/B/E/S makes for stock splits that occur after t) times the shares outstanding at t reported by Compustat (data item 25) divided by book equity for fiscal year t. We do not use an I/B/E/S forecast if the split adjusted version of the stock price reported by I/B/E/S at the end of the fiscal year differs by more than five percent from the price reported by CRSP.

All variables except ln M_t and ln A_t (in OH_t) are on a per share basis. We use CRSP's share factor (FACSHR) for stock splits and stock dividends (distribution codes 5510-5559) to adjust non-synchronous variables, such as Y_{t+1}/B_t and dA_{t+1}/A_t.

To reduce the influence of outliers, we delete a firm from the year t profitability and growth regressions of Tables 1 and 2 if an explanatory variable is outside the 0.5 or 99.5 percentile for that variable in year t. But we do not delete firms with extreme values when computing the fitted values from the profitability and growth regressions for use as explanatory variables in the return regressions of Table 3. Instead, we winsorize the explanatory variables in the profitability and growth regressions at the 0.5 percent level, shrinking extreme values to the 0.5 and 99.5 percentiles for year t. Thus, we delete firms with variables outside the 0.5 and 99.5 percentiles in the estimating the profitability and growth regressions, but we shrink extreme values when estimating expected profitability and growth for the return regressions. Of course, we consider only the upper or lower bound for one-sided variables, such as $+AC_t/B_t$ and $-AC_t/B_t$. We also winsorize other independent variables in the return regressions at the 0.5 and 99.5 percentiles.

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Table 1 - Regressions to predict profitability and growth

The table shows average slopes and their Fama-MacBeth (1973) t-statistics from annual cross-section regressions to predict profitability, $Y_{t+\tau}/B_t$, and growth, $dA_{t+\tau}/A_t = (A_{t+\tau}-A_t)/A_t$, one, two, and three years ahead (τ= 1,2,3). Y_t, D_t, and AC_t are earnings, dividends, and accruals for the fiscal year ending in calendar year t. $-AC_t$ is accruals for firms with negative accruals (zero otherwise) and $+AC_t$ is accruals for firms with positive accruals. B_t, A_t, and M_t are book equity, total assets, and stock market capitalization at the end of fiscal year t. I_t is the I/B/E/S consensus forecast of earnings for the coming year, sampled at the end of fiscal year t. $1Yr_t$ is the stock return for the year up to the end of fiscal year t, and $2\text{-}3Yr_t$ is the two-year return for the years up to the end of fiscal year t-1. OH_t is the probability of default on debt, estimated at the end of fiscal year t, from the logit regression model of Ohlson (1980). PT_t is Piotroski's (2000) composite index of firm strength. Neg Y_t is a dummy variable that is one for firms that have negative earnings for fiscal year t (zero otherwise), and No D_t is a dummy variable that is one for firms that pay no dividends during fiscal year t. The regressions are univariate (dA_t/A_t and I_t/B_t) or they use natural subsets of explanatory variables (ln B_t/M_t and ln M_t, or Neg Y_t, Y_t/B_t, $-AC_t/B_t$, and $+AC_t/B_t$, or No D_t and D_t/B_t, or $1Yr_t$ and $2\text{-}3Yr_t$, or OH_t and PT_t). The time period for the dependent variable in the regressions that forecast profitability and growth one year ahead is 1963-2003, except for the regressions that use I_t/B_t, where the period is 1977-2003, and the regressions that use PT_t, where the time period is 1972-2003.

