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Market Reactions to Tangible and Intangible Information

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ABSTRACT

The book-to-market effect is often interpreted as evidence of high expected returns on stocks of "distressed" firms with poor past performance. We dispute this interpretation. We find that while a stock's future return is unrelated to the firm's past accounting-based performance, it is strongly negatively related to the "intangible" return, the component of its past return that is orthogonal to the firm's past performance. Indeed, the book-to-market ratio forecasts returns because it is a good proxy for the intangible return. Also, a composite equity issuance measure, which is related to intangible returns, independently forecasts returns.

DURING THE PAST DECADE, financial economists have puzzled over two related observations. The first is that over long horizons, future stock returns are negatively related to past stock returns. The second is that stock returns are positively related to *price-scaled variables* such as the book-to-market ratio (BM).

Perhaps the most prominent interpretations of these effects are offered by DeBondt and Thaler (1985, 1987), Lakonishok, Shleifer, and Vishny (1994, LSV), and Fama and French (1992, 1993, 1995, and 1997). The DeBondt and Thaler and LSV papers argue that the reversal and book-to-market effects are a result of investor overreaction to past firm performance. Specifically, LSV argue that in forecasting future earnings, investors overextrapolate a firm's past earnings growth, and as a result stock prices of firms with poor past earnings (which tend to have high BM ratios) get pushed down too far. When the actual earnings are realized, prices recover, resulting in high returns for high BM firms. This basic idea is formalized in a paper by Barberis, Shleifer, Vishny (1998, BSV). LSV provide support for this hypothesis by showing that a firm's future returns are negatively related to its past 5-year sales growth.

In contrast, Fama and French argue that, since past performance is likely to be negatively associated with changes in systematic risk, high BM firms are likely to be riskier, and hence require higher expected returns. Specifically,

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they argue that the observed poor past performance of high book-to-market firms means that they are more likely to be distressed, and hence, more likely to be exposed to a priced systematic risk factor. Fama and French measure this risk as the covariance between the stock returns and the return of their HML portfolio, a zero-investment portfolio that consists of long positions in high book-to-market stocks and short positions in low book-to-market stocks.[1]

While these behavioral and risk-based explanations are very different, both are based on the premise that the high returns earned by high BM firms are associated with the deterioration of a firm's economic fundamentals, such as, poor sales and earnings performance. In the DeBondt and Thaler and LSV stories, investors overreact to the information contained in accounting growth rates, and in the Fama and French story, the increased risk and return of high BM firms is a result of the distress brought about by poor past performance.

We argue that neither interpretation provides a complete explanation of the data. In particular, our results indicate that there is no discernable relation between the return on a firm's common stock and its past fundamental performance, where fundamental performance is measured using standard accounting-based measures of growth per share.[2]

To understand how the literature has come to conclude that there is a negative relation between distress and future returns, note first that, indeed, there is a negative correlation between the book-to-market ratio and measured past performance: High BM firms are in fact, generally distressed, as Fama and French (1995) and LSV document. However, the combination of this fact and the fact that high BM firms have high future returns does *not* necessarily imply that distress causes high future returns.

The following book-to-market decomposition helps illustrate this point. In logs, the book-to-market ratio of firm i at time t can be expressed as its book-to-market ratio at time 0, plus its change in book value, minus its change in the market value, that is,

$$\log(B_{i,t}/M_{i,t}) = bm_{i,t} = bm_{i,0} + \Delta b_i - \Delta m_i.$$

Now assume that, at time 0, all firms have the same log book-to-market ratio (bm_0), and that between time 0 and time t, information about earnings arrives. Suppose that some firms receive bad news about the earnings from their ongoing projects, which causes Δb_i to be negative. Assuming that the poor earnings convey sufficiently bad information about the firm's future earnings, the market response to the bad earnings news causes the log share price to fall proportionately more. In other words, $|\Delta m_i| > |\Delta b_i|$, resulting in an overall increase in bm. On the other hand, good news about ongoing projects has the opposite effect: Δb is positive, but Δm is more positive, resulting in a decrease in $bm_{i,t}$. Under

[1] However, Daniel and Titman (1997) point out that the Fama and French empirical results are also consistent with mispricing-based models.

[2] There is, however, some evidence consistent with underreaction to past measured performance at shorter horizons, for example post-earnings announcement drift (see, e.g., Rendleman, Jones, and Latane (1982), Bernard and Thomas (1989)).

this interpretation, low *bm* firms are those that realize higher earnings than high *bm* firms, which is essentially the LSV–BSV and Fama and French interpretation of the evidence. However, this interpretation ignores the possibility that prices can move for reasons that are orthogonal to current performance information. Consider, for example, a firm that receives good news about future growth options; this information will not affect its book value, but its market value will increase in response to the good news, thereby decreasing the firm's *bm*.

As we show, this latter effect is the key to understanding why high BM firms realize high future returns. Specifically, we decompose individual firm returns into two components, one that is associated with past performance, based on a set of accounting performance measures, and one that is orthogonal to past performance. We show that future returns are unrelated to the accounting measures of past performance, which we denote as *tangible information*, but are strongly negatively related to the component of news about future performance, which is unrelated to past performance. We refer to this last component as *intangible information*.

Consistent with this interpretation, the accounting performance (e.g., earnings and book value growth) of many high-tech firms in the late 1990s is consistent with financial distress. However, since other information about these firms' future growth opportunities were viewed very favorably, their market values were high, resulting in extremely low book-to-market ratios. To the extent that the subsequent low returns of high-tech stocks can be characterized as resulting from previous overreaction, the culprit is overreaction to this other intangible information, and not to the tangible accounting information discussed in the above-cited literature.[3]

Figure 1 illustrates our calculation of tangible and intangible returns.[4] Each year, we perform a cross-sectional regression of firms' past 5-year log returns on a variety of fundamental growth measures (unanticipated book-value, earnings, cash flow, and sales growth, or all of these). For a given firm at a given point in time, we calculate $log(\hat{P}_t)$, the firm's expected log price at time t conditional on $log(P_{t-5})$ and on its unanticipated fundamental growth between $t-5$ and t. We define a given firm's tangible return as the fitted component of this cross-sectional regression, illustrated by the dashed line in the figure, and its intangible return as the residual. One can think of the tangible return as the past 5-year stock return that would be expected based solely on the past fundamental-growth measures. The intangible return is then the part of this past return that remains unexplained, and presumably is the result of an investor response to information not contained in the accounting growth measures we use.

[3] What we refer to as tangible and intangible information should not be confused with what accountants refer to as tangible and intangible assets, which refer to assets that cannot be objectively valued.

[4] The assumption here is that the log price-per-share change is equal to the log return. In our empirical tests, we perform these calculations on an adjusted per-share basis, as described in Subsection II.A.1.

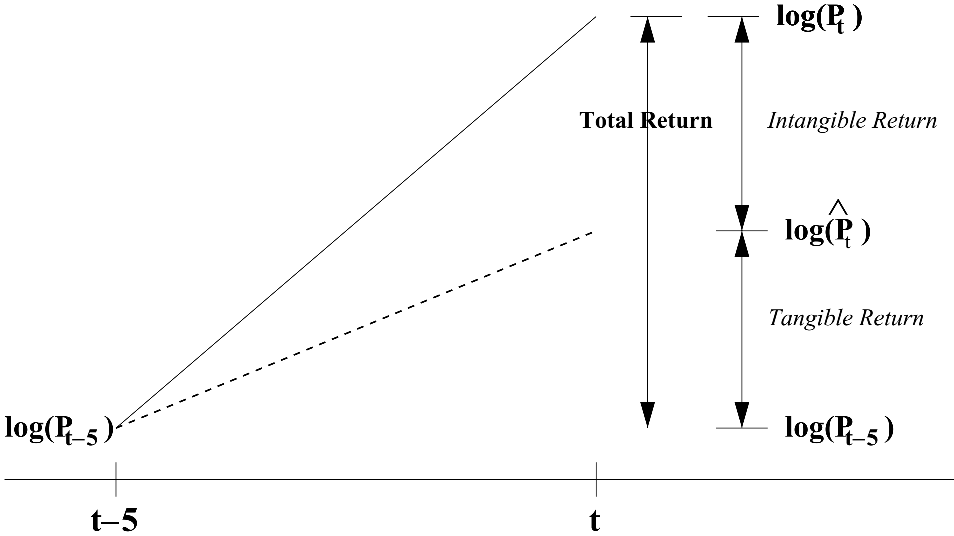

Figure 1. Graphical illustration of the breakdown of a firm's past return into tangible and intangible returns.

Empirically, we find that we can explain a substantial fraction of the cross section of past 5-year returns with accounting growth measured over the same 5-year period. The average R^2s in these cross-sectional regressions range up to 60%, depending on the fundamental performance measures we use. This is not surprising as stock returns, especially over a relatively long horizon such as 5 years, should be closely linked to concurrent fundamental performance. Also not surprising is that we find a strong positive relation between intangible returns and future fundamental performance measures; that is, a firm's intangible return reflects, at least partially, information about its future growth prospects.

What is more interesting is what we uncover about the relation of future returns to tangible and intangible information. In particular, we find no evidence of any link between past tangible information and future returns, whereas we find a strong negative relation between past intangible returns and future returns. In other words, evidence of return reversals is generated solely by the reversal of the *intangible* component of returns. As we show, this explains why the book-to-market effect subsumes the Debondt and Thaler (1995) reversal effect.

In addition to investigating the accounting and stock return-based measures of intangible information, we examine the relation between future returns and what we call the *composite share issuance* variable. This variable measures the amount of equity the firm issues (or retires) in exchange for cash or services. Thus, seasoned issues, employee stock option plans, and share-based acquisitions increase the issuance measure, while repurchases, dividends, and other actions that take cash out of the firm reduce the issuance measure.

There are two rationales for introducing this variable. The first has to do with reconciling our results with LSV, who show that a firm's per share stock returns are negatively related to the firm's *total* past sales growth. As we discuss below, LSV's measure incorporates both internally and externally funded growth. As an example of the latter, a firm could double its sales by executing a stock-financed merger with a firm with equal sales. Our results indicate that the two sources of growth are fundamentally different. In particular, future returns are unrelated to internally funded growth in sales, earnings, cash flow, or book value. However, future returns are strongly negatively associated with growth that is financed by share issuance.

In addition, our issuance variable is of interest because it is likely to capture components of intangible information that are not taken into account by our accounting-based variables. Indeed, the composite issuance variable is strongly positively correlated with our accounting-based measure of past intangible returns, suggesting that there is a common component that drives both variables. Specifically, managers tend to issue shares following the realization of favorable intangible information and repurchase shares following the realization of unfavorable intangible information. One interpretation of this is that favorable intangible returns reflect the arrival of profitable investment opportunities, perhaps as a result of decreases in the firm's discount rate, which may require external funding. An alternative interpretation is that positive intangible returns reflect mispricing, providing firms an opportunity to improve their value by timing the equity market, that is, issuing shares when they are overpriced and repurchasing shares when they are underpriced.[5] Regardless, if managers have information about the magnitude of the intangible information that is not reflected in our accounting-based measures, then the composite issuance variable will capture a component of the intangible return that would not otherwise be captured.

To test whether this second measure of intangible information provides additional explanatory power, we include the composite issuance variable in multivariate regressions that also include accounting-based proxies for tangible and intangible information. In these various regressions, the composite share issuance variable is significantly negatively related to future returns, providing further evidence that stock prices perform well (poorly) subsequent to the realization of unfavorable (favorable) intangible information.[6]

While the relation we observe between the future returns of a security and its past intangible returns and composite issuance may reflect mispricing, it is also possible that these variables proxy for risk differences across securities.

[5] The empirical evidence in Hovakimian, Opler, and Titman (2001) indicates that firms tend to repurchase (issue) shares when their stock prices perform poorly (well) relative to changes in their cash flows. Baker and Wurgler (2002) argue that this tendency reflects the fact that managers time the equity markets. The evidence in Loughran and Ritter (1997) and Ikenberry, Lakonishok and Vermaelen (1995) on long-run performance following equity issues and repurchases is consistent with the idea that managers can, in fact, successfully time the equity markets.

[6] A recent paper by Pontiff and Woodgate (2003) also explores the relation between share issuance and future returns.

To examine this possibility, we calculate the abnormal returns associated with intangible returns and issuance using a variety of risk–return models that appear in the literature. We find that the Fama–French model, which is designed to explain the book-to-market effect, does in fact explain the intangible returns effect, but does not explain the composite issuance effect. The CAPM and Lettau and Ludvigson (2001) conditional-CAPM explain neither phenomenon. Thus, the strong intangible return and issuance effects that we document cannot be explained by existing asset pricing models.

