Earnings, retained earnings, and book-to-market in the cross section of expected returns*

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Abstract

Book value of equity consists of two main parts: retained earnings and contributed capital. Retained earnings-to-market subsumes book-to-market's predictive power in the cross section of stock returns, despite comprising only 42% of book value on average. Contributed capital has no predictive power. Retained earnings represent the difference between accumulated past earnings and accumulated past dividends. We find that the predictive power of retained earnings arises entirely from accumulated past earnings. Our results imply that book-to-market predicts returns because it is a proxy for earnings yield (Ball, 1978). These results cast doubt on the notion that book-to-market identifies over- and undervalued securities.

JEL classification: G11, G12, M41.

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1 Introduction

Book value of equity consists of two main parts: retained earnings and contributed capital.[1] We show that retained earnings-to-market subsumes book-to-market's predictive power in the cross section of stock returns, despite this component comprising, on average, only 42% of the book value of equity. By contrast, contributed capital has no predictive power. Moreover, the predictive power of retained earnings arises entirely from accumulated past earnings, suggesting that book-to-market predicts returns because it is a proxy for earnings yield (Ball, 1978). Consistent with being a proxy for earnings yield, retained earnings-to-market predicts future earnings yields. Moreover, it predicts the cross section of stock returns out seven years. These results are difficult to reconcile with book-to-market predicting the cross section of returns because it assists in identifying over- and undervalued securities.

The accumulation of the total earnings a firm generated over its history to date, less accumulated dividend distributions, comprises retained earnings.[2] We expect retained earnings to be informative for expected returns for two main reasons. First, because earnings follow close to a random walk process (Ball and Watts, 1972; Gerakos and Gramacy, 2012), past earnings—especially recent past earnings—likely proxy for expected future equity cash flows and thus, when deflated by market values, for expected stock returns (Ball, 1978; Berk, 1995). Second, accounting accruals and one-time items that reduce the informativeness of bottom-line net income (Novy-Marx, 2013; Ball, Gerakos, Linnainmaa, and Nikolaev, 2015, 2016) largely average out over time, and consequently their effect on accumulated past earnings is attenuated.

Accumulated equity issuances less repurchases comprise the contributed capital component of the book value of equity. As a first-order effect, we see no reason to expect net capital contributed over the life of the firm to be substantially related to the cross section of returns. Recent net issuances could, however, lead to a negative relation between contributed capital and stock returns

[1] We use the terms "book value of equity" and "book value" to refer to the "book value of common equity" as defined in more detail below.

[2] "Earnings" here refer to bottom-line net income, which is what accountants transfer into retained earnings each period. Some stock repurchases affect retained earnings, as described in more detail below.

(i.e., the "net issuance anomaly").[3] We therefore expect either no relation or a negative relation between contributed capital and the cross section of expected returns.

An early indication that contributed capital and retained earnings contain different information about stock returns is obtained from the effect of deflators on the correlation between the two book value components. When they are deflated by the book value of equity, contributed capital and retained earnings are essentially perfectly negatively correlated, because they jointly comprise 96% of total book value. However, when deflated by market value of equity, they are almost uncorrelated. Introducing price in the denominator substantially alters the relation between the variables, suggesting that the two components contain different information about equity valuation.

We start by running Fama and MacBeth (1973) regressions to compare the information in retained earnings and contributed capital. We find that retained earnings-to-market subsumes book-to-market in explaining the cross section of average returns. By contrast, contributed capital-to-market has no explanatory power over the cross section of stock returns when controlling for retained earnings-to-market.[4] Thus, book-to-market only predicts stock returns because it contains retained earnings, which average only 42% of book value. The other components have no predictive ability.

We next dig deeper into the composition of the book value of equity and investigate the accumulated earnings and accumulated dividends components of retained earnings. Here our evidence indicates that retained earnings only predict stock returns because they contain past earnings. The accumulated dividends component of retained earnings is uninformative of the cross section of average returns. This result is consistent with book-to-market's explanatory power arising only because it provides a good proxy for expected earnings yield.

To provide further evidence on our explanation behind the predictive ability of book-to-market, we demonstrate that retained earnings-to-market is a significant predictor of future earnings yield.