τ	ln B_t/M_t	ln M_t	Neg Y_t	Y_t/B_t	$-AC_t/B_t$	$+AC_t/B_t$	No D_t	D_t/B_t	dA_t/A_t	$1Yr_t$	$2\text{-}3Yr_t$	OH_t	PT_t	I_t/B_t
Regressions to predict growth, $dA_{t+\tau}/A_t$														
Average slopes														
1	-0.11	-0.72	-0.06	0.59	0.00	0.01	0.02	-0.26	0.16	0.10	0.05	-2.62	1.20	0.66
2	-0.22	-1.74	-0.06	1.24	-0.11	0.01	0.06	-0.51	0.30	0.20	0.09	-4.71	2.12	1.31
3	-0.33	-2.88	-0.03	1.94	-0.09	-0.01	0.09	-0.81	0.44	0.29	0.12	-6.85	2.93	2.01
t-statistics														
1	-16.28	-4.30	-8.24	19.13	-0.01	0.69	2.57	-4.67	12.11	17.25	14.49	-17.52	8.05	9.14
2	-18.58	-6.29	-3.54	20.08	-1.45	0.32	4.35	-4.50	10.56	17.13	13.28	-18.68	10.02	9.61
3	-17.88	-6.57	-1.06	19.24	-1.04	-0.24	5.76	-4.24	10.56	15.33	13.65	-19.96	7.32	10.32
Regressions to predict profitability, $Y_{t+\tau}/B_t$														
Average slopes														
1	-0.08	1.01	-0.07	1.01	-0.02	-0.08	-0.02	1.07	0.09	0.10	0.04	-2.36	2.40	0.99
2	-0.07	0.81	-0.02	0.99	-0.01	-0.09	0.00	1.15	0.08	0.08	0.03	-1.74	1.82	0.94
3	-0.08	0.75	-0.01	1.02	-0.05	-0.07	0.00	1.17	0.08	0.07	0.03	-1.54	1.49	0.97
t-statistics														
1	-11.87	4.51	-6.02	58.54	-1.05	-8.26	-2.09	27.07	6.60	11.71	10.86	-17.90	13.23	34.58
2	-8.04	3.37	-1.79	41.47	-0.60	-6.75	-0.32	23.76	4.88	9.38	9.81	-17.61	12.59	26.56
3	-6.61	2.65	-0.47	34.31	-3.11	-4.18	0.48	20.83	4.05	9.08	5.01	-10.51	10.56	19.85

Table 2 - Multiple regressions to predict profitability and growth

The table shows average slopes and their Fama-MacBeth (1973) t-statistics from annual cross-section regressions to predict profitability, $Y_{t+\tau}/B_t$, and growth, $dA_{t+\tau}/A_t = (A_{t+\tau}-A_t)/A_t$, one, two, and three years ahead (τ= 1,2,3). Y_t, D_t, and AC_t are earnings, dividends, and accruals for the fiscal year ending in calendar year t. $-AC_t$ is accruals for firms with negative accruals (zero otherwise) and $+AC_t$ is accruals for firms with positive accruals. B_t, A_t, and M_t are book equity, total assets, and stock market capitalization at the end of fiscal year t. I_t is the I/B/E/S consensus forecast of earnings for the coming year, sampled at the end of fiscal year t. $1Yr_t$ is the stock return for the year up to the end of fiscal year t, and and $2\text{-}3Yr_t$ is the two-year return for the years up to the end of fiscal year t-1. OH_t is the probability of default on debt, estimated at the end of fiscal year t, from the probit regression model of Ohlson (1980). PT_t is Piotroski's (2000) composite index of firm strength. Neg Y_t is a dummy variable that is one for firms that have negative earnings for fiscal year t (zero otherwise), and No D_t is a dummy variable that is one for firms that pay no dividends during fiscal year t. Firms is the average number of firms in the regressions. The time period for the dependent variable in the regressions that forecast profitability and growth one year ahead is 1963-2003, except for the regressions that use I_t/B_t, where the period is 1977-2003, and the regressions that use PT_t, where the time period is 1972-2003.