I. Decomposition of the Book-to-Market Ratio

As we discuss in the Introduction, our analysis decomposes stock returns into a component that can be attributed to tangible information and a second component that can be attributed to intangible information. Specifically, the realized return from $t-5$ to t (i.e., the 5-year period before our portfolio formation date) is expressed as

$$\tilde{r}(t-5,t) = E_{t-5}[\tilde{r}(t-5,t)] + \tilde{r}^T(t-5,t) + \tilde{r}^I(t-5,t), \tag{1}$$

where $E_{t-5}[\tilde{r}(t-5,t)]$ is the expected return at $t-5$, and $\tilde{r}^T$ and $\tilde{r}^I$ are the unanticipated returns resulting from (unanticipated) tangible and intangible information, respectively.

Our empirical work regresses returns in the current month on proxies for past realizations of tangible and intangible returns. The null hypothesis of these regressions, that current returns are unrelated to past realizations of tangible and intangible returns, is consistent with a setting in which risk-neutral investors have rational expectations. However, if these past returns provide information about a firm's riskiness, or alternatively, if investors over- or underreact to information, past tangible and intangible returns may predict current returns.[7]

If we interpret accounting growth measures as tangible information, then our distinction between tangible and intangible returns can be viewed as a distinction between that portion of a stock's return that can be explained by accounting growth measures and that portion that is unrelated to these "fundamental" performance measures. To illustrate, consider the following decomposition:

$$bm_t \equiv \log\left(\frac{\mathrm{BE}_t}{\mathrm{ME}_t}\right) = \log\left(\frac{B_t}{P_t}\right) = \underbrace{\log\left(\frac{B_{t-\tau}}{P_{t-\tau}}\right)}_{\equiv bm_{t-\tau}} + \log\left(\frac{B_t}{B_{t-\tau}}\right) - \log\left(\frac{P_t}{P_{t-\tau}}\right). \tag{2}$$

The book-to-market ratio at time t is defined either as the ratio of the total book equity, BE_t, to the total market equity, ME_t, or as the ratio of the book value per share, B_t, to the market value per share (or share price), P_t. We decompose

[7] In an unpublished appendix to this paper (available at *http://kent.kellogg.northwestern.edu/*) we present a simple model that explicitly derives the regression coefficients that arise under various alternatives in which investors over- or underreact to information.

the log of the latter ratio into the τ-period-ago log book-to-market ratio, plus the log change in its book value, minus the log change in its price.

The elements of this book-to-market decomposition are directly related to those of the tangible-intangible return decomposition given in equation (1). First, $bm_{t-\tau}$ serves as a proxy for the firm's expected return between $t-\tau$ and t. More importantly, $bm_{t-\tau}$ proxies for the expected growth in book value over this period; empirically, low book-to-market firms have both higher future accounting growth rates and lower future returns. The log change in book value captures both the anticipated and unanticipated growth in book value from $t-\tau$ to t. The unanticipated component of this can be thought of as a proxy for the new tangible information that arrives between $t-\tau$ and t, while (after adjusting for splits, dividends, etc.) the log change in share price is equal to the log stock return, and will reflect all new information, tangible as well as intangible.

This decomposition is useful because it can help us understand why the log book-to-market ratio (bm_t) tends to predict future returns. Specifically, by regressing current returns on the individual components of the decomposition, we can determine whether the power of the book-to-market ratio to forecast future returns results from a correlation of current returns with past tangible returns, intangible returns, or some long-lived component of the firm that is reflected in the lagged book-to-market ratio.

Before running such a regression there are some adjustments that need to be made so that the elements of the book-to-market decomposition more accurately reflect our definitions of tangible and intangible returns. A good proxy for new information (both tangible and intangible) about firm value is the total return to a dollar invested in the firm. Thus, we must first convert the change in the per share market value of a firm's equity to the return on its stock. If there are no splits, dividends, etc., these two measures will be the same; in general, however, some adjustment must be made. The relation between the log returns and price changes is given by the expression

$$r(t-\tau, t) \equiv \sum_{s=t-\tau+1}^{t} \log\left(\frac{P_s \cdot f_s + D_s}{P_{s-1}}\right),$$

where f_s, a price adjustment factor from $s-1$ to s, adjusts for splits and rights issues, D_s is the value of all cash distributions paid between time $s-1$ and s, per share owned at time $s-1$, and P_s is the per share value at time s.[8] A slight manipulation of this equation shows that the log return is equal to the log price change plus a cumulative log share adjustment factor, $n(t-\tau, t)$, which is equal to the (log) number of shares one would have at time t, per share held at time $t-\tau$, had one reinvested all cash distributions back into the stock:

[8] We follow CRSP in this definition. Our f_s is equivalent to the CRSP *factor to adjust price in period*. See the 2002 *CRSP Data Description Guide for the CRSP U.S. Stock Database and CRSP U.S. Indices Database*, pages 77, 84, and 156.

$$
\begin{aligned}
r(t-\tau,t) &\equiv \sum_{s=t-\tau+1}^{t} \log\left(\left(\frac{P_s}{P_{s-1}}\right)\cdot f_s \cdot \left(1+\frac{D_s}{P_s \cdot f_s}\right)\right) \\
&= \sum_{s=t-\tau+1}^{t} \log\left(\frac{P_s}{P_{s-1}}\right) + \underbrace{\log(f_s) + \log\left(1+\frac{D_s}{P_s \cdot f_s}\right)}_{\equiv n_s} \qquad (3)\\
&= \sum_{s=t-\tau+1}^{t} \log\left(\frac{P_s}{P_{s-1}}\right) + \sum_{s=t-\tau+1}^{t} n_s \\
&= \log\left(\frac{P_t}{P_{t-\tau}}\right) + n(t-\tau,t). \qquad (4)
\end{aligned}
$$

Substituting expression (4) into equation (2) gives the current log book-to-market ratio as the sum of the lagged log book-to-market ratio and what we call the *book-return*, minus the log return:

$$
bm_t = bm_{t-\tau} + \underbrace{\log\left(\frac{B_t}{B_{t-\tau}}\right) + n(t-\tau,t)}_{\equiv r^B(t-\tau,t)} - r(t-\tau,t). \qquad (5)
$$

The book return between $t-\tau$ and t, $r^B(t-\tau, t)$ is intuitively very much like the stock return: The log stock return is the answer to the question, If I had purchased \$1 (at its market value) of this stock τ years ago, what would the (log) market value of my investment be today? In contrast, the log book return tells you what the (log) book value of your shares would be today had you purchased \$1 worth (at its book value) of this stock τ years ago.[9]

If we write the current book-to-market ratio in terms of both the stock return and the book return, we obtain

$$
bm_t = bm_{t-\tau} + r^B(t-\tau,t) - r(t-\tau,t). \qquad (6)
$$

Hence, the current book-to-market ratio can be expressed as the past book-to-market ratio, plus the log book return, minus the log stock return.

In our empirical work below we investigate the relation between the variables on the right-hand side of this equation and future returns. Calculation of the lagged log book-to-market ratio and the log stock return are straightforward. To calculate the remaining variable, the log book return, we sum the log change in the book value per share from $t-\tau$ to t and the share adjustment factor $n(t-\tau, t)$, following the definition in equation (5).[10] The monthly share adjustment factor is calculated using the prices at the beginning and end of

[9] Both the stock return and book return calculations assume both no additional investment in the stock, and reinvestment of all payouts (such as dividends) at the stock's market value at the time the payouts are made.

[10] An alternative method of calculating the book return is to simply plug the current and lagged book-to-market ratios and the past return $r(t-\tau, t)$ into equation (6). In our programs, we use both methods and verify consistency.

the period, and the return over the period (all from Center for Research in Security Prices at the University of Chicago (CRSP)). From equation (3), we have

$$n_s = r_s - \log\left(\frac{P_s}{P_{s-1}}\right). \tag{7}$$

Calculating the cumulative adjustment factor $n(t-\tau, t)$ then simply involves adding up the individual n_s's over the period from $t-\tau$ to t.

In Section II, we present estimates of regressions of returns on subsets of the variables on the right-hand side of equation (6). Our goal in these regressions is to determine the relations between current returns and past tangible and intangible returns. To determine the relation between current and past tangible returns, we regress current returns on $r^B(t-5, t)$ and bm_{t-5}. The estimated coefficient on the book return in this regression measures whether future returns are related to tangible information. The assumptions underlying this interpretation are that (1) $r^B(t-5, t)$ is not influenced by intangible information, and (2) the lagged book-to-market ratio serves as a control for the expected book return. These assumptions are consistent with the negative correlation between the lagged book-to-market ratio and the book return we document (see Table II below). As a result, the coefficient on the book return should capture the relation between the unanticipated book return (i.e., the unanticipated tangible information between $t-5$ and t) and the current stock return. Second, we run a regression with all three elements of the decomposition as independent variables. The past book-to-market ratio and the book return are assumed to control for tangible returns as well as expected returns, implying that the coefficient on past stock returns, in this multivariate regression, provides an estimate of the relation between past intangible returns and current stock returns.

These estimates provide insights about how the observed relation between book-to-market ratios and returns relates to the tendency of stock prices to over- or under-react to tangible and intangible information. Using this same approach, we estimate regressions with components of decompositions of other accounting ratios that have been shown to predict stock returns. For example, the sales-to-price ratio can be decomposed according to,

$$sp_t = sp_{t-\tau} + r^S(t-\tau, t) - r(t-\tau, t), \tag{8}$$

where r^S, the change in sales per adjusted share, can be viewed as another proxy for the tangible return. The components of this decomposition are then used in exactly the same way as the elements of the book-to-market decomposition to estimate the effect of tangible and intangible information.

Finally, we provide one additional decomposition that motivates our composite share issuance measure, $\iota(t-\tau, t)$, which we define below. We construct this measure with two goals. First, as we discuss in Section III, share issuance should be an additional proxy for intangible information. Consistent with this hypothesis, we find that our composite share issuance measure is strongly negatively related to future returns. Second, we wish to compare our results with those of LSV, who examine how stock prices react to total growth in sales rather than to our sales return, which is essentially a measure of the per-share change in sales. The difference between the two measures turns out to be the share issuance measure.

We can rewrite the equation for r^S, as given in equation (8), as

$$r^S(t-\tau,t) = \underbrace{\log\left(\frac{S_t \cdot N_t}{S_{t-\tau} \cdot N_{t-\tau}}\right)}_{g^{SLS}(t-\tau,t)} - \underbrace{\left(\log\left(\frac{N_t}{N_{t-\tau}}\right) - n(t-\tau,t)\right)}_{\equiv \iota(t-\tau,t)}, \qquad (9)$$

where N_t is the total number of shares outstanding at time t, and $S_t \cdot N_t$ is the firm's total sales in year t. We obtain the sales return, r^S, either by adding the adjustment factor $n(t-\tau, t)$ to the log growth of sales per share, as in equation (5) for book return, or by subtracting the composite share issuance measure $\iota(t-\tau,t)$ from g^{SLS} $(t-\tau, t)$, the total sales growth, as is done in equation (9) above.[11] In the former case, to obtain a reasonable measure of sales growth per dollar of investment, we must adjust for stock splits, etc., using the adjustment factor n. In the latter case, to adjust total sales growth, splits and stock dividends are not a concern, whereas share-issues, repurchases, and equivalent actions must be taken into account using the composite share issuance measure $\iota(t-\tau,t)$.

Note that, based on equations (7) and (9), ι can be written as

$$\begin{aligned}\iota(t-\tau,t) &= \log\left(\frac{N_t}{N_{t-\tau}}\right) + \log\left(\frac{P_t}{P_{t-\tau}}\right) - r(t-\tau,t)\\ &= \log\left(\frac{ME_t}{ME_{t-\tau}}\right) - r(t-\tau,t).\end{aligned}$$

That is, $\iota(t-\tau,t)$ is the part of a firm's growth in market value that is not attributable to stock returns. As such, corporate actions such as splits and stock dividends leave ι unchanged. However, *issuance activity*, which includes actual equity issues, employee stock option plans, or any other actions that trade ownership for cash or services (in the case of stock option plans) increases ι. For example, if a firm were to issue, at the market price, a number of shares equal in value to 20% of the shares outstanding at that time, this would increase ι by log (1.2) $\approx$ 0.18. In contrast, repurchase activity such as actual share repurchases, dividends, or any other action that pays cash out of the firm decreases ι.

In the next section, we examine the extent to which the three components of a firm's book-to-market ratio and composite share issuance individually predict future returns.

[11] Note that we can use ι to convert any "total" measure to a "return" value. For example, $r(t-\tau,t) = \log(\mathrm{ME}_t/\mathrm{ME}_{t-\tau}) - \iota(t,t-\tau)$.

II. Empirical Results

A. Book-to-Market Decomposition: Empirical Results

This subsection reports estimates from Fama and Macbeth (1973) regressions of monthly returns on the three components of the book-to-market ratio, as given in equation (6). The regressions examine book and market returns over 5 years (i.e., $\tau = 5$). This corresponds to the time horizon over which there is existing evidence of return reversals.