[3] See Ikenberry, Lakonishok, and Vermaelen (1995), Loughran and Ritter (1995), Daniel and Titman (2006), and Pontiff and Woodgate (2008).

[4] A third component of book equity on balance sheets is Accumulated Other Comprehensive Income, which is an accumulation of largely transitory past gains and losses. We describe this component in the following section. On average, it comprises 4% of book value. We find that—as is the case for contributed capital—the ratio of this component to the market value of equity has no explanatory power for the cross section of expected returns.

In contrast, contributed capital has no incremental power to predict future earnings yield. The retained earnings component of book-to-market also reliably explains the cross section of average returns further into the future than book-to-market itself. Its explanatory power persists at least seven years ahead and there is no evidence of reversals.

We draw the following conclusions. First, book-to-market explains the cross section of average returns only because of its retained earnings-to-market component. Second, retained earnings-to-market has explanatory power because past earnings proxy for expected equity cash flows, and thus, when deflated by market values, for expected stock returns (Ball, 1978; Berk, 1995).

Third, value strategies often use book value of equity as a benchmark for fundamental value, and hence as one indicator of market mispricing. But why would only one component of book value of equity (retained earnings)—especially a minority component—be a benchmark for the entire market value? Our evidence is that if book-to-market does indicate mispricing, it has to be mispricing of earnings. Even then, the evidence is inconsistent with mispricing, because the cross section of expected returns is predictable well into the future, with no signs of correction.

Fourth, our results suggest that replacing book-to-market with retained earnings-to-market in asset pricing tests results in a better specification, especially when the strategy being tested is correlated with the proportion of book value that consists of retained earnings (i.e., the firm's historical use of internal versus external finance).

Our evidence highlights the value of digging deeper into accounting numbers, whose components generally contain different information about the cross section of stock returns. Novy-Marx (2013) and Ball, Gerakos, Linnainmaa, and Nikolaev (2015, 2016) show that decomposing "bottom line" earnings into operating versus non-operating components and into accruals versus cash flow components increases the predictive power over the cross section of average returns. This study obtains similar insights from decomposing "bottom line" book value of equity.

2 Book value of equity, retained earnings, and contributed capital

Our basic thesis is that not all of the components of the book-to-market ratio's numerator—the book value of equity—contain the same information about the cross section of stock returns, and that differences in their informativeness shed light on the source and interpretation of the value premium. In other words, understanding the role of book-to-market in the cross section of stock returns requires an understanding of the individual components of the book value of equity as reported on firms' balance sheets.

The book value of common equity can be decomposed as follows, with the Compustat data items in brackets:[5]

$$\text{Common/Ordinary Equity [CEQ]} = \text{Contributed capital} + \text{Retained earnings} + \text{Other},$$

where:

$$\begin{aligned}
\text{Contributed capital} &= \text{Common/Ordinary Stock [CSTK]} \\
&\quad + \text{Capital Surplus/Share Premium Reserve [CAPS]} \\
&\quad - \text{Treasury Stock [TSTK]} \\
\text{Retained earnings} &= \text{Retained Earnings [RE]} \\
&\quad - \text{Accumulated Other Comprehensive Income [ACOMINC]} \\
\text{Other} &= \text{Accumulated Other Comprehensive Income [ACOMINC]}.
\end{aligned}$$

Contributed capital represents the net contribution of capital from shareholders that a firm receives from issuances and repurchases of its common stock. It consists of capital contributions that are recorded as the par value of common stock [CSTK] plus capital paid in excess of par value (i.e., "additional paid in capital") [CAPS], net of returns of capital to shareholders that are recorded as the book value of treasury stock [TSTK]. The par value of common stock and the

[5]Further details of the components of book value of equity are contained in the Appendix.

capital paid in excess of par value do not differ in economically important ways and can therefore be combined.[6] Treasury stock is the cost of stock repurchased from shareholders (but not retired) by the corporation. If the firm does not retire the repurchased stock (most frequently the case, because cancellation forgoes options to reissue the stock on the market or under executive compensation schemes), their repurchase cost is reported on the balance sheet as a negative offset to book equity.

