

Market Reactions to Tangible and Intangible Information Revisited

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ABSTRACT

Daniel and Titman (2006) propose that the value premium is due to investors overreacting to intangible information. They therefore decompose five-year changes in firms' book-to-market ratios into stock returns and a residual that is a proxy for tangible information based on accounting performance ("book returns"). Consistent with investors overreacting to intangible information, they find that only stock returns orthogonal to book returns reverse. We show that their decomposition creates a book return polluted by past book-to-market ratios, stock returns, net issuances, and dividends. Empirically, two-fifths of the variation in book returns is due to these factors. In addition, the Daniel and Titman (2006) result is sensitive to methodological choices. When we use the change in the book value of equity as a proxy for tangible information, only the tangible component of stock returns reverses. Moreover, current book-to-market subsumes the intangible return's power to predict the cross-section of average returns, which casts doubt on the argument that book-to-market forecasts returns because it is a good proxy for the intangible return.

Keywords: Value premium, Return reversals, Overreaction.

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1 Introduction

Why do firms with high book-to-market ratios earn higher returns than firms with low book-to-market ratios? De Bondt and Thaler (1985) and Lakonishok *et al.* (1994) propose that the value premium is due to return reversals caused by investors overreacting to firm performance. In contrast, Fama and French (1996) suggest that value firms earn higher returns because of their exposure to some priced systematic risk factor, such as distress risk.

Daniel and Titman (2006) posit that the value premium is due to investors overreacting to intangible information. They therefore decompose five-year changes in book-to-market ratios into stock returns and a residual that is a proxy for tangible information based on accounting performance (“book returns”). That is, their decomposition has the following identity:

$$\underbrace{dbm(t, t-5)}_{\text{change in log-BE/ME}} \equiv \underbrace{r^B(t, t-5)}_{\text{book return}} - \underbrace{r(t, t-5)}_{\text{stock return}}. \quad (1)$$

Consistent with their thesis, they find that it is only when stock prices move in response to intangible information—the return component orthogonal to book returns, obtained by regressing stock returns on book return and lagged book-to-market—that returns reverse. They conclude that the book-to-market ratio forecasts returns because it is a good proxy for the intangible return.

Changes in book-to-market ratios cannot be decomposed into book and stock returns. A simple example illustrates the problem. Suppose a firm has \$1 in book value of equity and \$2 in market value of equity, and so its book-to-market ratio is $1/2$. If the firm now issues \$1 worth of additional equity, both the book and market values of equity increase by \$1, and the book-to-market ratio increases to $2/3$. Because the Daniel-Titman decomposition factors out stock returns—which are neutral with respect to net issuances and dividends—from changes in the book-to-market ratio, book return captures this increase in full by being distorted upward by $\log(2/3) - \log(1/2) \approx 29\%$.

We show that book return combines return-on-equity with a nonlinear bundle of past book-to-market ratios and contemporaneous stock returns, net issuances, and dividends. This problem occurs because changes in market and book values of equity are additive and not multiplicative when

firms pay dividends or issue or retire equity. Hence, it is not possible to factor out stock returns from changes in the book-to-market ratio without creating a book return correlated with past book-to-market ratios, stock returns, net issuances, and dividends.

A cross-sectional regression of the book return on the return on equity measures the approximation error in book returns. For the Daniel-Titman decomposition to hold, such a regression should have an R^2 of one. Instead, we find an average R^2 is 0.57, implying that two-fifths of the cross-sectional variation in book returns is due to the approximation error induced by factoring out stock returns from changes in the book-to-market ratio. These results are not surprising given that firms rarely conform to the model under which the Daniel-Titman decomposition would hold. A majority of firms issue or repurchase equity or pay dividends during the typical five-year period, thereby introducing approximation error into book returns.

How big is the approximation error if we view book return as being equal to the return on equity plus noise?

$$r^B(t, t - 5) = \text{roe}(t, t - 5) + \text{approximation error.} \quad (2)$$

Among growth firms—the lowest quintile of firms in the BE/ME distribution—the average five-year return on equity is 0.77, the average approximation error is -0.15 , and the standard deviations of return on equity and the approximation error are 0.71 and 0.60. Among value firms the average five-year return on equity is 0.33, the average approximation error is 0.08, and the standard deviations are 0.40 and 0.32. These numbers show, first, that the average approximation error flips sign as we move from growth to value and, second, that the standard deviation of the approximation error nearly equals that of the return on equity.

To illustrate the importance of net issuances and dividends in the evolution of book-to-market ratios, we decompose changes in the book-to-market ratio into changes in the book and market values of equity. Among all-but-microcaps, net issuances and dividends explain one-third of the cross-sectional variation in changes in the book value of equity, and one-quarter of the variation in changes in the market value of equity. These sources of variation are important in return regressions. Without a control for net issuances, changes in the book value of equity barely correlate with future returns. The reason is that the book value of equity can increase either because the firm is profitable or because it issues new equity. But

profitable firms have high returns and firms issuing equity have low returns. Therefore, changes in the book value of equity *alone* are not informative about future returns.

The approximation error in book returns makes Daniel and Titman's projection of stock returns on book returns ill-suited for delineating between tangible and intangible returns. Even in an economy in which accounting performance is fully disconnected from firm valuations, stock returns *are* correlated with book returns in the Daniel and Titman (2006) decomposition. Furthermore, net issuances and dividends are counted as book returns, and their signs depend on whether a firm is classified as value or growth. If a growth firm, for example, issues equity, this action shows up as a high book return. That is, the firm appears to have good tangible performance just because it issued equity. Value firms that issue equity, in contrast, look worse than their peers that do not issue equity. Given that book returns are substantially polluted, cross-sectional differences in book returns have little economic content and provide no insight into the source of the value premium.

The Daniel and Titman (2006) decomposition is appealing because of the chain of arguments it could, in theory, sustain. Under this line of arguments, in return regressions the decomposition could replace today's book-to-market ratio with the lagged book-to-market ratio and the book and stock returns. By doing so, the decomposition could seemingly trace book-to-market's forecasting power back to the component of stock returns that is orthogonal to tangible information, book return. But this chain of arguments breaks down because book return is a flawed proxy for tangible information. Using a different proxy for tangible information will not fix this problem because such a switch would break the identity "stock returns + *something* = total change in the book-to-market ratio." The return regressions could then no longer be interpreted as being about why *book-to-market* correlates with future returns.

Questions regarding the effects of tangible and intangible information are interesting but difficult to resolve empirically. We show that the data are at odds with the argument that book-to-market predicts returns because "it is a good proxy for the intangible return" (Daniel and Titman 2006, p. 1605). Current book-to-market fully subsumes the intangible-return proxy's ability to predict the cross-section of average returns. This analysis suggests that book-to-market does not predict future returns because it is a good proxy for the intangible return. Instead, it appears that the intangible

return is a good proxy for the current book-to-market ratio. It also suggests that there is more to book-to-market's predictive power than its correlation with what Daniel and Titman (2006) call the intangible return. We also show that Daniel and Titman's (2006) conclusions reverse when we change the tangible-information proxy from book return to the change in the book value of equity. Under this specification the *tangible* returns reverse. We do not suggest that this is the correct conclusion. Rather, we view it as an example of the difficulty in separating the effects of tangible and intangible information.