A.1. Data Construction

Our regression analysis in the next subsection examines various decompositions of each firm's log fundamental-to-price ratio, where the "fundamental" measures include book value, sales, cash flow, and earnings. Consistent with the previous literature, we define a firm's log book-to-market ratio in year t (bm_t) as the log of the total book value of the firm at the end of the firm's fiscal year ending anywhere in year $t - 1$ minus the log of the total market equity on the last trading day of calendar year $t - 1$, as reported by CRSP. The other three ratios are defined analogously. Book value, sales, cash flow, and earnings are calculated using COMPUSTAT annual data as described in the Appendix.

The 12 cross-sectional regressions of monthly returns from July of year t through June of year $t + 1$ all use the same set of right-hand-side variables. The minimum 6-month lag between the end of the fiscal year and the date at which the returns are measured ensures that the necessary information from the firms' annual reports is publicly available information.

The variable bm_{t-5} is defined analogously as the log of the total book value of the firm at the end of the firm's fiscal year ending anywhere in year $t - 6$, as reported by COMPUSTAT, minus the log of the total market equity on the last trading day of calendar year $t - 6$, as reported by CRSP. Thus, bm_{t-5} is simply bm_t lagged 5 years. The variable $r(t - 5, t)$ is the cumulative log return on the stock from the last trading day of calendar year $t - 6$ to the last trading day of calendar year $t - 1$, and $r^B(t - 5, t)$ is the log book return, over the same time period, constructed as discussed in Section I. Finally, r_{mom} is the stock's 5-month cumulative log return from the last trading day of calendar year $t - 1$ to the last trading day of May of year t. We do not include the return in June of year t because of concerns about bid-ask bounce.

To be included in any of our regressions for returns from July of year t to June of year $t + 1$, we impose the requirement that a firm have a valid price on CRSP at the end of June of year t and of December of year $t - 1$. We also require that book value for the firm be available on COMPUSTAT for the firm's fiscal year ending in year $t - 1$. For most of our empirical analysis, in which we utilize past 5-year returns and book returns, we also require that the book value for the firm be available on COMPUSTAT for the firm's fiscal year ending in year $t - 6$, that the firm has a valid price on CRSP at the end of December of year $t - 6$, and that the return for the firm over the period from December of year $t - 6$ to December of year $t - 1$ be available. We also exclude all firms with prices that fall below 5 dollars per share as of the last trading day of June of year t. This is because of concerns about bid-ask bounce and the lack of trading activity among very low price stocks. Finally, consistent with Fama and French (1993), we exclude all firms with negative book values in either year $t-1$ or year $t-6$, though negative values at intermediate dates do not result in exclusion. When we run our analysis with alternative fundamental measures in Section II.B, we require that these measures (earnings, cash flow, or sales) be positive as well.[12]

A.2. Data Summary

Table I reports summary statistics for our sample. First note that, as a result of our sample selection criterion, the mean firm size is quite large; in 1990, for example, the mean firm size is \$1.4 billion. Note also that, in each year, the mean intangible return (the last column) is zero. This is true by construction, since the intangible return $r^{I(B)}$ is defined as the residual from a cross-sectional regression. Also, since $r = r^{T(B)} + r^{I(B)}$, the mean tangible return equals the mean (log) return.

There is slow time variation in the mean issuance measure. It is negative in all but 2 years in the 1968 to 1992 period, and is most negative in 1978 (when it is -0.126), but is positive each year from 1993 to 2003, achieving a maximum value of 0.134 in 1998. However, the standard deviation (*SD*), min, and max values show that there is considerable cross-sectional variation in the amount of issuance and repurchase activity.

Table II shows the average cross-sectional correlation coefficients among the variables we consider.[13] Some interesting patterns emerge. First, bm_t and bm_{t-5} are highly correlated, indicating that firms' book-to-market ratios are highly persistent. Second, bm_{t-5} is highly negatively correlated with r^B, which indicates that low book-to-market or low growth firms generally have higher future profitability (in the form of book returns) per share in the future.[14] Third, the

[12] Needless to say, a lot of firms are not included in our analysis because of our requirement that we measure book-to-market ratios in fiscal year $t-6$. Hence, our sample does not include firms that are younger than 5.5 years. Indeed, the vast majority of our sample is probably at least 12 years old (assuming a 7-year time period between founding and going public).

Also, note that the returns we calculate are associated with implementable portfolio strategies (i.e., they use CRSP and COMPUSTAT data, which are available ex ante). Hence, no selection biases are associated with our selection criteria.

[13] The t-statistics presented below each correlation coefficient are based on the time series of cross-sectional correlation coefficients, as in the Fama-MacBeth regressions. Because of the serial correlation in the time series of the correlation coefficient, we use a Newey–West procedure with six lags to calculate standard errors.

[14] This negative correlation is consistent with other findings, such as Fama and French (1995) and Vuolteenaho (2002). In particular, Vuolteenaho uses a VAR to decompose a firm's stock return into two components, namely, shocks to expected cash flows and shocks to expected returns (or discount rates). He finds that the typical firm's returns are mainly a result of news about cash flows, as opposed to future expected returns. He also finds that shocks to expected returns and shocks to future cash flows are positively correlated, meaning that, ex ante, firms that are expected to have high future cash flow growth will also have high future expected returns.

Table I

Sample Summary Statistics

This table presents summary statistics for the sample of firms at five points in the history of the sample. These firms meet all the restrictions described in Section II.A.2. The first three variables, from left to right, are the share price in dollars, the number of shares outstanding, and the total market equity. These are all measured as of the end of June of year t. The next two variables are the book value per share (in $) and the book-to-market ratio. These are measured as of the end of December of fiscal year $t - 1$. The next four variables are the composite share issuance measure, the lagged 5-year log return (from January of year $t - 5$ through the end of December of year $t - 1$), and the tangible and intangible returns over the same period. Number of shares are in millions, and market equity and total book value are in millions of dollars. Tangible and intangible returns are calculated using book returns, as described in the text.

	Share Price	Number of Shares	Market Equity	Book/ Share	Book/ Price	$(t-5, t)$ ι	r	$r^{T(B)}$	$r^{I(B)}$
			For 1968 (1,030 Firms}						
Mean	37.14	9.41	494.55	19.38	0.62	−0.06	0.84	0.84	0.00
SD	26.97	24.72	1,948.72	14.19	0.42	0.21	0.63	0.30	0.56
Min	5.00	0.12	2.18	0.05	0.011	−0.90	−1.05	−1.75	−1.54
Max	353.75	541.19	39,701	160.18	4.15	1.94	3.49	1.97	2.17
			For 1977 (1,504 Firms)						
Mean	21.98	14.28	479.10	22.70	1.23	−0.11	0.12	0.12	−0.00
SD	16.44	30.86	1,866.28	15.44	0.68	0.23	0.59	0.41	0.43
Min	5.00	0.22	1.56	1.30	0.176	−1.78	−1.83	−2.44	−1.60
Max	264.00	615.53	39,213	153.10	6.31	1.84	2.44	2.27	1.79
			For 1978 (2,463 Firms)						
Mean	20.48	10.83	322.53	20.52	1.25	−0.13	0.10	0.10	−0.00
SD	14.72	26.27	1,393.40	15.12	0.70	0.23	0.66	0.47	0.46
Min	5.00	0.23	2.20	0.17	0.024	−1.77	−2.43	−3.65	−1.41
Max	257.25	652.88	39,091	168.88	8.41	3.46	3.17	1.87	3.38
			For 1990 (1,921 Firms)						
Mean	28.49	36.97	1,393.35	20.15	0.75	−0.01	0.68	0.68	0.00
SD	165.40	82.60	4,309.62	120.51	0.46	0.38	0.68	0.37	0.57
Min	5.00	0.32	2.39	0.01	0.000	−2.45	−3.65	−3.33	−2.14
Max	7,200	1,250	67,527	5,251	7.01	3.47	3.57	2.44	4.22
			For 2000 (2,623 Firms)						
Mean	29.73	105.92	4,877.54	17.28	0.69	0.13	0.69	0.69	0.00
SD	237.67	398.28	25,005	197.32	0.55	0.47	0.87	0.44	0.75
Min	5.00	0.60	4.20	0.05	0.006	−2.00	−2.96	−3.93	−2.51
Max	12,119	9,893	524,352	10,077	7.98	5.73	5.70	4.39	3.29

univariate correlation between bm_t and $r(t-5, t)$ is negative and strong, that is, high BM firms are indeed low past return firms. However, the correlation between bm_t and $r^B(t-5,t)$ is weak and statistically insignificant, despite the fact that the correlation between $r(t-5, t)$ and $r^B(t-5, t)$ is strongly positive. This indicates that, on average, high bm firms experience low past stock returns, rather than high book returns. Consistent with this, a multivariate regression

Table II

Average Correlation Coefficients of Book-to-Market and Past Return Measures

This table reports the average annual cross-sectional correlation coefficients (in %) for a set of variables. bm_t, bm_{t-5}, and $r^B(t-5, t)$ are, respectively, the log book-to-market ratios at time t and time $t-5$, and the log book return from $t-5$ to t. $r(t-5, 5)$ is the past 5-year log return, lagged 6 months, and $\iota(t-5, 5)$ is the composite log share issuance over the same period. More details on the construction of these variables are given in Section II.A.1. The standard errors for these correlation coefficients are calculated using a Newey–West procedure with six lags, using the time series of the correlation coefficients. The time period is 1968:07–2003:12. t-statistics are reported in parentheses.

	bm_t	bm_{t-5}	$r^B(t-5,t)$	$r(t-5,t)$	$\iota(t-5,t)$
bm_t	100.0	53.5	−9.6	−47.7	−19.8
		(6.76)	(−0.42)	(−3.88)	(−1.40)
bm_{t-5}		100.0	−43.5	18.2	−15.1
			(−8.49)	(1.00)	(−1.34)
$r^B(t-5,t)$			100.0	41.8	−2.5
				(4.80)	(−0.20)
$r(t-5,t)$				100.0	1.5
					(0.07)
$\iota(t-5,t)$					100.0

of bm_t on $r^B(t-5, t)$ and $r(t-5, t)$ (not shown) generates strongly statistically significant positive and negative coefficients, respectively. Firms that experience past earnings growth that is not associated with increased stock returns generally have higher book-to-market ratios, as would be expected.

B. Book-to-Market Decomposition: Fama–MacBeth Regression Results

Table III presents the results from a set of Fama–MacBeth regressions of stock returns on various components of the book-to-market decomposition. Regression 1, a simple regression of returns on the log book-to-market ratio, shows that the book-to-market effect is strong in our sample, which is consistent with the existing literature. Regressions 2 through 8 decompose bm_t into its components as specified in equation (6).

Regression 2 indicates that bm_{t-5} can still forecast future returns. This evidence is consistent with the persistence of the book-to-market ratio seen in Table II. The ability of the 5-year lagged book-to-market ratio to forecast future returns is consistent with either bm capturing some permanent firm characteristic that could be associated either with actual or perceived risk, or with long-term mispricing. For example, firms with intangible assets such as patents and brand names that have persistently low book-to-market ratios may have unique return patterns that are associated with their characteristics. It is also possible that the risk or mispricing effects captured by bm are temporary, but of longer duration than 5 years. We do not attempt to discriminate between these two hypotheses.

Table III

Fama–MacBeth Regressions of Monthly Returns on Book-to-Market and Past Return Measures

This table reports the results of a set of Fama–MacBeth regressions of monthly returns on lagged fundamental-price ratios, past accounting-growth measures, and past returns. The variables are identical to those in Table II. The time period is 1968:07–2003:12. All coefficients are $X100$. t-statistics are reported in parentheses.

Regression Number	Constant	bm_t	bm_{t-5}	$r^B\,(t-5,t)$	$r(t-5,t)$	$\iota(t-5,t)$
1	1.301	0.321				
	(5.36)	(3.91)				
2	1.243		0.134			
	(5.09)		(2.13)			
3	1.272			−0.099		
	(5.05)			(−1.70)		
4	1.319				−0.245	
	(5.47)				(−3.41)	
5	1.210					−0.658
	(4.72)					(−4.39)
6	1.226		0.127	−0.029		
	(4.96)		(1.83)	(−0.46)		
7	1.284		0.270	0.276	−0.372	
	(5.55)		(3.13)	(3.33)	(−3.99)	
8	1.265		0.206	0.214	−0.331	−0.514
	(5.38)		(2.60)	(2.72)	(−3.71)	(−4.16)

The next set of univariate regressions allows us to gauge the extent to which returns are related to past realizations of tangible and intangible information. Specifically, regression 3 shows that the book return, on its own, does not reliably forecast future returns. When we include bm_{t-5}, which acts as a control for the expected book return over $t-5$ to t in regression 6, the relation between book returns and future stock returns is even weaker. This evidence is consistent with the observation that over a 5-year period, investors react appropriately to information about accumulated earnings. However, consistent with existing evidence in regression 4 we find evidence consistent with long-term reversal.[15] Regression 5 shows that a firm's composite share issuance is strongly negatively associated with its future returns, something we discuss in more detail in Section III.