Retained earnings are the entire earnings (i.e., net income) accumulated since the firm's inception less accumulated distributed dividends. Retained earnings increase as the firm generates and books earnings, and decrease as the firm books losses or declares dividends. A corporation cannot create earnings through trading in its own capital stock, so treasury stock transactions never increase retained earnings. However, treasury stock transactions do occasionally reduce retained earnings when previously repurchased treasury stock is reissued at a lower price than paid to repurchase it. Retained earnings therefore can become negative if a firm generates a series of book losses either during a growth phase or due to poor economic performance, or if a firm reissues substantial quantities of treasury stock at a lower price than it paid to purchase them into treasury.[7]

A third and typically much smaller component of book value of equity consists of accumulated other comprehensive income [ACOMINC]. Accumulated other comprehensive income is a technical account that accumulates over time the net amount of various paper (i.e., not realized in cash) gains and losses that primarily originate in transitory shocks to asset prices and that accountants exclude from earnings unless they subsequently are realized. These items include unrealized gains and losses on a class of marketable securities (those designated as "securities available for sale"), unrealized gains and losses on cash flow hedging instruments, unrealized gains and losses on pension plan assets net of liabilities, and foreign currency translation adjustments. If they later are realized,

[6] For example, the par value of common stock is commonly set to an arbitrarily small amount such as one cent. This practice circumvents restrictions in some jurisdictions against issuing stock at a price below par.

[7] Microsoft historically granted generous amounts of stock options to employees and also purchased substantial amounts of treasury shares. The options generally had exercise prices substantially below the cost to Microsoft of buying back the stock that was reissued to employees who exercised. This difference largely explains the $29.46 billion retained deficit it reported at June 30, 2007.

these gains and losses are removed from accumulated other comprehensive income and recognized in earnings, at which time they become part of retained earnings.[8]

Other comprehensive income violates the dictum of Black (1993, p. 5) that "[i]f we want to maximize the information about value in the earnings figure, and minimize the noise, we can choose accounting rules that make earnings look more like value and less like change in value. In other words, we can choose rules that minimize transitory components of earnings, while leaving the permanent components."[9] As a rough rule of thumb, other comprehensive income typically relates to stock prices on a dollar-for-dollar basis, whereas stock prices trade at multiples of reported earnings (Chambers, Linsmeier, Shakespeare, and Sougiannis, 2007). Similarly, earnings excluding comprehensive income are a better predictor of future operating cash flow (Dhaliwal, Subramanyam, and Trezevant, 1999). Compustat adds ACOMINC to their retained earnings variable RE, and because we expect it to have different implications for the cross section of stock returns, we back it out and study its contribution separately.[10]

Book value of equity therefore evolves over time as a function of net capital transactions with shareholders (new issuances less treasury stock purchases), net earnings retention (earnings less dividends), and some transitory gains and losses due to shocks to asset prices. Consequently, book-to-market ratios consist of several components with potentially different implications for asset pricing. In particular, retained earnings (when scaled by current market equity) likely is a proxy for earnings yield and hence for expected returns, but no such effect is expected for contributed capital and accumulated other comprehensive income.

3 Data

We take monthly stock returns from the Center for Research in Security Prices (CRSP) and annual accounting data from Compustat. Firms' dividend histories are taken from CRSP. We start

[8]These gains and losses bypass the income statement and therefore violate "clean surplus" accounting until they are realized, at which time they run through the income statement.

[9]Paton (1934) stated a similar dictum.

[10]In contrast with Compustat's treatment of ACOMINC, U.S. GAAP does not include accumulated other comprehensive income in retained earnings.

our sample with all firms traded on NYSE, Amex, and NASDAQ, and exclude securities other than ordinary common shares. We exclude financial firms, which are defined as firms with one-digit standard industrial classification codes of six. Delisting returns are taken from CRSP; if a delisting return is missing and the delisting is performance-related, we impute a return of -30% (Shumway, 1997; Beaver, McNichols, and Price, 2007). We match the firms on CRSP against Compustat, and lag annual accounting information by six months. For example, if a firm's fiscal year ends in December, we assume that this information is public by the end of the following June. We start our sample in July 1963 and end it in December 2015. The sample consists of firms with non-missing market value of equity, book-to-market, current month returns, and returns for the prior one-year period.