2 Daniel and Titman (2006) Decomposition

Daniel and Titman (2006) decompose the change in the book-to-market ratio into stock return and book return components. They describe the book return as “what the (log) book value of your shares would be today had you purchased \$1 dollar worth (at its book value) of this stock τ years ago” (p. 1612).

In their decomposition the log-book-to-market ratio at time t equals the log-book-to-market ratio at time $t - \tau$ plus the book return component minus the stock return with dividends reinvested:

$$bm_t = bm_{t-\tau} + r^B(t - \tau, t) - r(t - \tau, t). \quad (3)$$

Daniel and Titman (2006, footnote 10) note that even though they derive this expression by working on a per-share basis, $r^B(t - \tau, t)$ can be backed out from this equation by plugging in the current and lagged book-to-market ratios and stock returns.

We start by assuming that firms (1) do not pay dividends, (2) do not issue stock, and (3) do not repurchase equity. In the absence of these corporate events, under clean surplus accounting, the change in the book value of equity is solely due to net income. In this world the book-to-market ratio at time t equals

$$\frac{BE_t}{ME_t} = \frac{BE_{t-1} + NI_t}{ME_{t-1}(1 + r_t^x)} = \frac{BE_{t-1}(1 + roe_t)}{ME_{t-1}(1 + r_t^x)}, \quad (4)$$

in which NI_t is the net income in period t and r_t^x is the stock return without dividends. Although the firm in this example does not pay dividends, we

distinguish between r_t (return with dividends) and r_t^x (return without dividends) to fix the notation for the general setting. Taking logs, we get

$$bm_t = bm_{t-1} + \log(1 + roe_t) - \log(1 + r_t^x). \quad (5)$$

This expression conforms to Daniel and Titman's decomposition—the log-return-on-equity $\log(1 + roe_t)$ represents the book return, $r^B(t-1, t)$.

2.1 *The Effects of Dividends and Net Issuances*

When a firm pays a dividend, the company's book and market values of equity decrease by the dollar amount of the dividend. Similarly, when firms issue or retire equity, both the book and market values of equity increase or decrease by the amount of the net issuance. If the market value of equity does not change by the full amount of the dividend or issuance, the stock return captures the difference.

Because the Daniel and Titman decomposition factors out total stock returns from the change in the book-to-market ratio, the book return term subsumes the effects of net issuances and dividends. At the heart of the problem is the fact that the book-to-market ratio is not neutral with respect to these corporate events. For example, if a firm with a book-to-market ratio less than one issues equity, then both book and market values of equity increase and the book-to-market ratio increases towards one and, as a consequence, the firm's book return is distorted upwards. But if the firm's book-to-market ratio is above one, the book-to-market ratio decreases towards one and the book return is distorted downwards. The effect of dividends is the same except for the additional complication—which we detail below—that Daniel and Titman factor out stock returns with dividends reinvested.

Dividends and net issuances prevent decomposing book-to-market ratios the way Daniel and Titman (2006) suggest, because dividends and net issuances are additive, not multiplicative. The Daniel-Titman decomposition in effect takes logs of sums. When firms issue stock or pay dividends, these actions affect both the book and market values of equity by the same *dollar amount*; it would only be if these amounts were the same *proportion* of both the book and market values of equity that they would not affect the book-to-market ratio.

We assume that the company pays a dividend of D_t dollars at the end of the period and issues (or retires) I_t dollars worth of equity— I_t is positive

if the firm issues equity and negative if it repurchases shares. Without loss of generality, we examine just one time period. Adding more time periods either before or after the issuance and dividend periods does not affect the result. Now the firm's book-to-market ratio at time t equals

$$\frac{BE_t}{ME_t} = \frac{BE_{t-1}(1 + roe_t) + I_t - D_t}{ME_{t-1}(1 + r_t^x) + I_t - D_t}. \quad (6)$$

The problem is that we *cannot* factor out $\frac{BE_{t-1}(1+roe_t)}{ME_{t-1}(1+r_t)}$ from the expression on the right-hand side because of the additive-versus-multiplicative problem. We can, however, pull this expression out from (6) to identify the $r^B(t-1, t)$ in Daniel and Titman's decomposition:

$$\begin{aligned} \frac{BE_t}{ME_t} &= \frac{BE_{t-1}(1 + roe_t)}{ME_{t-1}(1 + r_t)} \left(1 + \frac{I_t - D_t}{BE_{t-1}(1 + roe_t)} \right) \frac{ME_{t-1}(1 + r_t^x + d_t)}{ME_{t-1}(1 + r_t^x) + I_t - D_t} \\ &= \frac{BE_{t-1}(1 + roe_t)}{ME_{t-1}(1 + r_t)} \left(1 + \frac{i_t - d_t}{\frac{BE_{t-1}}{ME_{t-1}}(1 + roe_t)} \right) \frac{1 + r_t^x + d_t}{1 + r_t^x + i_t - d_t}, \end{aligned} \quad (7)$$

where $d_t = D_t/ME_{t-1}$ is the dividend yield, $i_t = I_t/ME_{t-1}$ is the net-issuance yield, and $r_t = r_t^x + d_t$ is the stock return with dividends. Taking logs from both sides,

$$bm_t = bm_{t-1} + \log(1 + roe_t) - \log(1 + r_t) \quad (8)$$

$$+ \log\left(\frac{BE_{t-1}}{ME_{t-1}}(1 + roe_t) + i_t - d_t\right) - bm_{t-1} \quad (9)$$

$$- \log(1 + roe_t) + \log\left(\frac{1 + r_t^x + d_t}{1 + r_t^x + i_t - d_t}\right)$$

$$= bm_{t-1} - \log(1 + r_t) + \log\left(\frac{BE_{t-1}}{ME_{t-1}}(1 + roe_t) + i_t - d_t\right) \quad (10)$$

$$- bm_{t-1} + \log\left(\frac{1 + r_t^x + d_t}{1 + r_t^x + i_t - d_t}\right).$$

Matching this expression to the Daniel-Titman decomposition in equation (3), the book return equals

$$r^B(t-1, t) = \log\left(\frac{BE_{t-1}}{ME_{t-1}}(1 + roe_t) + i_t - d_t\right) - bm_{t-1} + \log\left(\frac{1 + r_t^x + d_t}{1 + r_t^x + i_t - d_t}\right). \quad (11)$$

If $i_t = d_t = 0$, then (11) collapses to $r^B(t-\tau, t) = \log(1 + \text{roe}_t)$. But in other cases the decomposition is polluted because the book return is a nonlinear function of the lagged book-to-market ratio and the contemporaneous stock return.