Regressions 6–8 are multivariate regressions, which include the lagged book-to-market ratio, the book return, and the past returns. Note that the coefficient on past returns in regressions 7 and 8 is just slightly more negative

[15] We find a particularly strong long-term reversal effect, because there is a minimum of a 6-month gap between the period over which $r(t-5,t)$ is calculated and the returns that we forecast. The 6-month momentum effect, which we eliminate with this experimental design, reduces the reversal effect as calculated in Debondt and Thaler (1985) (see also Asness (1995).

and significant than in regression 4. However, in moving from regression 6 to regression 7, the coefficient on book return changes significantly, from a negative (but insignificant) coefficient in 6 to a positive (and significant) coefficient in 7, when we add the past 5-year return to the regression. The reason for this is not that past book returns have any power to forecast future returns, but rather that the *only* component of past returns that forecasts future returns is the component that is orthogonal to past book returns.

These regressions, in combination with the univariate regressions, are consistent with the model predictions discussed in Section I for the case in which there is overreaction to intangible information (or, equivalently, when positive intangible information reflects decreased risk), but not to over- or underreaction to tangible information.

C. Calculating the Intangible Return

The regressions reported in Table III find no significant relation between past book returns and future returns (Regressions 3 and 6), but they do indicate a significant negative relation between past returns and future returns, especially after controlling for book returns. In this subsection, we estimate an equivalent representation of our model, which introduces a variable that orthogonalizes the past returns variable with respect to the lagged fundamental price ratio and our tangible return. In other words, we would like to calculate the portion of stock returns that cannot be explained by fundamental accounting variables. We do this by first estimating cross-sectional regressions at each time, and defining the residual from this regression as the intangible return. So, for example, to calculate the book value-based intangible return, we run a cross-sectional regression of the past 5-year log stock returns of each firm on the firms' 5-year lagged log book-to-market and their 5-year book-return, that is,

$$r_i(t-5,t) = \gamma_0 + \gamma_{BM} \cdot bm_{i,t-5} + \gamma_B \cdot r_i^B(t-5,t) + u_{i,t}. \tag{10}$$

We define a firm's tangible return over this time period as the fitted component of the regression

$$r_i^{T(B)}(t-5,t) \equiv \hat{\gamma}_0 + \hat{\gamma}_{BM} \cdot bm_{i,t-5} + \hat{\gamma}_B \cdot r_i^B(t-5,t), \tag{11}$$

and the intangible return as the regression residual

$$r_i^{I(B)}(t-5,t) \equiv u_{i,t}. \tag{12}$$

Note that the sum of the tangible and intangible returns is equal to the total (log) stock return. In addition to providing this decomposition using book returns as a tangible information proxy, we test the robustness of our findings by estimating similar regressions using other types of tangible information. Specifically, to be consistent with the earlier work of Lakonishok et al. (1994), we examine sales, cash flow, and earnings. Our definitions of these variables are almost identical to those of LSV: Earnings are measured before extraordinary items, and cash flow is defined as earnings plus common equity's share of depreciation.[16]

We also calculate tangible and intangible returns using yearly cross-sectional multivariate regressions of firm stock returns over $(t-5, 5)$ on all eight lagged fundamental-to-price ratios and on all measures of fundamental returns over the same time period, that is,

$$\begin{aligned} r_i(t-5,t) = \alpha &+ \gamma_1\, bm_{i,t-5} + \gamma_2\, sp_{i,t-5} + \gamma_3\, cp_{i,t-5} + \gamma_4\, ep_{i,t-5} \\ &+ \gamma_5 r_i^B(t-5,t) + \gamma_6 r_i^{SLS}(t-5,t) + \gamma_7 r_i^{CF}(t-5,t) \\ &+ \gamma_8 r_i^{ERN}(t-5,t) + u_{i,t}. \end{aligned} \tag{13}$$

Specifically, in each year, the past return for each firm is broken up into three parts, namely, an expected return (expected growth) component, captured by the lag bm_{t-5}, and unanticipated tangible and intangible return components. Our proxy for the intangible return is again the regression residual

$$r_i^{I(\mathrm{Tot})}(t-5,t) \equiv u_{i,t},$$

and our total (unanticipated) tangible return for firm i is defined as:

$$\begin{aligned} r_i^{T(Tot)}(t-5,t) \equiv \hat{\gamma}_5 r_i^B(t-5,t) &+ \hat{\gamma}_6 r_i^{SLS}(t-5,t) + \hat{\gamma}_7 r_i^{CF}(t-5,t) \\ &+ \hat{\gamma}_8 r_i^{ERN}(t-5,t). \end{aligned} \tag{14}$$

By construction, our tangible return measure is orthoganalized with respect to $bm_{i,t-5}, sp_{i,t-5}, cp_{i,t-5}$, and $ep_{i,t-5}$. Assuming our specification is reasonably accurate—meaning that these price-scaled variables at $t-5$ capture expected growth, and that this relation is relatively constant across firms—our tangible return measure should measure the unanticipated changes in observed firm performance over the period from $t-5$ to t.

The left-hand side of Table IV reports the results of Fama–MacBeth forecasting regressions of monthly returns on the lagged 5-year tangible and intangible returns. In addition, the last column of Table IV reports the average R^2s of the regressions used to calculate the tangible and intangible returns, that is, of the regressions in equations (10) and (13). The average R^2s of these regressions of past returns ($r(t-5, t)$) on the lagged fundamental price ratios and the concurrent fundamental growth measures range from about 20% in the sales regression to almost 58% in the multivariate regression that includes all the accounting performance variables. It should be noted that while in each of the regressions a significant amount of the cross-sectional dispersion of returns is explained by the accounting performance variables, there is also a significant amount that is not explained. In other words, both the tangible and intangible components of past returns contribute significantly to the cross-sectional variance of returns.

Regressions 1 and 2 in this table are identical to regressions 6 and 7 in Table III. These are included for comparison with regression 3. In regression 3, we include the lagged book-to-market ratio, the book return, and the

[16] See the Appendix for a detailed data description.

Table IV

Fama–MacBeth Regressions with Intangible Returns

This table reports the results of a set of Fama–MacBeth regressions of monthly returns on past 5-year log returns, past accounting growth measures, and past intangible returns. The *intangible returns* are described in the text. $r^{I(B)}$ denotes the log intangible return (relative to the book return) from $t-5$ to t; bm_{t-5} and r^B $(t-5, t)$ are, respectively, the log book-to-market ratio at time $t-5$, and the log book return from $t-5$ to t. The variables used in the sales, cash flow, and earnings regressions are defined similarly. The regression reported in row 13 uses the *total tangible return*, as defined in equation (14). The final column reports average R^2s for the cross-sectional regressions used to calculate the intangible returns. For example, the R^2_{avg} reported in the last column of row 3 is for the cross-sectional regressions of past 5-year returns ($r(t-5, t)$) on bm_{t-5} and r^B $(t-5, t)$. (See equations (10) and (13).) The time period is 1968:07–2003:12. All coefficients are $X100$. t-statistics are reported in parentheses.

Regression Number	Fama–MacBeth Forecasting Regression Coeff's and t-statistics						
	Constant	bm_t	bm_{t-5}	$r^B(t-5,t)$	$r^{I(B)}$	$r(t-5,t)$	R^2_{avg}
1	1.226		0.127	−0.029			
	(4.96)		(1.83)	(−0.46)			
2	1.284		0.270	0.276		−0.372	
	(5.55)		(3.13)	(3.33)		(−3.99)	
3	1.226		0.127	−0.029	−0.372		35.68%
	(4.96)		(1.83)	(−0.46)	(−3.99)		
	Constant	sp_t	sp_{t-5}	$r^S(t-5,t)$	$r^{I(S)}$	$r(t-5,t)$	R^2_{avg}
4	1.084	0.206					
	(4.32)	(3.87)					
5	1.102		0.162	0.285		−0.342	
	(4.63)		(3.12)	(5.08)		(−4.24)	
6	1.069		0.101	0.110	−0.342		19.97%
	(4.22)		(2.11)	(2.23)	(−4.24)		
	Constant	cp_t	cp_{t-5}	$r^C(t-5,t)$	$r^{I(C)}$	$r(t-5,t)$	R^2_{avg}
7	1.980	0.336					
	(8.19)	(4.66)					
8	1.997		0.309	0.261		−0.504	
	(8.56)		(3.82)	(4.59)		(−4.89)	
9	1.408		0.091	−0.035	−0.504		46.18%
	(6.07)		(1.39)	(−0.86)	(−4.89)		
	Constant	ep_t	ep_{t-5}	$r^E(t-5,t)$	$r^{I(E)}$	$r(t-5,t)$	R^2_{avg}
10	2.004	0.293					
	(8.23)	(4.27)					
11	2.021		0.273	0.254		−0.486	
	(8.45)		(3.39)	(4.76)		(−4.64)	
12	1.393		0.081	0.010	−0.486		44.40%
	(6.10)		(1.30)	(0.30)	(−4.64)		
	Constant			$r^{T(Tot)}(t-5,t)$	$r^{I(Tot)}$		R^2_{avg}
13	1.290			−0.095	−0.498		57.81%
	(5.55)			(−1.43)	(−4.56)		

intangible return, which is the past return orthogonalized with respect to bm_{t-5} and $r^B(t-5, 5)$ as described above. In regression 3, the coefficients and t-statistics on bm_{t-5} and $r^B(t-5, 5)$ are identical to those in regression 1; this must be the case since $r^{I(B)}$ is orthogonalized to these two variables each year. Also, given our orthogonalization procedure, the coefficient and t-statistic on $r^{I(B)}$ in regression 3 are identical to those on $r(t-5, t)$ in regression 2.

The results in regression 3 and in Table III reveal no reliable relation between future and past book returns, whereas they suggest a strongly significant relation between future returns and past intangible returns. In regressions 4, 7, and 10 we rerun regression 1 from Table III only using the lagged log sales-to-price ratio, cash flow-to-price ratio, and earnings-to-price ratio.[17] These variables forecast future returns about as well as the book-to-market ratio. We then decompose these fundamental-to-price ratios into components, based on the decompositions equivalent to that in equation (2). The evidence in regressions 6, 9, and 12 are consistent with the book return measure: The insignificant coefficients on the fundamental returns variables are insignificant and small relative to the coefficients and t-statistics on the past intangible returns in the same regressions.[18] Finally, regression 13 regresses future returns on the past tangible and intangible returns calculated with the multivariate regression that includes all four accounting performance measures. Again, we find a strong link between the unexplained component of the past return (the intangible component) and future returns, but no reliable relation between the tangible component and future returns.

III. Share Issuance and Future Returns

In this section, we examine the relation between the composite share issuance measure introduced in Section I and future returns. As we mention in the Introduction, we do this both to reconcile our findings with the LSV findings and because the share issuance variable provides an additional measure of intangible information. To understand this second point, recall that past evidence (e.g., Hovakimian, Opler and Titman (2001)) indicates that firms are more likely to issue equity and less likely to repurchase shares following periods in which their stock prices perform well relative to their earnings. In other words, the issuance and repurchase choices tend to be related to past realizations of what we describe as intangible information.[19] Of course, a manager's intangible

[17] We follow convention in using the terminology "price" for these three ratios, and "market" for the book-to-market ratio. "Market" has the same meaning as "price."

[18] The one coefficient that is close to being statistically significant here is that on r^S in regression 6. However, note that the coefficient is positive rather than negative, as would be expected if there is simple overreaction to past sales growth.

[19] In an analysis documented in the unpublished appendices to this paper (available at *http://kent.kellogg.northwestern.edu/*), we find that our composite issuance variable is significantly related to both stock prices and book returns in ways that are consistent with the prior literature on repurchases and share issuance choices. Specifically, we find that firms tend to issue (repurchase) shares following favorable (unfavorable) intangible information, that is, when past returns have been high relative to past book returns.

information is much more precise than the empirical proxies we use here. As a result, the issuance-repurchase choices provide independent information about intangible information and hence, if investors underreact to intangible information, or alternatively, if intangible information is related to risk, then these choices should forecast future returns. However, investors' issuance choices are not a perfect proxy for intangible information—other factors also influence a firm's issuance decision (whether they issue or repurchase, and if so, how much). This suggests that both our intangible return proxies and the composite issuance chosen by the manager should forecast future returns.

To test this possibility, in Table V we add $\iota(t-5,t)$ to our earlier regressions of returns on accounting returns and various measures of intangible returns. These regression estimates show that $\iota(t-5,t)$ and intangible returns are both significant when the two variables are included in the same regression, suggesting that indeed these variables have independent effects on returns.

Table V

Fama–MacBeth Regressions of Monthly Returns on Past Tangible and Intangible Returns and Composite Issuance

The table presents the results of a set of Fama–MacBeth coefficients and t-statistics for regressions of monthly returns on lagged fundamental-to-price ratios, accounting returns, intangible returns, and composite issuance. The forecasting regressions reported in this table are identical to those in Table IV, with the exception that we also include composite issuance as an explanatory variable. The time period is 1968:07–2003:12. All coefficients are × 100. Fama-MacBeth t-statistics are in parentheses.