In Fama and MacBeth (1973) regressions, we exclude Microcaps, which are a numerical majority but comprise only 4% of aggregate market capitalization (Novy-Marx, 2013) and can exert undue influence. Following Fama and French (2008), we define Microcaps as stocks with a market value of equity below the 20^{th} percentile of the NYSE market capitalization distribution. In Fama and MacBeth (1973) regressions, we re-compute the explanatory variables every month. In portfolio sorts, we rebalance the portfolios annually at the end of June.

We generate two measures of book-to-market that differ in their numerators. First, we follow Fama and French and calculate the book value of equity as shareholders' equity, plus balance sheet deferred taxes, plus balance sheet investment tax credits, plus postretirement benefit liabilities, and minus preferred stock. We set missing values of balance sheet deferred taxes and investment tax credits 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, Fama, and French (2000) book values of equity from Ken French's website to fill in missing values.[11]

[11] See `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/variable_definitions.html` and Cohen, Polk, and Vuolteenaho (2003, p. 613) for a detailed discussion of how this book value of equity measure is calculated.

For the second measure of book-to-market, we use Compustat's book value of common shareholders' equity measure [CEQ]. The benefits of the second measure are that it reflects the book value of common equity reported on firms' balance sheets, and also that it can be broken down into the components that we expect to be differently priced, including contributed capital and retained earnings.

Table 1 presents descriptive statistics for book-to-market its components. Panel A presents descriptive statistics for book-to-market and retained earnings-to-market. The first two rows compare the Fama and French book-to-market measure and book-to-market based on the book value of equity reported on balance sheets. The distributions of the two measures are almost identical with means of 0.86 and 0.83. The third row describes the distribution of retained earnings-to-market. This measure is skewed, with a mean of -0.05 and a median of 0.27.

The next two rows present the distributions of contributed capital-to-market and accumulated other comprehensive income-to-market. The mean of contributed capital-to-market is similar to the means of the book-to-market measures (0.88 vs. 0.86 and 0.83), but the median is smaller (0.38 vs. 0.72 and 0.68). Accumulated other comprehensive income-to-market is smaller than the other components with a mean of 0.03 and a median of 0.01.

In Panel B, we present the distributions of the components of the book value of equity as a percentage of the book value of equity.[12] On average, contributed capital represents a larger percentage of the book value of equity (53%). Fewer than four percent of the sample firms have negative contributed capital. On average, retained earnings are 42% of the book value of equity, and 13% of the sample firms have negative retained earnings. Accumulated other comprehensive income represents a much smaller share of the book value of equity, with a mean of 4%.

Panel C presents the distributions of the ratios of the components to the total book value of equity for the six Fama and French portfolios. Several patterns emerge from these distributions. First, larger firms have higher percentages of retained earnings and lower frequencies of negative

[12] In this analysis, we drop firms for which a single component contributes more than 200% or less than -100% of the book value of equity. Excluding these firms drives the differences between Panel A and Panel B in the percentages of firms with negative values of the components.

retained earnings. Second, large growth firms have higher percentages of retained earnings while small growth firms have lower percentages of retained earnings.

Panel D presents Pearson and Spearman correlations for book-to-market, retained earnings-to-market, contributed capital-to-market, and accumulated other comprehensive income-to-market. Not surprisingly, all three components positively correlate with book-to-market, to which they sum. The informative result is that retained earnings-to-market and contributed capital-to-market are only slightly negatively correlated (Pearson -0.09, Spearman -0.16). These components comprise 96% of book value of equity, so when deflated by book value they are essentially perfectly negatively correlated. However, when deflated by market value they are almost uncorrelated, indicating they contain different types of information about market values. Simply changing from a book to a market denominator substantially alters the relation between the variables, which indicates that the market prices the two components differently and suggests they contain different information about stock returns.

4 The cross section of returns

4.1 Retained earnings versus contributed capital

Panel A of Table 2 presents our Fama and MacBeth (1973) regressions using the book-to-market definition as per Fama and French. We require that the book value of equity is positive and we take the natural logarithm of all ratios. Column 1 reports the baseline regressions that include as control variables size, prior one-month return, and prior one-year return skipping a month. As expected, book-to-market is statistically significant (coefficient of 0.24 with a t-value of 3.48) and in line with prior studies.