τ	Firms	Int	ln B_t/M_t	ln M_t	Neg Y_t	Y_t/B_t	$-AC_t/B_t$	$+AC_t/B_t$	dA_t/A_t	No D_t	D_t/B_t	$1Yr_t$	$2\text{-}3Yr_t$	OH_t	PT_t	I_t/B_t	R^2
Regressions to predict growth, $dA_{t+\tau}/A_t$																	
Average slopes																	
1	1931	1.13	-0.10	-0.53	-0.09	0.20	0.03	-0.09	0.05	-0.01	-1.14						0.12
2	1784	1.26	-0.19	-1.20	-0.14	0.46	-0.04	-0.21	0.10	-0.02	-2.19						0.15
3	1646	1.40	-0.28	-1.95	-0.14	0.79	0.03	-0.35	0.12	-0.03	-3.30						0.16
t-statistics																	
1		131.46	-12.93	-3.25	-13.55	4.51	1.02	-5.73	6.82	-2.56	-14.26						
2		69.97	-15.98	-4.42	-6.49	5.66	-0.46	-8.58	5.80	-2.62	-15.09						
3		47.87	-16.46	-5.23	-4.14	6.91	0.35	-9.42	5.46	-2.76	-14.25						
Average slopes																	
1	1401	1.08	-0.08	-0.26	-0.06	0.12	0.06	-0.09	0.00	-0.02	-1.08	0.04	0.02	-1.10	-0.01	0.10	0.16
2	1301	1.15	-0.16	-0.80	-0.09	0.25	0.02	-0.16	0.00	-0.04	-2.05	0.07	0.04	-2.25	0.26	0.14	0.19
3	1207	1.23	-0.26	-1.38	-0.09	0.43	0.09	-0.26	-0.02	-0.05	-3.24	0.13	0.04	-3.13	0.88	0.18	0.19
t-statistics																	
1		50.17	-9.66	-0.67	-10.65	3.54	2.22	-2.80	-0.03	-2.76	-7.52	3.23	6.32	-10.55	-0.11	2.26	
2		29.19	-11.04	-1.40	-7.17	3.37	0.51	-3.45	-0.13	-2.78	-10.63	7.14	4.93	-13.05	1.01	1.48	
3		17.28	-12.72	-1.88	-3.31	2.40	1.17	-3.67	-0.52	-2.54	-10.38	5.59	4.27	-9.75	1.47	1.61	

Table 2 (continued)

τ	Firms	Int	ln B_t/M_t	ln M_t	Neg Y_t	Y_t/B_t	$-AC_t/B_t$	$+AC_t/B_t$	dA_t/A_t	No D_t	D_t/B_t	$1Yr_t$	$2\text{-}3Yr_t$	OH_t	PT_t	I_t/B_t	R^2
Regressions to predict profitability, $Y_{t+\tau}/B_t$																	
Average slopes																	
1	1931	0.03	-0.04	-0.02	-0.07	0.79	-0.03	-0.07	-0.01	-0.03	0.02						0.39
2	1784	0.04	-0.04	-0.05	-0.02	0.71	-0.03	-0.07	-0.02	-0.02	0.12						0.26
3	1646	0.05	-0.04	0.01	-0.01	0.70	-0.07	-0.05	-0.02	-0.02	0.13						0.20
t-statistics																	
1		4.02	-7.97	-0.27	-7.28	34.45	-2.07	-7.82	-1.62	-10.02	0.72						
2		3.60	-5.30	-0.37	-2.61	20.75	-2.14	-5.25	-3.16	-6.13	2.03						
3		3.07	-3.82	0.09	-0.96	14.49	-4.10	-2.62	-3.04	-3.68	1.47						
Average slopes																	
1	1401	-0.04	-0.04	0.20	-0.05	0.46	-0.02	-0.11	-0.02	-0.03	0.06	0.04	0.00	-0.23	0.43	0.37	0.38
2	1301	-0.04	-0.04	0.36	-0.01	0.39	-0.03	-0.09	-0.04	-0.03	0.06	0.02	0.00	-0.14	0.45	0.39	0.24
3	1207	-0.04	-0.04	0.62	-0.01	0.43	-0.06	-0.06	-0.02	-0.03	-0.06	0.00	-0.02	-0.15	0.32	0.50	0.18
t-statistics																	
1		-3.75	-9.19	1.92	-8.62	10.24	-0.99	-10.84	-2.85	-7.99	1.28	5.86	-1.00	-2.82	4.74	7.03	
2		-2.19	-7.39	2.33	-1.63	8.51	-1.11	-3.59	-4.54	-8.22	0.90	2.11	-1.64	-1.20	3.14	9.32	
3		-2.04	-3.70	3.33	-0.80	6.17	-2.32	-2.06	-2.11	-3.63	-0.53	0.10	-1.88	-0.61	2.39	6.77	