Regression Number	Constant				$\iota(t-5,t)$
1	1.210				−0.658
	(4.72)				(−4.39)
	Constant	bm_{t-5}	$r^B\,(t-5,t)$	$r^{I(B)}$	$\iota(t-5,t)$
2	1.225	0.080	−0.057	−0.331	−0.514
	(4.93)	(1.26)	(−0.95)	(−3.71)	(−4.16)
	Constant	sp_{t-5}	$r^S\,(t-5,t)$	$r^{I(S)}$	$\iota(t-5,t)$
3	1.106	0.082	0.061	−0.311	−0.513
	(4.47)	(1.83)	(1.25)	(−4.05)	(−3.87)
	Constant	cp_{t-5}	$r^C\,(t-5,t)$	$r^{I(C)}$	$\iota(t-5,t)$
4	1.335	0.060	−0.041	−0.455	−0.451
	(5.53)	(1.00)	(−1.03)	(−4.64)	(−3.80)
	Constant	ep_{t-5}	$r^E\,(t-5,t)$	$r^{I(E)}$	$\iota(t-5,t)$
5	1.308	0.050	0.004	−0.439	−0.451
	(5.50)	(0.88)	(0.13)	(−4.41)	(−3.89)
	Constant	$r^{T(Tot)}(t-5,t)$		$r^{I(Tot)}$	$\iota(t-5,t)$
6	1.272	−0.105		−0.441	−0.489
	(5.38)	(−1.67)		(−4.24)	(−3.73)

As with our other evidence, there are several possible interpretations of this negative issuance return relation. One is that managers understand that the market overreacts to intangible information (and underreacts to the decision to issue). Hence, managers may issue opportunistically, timing their issues and repurchases to take advantage of mispricing. Alternatively, managers may simply issue when growth options (i.e., investment opportunities) look favorable, that is, following a period of high intangible returns. If investors overreact to the intangible information conveyed by the issuance choice, or alternatively, if the issuance choice is related to the firm's risk, then future returns will be related to the issuance choice in much the same way that returns are related to our accounting-based measures of intangible information.

A. The Relation of Our Results to the Findings of LSV

As we discuss earlier, Lakonishok et al. (1994, LSV) provide empirical results that appear to support the hypothesis that investors overreact to tangible information. Specifically, LSV find a strong and significant negative relation between a firm's past sales growth and its future stock returns. This result, which contrasts with the findings reported in Table IV, is puzzling since our sales return measure is similar to the sales growth measure used by LSV. In this section we show that the difference arises because LSV's tests use a firm's *total* sales growth, as opposed to our sales return measure, which examines growth per dollar of equity invested. This distinction is important since total sales growth can result from an equity-financed increase in the scale of a firm's operations (e.g., by acquiring another firm), or alternatively, by attracting new customers to their existing lines of business without additional equity.

Mathematically, this is straightforward. Equation (9) shows that

$$g^{SLS}(t-\tau,t) = r^{SLS}(t-\tau,t) + \iota(t-\tau,t).$$

That is, high total log sales growth g^{SLS} can result either from high past sales return (a high r^{SLS}) or from scale increases associated with high past share issuance. This means that the negative relation between g^{SLS} and future returns that LSV uncover could be caused by a negative relation between r^{SLS} and future stock returns, but could also be an artifact of a negative relation between past issuance activity and future stock returns, which is consistent with both the previous literature and our results (see regressions 5 and 8 in Table III).

This section shows that the strong negative relation between g^{SLS} and future returns is indeed attributable to the negative relation between equity issuance and future returns. Specifically, we show that after controlling for equity issuance there is no relation between total sales growth and future returns.[20]

[20] Only a small fraction of firms have high issuance activity (ι). As we explain, it is these high-ι firms that are largely responsible for the observed sales growth–return relation. Specifically, we find that after excluding the 10% of the firms with the greatest composite share issuance, but not generally with the highest total sales growth, there is no longer any relation between total sales growth and future returns.

Table VI

Fama–MacBeth Regressions of Monthly Returns on Cash Flow to Price and Past Sales Growth Measures

This table presents Fama–MacBeth regressions of future returns on the cash flow-to-price ratio cp_t, the log total sales growth g^{SLS}, the log sales return r^{SLS}, and composite share issuance ι. The time period is 1968:07–2003:12. All coefficients are × 100. Fama–MacBeth t-statistics are in parentheses.

Regression Number	Constant	cp_t	$g^{SLS}(t-5,t)$	$r^{SLS}(t-5,t)$	$\iota(t-5,t)$
1	2.080	0.332	−0.191		
	(8.85)	(4.76)	(−2.87)		
2	1.260			−0.014	
	(5.19)			(−0.26)	
3	1.914	0.294	−0.072		−0.411
	(7.53)	(4.36)	(−1.27)		(−3.39)
4	1.914	0.294		−0.072	−0.483
	(7.53)	(4.36)		(−1.27)	(−3.55)

Thus, the LSV results appear to be attributable not to overreaction to any sort of fundamental growth, but rather to underreaction to information about management choices that affects inflows and outflows of equity capital. An alternative view is that investors overreact to growth that firms generate with funds raised through equity issues. Because management's decision to issue does not generally reflect favorable tangible information, managers presumably issue following good intangible returns.

Regression 1 of Table VI reports the result of a Fama-MacBeth regression that verifies that the LSV results continue to hold using our methodology and sample. The coefficient on g^{SLS}, the total sales growth, is significantly negative, even in a multivariate regression that includes the cash flow-to-price ratio, cp_t.

However, regression 2 shows that if instead of using g^{SLS} as an independent variable in the regression, we use our sales return measure, r^{SLS}, we obtain a coefficient that is quite different and is statistically insignificant. This difference is somewhat surprising since the average cross-sectional correlation between g^{SLS} and r^{SLS} is quite high ($\rho = 0.764$, $t = 11.1$). Again, the difference is due to the fact that g^{SLS} is defined as the log change in the *total* sales of the firm, while $r^{SLS}(t-\tau, t)$ is adjusted for new issues, repurchases, etc. The difference between the two measures is the composite share issuance, $\iota(t-\tau, t)$, as defined in equation (9).

As discussed in Section I, ι will be positive if a firm has issued equity, either directly or indirectly (e.g., through the exercise of employee stock options or convertible bonds, or with stock-based acquisitions), and will be negative if a firm has repurchased shares or pays dividends. We see in Table V that there is a strong negative relation between $\iota(t-5,t)$ and future returns. Regression 3 of Table VI shows that, after controlling for ι, growth in sales has no significant explanatory power for future returns. Indeed, given the relation in equation (9), the coefficients on r^{SLS} or g^{SLS} must be the same after controlling for composite issuance. Comparing regressions 3 and 4 shows that this is the case.

IV. The Risk-Adjusted Returns of the Fama–MacBeth Portfolio Strategies

In this section we take a closer look at the portfolios that are implicit in the Fama-MacBeth analysis, and ask two questions: (1) Are the abnormal returns of these portfolios likely to be achievable in practice, and (2) Can these returns be explained by standard asset pricing models?

Intuitively, one might expect that a firm's intangible returns and issuance activity is associated with the systematic risk of its stock. Both these variables are likely to be associated with increases in the value of a firm's growth opportunities, which can be viewed as call options on potential assets in place. Since options are typically riskier than the underlying asset, one might expect growth options to be riskier than assets in place. If this is the case, high intangible returns and issuance will be associated with higher systematic risk. This, in turn, would suggest a positive relation between expected returns and both intangible returns and issuance, which is inconsistent with our evidence. However, Berk, Green and Naik (1999, BGN) provide an alternative view that is consistent with the observed negative relation between both intangible returns and issuance and future returns. In their model, a firm's growth options are assumed to have lower betas than the firm's assets in place, which suggests that high intangible returns and high issuance should be associated with lower risk and returns.

To examine these possibilities empirically we consider three candidate asset pricing models, the CAPM, the Fama and French (1993) three-factor model, and the Lettau and Ludvigson (2001) version of the conditional CAPM. In each case, we determine the portfolio returns that are implicit in our Fama–MacBeth coefficient estimates, and we then use the models to evaluate their respective risks and abnormal returns.

The time-series coefficients in a set of Fama–MacBeth regressions can be viewed as the returns of zero-investment portfolios with weights at each time given by the rows of the matrix

$$\mathbf{W}_t = (\mathbf{X_t'X_t})^{-1}\mathbf{X_t'}.$$

$\mathbf{X}_t$ is the matrix of independent variables from the cross-sectional regression at time t. The Fama–MacBeth t-statistic is therefore just the mean return of this portfolio, divided by the return standard deviation of the portfolio, times $\sqrt{T}$.

If one were able to trade at the prices reported by CRSP, then the average returns realized on these portfolios would equal the coefficients reported in the preceding tables. Actually achieving these returns, however, is likely to be difficult since the Fama–MacBeth portfolios are approximately equal-weighted and thus require significant rebalancing each month. This means that bid-ask bounce, illiquidity, and transaction costs might make the actual returns from such a strategy unachievable, especially for low market capitalization portfolios. To address this issue we consider a value-weighted version of these coefficient portfolios. Specifically, the vector of asset weights at time t in this portfolio is

$$\mathbf{w}_t^{VW} = \frac{\left(\mathbf{w}_t^{EW}\right)^+ \cdot \mathbf{ME}_t}{\mathrm{ME}_t^+} + \frac{\left(\mathbf{w}_t^{EW}\right)^- \cdot \mathbf{ME}_t}{\mathrm{ME}_t^-},$$

where $\mathbf{w}_t^{EW}$ is the appropriate row of $\mathbf{W}_t$ from above, $(\mathbf{w}_t^{EW})^+$ is a vector whose elements equal $\mathbf{w}_t^{EW}$ when the element is positive, and otherwise are zero, and $\mathbf{ME}_t$ is the vector of firm market equity values. Finally, ME_t^+ and ME_t^- denote the sum of the market caps of the firms whose elements in $\mathbf{w}_t^{EW}$ are positive and negative, respectively.

Constructing the weights in this way results in some nice properties. First, note that the sum over the positive weights is $+1$, and the sum over the negative weights is -1, so the zero-investment portfolio returns we report are as conventionally defined (i.e., as the profit from going long \$1 and short \$1). Second, since our vector of right-hand side variables $\mathbf{X}_t$ only changes once per year on July 1, the returns we report are from a portfolio that requires considerably less rebalancing.[21] Finally, while this weighting scheme does not produce exact value-weighting, it does ensure that small stocks generally have portfolio weights that are closely tied to their market capitalizations. These last two properties, along with the fact that we exclude all stocks with end-of-June prices less than \$5, mean that frictions in trading these stocks are minimized.

It should be noted that in addition to being more achievable, these portfolios are weighted more toward larger stocks, and thus achieve different returns from the unadjusted Fama–MacBeth portfolios examined in the previous section, which are not value-weighted. Hence, a comparison of these two sets of returns provides one indication of the effect of size on both the intangible return effect and the composite issuance effect.[22]

Table VII presents a set of time-series regressions in which the dependent variables are the Fama–MacBeth value-weighted portfolios. The portfolio evaluated in Panel A has weights that correspond to the coefficient on $r^{I(B)}$ in Table IV, regression 3, and Panel B uses the weights that correspond to the $\iota(t-5,t)$ coefficient in the multivariate cross-sectional regressions with $bm_{t-5}, r^B(t-5,t), r^{I(B)}$ as additional right-hand side variables (as in Table V,

[21] Specifically, rebalancing is required *only* if the composite issuance variable is non-zero, that is, if the firm pays dividends, repurchases, or issues new shares, or if the firm is delisted or merged. If a firm pays a dividend or repurchases shares, any received cash is invested in all other stocks so as to maintain the portfolio weights. If a firm issues shares, then additional shares of that firm are purchased and shares in the other stocks are sold in a way that maintains the value weights. Of course, given that the strategy requires some rebalancing, there exist transaction costs that we ignore in our results.

[22] In unpublished appendicies, we examine the size effect directly by examining the returns of constructing value-weighted Fama–MacBeth portfolios from subsamples of stocks that are sorted into size quintiles.

Table VII

Results from Time-Series Regressions of Value-Weighted Portfolio Returns on Sets of Factor-Mimicking Portfolios

This table reports the results of time-series regressions of three zero-investment portfolio returns on benchmark portfolio returns. The dependent variables in Panels A and B are: (A) the time series of value-weighted coefficients from the Fama–MacBeth cross-sectional regressions of monthly and quarterly returns on $r^{I(B)}$ as in Table IV, regression 3; and (B) $\iota(t-5,t)$ orthogonalized with respect to $bm_{t-5}, r^B(t-5,t)$ and $r^{I(B)}$ as in Table V, regression 2. The calculation of the value-weighted coefficient series is described in Section III.B of the text. The independent variables in each panel are the contemporaneous excess market return, SMB and HML zero-investment portfolio returns, obtained from Kenneth French, and the quarterly excess VW returns times the $\widehat{cay}$ series as of the end of the preceding quarter, as estimated in Lettau and Ludvigson (2001). OLS t-statistics are reported in parentheses below each of the coefficients. The final column reports R^2s (in %) for each of the these time-series regressions. The time period of the dependent variable in the monthly regressions in 1968:07–2003:12, and the period for the quarterly regressions is 1968:2–2003:3.