In column 2, we replace book-to-market with retained earnings-to-market and an indicator variable for negative retained earnings.[13] The coefficient on retained earnings-to-market is positive and its t-value is greater than the t-value for book-to-market (4.92 vs. 3.48). In columns 3, we

[13]When retained earnings are negative, we replace the log of retained earnings-to-market with zero and include an indicator variable for negative values.

include the book-to-market ratio along with retained earnings-to-market. The book-to-market ratio is no longer statistically significant—the t-value is 0.85. By contrast, the t-value on retained earnings-to-market increases to 5.27, showing that the information in retained earnings-to-market subsumes the information in book-to-market.

In columns 4, and 5, we run similar regressions that replace retained earnings-to-market with contributed capital-to-market. When contributed capital-to-market is included on its own, it is statistically insignificant (t-value = 0.33). When we include it along with book-to-market in columns 5, the t-value on book-to-market increases to 4.55, while the t-value on contributed capital is large and negative (-4.48), implying that that difference (i.e., retained earnings-to-market) predicts returns.

In columns 6 and 7, we repeat the regressions with accumulated other comprehensive income-to-market. In these regressions, accumulated other comprehensive income-to-market is not statistically significant and the t-value on book-to-market is similar in magnitude to that in column 2. In column 8, we include retained earnings-to-market, contributed capital-to-market, and accumulated other comprehensive income-to-market along with indicators for negative values for the three ratios. In this specification, only retained earnings-to-market is significant (t-value = 5.31).

Panel B of Table 2 repeats the analysis in Panel A with the book-to-market ratio based on the book value of equity actually reported on the firm's balance sheet (i.e., without the adjustments implemented by Fama and French). Reported book-to-market also is statistically significant, with a coefficient of 0.25 (vs. 0.24) and a t-value of 3.64 (vs. 3.48). Similar to Panel A, book-to-market loses its statistical significance when we include the ratio of retained earnings-to-market into regression (coefficient 0.05 with t-value 0.72). In contrast, retained earnings-to-market is highly significant with coefficient 0.18 and t-value 5.31. The estimates in the remaining columns closely mimic the findings in Panel A. This analysis suggest that the findings above are not sensitive to the definition of the book value.

Overall, the regressions in Panels A and B show that book-to-market predicts the cross section of returns only because it contains retained earnings. Other components of book-to-market provide no significant information about the cross section of average returns, and removing these other

components (i.e., using retained earnings alone) increases the t-value. These results imply that in asset pricing regressions it is preferable to use the retained earnings-to-market ratio rather than the book-to-market ratio. We explore the reasons underlying this in Section 6 below.

4.2 Addressing negative observations

In Panel C of Table 2, we present results for alternative samples. In columns 1 and 2, we expand the sample in Panel A to include firms with negative book values of equity. For these observations, we replace the log of book-to-market with zero and include an indicator variable for negative values. Our results for retained earnings-to-market are essentially unchanged by this modification (t-value = 5.20).

Our main results in Panel A include firms with negative retained earnings, and we control for such firms with an indicator variable. It could be that the non-linearity arising from the indicator variable affects the coefficient on retained earnings-to-market. In columns 3 and 4, we therefore restrict the sample to firm-years with positive retained earnings. Again, our results for retained earnings-to-market remain essentially unchanged (t-value = 5.49).

5 Portfolio sorts

We next perform portfolio tests, which provide a potentially more robust method to evaluate predictive ability without imposing the parametric assumptions embedded in the Fama and MacBeth (1973) regressions. Table 3 reports excess returns, CAPM alphas, and alphas from the three-factor model, together with their t-values, for quintiles sorted on book-to-market, retained earnings-to-market, and contributed capital-to-market.

With respect to excess returns, the high-minus-low portfolios generate positive returns for book-to-market (35 basis points per month with a t-value of 2.60) and retained earnings-to-market (43 basis points per month with a t-value of 2.73). By contrast, the high-minus-low portfolio for contributed capital-to-market generates only 7 basis points a month with a t-value of 0.54. When

we examine CAPM alphas, the pattern is the same: book-to-market and retained earnings-to-market spread returns, while contributed capital-to-market does not.