It is important to point out that this problem occurs regardless of whether book-to-market ratios are decomposed on a per-share or total-value basis. To understand why, note that the end result of Daniel and Titman's (2006) decomposition is an expression that equates the change in the book-to-market ratio to the difference between book and stock returns. That is, if we have equation (1) and we are then given the values of $r(t-5, t)$ and $dbm(t-5, t)$ (which are the same on a per share and total value basis), it is only a matter of solving for $r^B(t-5, t)$. The route (per share or total value) by which we travel to derive equation (1) is irrelevant.

2.2 *The Relations Between Book Returns, Returns on Equity, Net Issuances, Dividends, and Stock Returns*

We next illustrate how book returns depend on returns on equity, net issuance, dividends, and stock returns. Moreover, we show that these relations differ for value and growth firms.

Equation (11) indicates that the marginal effect of an increase in the log-return on equity on the book return (which is expressed in logs) is

$$\frac{\partial}{\partial \log(1 + \text{roe}_t)}(r^B(t-1, t)) = \frac{1}{1 + \frac{\text{ME}_{t-1}}{\text{BE}_{t-1}} \frac{i_t - d_t}{1 + \text{roe}_t}}. \quad (12)$$

If $i_t = d_t = 0$, the book return moves one-to-one with the log-return on equity. If, however, firms issue equity, then the relation between the book return and the return on equity is weaker among firms with low book-to-market ratios (growth firms) than among firms with high book-to-market ratios (value firms).

The book return is increasing in net issuances if

$$\frac{\partial}{\partial \log(1 + i_t)}(r^B(t-1, t)) > 0 \quad \Rightarrow \quad \frac{\text{BE}_{t-1}(1 + \text{roe}_t)}{\text{ME}_{t-1}(1 + r_t^x)} < 1. \quad (13)$$

If a firm's book-to-market ratio before it issues equity is less than one, its book-to-market ratio increases towards one as the firm issues equity, and if the book-to-market ratio is above one, the ratio decreases towards one.

That is, a growth firm issuing equity will earn a high book return relative to otherwise identical firms that do not issue equity. A value firm, in contrast, lowers its book return by issuing equity. The case of firms retiring equity can be treated by setting $i_t < 0$, which flips the sign of the distortion term. For example, a growth firm that repurchases equity has a higher book return than an otherwise identical firm that does nothing.

The condition for when the book return is increasing in d_t is not as clean as it is for i_t but if $\text{roe}_t = r_t^x = i_t = 0$, then the book return is increasing in d_t (for the first dollar of dividends paid) if the firm's book-to-market ratio is greater than one-half. That is, if a growth firm with a book-to-market ratio less than one-half pays a dividend, this dividend decreases the book return. The reason for this seemingly odd cutoff is that Daniel and Titman factor out stock returns *with dividends* from the change in the book-to-market ratio. The market value of equity decreases as dividends are paid, but then the Daniel-Titman decomposition pulls out dividends from the market value of equity for a second time.

The condition when the book return is increasing in without-dividends stock returns is

$$\frac{\partial}{\partial \log(1 + r_t^x)}(r^B(t-1, t)) > 0 \Rightarrow i_t > 2d_t. \quad (14)$$

That is, when firms issue equity but do not pay dividends, the book return is increasing in the stock return; if they repurchase equity, the book return is decreasing in the stock return; and if firms do not issue or repurchase equity but pay dividends, then the book return is decreasing in the stock return.

The mechanical effects of net issuances, dividends, and stock returns are undesirable if $r^B(t-5, t)$ is to measure firms' accounting-based performance. This definition of book return does not align with Daniel and Titman's thought experiment of how well \$1 invested in the firm's book equity would perform. The more natural definition—the return on equity—is neutral with respect to dividends, issuances, and share repurchases in the same way as stock return is neutral with respect to these events.

2.3 Decompositions of Other Price-scaled Variables

Daniel and Titman (2006) use similar decompositions to generate additional proxies for tangible information. For example, they decompose the

sales-to-price ratio as

$$sp_t = sp_{t-\tau} + r^S(t - \tau, t) - r(t - \tau, t), \quad (15)$$

where $r(t - \tau, t)$ is the stock return with dividends reinvested and $r^S(t - \tau, t)$ is a book return-like construct. Even though sales do not adjust one-to-one in response to net issuances and dividends, this decomposition faces the same problem as the book-to-market ratio decomposition. In the same one-period setting as above with end-of-period net issuances and dividends, a firm's sales-to-price ratio evolves according to

$$\frac{\text{Sales}_t}{\text{ME}_t} = \frac{\text{Sales}_{t-1}(1 + r_t^S)}{\text{ME}_{t-1}(1 + r_t^X) - I_t + D_t}. \quad (16)$$

We can factor out the lagged sales-to-price ratio and stock return to identify $r^S(t - 1, t)$:

$$\begin{aligned} \frac{\text{Sales}_t}{\text{ME}_t} &= \frac{\text{Sales}_{t-1}(1 + r_t^S)}{\text{ME}_{t-1}(1 + r_t)} \frac{\text{ME}_{t-1}(1 + r_t^X + d_t)}{\text{ME}_{t-1}(1 + r_t^X) + I_t - D_t} \\ &= \frac{\text{Sales}_{t-1}(1 + r_t^S)}{\text{ME}_{t-1}(1 + r_t)} \frac{1 + r_t^X + d_t}{1 + r_t^X + i_t - d_t}. \end{aligned} \quad (17)$$

Taking logs from both sides,

$$sp_t = sp_{t-1} - \log(1 + r_t) + \log(1 + r_t^S) + \log\left(\frac{1 + r_t^X + d_t}{1 + r_t^X + i_t - d_t}\right). \quad (18)$$

By matching this expression against (15), we identify $r^S(t - 1, t)$ as

$$r^S(t - 1, t) = \log(1 + r_t^S) + \log\left(\frac{1 + r_t^X + d_t}{1 + r_t^X + i_t - d_t}\right). \quad (19)$$

Daniel and Titman (2006) note that their measure $r^S(t - \tau, t)$ differs from the regular sales-growth measure of Lakonishok *et al.* (1994), but they suggest that the difference equals i_t . Equation (19) shows that, similar to the book-to-market decomposition, the sales-to-price decomposition induces mechanical correlations not just between $r^S(t - \tau, t)$ and net issuances, but also between $r^S(t - \tau, t)$ and dividends and stock returns. That is, even in a world in which sales growth is disconnected from stock valuation, the sales-to-price decomposition in equation (15) forces $r^S(t - \tau, t)$ to be a function of $r(t - \tau, t)$.