Regression	Frequency	$\hat{\alpha}$	$\hat{\beta}_{Mkt}$	$\hat{\beta}_{SMB}$	$\hat{\beta}_{HML}$	$\hat{\beta}_{Mkt \cdot c\hat{a}y}$	$R^2(\%)$
			Panel A: Intangible Portfolio Return				
1	Monthly	−0.363					
		(−2.12)					
2	Monthly	−0.427	0.153				4.08
		(−2.54)	(4.25)				
3	Monthly	0.203	−0.085	−0.381	−1.064		74.63
		(2.28)	(−4.05)	(−13.73)	(−33.53)		
4	Quarterly	−1.293	0.197				6.7
		(−2.26)	(3.15)				
5	Quarterly	−0.979	0.186			−7.834	10.0
		(−1.62)	(2.95)			(−1.50)	
			Panel B: Orthogonalized Issuance Portfolio Return				
6	Monthly	−0.384					
		(−3.15)					
7	Monthly	−0.519	0.319				35.21
		(−5.27)	(15.18)				
8	Monthly	−0.474	0.243	0.227	−0.104		46.27
		(−5.15)	(11.19)	(7.93)	(−3.18)		
9	Quarterly	−1.632	0.360				45.7
		(−5.39)	(10.81)				
10	Quarterly	−1.640	0.360			0.183	44.9
		(−5.39)	(10.70)			(0.07)	

regression 3). That is, at any point in time the cross-section of Panel B portfolio weights is orthogonal to the cross section of the stocks' past tangible and intangible returns.

In rows 1 and 6 of Table VII we report the mean returns and associated t-statistics for the two portfolios. In rows 2 and 7 we report the results of the time-series regression

$$r_{p,t} = \alpha + \beta_{Mkt}(R_{m,t} - R_{f,t}) + \epsilon_t.$$

For the intangible portfolio return, the coefficient on the excess market return is 0.153 ($t = 4.25$): The high intangible return firms (which experience *low* future returns) actually have a higher beta than the low intangible return firms. Here, the risk story goes the wrong way. In this test, we also obtain an alpha of −0.427 ($t = -2.54$), so we reject the CAPM null hypothesis that $\alpha = 0$.

To assess whether the return of this zero-investment portfolio is consistent with the Fama and French three-factor model we run a time-series regression with the three Fama–French factors as independent variables, that is,

$$r_{p,t} = \alpha + \beta_{Mkt} \cdot (R_{m,t} - R_{f,t}) + \beta_{SMB} \cdot \mathrm{SMB}_t + \beta_{HML} \cdot \mathrm{HML}_t + \epsilon_t.$$

The results from this regression, reported in regression 3 of Table VII, reveal that the α is significantly positive. Rows 6, 7, and 8 of Panel B report the results of equivalent regressions for the value-weighted coefficient portfolio that corresponds to the orthogonalized issuance variable. Here we find that the intercepts are all negative and are significant at very high levels. Indeed, the intercepts for the CAPM and Fama–French models both have t-statistics that exceed five.

A potential criticism of the Fama and French three-factor model is that the factors, which are not directly related to economic factors, are specially designed to capture the book-to-market effect (which is closely related to our intangible return effect). For this reason, we also examine whether the returns of the intangible return and issuance portfolios can be explained by the conditional CAPM of Lettau and Ludvigson (2001, LL). LL construct a variable, which they refer to as $\widehat{cay}$, that is related to a macroeconomic factor. They conclude that $\widehat{cay}$ provides a good instrument for the expected return on the market and that a conditional CAPM using $\widehat{cay}$ as an instrument explains the returns of the 25 Fama and French (1993) portfolios.

We use a time-series regression approach suggested by Cochrane (2000) to estimate whether the LL version of the conditional CAPM can explain the returns of these portfolios. We do this by running the regressions

$$\tilde{r}_{i,t} = \alpha + \beta_{Mkt}\tilde{r}_{m,t} + \beta_{Mkt\cdot c\hat{a}y}(\widehat{cay}_{t-1} \cdot \tilde{r}_{m,t}) + \epsilon_{i,t}, \tag{15}$$

where $\tilde{r}_{i,t}$ is the quarterly return on our zero-investment test portfolio, $\tilde{r}_{m,t}$ is the quarterly excess return on the value-weighted market portfolio net of the 3-month risk-free rate, and $\widehat{cay}_{t-1}$ is the Lettau and Ludvigson variable, estimated at the start of the quarter.[23]

The results of these regressions for the quarterly returns of the intangible return portfolio and orthogonalized issuance portfolio are reported, respectively, in regressions 4 and 5 and regressions 9 and 10 of the table. Regressions 4 and 5 regress the quarterly portfolio return on the excess return of the market. Regressions 5 and 10 report the results of the estimation of equation (15). In

[23] The $\widehat{cay}$ data are provided by Martin Lettau.

both cases, the LL $\widehat{cay}$ variable is statistically insignificant and the intercepts are not materially affected when this variable is added to the regression.[24]

In summary, our evidence suggests that the excess returns associated with intangible returns and our composite issuance variable cannot be explained by existing asset pricing models. Although the rejection of the models with the intangible returns portfolio is relatively weak, the rejection of the models with the composite issuance portfolio is extremely strong.

The latter results are related to the recent controversy about the significance of the negative returns following IPOs and SEOs. Specifically, Mitchell and Stafford (2000) and Brav, Geczy and Gompers (2000) (as summarized by Fama (1998)), argue that the Loughran and Ritter (1995, 1997) findings, which indicate that returns are significantly negative following IPOs and SEOs, are spurious. They argue further that the predictability is eliminated when time-series tests of value-weighted portfolios are used (tests which are not subject to these problems), and also when the returns are evaluated relative to the Fama and French (1993) model benchmark. In response to these arguments, Loughran and Ritter (2000) conclude that, while these value-weighted time-series tests do have appropriate statistical size, they lack statistical power.

Here, we use a more comprehensive measure of issuance and repurchase activity and we provide time-series tests that are not subject to the econometric problems of the earlier Loughran and Ritter tests. Our results, which are strongly statistical significant, are consistent with the timing hypothesis suggested by Loughran and Ritter and others; that is, firms issue equity when expected returns are low and repurchase equity when expected returns are high.

V. A Behavioral Interpretation

Behavioral explanations can also shed light on why returns might be related to past realizations of tangible and intangible information. For example, the psychology literature suggests that individuals react differently to information that is difficult to interpret. Specifically, individuals tend to be more overconfident in settings in which more judgment is required to evaluate information, and feedback on the quality of this judgment is ambiguous in the short run (see, e.g. Einhorn (1980), Griffin and Tversky (1992)). If this is the case, then we might expect investors to put too little weight on tangible information relative to intangible information, and thus to overreact to intangible information.

The distinction between tangible and intangible information may also be related to the Daniel, Hirshleifer, and Subrahmanyam (1998, DHS) distinction between public and private information. Current earnings are publicly disclosed, while more ambiguous information about growth opportunities is at least partially collected (or interpreted) privately by investors. DHS argue that

[24] The tests of the LL conditional CAPM are all run using quarterly rather than monthly regressions. Thus, to make the regression coefficients comparable to those in the monthly regressions, the coefficients should be divided by 3.

investors are overconfident about the precision of their private signals and, therefore, in the long run, they overreact to intangible private information and underreact to tangible public information.[25]

In addition to the results in this paper, there are three additional papers that we know of that find evidence that is consistent with the idea that the distinction between tangible and intangible information has different effects on stock returns. Daniel and Titman (1999) find that the momentum effect is stronger for growth firms than value firms, and interpret this as resulting from the fact that a substantial part of a growth firm's value consists of growth options that must be evaluated subjectively. Also, the evidence in Chan, Lakonishok and Sougiannis (2001) suggests that the book-to-market effect is far stronger among firms with high R&D expenditures, that is, firms for which the information about firm value is largely intangible. Daniel, Hirshleifer, and Subrahmanyam (2001) interpret this evidence as consistent with greater overreaction to intangible than tangible information. Finally, Jiang, Lee and Zhang (2005) consider what they call "information uncertainty" variables and examine their interactions with price and earnings momentum. As proxies for information uncertainty, they use firm age, firm return volatility, average daily turnover, and the duration of a firm's cash flows. In all cases, they find that earnings and price momentum effects are stronger when these proxies suggest higher information uncertainty, in other words, when information about the firm is more intangibile.[26]

To put somewhat more structure on the idea that investors may react differently to tangible and intangible information we explore this idea in a simple model that we describe in an unpublished appendix. Consistent with the behavioral evidence cited earlier, we assume that a risk-neutral investor overestimates the precision of the signal he extracts from intangible information, but properly estimates the precision of the signal extracted from harder tangible information. We show that the empirical implications of the model are consistent with our empirical findings in Section II.

Also, the unreported model illustrates that the implications of the behavioral model are direct analogues of the more traditional risk-based models. For example, risk premia decreasing with favorable intangible information has the same implications as overreaction to intangible information. Moreover, random changes in risk premia, which can also generate our results, provide the same implications as stock prices reacting to pure noise. Although we are not able to directly test our behavioral model, we view it as a plausible alternative to the specific risk-based models that we do test.

[25] The distinction between tangible and intangible information plays less of a role in the model developed by Barberis, Shleifer and Vishny (1998, BSV), which is at least partially motivated by the LSV results. The BSV model is based on the idea that investors misinterpret the pattern of information events, such as earnings announcements. Although their arguments can probably be applied to intangible as well as tangible information signals, their interpretation is presented in terms of investors overreacting to tangible information such as earnings and sales.

[26] Also related is Klibanoff, Lamont and Wizman (1998), who find evidence of overreaction to what they call "salient" information.

VI. Robustness Tests

In this section, we examine the robustness of our results to a number of changes in our experimental design. Specifically, we rerun our tests for large and small firms, for intangible returns and the composite issuance variable calculated over different horizons, for January and non-January months, and finally, for two distinct subperiods. We also examine how the explanatory power of our composite issuance variable compares against simple dummy variables that indicate whether firms issued or repurchased equity in the previous years.

A. Firm Size

To examine whether our results are consistent across firm-size classifications, we divide our sample into size quintiles according to NYSE breakpoints and examine the extent to which our results hold across samples of firms with different market capitalizations.[27] We first replicate the time-series tests of Section III.B for both the largest and the smallest market capitalization quintiles. The results of these time-series regressions are presented and discussed in detail in the unpublished appendices of this paper.[28] The results are generally consistent with the results for the full sample: The small capitalization intangible portfolio returns cannot be explained by the CAPM, but can be largely explained by the Fama and French (1993) three-factor model; the issuance portfolio returns cannot be explained by either of the models. The one difference is that the intangible return effect is not present for the firms with the largest capitalizations whereas the issuance portfolio returns are highly significant even for the largest firms.

B. A Time-Horizon Robustness Check

As a further robustness test, we rerun our primary tests using different time horizons to measure the respective tangible and intangible returns and the composite issuance variables. Specifically, Table VIII replicates the regression reported in Table IV with the fundamental growth, past returns, and issuance variables broken up into the components measured from $t-5$ to $t-3$, and the components from $t-3$ to t. Regression 1 shows that, for composite issuance, it is principally the latter component that explains future returns. Regressions 4, 7, 10, and 13 show that this result continues to hold after controlling for measures of past tangible and intangible returns.

Regressions 2, 5, 8, and 11 show that, for each of our four measures of fundamental growth, both the $(t-5, t-3)$ and the $(t-3, t)$ components of fundamental growth are unrelated to future returns, which is consistent with our earlier findings. The results also show that both the $(t-5, t-3)$ and the $(t-3, t)$ components of past returns forecast future returns, after controlling

[27] We perform this classification as of the end of June of each year, and the classification is maintained through the end of June of the subsequent year.

[28] Available at *http://kent.kellogg.northwestern.edu/*.

Table VIII

Fama–MacBeth Regressions of Returns on Lagged Growth Measures, 1968:07–2003:12

The results presented in this table are almost identical to those shown in Table IV, except that here we decompose the past 5-year return, past composite issuance, and the book, sales, cash flow, and earnings returns into $(t-5, t-3)$ and $(t-3, t)$ values. All coefficients are × 100, and Fama–MacBeth t-statistics are in parentheses.