Table 3 – Monthly cross-section return regressions

The table shows average slopes and their Fama-MacBeth (1973) t-statistics from monthly cross-section regressions to predict stock returns. Y_t, D_t, and AC_t are earnings, dividends, and accruals for the fiscal year ending in calendar year t. $-AC_t$ is accruals for firms with negative accruals (zero otherwise) and $+AC_t$ is accruals for firms with positive accruals. B_t, A_t, and M_t are book equity, total assets, and stock market capitalization at the end of fiscal year t. I_t is the IBES consensus forecast of earnings for the coming year, sampled at the end of fiscal year t. $1Yr_t$ is the stock return for the year up to the end of fiscal year t, and $2\text{-}3Yr_t$ is the two-year return for the years up to the end of fiscal year t-1. OH_t is the probability of default on debt, estimated at the end of fiscal year t, from the logit regression model of Ohlson (1980). PT_t is Piotroski's (2000) composite index of firm strength. Neg Y_t is a dummy variable that is one for firms that have negative earnings for fiscal year t (zero otherwise), and No D_t is a dummy variable that is one for firms that pay no dividends during fiscal year t. $E(Y_{t+\tau}/B_t)$ and $E(dA_{t+\tau}/A_t)$, expected profitability and growth, are fitted values from the first pass regressions in Table 2 that include (i) lagged fundamentals (ln B_t/M_t, ln M_t, Neg Y_t, Y_t/B_t, $-AC_t/B_t$, $+AC_t/B_t$, dA_t/A_t, No D_t, and D_t/B_t) and (ii) lagged fundamentals, lagged returns, I_t/B_t, OH_t, and PT_t. Firms is the average number of firms in the regressions. The regressions are estimated monthly, beginning in July of 1963, using explanatory variables that are updated at the end of each June. The accounting explanatory variables in the regression for July of year t are for fiscal years ending in calendar year t-1. The size variable, ln M_t, is measured at the end of June of year t, but in B_t/M_t, M_t is measured at the end of December of year t-1. The time period for the dependent returns in the regressions is July 1963 to December 2003, except for the regressions that require I_t/B_t, where the period is July 1977 to December 2003, and the regressions that require PT_t, where the time period is July 1972 to December 2003.

Part A: Regressions use lagged profitability and growth

	Firms	Int	ln B_t/M_t	ln M_t	Neg Y_t	Y_t/B_t	$-AC_t/B_t$	$+AC_t/B_t$	dA_t/A_t	OH_t	PT_t	R^2
Ave slopes	2037	1.64	0.28	-0.06								0.02
t-statistics		3.76	2.86	-1.18								
Ave slopes	2037	1.66	0.27	-0.08	0.01	1.09			-0.42			0.03
t-statistics		4.23	2.60	-1.78	0.06	2.49			-3.98			
Ave slopes	2037	1.81	0.25	-0.10	0.01	1.38	-0.28	-1.44	-0.21			0.04
t-statistics		4.80	2.47	-2.32	0.04	3.13	-0.89	-6.75	-2.10			
Ave slopes	2234	1.35	0.33	-0.07						-0.04	0.06	0.03
t-statistics		2.37	2.89	-1.28						-2.23	2.42	
Ave slopes	2234	1.48	0.33	-0.08	0.13	1.51	-0.12	-1.33	-0.29	-0.03	0.04	0.03
t-statistics		3.31	2.74	-1.69	0.85	3.33	-0.51	-5.32	-2.68	-1.60	2.44	

Table 3 (continued)

Part B: Regressions use expected profitability, $F(Y_{t+\tau}/B_t)$, and growth, $F(dA_{t+\tau}/A_t)$, from first pass regressions