3 Data

We obtain stock returns from the Center for Research in Security Prices (CRSP) and accounting data from Compustat. Our sample starts with all common stocks traded on the NYSE, Amex, and NASDAQ. We exclude financial firms and utilities (two-digit SIC codes of 49 and 60 through 69) from the sample. We calculate the book value of equity following Ken French's definition: shareholders' equity, plus balance sheet deferred taxes, plus balance sheet investment tax credits, plus postretirement benefit liabilities, minus preferred stock. We set missing values of balance sheet deferred taxes, investment tax credit, and postretirement benefit liabilities equal to zero. To calculate the value of preferred stock, we set it equal to the redemption value if available, or else the liquidation value or the carrying value, in that order. If shareholders' equity is missing, we set it equal to the value of common equity if available, or total assets minus total liabilities. We then use the Davis *et al.* (2000) book values of equity from Ken French's website¹ to fill in missing values of the book value of equity. Because we require the return on equity, we start our sample in July 1963. We end it in December 2013. Because our tests mirror those in Daniel and Titman (2006) and use five years of historical data, we start the regressions in July 1968.

We construct the sample and explanatory variables using the same rules as Daniel and Titman (2006): we update all variables once a year in June; we take the book value of equity from a fiscal year that ended in year $t - 1$; we divide book value of equity by the end-of-December market value of equity to compute the book-to-market; and we require non-missing and non-negative values of book value of equity in year $t - 1$ and year $t - 6$, non-missing values of market value of equity in December of year $t - 1$ and December of year $t - 6$, and non-missing stock price at the end of June in year t . We remove companies with share prices below \$5 per share as of the end of June except in Section 5's tests that partition the sample based on market capitalization. Similar to Daniel and Titman (2006), the 12 cross-sectional regressions from July of year t through June of year $t + 1$ all use the same set of right-hand-side variables.

Table 1 describes the data. We compute averages, standard deviations, and percentiles of firm size, book-to-market and other variables every

¹See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Variable	Mean	SD	Percentiles					
			10	25	50	75	90	
Market value of equity, millions	2,370.94	9,508.45	39.25	99.89	321.40	1,176.02	4,167.62	
Book-to-market	0.83	0.65	0.26	0.44	0.71	1.07	1.51	
Book return, $r^B(t-5, t)$	0.51	0.64	-0.11	0.27	0.53	0.79	1.14	
Return on equity, $\log(1 + \text{roe}(t-5, t))$	0.55	0.54	0.03	0.31	0.55	0.80	1.09	
Stock return, $r(t-5, t)$	0.47	0.76	-0.45	0.00	0.46	0.93	1.41	
Dividend yield, $r^{\text{div}}(t-5, t)$	0.10	0.09	0.00	0.03	0.08	0.15	0.21	
Issuance yield, $r^{\text{iss}}(t-5, t)$	0.12	0.36	-0.12	-0.02	0.04	0.20	0.46	

Table 1: Sample summary statistics, 1968–2013.

Description: This table shows sample summary statistics. Book return is the change in the log-book-to-market ratio from year $t-6$ to year $t-1$ plus the total log-stock return over the same time period. Return on equity is the logarithm of the book value of equity five years prior plus the income before extraordinary items over the five-year period, divided by the book value of equity five years prior. Dividend yield is the five-year log-return with dividends reinvested minus the log-return without dividends. Issuance yield is the log-change in the five-year log-change in the market value of equity minus the log-return without dividends. The numbers in this table are time-series averages of the cross-sectional mean, standard deviation, and percentiles for each variable.

June and report the time-series averages of these statistics. The average book-to-market ratio, for example, is 0.83; this is the time-series average of the cross-sectional average from June 1968 through June 2013. We compute net issuances the same way as Daniel and Titman (2006). It is the five-year log-change in the market value of equity minus the log-return on the stock without dividends over the same time period. Dividend yield is the five-year log-return on the stock with dividends minus the log-return without dividends.

The statistics on net issuances and dividends show that the world is rarely as still as required for the Daniel-Titman decomposition to hold. The mean net-issuance yield is 12%, and the 75th and 90th percentiles are 20% and 46%. That is, over the average five-year period, one-quarter of all firms issue more than one-fifth and one firm in ten almost *half* of their market values of equity. These net issuance numbers, although dramatic, are in line with those reported in Daniel and Titman (2006). In their Table 1 the standard deviation of net issuances ranges from 21% to 47% depending on the cross-section. Dividend yields are also often significant. A quarter of firms pay over 15% of their market capitalization in dividends over a five-year period. These estimates suggest that firms rarely conform to the world under which the Daniel-Titman decomposition recovers the return on equity. For example, of the 77,300 firm-year observations in the panel, only 8,926 (12%) satisfy the conditions $|i_t| < 5\%$ and $d_t < 5\%$.

4 An Analysis of Book Returns

The thrust of the Daniel-Titman decomposition is that it separates stock returns from book returns so that a regression of stock returns on book returns provides a method to identify the component of stock returns due to intangible information. But book return is the “everything else” part of the change in the book-to-market ratio—a nonlinear bundle of lagged book-to-market, return on equity, stock return, net issuances, and dividends.

The complications in book return increase when one examines longer periods of time—it is more likely that firms issue shares, repurchase equity, or pay dividends over a span of five years—and when this measure is taken to the cross-section of stocks. The problem in the cross-section is that book returns are not comparable. A company can have a high book return if it earns a high return on equity, if it is a growth firm and issues stock, if it is

a value firm and repurchases shares, if it is a firm with low book-to-market ratio and pays a dividend, or if the stock return is in the right region given the firm characteristics. Only the first source of variation reflects firms' accounting-based performance.

4.1 A Simple Empirical Test

If firms never issue or retire equity, do not pay dividends, and experience no changes in deferred taxes or investment tax credits, then the data conform to a simple identity in (5):

$$bm_t = bm_{t-5} + \log(1 + roe_t) - \log(1 + r_t).$$

A regression of $r^B(t - 5, t)$ on $\log(1 + roe_t)$ therefore provides a simple test of the amount of approximation error built into the book return. If net issuances and dividends are economically negligible, then both the R^2 and the regression slope will equal one. If the world is more complicated, R^2 s will be less than one and the regression slope will differ from 1.0.

The first row in Table 2 reports the estimates from this regression. Because all variables are defined over five-year periods, we estimate annual cross-sectional regressions, compute time-series averages of these annual estimates, and use the Newey and West (1987) procedure with five lags to compute the standard errors. The average R^2 in the first regression is 56.6%. Put differently, *two-fifths* of the variation in book return comes from the combination of lagged book-to-market ratios, and contemporaneous net issuances, dividends, and stock returns. The estimated slope on $\log(1 + roe_t)$ is 0.823. The t -value from the test that this coefficient equals one is -5.43 using the Newey-West procedure with five lags.

The second regression shows that the low R^2 is not due to the fact that the book value of equity sometimes changes because of changes in deferred taxes, investment tax credits, and postretirement benefit liabilities on the balance sheet.² In the second regression, roe_t^* is a broader return-on-equity-like measure that adds changes in deferred taxes, investment tax credits, and postretirement benefit liabilities to net income (not income before extraordinary items). The adjusted R^2 in this regression is higher

²See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/variable_definitions.html and Cohen *et al.* (2003, p. 613) for a detailed discussion on how the book value of equity is defined.