	Constant	bm_{t-5}	$r^B(t-5, t-3)$	$r^B(t-3, t)$	$r(t-5, t-3)$	$r(t-3, t)$	$\iota(t-5, t-3)$	$\iota(t-3, t)$
1	1.204						−0.256	−1.221
	(4.70)						(−1.65)	(−6.45)
2	1.233	0.125	0.018	−0.080				
	(5.00)	(1.77)	(0.25)	(−0.90)				
3	1.207	0.260	0.308	0.317	−0.382	−0.316		
	(5.34)	(3.12)	(3.73)	(3.09)	(−4.17)	(−2.57)		
4	1.184	0.197	0.237	0.220	−0.307	−0.279	−0.202	−0.899
	(5.16)	(2.59)	(3.08)	(2.17)	(−3.57)	(−2.32)	(−1.60)	(−5.77)
	Constant	sp_{t-5}	$r^S(t-5, t-3)$	$r^S(t-3, t)$	$r(t-5, t-3)$	$r(t-3, t)$	$\iota(t-5, t-3)$	$\iota(t-3, t)$
5	1.076	0.096	0.098	0.139				
	(4.26)	(2.02)	(1.81)	(1.80)				
6	1.069	0.144	0.249	0.332	−0.329	−0.285		
	(4.61)	(2.98)	(4.44)	(4.21)	(−4.23)	(−2.47)		
7	1.079	0.118	0.208	0.196	−0.274	−0.252	−0.235	−0.916
	(4.73)	(2.58)	(3.66)	(2.39)	(−3.70)	(−2.25)	(−1.73)	(−5.56)
	Constant	cp_{t-5}	$r^C(t-5, t-3)$	$r^C(t-3, t)$	$r(t-5, t-3)$	$r(t-3, t)$	$\iota(t-5, t-3)$	$\iota(t-3, t)$
8	1.425	0.094	−0.033	−0.027				
	(6.10)	(1.43)	(−0.74)	(−0.58)				
9	1.920	0.310	0.311	0.195	−0.511	−0.376		
	(8.23)	(3.66)	(4.68)	(3.62)	(−4.73)	(−2.82)		
10	1.758	0.255	0.266	0.169	−0.429	−0.350	−0.274	−0.664
	(7.22)	(3.26)	(4.23)	(3.23)	(−4.25)	(−2.68)	(−2.34)	(−4.51)
	Constant	ep_{t-5}	$r^E(t-5, t-3)$	$r^E(t-3, t)$	$r(t-5, t-3)$	$r(t-3, t)$	$\iota(t-5, t-3)$	$\iota(t-3, t)$
11	1.412	0.085	0.014	0.014				
	(6.07)	(1.31)	(0.35)	(0.34)				
12	1.958	0.283	0.310	0.189	−0.505	−0.343		
	(7.94)	(3.21)	(4.65)	(3.76)	(−4.46)	(−2.51)		
13	1.793	0.234	0.273	0.168	−0.428	−0.324	−0.263	−0.610
	(7.11)	(2.86)	(4.30)	(3.43)	(−4.03)	(−2.42)	(−2.32)	(−4.26)

for fundamental performance and regardless of whether we control for composite issuance. While there is no statistically significant difference between the coefficients on the two components of past returns, the results suggest that, if anything, the $(t-5, t-3)$ component is a slightly stronger predictor of future returns.

C. Seasonal Effects

Both the Debondt and Thaler (1985) return-reversal effect and the book-to-market effect have strong January seasonals. Indeed, prior evidence suggests that there is no reversal effect outside of January. Given this, we expect the results presented in the previous subsections to also differ between January and non-January months. Our unpublished appendices present the regressions from Tables III and IV, estimated separately for January and non-January returns. As anticipated, we find that intangible returns reverse more strongly in January than in February to December. However, while past returns do not forecast future returns outside of January at a statistically significant level, past *intangible* returns do.

One striking difference relative to our other findings is that the January coefficients in the univariate regressions on tangible returns are all significantly negative. In other words, for the month of January, there is strong evidence that firms that have experienced lower fundamental performance over the previous 5 years tend to have higher returns in January. This evidence is consistent with tax loss selling, which depresses the stock prices of past losers in December and allows them to realize higher returns in January regardless of whether their past returns were a result of favorable tangible or intangible information. However, offsetting this effect is the fact that, in the February to December months, the corresponding coefficients are all positive, and close to statistically significant for the sales- and cash flow-based tangible return measures. In addition, the signs on the accounting growth variables are all positive in the multivariate regressions, which is consistent with the hypothesis that January reversals due to tangible returns occur only because of the correlation between fundamental and stock returns, and that in January as well as other months, intangible returns reverse more strongly than tangible returns.

D. Time-Based Subperiod Analysis

We also examine our results for the two non-overlapping subsamples 1968:07 to 1985:06 (204 months) and 1985:07 to 2001:12 (198 months). With one exception, the Fama–MacBeth tests for the subperiods are fully consistent with the full-sample results: Past tangible returns do not forecast future returns at a statistically significant level, while past intangible returns and past composite issuance both do forecast future returns. This is true whether we calculate tangible and intangible returns using sales, cash flow, earnings, or book values, with the exception that the relation between past intangible returns and future returns is insignificant when we use book values.

E. Asymmetry Tests

We also investigate whether there is any asymmetry in the intangible return or composite share issuance effects. Specifically, we examine whether past positive and negative intangible (and tangible) returns forecast future returns differently. If the predictability we observe arises because of mispricing, and short-sale restrictions make it costly for arbitrageurs to eliminate overpricing, such asymmetries might result. However, we find no evidence of any statistically significant asymmetries for either past issuance or past intangible returns. Interestingly, when tangible returns are calculated using cash flow measures, there is marginally significant evidence of a difference for tangible returns, but the relation is slightly stronger for negative past tangible returns, which goes against the short-sale constraints hypothesis.

F. Share Repurchases, Share Issuance, and Composite Issuance

The fact that the composite issuance variable provides reliable forecasts of expected returns is not surprising given the previous literature that documents excess returns following both seasoned equity offerings (SEOs) and share repurchases. In particular, Loughran and Ritter (1997) find that stocks realize significant negative returns following SEOs, and Ikenberry, Lakonishok and Vermaelen (1995) find significant positive post-announcement returns following the share repurchase announcements. In this subsection we examine the extent to which our composite issuance variable captures the forecasting power of SEOs and repurchases.

To evaluate the marginal explanatory power of our composite issuance variable we construct dummy variables that indicate whether or not the firm announced an SEO or a repurchase in each of the preceding years leading up to the portfolio formation date.[29] Given repurchase data availability, we conduct our analysis on stock returns over the period from July 1982 though June 1998.

The results of these regressions are reported in Table IX. Regression 1 shows that both the SEO and repurchase indicators reliably forecast future returns over the above time period. An SEO in the year leading up to portfolio formation ($t - 1$) is negatively associated with future returns, while the announcement of a repurchase is positively associated with future returns, consistent with the results cited earlier. In regressions 2–9, we control for 5-year tangible and intangible returns and composite issuance. For some specifications of intangible returns, the SEO indicator variables are no longer statistically significant at the 5% level. However, the $t - 2$ repurchase indicator variable remains statistically significant for all specifications. In addition, the coefficient on our composite issuance variable remains highly significant, with a t-statistic in the range of 3.5–5, depending on the precise specification.[30]

There are several possible reasons why the composite issuance variable continues to have forecasting power in the presence of these indicator variables. First, composite issuance is a "catch-all" measure of all forms of issuance and repurchase. Perhaps, by including sources of new equity (e.g., the conversion

[29] We thank Jay Ritter and David Ikenberry for supplying us with their databases of SEO announcements (see Loughran and Ritter (1997)) and repurchase announcements (see Ikenberry et al. (1995)). The SEO database contains the announcement dates for all 8,425 CRSP-listed firms that conduct SEOs between January 1970 and September 2001, excluding utilities and pure secondary offerings. The repurchase database contains the announcement dates for all 5,730 CRSP-listed firms that announce a repurchase program between January 1980 and December 30, 1996. We match these two databases to our merged CRSP-COMPUSTAT data by CRSP PERMNO.

In the 1980 to 1986 period, after the imposition of our screens (see the Appendix), our sample contains a total of 5,143 SEOs and 5,650 repurchase programs.

[30] Most of the variation in this t-statistic arises because of different screens rather than different measures of intangible returns. For example, when we include cash flow return in the regression, we exclude firms with negative cash flows in fiscal years $t - 6$ or $t - 1$.

Table IX

Fama–MacBeth Regressions with SEO and Repurchase Indicator Varibles

This table presents the results of a set of Fama-MacBeth regressions of individual stock returns on a set of ex ante forecasting variables. The variables are (1) the tangible and intangible returns relative to book value, sales, cash flow, and earnings over the period from $t-5$ through t, as described earlier; (2) composite share issuance from $t-5$ through t; and (3) dummy variables that are equal to one if the firm announces an SEO or a repurchase program in the period from July of year $t-1$ through June of year t (labeled $t-1$), or in the period from July of year $t-2$ through June of year $t-1$ (labeled $t-2$). All coefficients are $\times$ 100. The time period is 1982:07–1998:06. Fama–MacBeth t-statistics are shown in parentheses

					Indicator Variables			
					SEO		Repurchase	
Regression Number	Constant	$r^{T(BV)}$	$r^{I(BV)}$	ι	$t-1$	$t-2$	$t-1$	$t-2$
1	1.507				−0.461	−0.261	0.133	0.273
	(4.87)				(−3.17)	(−1.85)	(1.56)	(3.51)
2	1.295	0.233	−0.194		−0.383	−0.265	0.133	0.273
	(3.84)	(2.55)	(−1.94)		(−2.91)	(−1.91)	(1.59)	(3.53)
3	1.318	0.148	−0.159	−0.665	−0.205	−0.056	0.095	0.213
	(3.97)	(1.76)	(−1.66)	(−5.19)	(−1.72)	(−0.46)	(1.14)	(2.77)
	Constant	$r^{T(SLS)}$	$r^{I(SLS)}$	ι	$t-1$	$t-2$	$t-1$	$t-2$
4	0.966	0.649	−0.221		−0.403	−0.193	0.130	0.282
	(3.07)	(5.34)	(−2.56)		(−2.97)	(−1.48)	(1.57)	(3.59)
5	1.037	0.523	−0.201	−0.508	−0.269	−0.041	0.100	0.236
	(3.47)	(4.18)	(−2.41)	(−3.81)	(−2.20)	(−0.36)	(1.21)	(3.02)
	Constant	$r^{T(CF)}$	$r^{I(CF)}$	ι	$t-1$	$t-2$	$t-1$	$t-2$
6	1.417	0.130	−0.288		−0.365	−0.206	0.069	0.255
	(4.48)	(1.61)	(−2.66)		(−2.84)	(−1.61)	(0.86)	(3.22)
7	1.411	0.086	−0.254	−0.534	−0.229	−0.050	0.041	0.211
	(4.46)	(1.11)	(−2.44)	(−3.96)	(−1.94)	(−0.43)	(0.50)	(2.65)
	Constant	$r^{T(ERN)}$	$r^{I(ERN)}$	ι	$t-1$	$t-2$	$t-1$	$t-2$
8	1.384	0.203	−0.297		−0.349	−0.230	0.072	0.269
	(4.35)	(2.37)	(−2.72)		(−2.64)	(−1.84)	(0.89)	(3.41)
9	1.375	0.163	−0.268	−0.507	−0.218	−0.082	0.044	0.227
	(4.32)	(1.95)	(−2.56)	(−3.80)	(−1.79)	(−0.73)	(0.54)	(2.89)

of convertible debt and the exercise of executive stock options) that are not included in the SEO sample, the composite issuance variable more accurately captures the extent to which management believes their firm is under- or over-valued. Second, the composite issuance variable measures the magnitude of the issuance/repurchase.

However, these results suggest that it is *not* the case that the composite issuance variable fully captures the effect of all forms of issuance on future returns. Indeed, the SEO and repurchase indicator variables have independent explanatory power in the Fama–MacBeth regressions. The significance of these variables suggests that the decision to issue or repurchase equity contains some information that is independent of the magnitude of the transaction.

VII. Conclusions

There are a number of ways to decompose the information that moves stock prices. For example, Campbell (1991) decomposes stock returns into a component that reflects information about cash flows, and a second component that reflects information about discount rates. In this paper we suggest an alternative decomposition. Specifically, we denote the information about a firm's past and current performance that is described in its accounting statements as *tangible information*, because such information is relatively concrete. All other information, which is by definition orthogonal to the tangible information, we refer to as *intangible information.*

We find that this decomposition is useful for helping us think about empirical regularities discussed in the literature. For example, previous explanations of the reversal effect and the book-to-market effect focus on the idea that stock returns are negatively related to past performance. Risk-based explanations posit that risk premia are associated with past realizations of performance, for example, that high book-to-market firms are "distressed" in some fundamental sense, and they therefore enjoy high risk premia. Behavioral explanations posit that investors overreact to information about a firm's recent performance (e.g., its sales or earnings growth).

Our empirical evidence is inconsistent with these explanations. Specifically, we find no significant cross-sectional relation between our past performance measures and future stock returns. Rather, we find that the book-to-market and reversal effects arise because future returns are cross-sectionally related to past realizations of intangible information, that is, to that component of past returns that cannot be explained by tangible information about past performance.