τ	Firms	Int	ln B_t/M_t	ln M_t	$F(dA_{t+\tau}/A_t)$	$F(Y_{t+\tau}/B_t)$	R^2
Expected profitability and growth estimated with lagged fundamentals							
Average slopes							
1	2037	1.62	0.36	-0.08	0.01	1.60	0.03
2	2037	1.12	0.47	-0.08	0.36	2.07	0.03
3	2037	1.01	0.51	-0.07	0.38	2.04	0.03
t-statistics							
1		1.83	3.24	-1.86	0.01	2.01	
2		1.93	3.71	-1.71	0.77	2.37	
3		1.94	3.94	-1.53	1.19	2.37	
Expected profitability and growth estimated with lagged fundamentals, lagged returns, I_t/B_t, OH_t, and PT_t							
Average slopes							
1	1492	2.20	0.18	-0.09	-0.35	1.31	0.04
2	1492	1.76	0.24	-0.10	0.05	1.60	0.04
3	1492	1.59	0.27	-0.09	0.17	1.40	0.03
t-statistics							
1		2.01	1.30	-1.67	-0.31	1.24	
2		2.69	1.56	-1.73	0.10	1.45	
3		2.71	1.78	-1.64	0.53	1.57	

Table 4 – Predicted and actual average high minus low return spreads for six size-B/M groups and three-factor regressions coefficients for the spreads

In June of each year, the NYSE, AMEX, and Nasdaq firms in our sample are allocated to two size groups, small (S) and big (B), according to whether their market cap is below or above the NYSE median. Firms are also allocated to three book-to-market groups depending on whether their B_t/M_t is in the bottom 30% (L), middle 40% (M), or top 30% (H) of B_t/M_t for NYSE firms. Intersecting the size and B_t/M_t groups produces six portfolios, SL, SM, SH, BL, BM, and BH. Each month the fitted values, computed using the average monthly slopes for the full sample period from the return regressions in Table 3, are used to allocate stocks in each of the six size-B_t/M_t groups to high and low predicted return portfolios based on whether their regression fitted values for the month are above or below their group's median. For each return regression in Table 3 and for each of the six size-B_t/M_t groups, the table shows the average predicted and actual differences between the value-weight average high and low returns, and the regression coefficients obtained when the three-factor model (3) is estimated on the return spread for each group. The table also shows time series averages and regression coefficients for simple monthly averages (Ave) of the six value-weight return spreads. GRS is the F-statistic of Gibbons, Ross, and Shanken (1989) testing whether the intercepts for the six portfolio spreads are all zero. The GRS p-value, p(GRS), is the probability of a larger value of GRS if the true values of intercepts in a given set of regressions are all zero.

The explanatory variables in the return regressions (defined in Table 3) used to allocate firms to high and low predicted return portfolios are:

1 $\ln B_t/M_t$, $\ln M_t$
2 $\ln B_t/M_t$, $\ln M_t$, Neg Y_t, Y_t/B_t, dA_t/A_t
3 $\ln B_t/M_t$, $\ln M_t$, Neg Y_t, Y_t/B_t, $-AC_t/B_t$, $+AC_t/B_t$, dA_t/A_t
4 $\ln B_t/M_t$, $\ln M_t$, OH_t, PT_t
5 $\ln B_t/M_t$, $\ln M_t$, Neg Y_t, Y_t/B_t, $-AC_t/B_t$, $+AC_t/B_t$, dA_t/A_t, OH_t, PT_t
6 $\ln B_t/M_t$, $\ln M_t$, $F(Y_{t+1}/B_t)$, $F(dA_{t+1}/A_t)$
7 $\ln B_t/M_t$, $\ln M_t$, $F(Y_{t+1}/B_t)$, $F(dA_{t+1}/A_t)$