Regression	Sample	Firms	Explanatory variable			Adj. R ²
			roe _t	roe* _t	d _t	
(1)	Full	1,599.4	0.823 (25.33)			56.6%
(2)	Full	1,599.4		0.806 (27.61)		63.5%
(3)	Full	1,599.4	0.850 (21.61)		-0.652 (-3.10)	60.5%
(4)	BE _{t-5} /ME _{t-5} ≤ 1/2	609.3	0.781 (17.70)		-1.387 (-8.10)	60.8%
(5)	1/2 < BE _{t-5} /ME _{t-5} ≤ 1	535.1	0.878 (31.19)		-0.473 (-3.82)	60.9%
(6)	BE _{t-5} /ME _{t-5} > 1	455.0	0.934 (34.23)		-0.018 (-0.11)	64.7%

Table 2: A simple empirical test.

Description: This table reports estimates from cross-sectional regressions of five-year book returns on log-return on equity, net-issuance yield, and dividend yield over the same time period. Book return, based on the Daniel and Titman (2006) decomposition, is the change in the log-book-to-market ratio from year $t - 6$ to year $t - 1$ plus the total log-stock return over the same time period. Return on equity, roe_t, is the logarithm of the book value of equity five years prior plus the income before extraordinary items over the five-year period, divided by the book value of equity five years prior, and roe*_t is the return on equity based on net income (instead of income before extraordinary items) adjusted for changes in deferred taxes, investment tax credits, and postretirement benefit liabilities. Net-issuance yield, i_t, is the five-year log-change in the market value of equity minus the log-return on the stock without dividends over the same time period. Dividend yield, d_t, is the five-year log-return on the stock with dividends minus the log-return without dividends. Firms is the average number of firms per cross-sectional regression. The regressions are estimated annually using data from 1968 through 2013. The numbers in this table are the average annual estimates with standard errors adjusted using the Newey-West procedure with five lags. Regressions 1 through 3 use the full sample and regressions 4 through 6 split the sample based on firms' book-to-market ratios five years prior.

Interpretation: Regressions (1) and (2) show that differences in return on equity explain less than two-thirds of the cross-sectional variation in book returns. This explanatory power is low. In the absence of dividends, share issuances, and share repurchases, and under clean surplus accounting, the R² would be 100%. Regressions (3) through (6) show that dividends and issuances play an important role in determining book returns and their role varies with whether a firm is classified as value or growth.

than that in the first but still leaves well over one-third of the variation in the book return unaccounted.

Even though the book return in (11) is nonlinear in net issuances and dividends, it could be that a first-order approximation that linearizes $r^B(t-5, t)$ in dividends and net issuances adequately captures most of the variation from these sources. The third regression in Table 2 controls for the net-issuance and dividend yields, but R^2 increases only a little.

The fact that dividends and issuances do not play that important a role in regression (3) does not imply that they play no role in determining book returns—it is just that the relations are nonlinear. The remaining three regressions in Table 2 divide the sample based on the beginning-of-the-period book-to-market ratio, BE_{t-5}/ME_{t-5} using cutoffs of 0.5 and 1. These cutoffs are meaningful because the marginal effects of dividend yields and net issuances on the book return change at these cutoffs when stock returns and returns on equity are zero.

The estimates from these regressions show that dividends and issuances are important. In the sample of growth firms, $BE_{t-5}/ME_{t-5} < 0.5$, the slope on the dividend yield has a t -value of -8.1 , and that on issuances has a t -value of 0.79 . Growth firms that pay dividends record lower book returns than firms that do not. In the sample of value firms, $BE_{t-5}/ME_{t-5} > 1$, by contrast, the slope on the dividend yield is statistically insignificant and that on issuances has a t -value of -14.9 . The message of Table 2 is that the book return is, as equation (11) suggests, a bundle of lagged book-to-market ratios and contemporaneous stock returns, net issuances, and dividends.

Figure 1 graphically illustrates the problems with the book return by plotting the percentile rank of the return on equity as a function of the book return percentile rank. We compute these percentile ranks annually, and then take the time-series averages of the average return-on-equity percentile rank and the empirical 90% percentile confidence interval of the return-on-equity percentile rank. If the data had a one-to-one mapping between the book return and the return on equity, then both the average and the confidence interval would collapse to the 45-degree line. This does not happen in the data. Firms that lie in the middle of the book return distribution (that is, around the 50th percentile on the x -axis), have return-on-equity percentile ranks between 19% and 79% nine-tenths of the time. Conversely, over one-tenth of these firms are in either the bottom or top return-on-equity quartile.

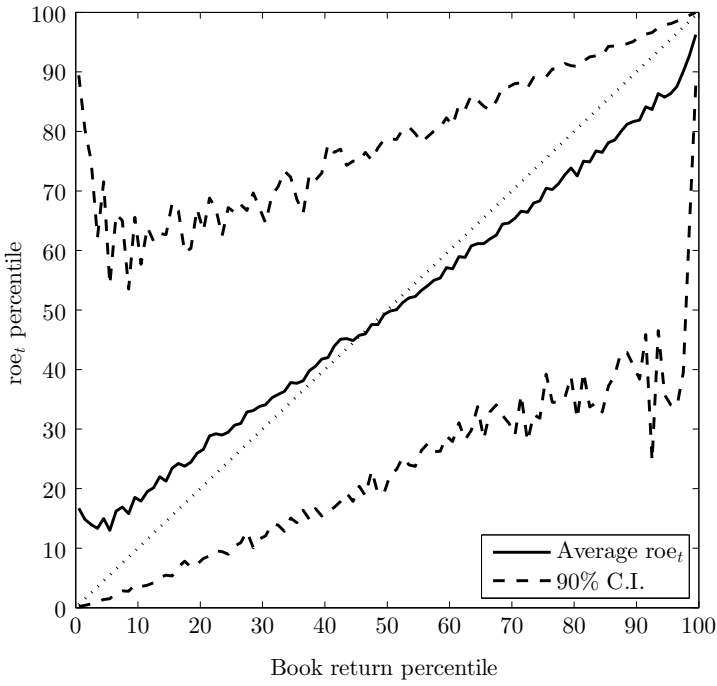


Figure 1: The relation between the book return and the return on equity.

Description: This figure computes annual book return and return-on-equity percentile ranks for all NYSE, Amex, and NASDAQ firms, and then plots the average roe_t percentile rank (solid line) and the empirical 90% confidence interval (dashed lines) of this percentile rank as a function of the book return percentile rank. The 45-degree dotted line is the average book return percentile rank plotted against itself. Book return, based on the Daniel and Titman (2006) decomposition, is the change in the log-book-to-market ratio from year $t - 6$ to year $t - 1$ plus the total log-stock return over the same time period. Return on equity is the logarithm of the book value of equity five years prior plus the income before extraordinary items over the five-year period, divided by the book value of equity five years prior. This figure uses data from 1968 through 2013.