The fact that we see intangible return reversals and not tangible return reversals is consistent with several other results in the literature. For example, Fama and French (1996) show that the Debondt and Thaler (1985) reversal effect is subsumed by the book-to-market effect. We show that this is true because only intangible returns reverse, and the book-to-market ratio is a good proxy for past intangible returns. Furthermore, there is no return reversal outside of January, while the book-to-market effect is present in all months. Consistent with this, we show that intangible return reversals occur even outside of January.

In addition, we investigate the relation between a firm's *composite issuance* and its future stock returns. There are at least two reasons why the composite issuance measure is likely to be related to the realization of intangible information. The first is that managers are likely to issue equity to fund growth opportunities, and the second is that managers are more likely to issue equity subsequent to a decline in the perceived cost of equity. In both cases, the equity issue is triggered by information that we classify as intangible. Empirically, we find that composite issuance is strongly negatively related to future returns, even after controlling for past intangible returns. This provides further evidence that is consistent with a negative association between realizations of intangible information and future returns.

The predictive power of our composite issuance variable explains the discrepancy between our results and those of Lakonishok et al. (1994, LSV). LSV present evidence that investors overreact to past sales growth rates. We show that the difference between the LSV sales growth variable and ours is that we measure growth on a per-dollar-invested basis, while LSV measure the overall firm's *total* sales growth. Mathematically, total (log) sales growth is equal to our measure plus composite share-issuance. Thus, firms that issue shares, undertake share-based acquisitions, or compensate their employees with stock options may realize large total sales growth while not obtaining a high sales return. We show that only firms that grow via share issuance experience negative future returns.

Our finding that future returns are related to past intangible returns and past issuance, but not (significantly) to past tangible returns, is potentially consistent with standard risk-based models. In the language of the Campbell (1991) decomposition, intangible returns and issuance may proxy primarily for changes in discount rates, whereas tangible returns may reflect changes in future cash flows. Thus, the rational expectations interpretation of these results is that changes in expected returns are uncorrelated with the accounting-based performance measures we use here. This negative relation between past intangible returns and future returns arises because discount rate increases result in negative intangible returns. Similarly, issuance is a proxy for discount rate news.

An additional implication of such a model is that the covariance between a firm's realized returns and marginal utility changes decreases following positive intangible returns and issuance, that is, intangible returns render firms less risky for investors. We show that a CAPM-based test of this implication fails. Specifically, market betas increase when intangible returns are high, which is the opposite of what one would expect from the risk-based stories. Of course, the market returns may be a poor proxy for investors' changes in marginal utility.

The Fama and French (1993) HML factor beta, which is designed to explain the book-to-market effect, does increase with negative realizations of intangible information, which is consistent with our evidence, but fails to explain the positive returns associated with our composite issuance variable. Finally, we find that the risk factor introduced by Lettau and Ludvigson (2001) fails to explain the excess returns associated with either variable. Future rational expectations-based models may very well explain our results, but such models will have to show how stock returns covary with priced risk factors such that the risk and expected returns decline upon a realization of positive intangible information or when firms issue equity, but that they be relatively unrelated to the realization of tangible information.

Behavioral theories may offer another avenue for explaining these results. There is substantial evidence from the psychology literature that individuals are overconfident about their abilities, and as a result, tend to overestimate the quality of information signals they generate about security values. The psychology literature also suggests that the degree to which individuals are overconfident depends on the situation. In particular, individuals tend to be more overconfident about their ability to evaluate information that is relatively vague, that is, information that we classify as intangible. As a result, there is likely to be more evidence of overreaction to intangible information, which is consistent with our finding that favorable intangible information about a stock is followed by lower than average subsequent returns.

Alternatively, it is possible that our results arise because of price changes that are essentially self-generated. For example, it is plausible that small movements in stock prices, generated by relatively minor liquidity events, can snowball into major price moves if the original price move attracts the interest of momentum investors and analysts who develop "stories" to explain the price move (see, e.g, DeLong, Shleifer et al. (1990)).[31] This would lead to over- or underpricing, which would later be reversed.

Although these behavioral explanations are plausible, they also raise questions that are difficult to answer. For example, if our results were generated because of behavioral biases, we would expect the intangible returns and the composite issuance effects to arise much more strongly among smaller stocks, which are more difficult to arbitrage. We find that this is indeed the case for the intangible returns effect, but not for the issuance effect.

Up to this point, we define intangible information by what it is not, namely we define it as information that is orthogonal to the tangible information that appears on a firm's accounting statements. An interesting avenue for future research would be to explicitly identify sources of intangible information that lead to overreaction. We conjecture that this is information that is related to firms' growth opportunities. In particular, it may be the case that investors overestimate the precision of relatively nebulous information about future growth opportunities, and as a result, tend to overreact to the information. Unfortunately, testing this possibility is likely to be difficult since, almost by definition, it is difficult to identify and characterize this nebulous information.

[31] DeLong et al. (1990) remark that Soros's trading strategies around the conglomerate boom appear similar to positive feedback trading strategies of the following sort:

> The truly informed investment strategy in this case, says Soros, was not to sell short in anticipation of the eventual collapse of conglomerate shares (for that would not happen until 1970) but instead to buy in anticipation of further buying by uninformed investors. The initial price rise in conglomerate stocks, caused in part by purchases by speculators like Soros, stimulated the appetites of uninformed investors *since it created a trend of increasing prices and allowed conglomerates to report earnings increases through acquisitions.* [emphasis added]

Appendix: Data Construction

We use CRSP data for stock prices and returns. We use the merged COMPUSTAT annual data (supplied by CRSP) for all accounting information, and for the number of shares. To merge the CRSP and COMPUSTAT data, we use CRSPLink, as updated by Ken French.

To obtain shareholders' equity we use, when not missing, stockholders' equity (item 216). If it is missing, we use Total Common Equity (item 60) plus Preferred Stock Par Value (item 130) if both of these are present. Otherwise, we use Total Assets (item 6) minus Total Liabilities (item 181), if both are present. If none of these yield a valid shareholders' equity measure, we treat shareholders' equity as missing for this firm year.

To obtain book equity, we subtract from shareholders' equity the preferred stock value, where we use redemption value (item 56), liquidating value (item 10), or carrying value (item 130), in that order, as available. If all of the redemption, liquidating, or par values are missing from COMPUSTAT, then we treat the book equity value as missing for that year. Finally, if not missing, we add to this value balance sheet deferred taxes (item 35) and subtract off the FASB106 adjustment (item 330).

Our measure of earnings is income before extraordinary items (item 18), and our sales measure is the COMPUSTAT sales (item 12). These two definitions are consistent with those of Lakonishok et al. (1994). Our cash flow measure is income before extraordinary items minus the share of depreciation that can be allocated to (after-interest) income, plus any deferred taxes, that is:

$$\mathrm{CF} = \mathrm{INC} + \mathrm{DEPR} \times \left(\frac{\mathrm{ME}}{\mathrm{Assets} - \mathrm{BE} + \mathrm{ME}}\right) + \mathrm{DFTX},$$

where INC is income before extraordinary items, DEPR is depreciation from COMPUSTAT (item 14), Assets is total assets (item 6), and DFTX is deferred taxes (item 50). ME is market equity based on COMPUSTAT values. Specifically, it is the number of shares from COMPUSTAT (item 25) times the share price (item 199). BE is the corresponding book equity, as defined above.

REFERENCES

Asness, Clifford S., 1995, The power of past stock returns to explain future stock returns, Working paper, University of Chicago.

Baker, Malcolm, and Jeffrey Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57, 1–32.

Barberis, Nicholas, Andrei Shleifer, and Robert Vishny, 1998, A model of investor sentiment, *Journal of Financial Economics* 49, 307–343.

Berk, Jonathan, Richard C. Green, and Vasant Naik, 1999, Optimal investment, growth options, and security returns, *Journal of Finance* 54, 1553–1607.

Bernard, Victor L., and Jacob K. Thomas, 1989, Post-earnings-announcement drift: Delayed price response or risk premium? *Journal of Accounting Research, Supplement* 27, 1–48.

Brav, Alon, Christoper Geczy, and Paul A. Gompers, 2000, Is the abnormal return following equity issuances anomalous? *Journal of Financial Economics* 56, 209–249.

Campbell, John Y., 1991, A variance decomposition for stock returns, *Economic Journal* 101, 155–173.

Chan, Louis K.C., Josef Lakonishok, and Theodore Sougiannis, 2001, The stock market valuation of research and development expenditures, *Journal of Finance* 56, 2431–2456.

Cochrane, John H., 2000, *Asset Pricing* (Princeton University Press, NJ).

Daniel, Kent D., David Hirshleifer, and Avanidhar Subrahmanyam, 1998, Investor psychology and security market under- and over-reactions, *Journal of Finance* 53, 1839–1886.

Daniel, Kent D., David Hirshleifer, and Avanidhar Subrahmanyam, 2001, Overconfidence, arbitrage, and equilibrium asset pricing, *Journal of Finance* 56, 921–965.

Daniel, Kent D., and Sheridan Titman, 1997, Evidence on the characteristics of cross-sectional variation in common stock returns, *Journal of Finance* 52, 1–33.

Daniel, Kent D., and Sheridan Titman, 1999, Market efficiency in an irrational world, *Financial Analysts' Journal* 55, 28–40.

DeBondt, Werner F. M., and Richard H. Thaler, 1985, Does the stock market overreact? *Journal of Finance* 40, 793–808.

DeBondt, Werner F. M., and Richard H. Thaler, 1987, Further evidence on investor overreaction and stock market seasonality, *Journal of Finance* 42, 557–581.

DeBondt, Werner F. M., and Richard H. Thaler, 1995, Financial decision-making in markets and firms: A behavioral perspective, in Robert A. Jarrow, Voijslav Maksimovic, and William T. Ziemba, eds.: *Finance, Handbooks in Operations Research and Management Science*, vol. 9, chap. 13, pp. 385–410 (North Holland, Amsterdam).

DeLong, J. Bradford, Andrei Shleifer, Lawrence Summers, and Robert J. Waldmann, 1990, Positive feedback investment strategies and destabilizing rational speculation, *Journal of Finance* 45, 375–395.

Einhorn, Hillel J., 1980, Overconfidence in judgment, New Directions for Methodology of Social and Behavioral Science 4, 1–16.

Fama, Eugene F., 1998, Market efficiency, long-term returns and behavioral finance, *Journal of Financial Economics* 49, 283–306.

Fama, Eugene F., and Kenneth R. French, 1992, The cross-section of expected stock returns, *Journal of Finance* 47, 427–465.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3–56.

Fama, Eugene F., and Kenneth R. French 1995, Size and book-to-market factors in earnings and returns, *Journal of Finance* 50, 131–156.

Fama, Eugene F., and Kenneth R. French, 1996, Multifactor explanations of asset pricing anomalies, *Journal of Finance* 51, 55–84.

Fama, Eugene F., and Kenneth R. French, 1997, Industry costs of equity, *Journal of Financial Economics* 43, 153–193.

Fama, Eugene F., and James MacBeth, 1973, Risk, return and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607–636.

Griffin, Dale, and Amos Tversky, 1992, The weighing of evidence and the determinants of overconfidence, *Cognitive Psychology* 24, 411–435.

Hovakimian, Armen, Tim Opler, and Sheridan Titman, 2001, The debt-equity choice, *Journal of Financial and Quantitative Analysis* 36, 1–24.

Ikenberry, David, Josef Lakonishok, and Theo Vermaelen, 1995, Market underreaction to open market share repurchases, *Journal of Financial Economics* 39, 181–208.

Jiang, Guohua, Charles M. C. Lee, and Grace Y. Zhang, 2005, Information uncertainty and expected returns, *Review of Accounting Studies* 10, 185–221.

Klibanoff, Peter, Owen Lamont, and Thierry A. Wizman, 1998, Investor reaction to salient news in closed-end country funds, *Journal of Finance* 53, 673–699.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, Contrarian investment, extrapolation and risk, *Journal of Finance* 49, 1541–1578.

Lettau, Martin, and Sydney Ludvigson, 2001, Resurrecting the (C)CAPM: A cross-sectional test when risk premia are time-varying, *Journal of Political Economy* 109, 1238–1287.

Loughran, Tim, and Jay Ritter, 1995, The new issues puzzle, *The Journal of Finance* 50, 23–52.

Loughran, Tim, and Jay Ritter, 1997, The operating performance of firms conducting seasoned equity offerings, *The Journal of Finance* 52, 1823–1850.

Loughran, Tim, and Jay Ritter, 2000, Uniformly least powerful tests of market efficiency, *Journal of Financial Economics* 55, 361–389.

Mitchell, Mark, and Erik Stafford, 2000, Managerial decisions and long-term stock price performance, *Journal of Business* 73, 287–320.

Pontiff, Jeffrey, and Artemiza Woodgate, 2003, Shares outstanding and cross-sectional returns, Working paper, Boston College.

Rendleman, Richard J., Charles P. Jones, and Henry A. Latane, 1982, Empirical anomalies based on unexpected earnings and the importance of risk adjustment, *Journal of Financial Economics* 10, 269–287.

Vuolteenaho, Tuomo, 2002, What drives firm level stock returns? *Journal of Finance* 57, 233–264.