Regressions 1-5 use lagged profitability, growth, accruals, OH_t, and PT_t as proxies for expected profitability and growth. Regressions 6 and 7 use $F(Y_{t+1}/B_t)$ and $F(A_{t+1}/A_t)$, the fitted values from the profitability and growth regressions of Table 2 for forecasts 1 year ahead, as proxies for expected profitability and growth. In Regression 6, $F(Y_{t+1}/B_t)$ and $F(A_{t+1}/A_t)$ use $\ln B_t/M_t$, $\ln M_t$, Neg Y_t, Y_t/B_t, $-AC_t/B_t$, $+AC_t/B_t$, dA_t/A_t, No D_t, and D_t/B_t as explanatory variables. Regression 7 adds $1Yr_t$, $2\text{-}3Yr_t$, OH_t, PT_t, and I_t/B_t to the variables used to construct $F(Y_{t+1}/B_t)$ and $F(A_{t+1}/A_t)$. Return spreads computed using regressions 1-3 are for July 1963 to December 2003, the spreads computed using regressions 4 and 5 start in July 1972, and those computed using regressions 6 and 7 start in July 1977.

Average spread in expected returns

	SL	SM	SH	BL	BM	BH	Ave
1	0.18	0.10	0.20	0.28	0.16	0.17	0.18
2	0.41	0.20	0.25	0.32	0.23	0.23	0.27
3	0.46	0.29	0.31	0.36	0.29	0.26	0.33
4	0.32	0.22	0.27	0.33	0.20	0.22	0.26
5	0.50	0.33	0.35	0.35	0.26	0.27	0.34
6	0.27	0.18	0.23	0.31	0.23	0.22	0.24
7	0.20	0.14	0.17	0.24	0.20	0.18	0.19

	Average spread in actual returns							t-statistics for average spread in actual returns						
	SL	SM	SH	BL	BM	BH	Ave	SL	SM	SH	BL	BM	BH	Ave
1	0.34	0.03	0.02	0.10	0.27	0.25	0.17	3.41	0.37	0.19	0.92	2.36	2.12	3.04
2	0.49	0.23	0.19	0.17	0.29	0.24	0.27	3.78	2.80	2.10	1.38	2.67	2.12	4.74
3	0.76	0.20	0.24	0.23	0.32	0.27	0.34	5.72	2.56	3.02	2.06	3.13	2.31	6.32
4	0.53	0.23	0.15	0.11	0.26	0.23	0.25	4.50	3.06	1.71	0.82	2.14	1.72	4.68
5	0.83	0.28	0.24	0.26	0.14	0.22	0.33	5.88	3.27	2.60	1.95	1.29	1.58	5.41
6	0.48	0.07	0.16	0.18	0.28	0.27	0.24	3.04	0.77	1.89	1.45	2.57	2.34	3.63
7	0.41	0.28	0.20	0.21	0.16	0.01	0.21	1.84	2.75	1.63	1.56	1.32	0.03	2.57

Table 4 (continued)

Three-factor intercept for spread in actual returns, a

	SL	SM	SH	BL	BM	BH	Ave
1	0.18	0.03	-0.07	-0.23	0.05	0.07	0.00
2	0.34	0.27	0.11	-0.20	0.05	0.05	0.11
3	0.70	0.24	0.20	-0.07	0.13	0.09	0.22
4	0.38	0.26	0.13	-0.13	0.14	0.20	0.16
5	0.70	0.34	0.23	-0.03	0.01	0.18	0.24
6	0.28	0.03	0.11	-0.19	0.07	0.11	0.07
7	0.28	0.28	0.18	-0.09	0.00	-0.09	0.09

t-statistics for three-factor intercept, a

	SL	SM	SH	BL	BM	BH	Ave	GRS	p(GRS)
1	2.07	0.31	-0.74	-2.59	0.54	0.65	0.06	2.15	0.0471
2	3.42	3.34	1.30	-1.99	0.59	0.44	2.63	4.17	0.0004
3	7.10	3.21	2.55	-0.76	1.48	0.87	5.00	10.75	0.0000
4	3.99	3.54	1.38	-1.08	1.19	1.55	3.34	5.03	0.0001
5	6.68	4.40	2.46	-0.25	0.06	1.25	4.58	10.05	0.0000
6	2.47	0.38	1.28	-1.91	0.71	0.99	1.32	1.97	0.0681
7	1.61	2.78	1.48	-0.75	-0.01	-0.65	1.32	1.83	0.0929