Interpretation: This figure shows that book return is a noisy measure of return on equity and that firms with low (high) book returns rank systematically higher (lower) in the return-on-equity distribution than what their book-return ranking would suggest. This systematic distortion is pronounced among firms toward the extreme left tail of the book-return distribution.

The left-tail of the distribution in particular is problematic. Many of the firms in the first book return percentile rank above the median in the

return-on-equity distribution. Some of these firms are profitable value firms that issue equity, thus distorting their book returns downwards. The tails are asymmetric because for the same effect to exist in the distribution's right tail, we would need to have unprofitable growth firms that retire equity—such firms are rare in the data.

4.2 Book Returns and Tangible Information

Daniel and Titman (2006) estimate cross-sectional regressions of five-year stock returns on five-year book returns and lagged log-book-to-market ratios to extract the return component attributable to intangible information,

$$r_i(t-5, t) = \underbrace{a + b_1 r_i^B(t-5, t) + b_2 bm_{i,t-5}}_{\text{tangible return}} + \underbrace{r_i^I(t-5, t)}_{\text{residual= intangible return}}. \quad (20)$$

However, because contemporaneous stock returns, net issuances, and dividends contaminate the book return, the attribution suggested by this projection is arbitrary. Even in a world in which accounting performance is fully disconnected from the stock market, book returns would be a function of stock returns.

Cross-sectional variation in the book return can explain variation in contemporaneous stock returns because (1) the return on equity correlates with stock returns, (2) the nonlinear component of stock returns embedded in the book return correlates with stock returns, (3) the net issuances embedded in the book return correlate with stock returns, or (4) the dividends embedded in the book return correlate with stock return. An intuitive test of whether the approximation error in the book return affects the correlation between stock returns and the book return is to measure whether the book return *at least* fully captures the information in the return on equity.

Table 3 examines the extent to which book returns capture this piece of tangible information. The first regression is a univariate regression of stock returns on book returns. The slope from this regression is 0.542, and the R^2 is 18.1%. This correlation is a function of the four links discussed above. The second regression shows, for comparison, that in a regression against the five-year return on equity, the estimated slope on the return on equity is 0.570 and the R^2 is 16.6%. The third regression includes both book returns and the five-year return on equity at the same time, and it

Regression	Explanatory variable		Average adjusted R^2
	Book return	Return on equity	
(1)	0.542 (24.31)		18.1%
(2)		0.570 (19.42)	16.6%
(3)	0.362 (9.68)	0.269 (6.91)	20.3%

Table 3: Stock returns, book returns, and return on equity.

Description: This table reports estimates from cross-sectional regressions of five-year log-stock returns on the book returns and the log-return on equity over the same time period. Book return is the five-year change in the log-book-to-market plus the total log-stock return over the same time period. Return on equity, roe_t , is the logarithm of the book value of equity five years prior plus the income before extraordinary items over the five-year period, divided by the book value of equity five years prior. The regressions are estimated annually using data from 1968 through 2013. The numbers in this table are the average annual estimates with standard errors adjusted using the Newey-West procedure with five lags.

Interpretation: This table shows that book return does not capture a large portion of tangible information as measured by the return on equity. If book return contained all of the information in return on equity, the slope on return on equity would be insignificant in regression (3).

shows that the book return is a poor measure of accounting performance. Although the slope on the book return remains positive and significant, so is the slope on the return on equity. The estimated slope on the return on equity is 0.269 with a t -value of 6.91. Book return thus does not capture a large chunk of tangible information.

5 Fama and French (2008) Decomposition, Net Issuances, and Dividends

To further explore the role of net issuances and dividends, we next use an alternative decomposition to examine the evolution of book-to-market ratios:

$$bm_t = bm_{t-\tau} + dbe(t - \tau, t) - dme(t - \tau, t), \quad (21)$$

in which $dbe(t - \tau, t)$ is the log-change in the book value of equity from year $t - \tau$ to year t , and $dme(t - \tau, t)$ is the change in the market value of equity over the same time period. This decomposition is natural because it does not factor out stock returns from changes in the market value of equity.

Cross-sectional regressions of stock returns on the components in equation (21) illustrate the problem with the Daniel and Titman (2006) specification. As we show below, the slopes on the two change-variables are close to each other among all-but-microcaps but *only* when the regression controls for net issuances. This control is important because net issuances are embedded in changes in both the book and market values of equity—if a firm issues or retires equity, both book and market values of equity change. The same is true for dividends.

Fama and French (2008) use the decomposition in equation (21), and go further by controlling for net issuances in their regressions and by defining changes in the book and market values of equity “net” of net issuances. Their netting approach makes the same assumption that is implicit in the Daniel and Titman decomposition—the book-to-market ratio equals one. However, if a firm has \$1 in book value of equity and \$2 in market value of equity and the firm then issues \$1 worth of new equity, its issuance yield on the book side is 100% but only 50% on the market side—that is, its book value of equity doubles but its market value of equity only increases by one-half. The use of the market issuance yield for netting means that when value firms issue equity, changes in the book value of equity are not adjusted sufficiently, and when growth firms issue equity, the netting subtracts off too much.

We use the decomposition in equation (21) to illustrate, first, the extent that net issuances and dividends affect the evolution of book-to-market ratios and, second, how sensitive the results from cross-sectional regressions are to the inclusion of controls for net issuances and dividends. These results relate to the Daniel and Titman (2006) decomposition because that decomposition pushes net issuances and dividends into the book return term.

Table 4 reports estimates from regressions of five-year changes in the book and market values of equity against net issuances and dividends. We split the sample into all-but-microcap (ABM) stocks and microcap stocks, which is the same partition used in Fama and French (2008). Microcaps are stocks with a market value below the 20th percentile of the NYSE

Model	Dependent variable	Sample					
		ABM			Microcaps		
		i	Regressor	d	i	Regressor	d
(1)	$dbe(t-5, t)$	1.030 (27.14)			0.421 (10.67)		Average Adj. R^2 6.3%
(2)			-3.111 (-8.88)			-0.717 (-3.56)	1.0%
(3)		0.894 (25.63)	-2.333 (-10.88)		0.412 (11.29)	-0.336 (-2.11)	6.8%
(4)	$dmc(t-5, t)$	1.091 (16.60)			0.663 (10.13)		11.1%
(5)			-2.831 (-6.62)			-0.419 (-1.27)	2.6%
(6)		0.963 (22.40)	-1.996 (-6.10)		0.671 (11.10)	0.167 (0.56)	13.2%

Table 4: Changes in market and book values of equity, net issuances, and dividends.