A different pattern emerges when we examine alphas from the three-factor model. The high-minus-low portfolio for book-to-market has a significantly negative alpha (−14 basis points per month with a t-value of −2.39), as does the high-minus-low portfolio for contributed capital-to-market (−29 basis points per month with a t-value of −2.95). The three-factor model, however, prices the retained earnings-to-market high-minus-low portfolio with the alpha being effectively zero (3 basis points per month with a t-value of 0.33). Positive loadings on HML drive the negative alphas for high-minus-low book-to-market and contributed capital-to-market portfolios. Although these strategies positively correlate with HML, they do not (fully) generate the value premium and are, hence, penalized.[14]

In Table 4, we further demonstrate that the predictive power in book-to-market arises from its retained earnings component. To do so, we implement conditional two-way sorts on the two measures. We then present CAPM alphas and t-values associated with those alphas for value-weighted portfolios.

Panel A presents a conditional two-way sort in which we first sort stocks into quintiles based on retained earnings-to-market and then, within each retained earnings-to-market quintile, we sort stocks into quintiles based on book-to-market. Consistent with our previous results, within each retained earnings-to-market quintile, the CAPM alphas for the book-to-market high minus low portfolios are not significantly different from zero.

Panel B reverses the order of the conditional sorts. We first sort on book-to-market and then, within each book-to-market quintile, sort based on retained earnings-to-market. In this specification, the CAPM alphas for the retained earnings-to-capital high-minus-low portfolios are statistically significant in four of the five quintiles, showing that retained earnings-to-market has information content holding book-to-market constant.

[14]Gerakos and Linnainmaa (2016) find a similar result when they decompose book-to-market into prior changes in the market value of equity and a residual component. They find that a high-minus-low strategy that trades the residual component earns a significantly negative three-factor model alpha. Contributed capital therefore behaves similar to their residual component.

In sum, the evidence based on portfolio sorts reconciles with our findings from Fama and MacBeth (1973) regressions and implies that retained earnings-to-market ratio is a more powerful predictor of future returns as compared with book-to-market, whereas contributed capital has no power to predict returns.

6 Analysis of what explains the retained earnings premium

In this section, we dig deeper into the composition of retained earnings and explore what underlies the difference between the information in contributed capital and retained earnings for expected returns.

6.1 Accumulated dividends versus accumulated earnings

Because retained earnings represent the difference between accumulated earnings and accumulated dividends, differences in firms' payout policies can drive differences in retained earnings. For example, a firm could have low retained earnings scaled by market value because it has a low earnings yield, or because historically it paid out a large portion of its earnings as dividends. To rule out the possibility that dividend policy rather than the firm's underlying earnings yield drives our results, we use CRSP to estimate the cumulative amount of dividends distributed by the firm since it went public.[15]

In column 2 of Table 5, we include in the regression the natural logarithm of the ratio of cumulative dividends to the market value equity. In this specification, retained earnings-to-market remains positive and significant (coefficient of 0.17 with a t-value of 5.04) and the estimates are similar to the baseline regression presented in column 1 (coefficient of 0.18 with a t-value of 5.25). By contrast, cumulative dividends-to-market is negative and insignificant (t-value $= -1.28$). The insignificance of the accumulated dividends component of retained earnings is consistent with book-

[15]We cannot directly observe the accumulated earnings component of retained earnings for older firms, because Compustat data do not go back to their origin. However, dividends data are obtainable from CRSP back to 1926, so with the exception of firms created before that date we can observe the accumulated dividends component of retained earnings and infer its accumulated earnings component by difference.

to-market's explanatory power over the cross section arising because it provides a good proxy for expected earnings yield.

6.2 Fama and MacBeth (1973) regressions with earnings cumulated over different back windows

To examine more closely whether it is the accounting accumulation of earnings in retained earnings that is responsible for retained earnings' predictive ability, we construct our own accumulation of earnings backward in time. We accumulate over windows ending with the most recent year and extending back by an increasing number of years. We deflate the sum by the most recent market value of equity and then take the natural logarithm. In all of the regressions, we include as controls: size, prior one-month return, and prior one-year returns skipping a month.

Panel A of Table 6 presents the Fama and MacBeth (1973) regressions using this backward-accumulated earnings measure. The top of the panel presents results for regressions that include the accumulated earnings measures, indicators for negative accumulated earnings, and the control variables, but exclude book-to-market.[16] For all accumulation windows, the coefficients on the accumulated earnings measures are statistically positive, with t-values ranging from 2.21 for the two-year-back window to 3.02 for the ten-year-back window.