Three-factor market slope for spread in actual returns, b

	SL	SM	SH	BL	BM	BH	Ave
1	-0.05	-0.08	0.02	0.11	0.08	0.12	0.03
2	-0.13	-0.14	-0.02	0.08	0.07	0.12	0.00
3	-0.17	-0.13	-0.04	0.06	0.04	0.11	-0.02
4	-0.07	-0.10	-0.02	0.07	0.03	0.06	0.00
5	-0.16	-0.17	-0.04	0.05	0.01	0.05	-0.04
6	-0.08	-0.09	-0.04	0.09	0.06	0.08	0.01
7	-0.02	-0.07	-0.07	0.08	0.01	0.03	-0.01

t-statistics for three-factor market slope, b

	SL	SM	SH	BL	BM	BH	Ave
1	-2.26	-4.01	0.77	5.25	3.47	4.50	3.92
2	-5.20	-7.48	-0.89	3.25	3.18	4.48	-0.46
3	-7.21	-6.90	-1.92	2.62	1.69	4.18	-2.09
4	-3.09	-5.84	-0.98	2.48	1.17	2.01	-0.35
5	-6.34	-8.98	-1.83	1.59	0.60	1.63	-3.37
6	-2.73	-4.60	-1.72	3.60	2.47	3.09	0.41
7	-0.46	-2.94	-2.17	2.95	0.44	0.70	-0.38

Three-factor SMB slope for spread in actual returns, s

	SL	SM	SH	BL	BM	BH	Ave
1	0.08	0.26	0.20	0.37	0.43	0.31	0.28
2	-0.04	0.17	0.24	0.31	0.44	0.29	0.24
3	-0.17	0.01	0.14	0.26	0.39	0.28	0.15
4	-0.05	0.07	0.01	0.30	0.21	0.16	0.12
5	-0.07	0.03	0.06	0.22	0.26	0.18	0.11
6	-0.19	-0.05	0.06	0.32	0.40	0.25	0.13
7	-0.33	0.06	0.10	0.30	0.32	0.19	0.10

t-statistics for three-factor SMB slope, s

	SL	SM	SH	BL	BM	BH	Ave
1	3.07	9.80	6.77	13.35	14.19	8.90	24.29
2	-1.23	6.85	8.82	9.91	15.98	8.78	18.74
3	-5.44	0.62	5.74	8.65	14.00	8.20	11.28
4	-1.58	3.25	0.31	8.32	5.59	3.96	7.87
5	-2.33	1.37	2.23	5.90	8.19	4.16	7.20
6	-5.38	-1.99	2.27	9.96	13.58	7.18	7.99
7	-5.99	1.90	2.42	8.26	8.74	4.07	4.62

Three-factor HML slope for spread in actual returns, h

	SL	SM	SH	BL	BM	BH	Ave
1	0.38	-0.04	0.07	0.43	0.18	0.12	0.19
2	0.51	-0.02	0.06	0.59	0.23	0.17	0.26
3	0.43	0.03	0.05	0.49	0.18	0.13	0.22
4	0.38	0.01	0.07	0.30	0.13	-0.06	0.14
5	0.43	0.02	0.03	0.47	0.17	-0.02	0.18
6	0.66	0.20	0.12	0.59	0.21	0.14	0.32
7	0.61	0.07	0.10	0.49	0.24	0.12	0.27

t-statistics for three-factor HML slope, h

	SL	SM	SH	BL	BM	BH	Ave
1	12.21	-1.28	2.11	13.43	5.02	2.94	14.38
2	13.92	-0.55	2.05	16.30	7.09	4.28	17.59
3	12.20	0.95	1.58	14.13	5.76	3.20	13.79
4	11.39	0.42	2.12	7.12	3.15	-1.32	8.06
5	11.54	0.66	0.92	11.08	4.64	-0.34	10.03
6	15.70	7.12	3.93	16.04	6.09	3.49	16.75
7	9.27	1.86	2.06	11.45	5.55	2.10	10.05