Description: This table reports estimates from cross-sectional regressions of five-year log-changes in the book and market values of equity on net-issuance yield and dividend yield. Net-issuance yield, i , is the five-year log-change in the market value of equity minus the log-return on the stock without dividends. Dividend yield, d , is the five-year log-return on the stock with dividends minus the log-return without dividends. The sample is divided into all-but-microcap (ABM) stocks and microcap stocks. Microcaps are stocks with a market value below the 20th percentile of the NYSE market capitalization distribution. The regressions are estimated annually using data from 1968 through 2013. The numbers in this table are the average annual estimates with standard errors adjusted using the Newey-West procedure with five lags.

Interpretation: This table shows that dividends and issuances are important determinants of changes in the book and market values of equity and that the importance of these events varies between all-but-microcap and microcap stocks.

market capitalization distribution. The estimates show that net issuances and dividends are important components of changes in book and market values of equity, in particular among all-but-microcaps.³

In the all-but-microcaps sample, net issuances and dividends explain one-third of the cross-sectional variation in changes in the book value of equity, and one-quarter of the variation in changes in the market value of equity. Although both dividends and net issuances are also important in the sample of microcaps, changes in both book and market values of equity are far noisier. Net issuances and dividends explain only around one-tenth of the cross-sectional variation in changes in the book and market values of equity.

Table 5 shows that the control for net issuances is important in cross-sectional Fama and MacBeth (1973) regressions that relate future returns to old book-to-market ratios and changes in the book and market values of equity. Future returns are positively related to the change in the book value of equity and negatively related to the change in the market value of equity. The dbe_t term, however, is statistically insignificant in the ABM-stocks sample in regressions (1) and (3). The reason lies with net issuances. The change in the book value of equity has two conflicting forces within it when it comes to forecasting future returns. When the change is positive because a firm is profitable, the average future return is high.⁴ When the change is positive because a firm issues equity, the average future return is low.⁵ The change in the book value of equity conflates these two components, giving the appearance that the change in the book value of equity contains no

³The slopes on i_t and d_t do not equal +1 and -1 in Table 4 for four reasons. First, the book and market values of equity also change with return on equity and stock return, and these determinants correlate with net issuances and dividends. Second, i_t and d_t cumulate monthly differences in log-changes in the market values of equity, log-returns, and log-returns without dividends. By contrast, the identity linking changes in the market values of equity to net issuances and dividends— $ME_{t+1}/ME_t = 1 + r_{t+1}^x + I_t/ME_t - D_t/ME_t$ —holds in simple returns. Third, because i and d are computed from market values of equity and returns with and without dividends, they are scaled by the market value of equity. The identity linking changes in the book values of equity to net issuances and dividends— $BE_{t+1}/BE_t = 1 + roe_{t+1} + I_t/BE_t - D_t/BE_t$ —scales by the book value of equity. Fourth, by splitting the sample into ABM stocks and microcaps, the analysis indirectly partitions the sample based on the dependent variable. For example, if a firm is in the microcaps sample today, its $dme(t-5, t)$ cannot have been too high.

⁴See, for example, Novy-Marx (2013).

⁵See, for example, Loughran and Ritter (1997), Daniel and Titman (2006), and Pontiff and Woodgate (2008).

Regression	Explanatory variable					Adj. R^2
	bm_{t-5}	dbe_t	dme_t	i_t	d_t	
Sample: ABM Stocks						
(1)	0.112 (1.61)	0.052 (0.69)	-0.272 (-3.36)			2.23%
(2)	0.134 (1.93)	0.138 (1.85)	-0.252 (-3.14)	-0.416 (-3.71)		2.58%
(3)	0.113 (1.61)	0.044 (0.58)	-0.269 (-3.39)		-0.602 (-0.87)	2.99%
(4)	0.138 (1.98)	0.131 (1.74)	-0.248 (-3.12)	-0.430 (-4.14)	-0.626 (-0.96)	3.31%
Sample: Microcaps						
(5)	0.245 (3.03)	0.206 (2.92)	-0.541 (-7.20)			1.04%
(6)	0.219 (2.95)	0.190 (2.71)	-0.504 (-6.43)	-0.101 (-0.86)		1.32%
(7)	0.243 (3.20)	0.207 (3.05)	-0.533 (-7.35)		-0.411 (-0.76)	1.41%
(8)	0.218 (3.08)	0.192 (2.85)	-0.500 (-6.54)	-0.101 (-0.92)	-0.502 (-1.01)	1.64%

Table 5: Average returns, book-to-market ratios, net issuances, and dividends.

Description: This table reports estimates from cross-sectional regressions of one-month stock returns on book-to-market ratios five years prior (bm_{t-5}), the five-year changes in the book (dbe_t) and market (dme_t) values of equity, net-issuance yields (i_t), and dividend yields (d_t). Net-issuance yield, i_t , is the five-year log-change in the market value of equity minus the log-return on the stock without dividends. Dividend yield, d_t , is the five-year log-return on the stock with dividends minus the log-return without dividends. The sample is divided into all-but-microcap (ABM) stocks and microcap stocks. Microcaps are stocks with a market value below the 20th percentile of the NYSE market capitalization distribution. The regressions are estimated monthly using data from July 1968 through December 2013. The numbers in this table are the time-series averages of these monthly estimates.

Interpretation: This table shows that among all-but-microcap stocks the relation between future stock returns and changes in the book value of equity is sensitive to including a control for net issuances. Average return is higher when the book value equity increases because a firm is profitable and lower when the book value of equity increases because a firm issues equity.

information about future returns—an increase in the book value of equity can imply high or low future returns depending on *why* it increased.

The regression with just the net-issuance yield as the control is the same specification used in Fama and French (2008), and it confirms their finding.⁶ Among all-but-microcaps, changes in the book and market values of equity are approximately equally informative about average future returns. The test of equality of the slopes, $b_{dme(t-5,t)} = -b_{dbe(t-5,t)}$, returns a t -value of 1.80.⁷ In the microcaps sample changes in the market values of equity are more informative. The dividend-yield control does not affect the coefficients as much as net issuances among either sample because there is little difference in average returns between high- and low-dividend stocks.

6 Intangible Information and the Cross-section of Average Returns

Daniel and Titman (2006, p. 1622) estimate regressions of monthly stock returns on lagged book-to-market ratios, book return, and intangible return, and find that the slope on the book return is statistically insignificant while that on the intangible return is significantly negative. These regressions lead them to conclude that book-to-market forecasts future returns because it is a good proxy for the intangible return.

Regressions 1 through 3 in Table 6 replicate the similarly numbered regressions in Daniel and Titman (2006, Table IV), and the estimates confirm their results. The only difference is that whereas bm_{t-5} is only marginally significant in Daniel and Titman's regressions (t -value = 1.83 in their regression 3), it is significant at a 5% level (t -value = 2.35) in our sample. The slopes on the book return and intangible return, however, are similar to those in Daniel and Titman both in magnitude and statistical significance. Stocks with high intangible returns earn significantly lower future returns than stocks with low intangible returns.

Regression 4 tests the argument that book-to-market explains the cross-section of average returns because it is a proxy for the intangible return.

⁶The only difference is that, in addition to including net issuances as a regressor, Fama and French (2008) subtract it from changes in the book and market values of equity.

⁷If we end the sample in December 2006 to match Fama and French's sample period, the slope on the change in the book value of equity in regression (2) increases to 0.191 (t -value = 2.24) and the t -value from the test of the equality of the slopes decreases to 1.52.

Regressor	Regression						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Current BE/ME, bm_t				0.242 (2.68)	0.249 (2.86)	0.231 (1.91)	0.478 (4.94)
Lagged BE/ME, bm_{t-5}	0.121 (2.36)	0.244 (3.60)	0.121 (2.35)				
Book return, $r^B(t-5, t)$	0.014 (0.30)	0.269 (3.97)	0.015 (0.31)	-0.003 (-0.06)			
Stock return, $r(t-5, t)$		-0.324 (-4.26)					
Intangible return, $r^I(t-5, t)$			-0.324 (-4.26)	-0.082 (-0.83)	-0.076 (-0.81)	-0.093 (-0.81)	0.205 (2.43)
Tangible return, $r^T(t-5, t)$							-0.406 (-4.39)
Average adjusted R^2	0.68%	1.47%	1.47%	1.47%	1.25%	1.47%	1.70%

Table 6: Average returns and intangible information.

Description: This table reports estimates from cross-sectional regressions of one-month stock returns on log-book-to-market ratios in years $t-1$ and $t-6$, five-year book return, five-year stock return, and the intangible and tangible components of five-year stock returns. The intangible return in regressions 1 through 6 is the residual from a cross-sectional regression of five-year stock returns on the log-book-to-market ratio in year $t-6$ and the five-year book return. In regression 7 it is the residual from a cross-sectional regression of five-year stock returns on the log-book-to-market ratio in year $t-6$ and the five-year change in the book value of equity. The tangible returns are the fitted values from these regressions. The regressions are estimated monthly using data from July 1968 through December 2013. The numbers in this table are the time-series averages of these monthly estimates.

Interpretation: Regressions (1) through (3) replicate regressions (1) through (3) in Daniel and Titman (2006, Table IV). Regressions (4) and (5) show that the intangible return does not predict future returns in regressions that control for the current book-to-market. These regressions suggest that the intangible return predicts returns in regression (3) because it is a proxy for the current book-to-market. Regression (7) shows that if the tangible and intangible returns are extracted by using changes in the book value of equity as the tangible-information proxy, it is the tangible return that reverses.

This specification repeats regression 3 but replaces lagged book-to-market with current book-to-market.⁸ This regression can tell us to what extent the intangible return has independent power in forecasting returns—or whether book-to-market subsumes the intangible return. In this regression the slope on the current book-to-market is statistically significant (t -value = 2.68) while that on the intangible return is statistically insignificant (t -value = -0.83). The alternative interpretation for Daniel and Titman’s results then is that the intangible return gets its power by being a proxy for *current* book-to-market ratios. That is, book-to-market is not necessarily a proxy for intangible return. Rather, given how the test is set up with controls for book return and lagged book-to-market, intangible return is a proxy for current book-to-market. Regression 5 shows that the result is the same if book return is dropped from the regression. At its simplest, the estimates of regression 5 show that in a two-way horse race between book-to-market and the intangible return, only book-to-market has independent power in forecasting returns.

Fama and French (2008) point out that it is difficult to set up a test that separates the effects of tangible and intangible information. Regressions 6 and 7 in Table 6 illustrate this point by further modifying the specification. Regression 6 adds the tangible-return component to the regression. The explanatory power of this regression is the same as that of regressions 2, 3, and 4 because the regressors in these models have the same linear span. In this regression the intangible return is negatively correlated and the tangible return positively correlated with future returns, but both slopes are statistically indistinguishable from zero.

Regression 7 examines how sensitive the results are to the tangible information proxy. Instead of using the book return to extract the tangible and intangible returns, we estimate cross-sectional regressions of five-year returns on the lagged book-to-market and the change in the book value of equity,

$$r_i(t-5, t) = \underbrace{a + b_1 dbe(t-5, t) + b_2 bm_{i,t-5}}_{\text{alt. tangible return}} + \underbrace{r_i^I(t-5, t)}_{\text{residual = alt. intangible return}}. \quad (22)$$

Our inferences change considerably as we move from regression 6 to 7 by changing the tangible-information proxy from book return to the change

⁸We thank one of the referees for suggesting this test.

in the book value of equity. In regression 7 it is now the tangible return component that reverses, and the intangible return component is *positively* related to future returns. We do not suggest that the correct conclusion is that only tangible returns reverse. Rather, we take Table 6's results as supporting Fama and French's (2008) conjecture that it is difficult to set up a test that disentangles tangible information from intangible information. The estimates in Table 6 show that inferences are sensitive both to how we set up the regression—do we control for year $t - 1$ or year $t - 6$ book-to-market—and how we define tangible information.

7 Conclusions

We explain why Daniel and Titman's (2006) decomposition of the changes in book-to-market ratios cannot delineate between tangible and intangible returns. By factoring out stock returns, the decomposition introduces book returns that are correlated with lagged book-to-market ratios, and contemporaneous stock returns, net issuances, and dividends. Book return is empirically a poor proxy for tangible information because of these problems. Two-fifths of the cross-sectional variation in book returns stems from sources other than differences in returns on equity.

Our results validate Fama and French's (2008) conjecture that it is difficult for any empirical specification to separate effects of tangible and intangible information. Indeed, changing the set of tangible information from the book return to the change in the book value of equity reverses Daniel and Titman's conclusions about the effects of tangible and intangible information. Moreover, in a two-way horse race between current book-to-market and Daniel and Titman's intangible return only the current book-to-market forecasts returns. This result casts doubt on the argument that book-to-market forecasts returns because it is a good proxy for the intangible return.

Another takeaway from Daniel and Titman's (2006) analysis is that future stock returns only weakly correlate with long-term fundamental performance. However, recent research in this area finds the opposite. For example, Novy-Marx (2013) finds that gross profitability strongly correlates with both future profitability and future stock returns.⁹ Similarly, Ball *et al.*

⁹See also Fama and French (2015).

(2015) find that profitability, lagged by as much as ten years, correlates with future returns.

The question of why book-to-market ratios correlate with future returns remains important. Fama and French (2008) show that recent changes in book-to-market ratios carry more information about expected returns than historical book-to-market ratios, but their results shed no light on what this information might entail. Gerakos and Linnainmaa (2016) use Fama and French's (2008) decomposition to divide the HML factor into two parts, and suggest that these parts carry different prices of risk. They show that book-to-market's ability to explain variation in future returns traces back to changes in the market value of equity, and suggest that these changes are important because they pick up *changes* in expected returns. If a stock's expected return increases, its instantaneous return is negative, thus turning it into a value stock, and vice versa.

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