In the bottom half of the panel, we include book-to-market in the regressions. For most of the windows, the coefficient on accumulated earnings-to-market remains statistically positive with the highest t-value being for accumulating back ten years (3.07). Importantly, the coefficients and their associated t-values for book-to-market almost monotonically decrease in the length of the back accumulation, starting at 3.04 for the current period's earnings alone to 0.03 for earnings accumulated ten years back.

In Panel B, we use income before extraordinary and special items as the earnings measure, again deflated by the most recent market value of equity. This profit measure excludes accounting-based items in individual years that are unlikely to persist and hence unlikely to contain information

[16] When the backward-accumulated earnings are negative, we set the log of accumulated earnings-to-market equal to zero and include an indicator variable for negative values.

about expected returns. In the top half of the panel, the coefficients and their associated t-values are larger than when we use the net income-based measure in Panel A, starting at 3.47 at the one year horizon and ending at 3.07 at the ten year horizon. When we include book-to-market in the bottom half of the panel, the t-values on book-to-market monotonically decrease in the horizon starting at 3.04 for the current period and decreasing to 0.67 at ten years. By contrast, the coefficients and t-values remain relatively constant for accumulated earnings across the horizons, ranging from 3.07 at the one year horizon to 2.44 at the ten year horizon.

The differences between Panels A and B appear to be driven by one-time extraordinary and special items in earnings. When these items are removed from the earnings measure, accumulated earnings-to-price gains statistical significance and book-to-market loses significance as the horizon increases. This effect is similar to the "washing-out" that occurs when earnings are accumulated in the retained earnings component of book-to-market. By accumulating earnings, retained earnings effectively "wash out" one-time accounting shocks.

6.3 Predicting earnings yield with retained earnings versus contributed capital

Our central thesis is that retained earnings is correlated with expected earnings yield, which in turn proxies for expected returns, and this explains the predictive power of book-to-market. At the same time, we have no reason to expect contributed capital to be informative of future earnings yield. An additional test of this thesis is whether retained earnings actually is informative about future earnings yield (earnings deflated by the beginning-of-period market value), and contributed capital is not. The test also allows us to discriminate between our rational pricing explanation of the book-to-market effect and the alternative explanation that book-to-market helps identify mispricing explanation.

We define future earnings yield as net income in year $t+k$ deflated by the market value of equity in year $t+k-1$, where t is current year. We estimate predictive regressions for one- to ten-year horizons following the methodology in Jegadeesh and Titman (1993). In a K-horizon regression, we estimate K regressions of earnings yield in year t against the year $t-1, ..., t-K$ predictors, and

take the sum of the slope estimates to form a time series of non-overlapping observations.[17] The regressions are estimated annually using data from 1963 through 2015. We restrict the sample to observations with positive book value of equity and non-missing values for retained earnings and contributed capital. To be consistent with the returns-based evidence in Table 2, we estimate the regressions using all-but-microcaps and control for firm size.

Table 7 presents Fama and MacBeth (1973) regression estimates and their t-values from cross-sectional regressions that predict future earnings yield. The table reports two regression specifications, both estimated across varying prediction horizons. Regression 1 shows that book-to-market has a statistically significant positive association with future earnings yield. Regression 2 indicates that this effect is driven purely by retained earnings. When book value is decomposed into contributed capital and retained earnings, the retained earnings-to-market ratio becomes a more powerful predictor of future yield than the book-to-market ratio in Regression 1, and is statistically significant up to 10 years into the future. In contrast, the ratio of contributed capital to market value of equity exhibits a negative and statistically insignificant relation to future earnings yield across all prediction horizons.

In this methodology, the coefficients over increasing horizons are cumulative effects. The increase in the coefficient on retained earnings-to-market as the horizon extends to 10 years indicates a consistently positive relation over the 10 years. Under the mispricing explanation, one would expect the coefficient would begin to fall as the prediction horizon increases, because undervaluation should be at least partially corrected over a period as long as a decade. The evidence in Regression 2 shows no evidence of reversals. The coefficient on retained earnings-to-market increases at a steady rate as the horizon extends to four years, after which the increments remain positive but decline in magnitude, and the t-values decline monotonically. Thus, retained earnings-to-market is informative about future earnings yield over long horizons but with decreasing accuracy. Con-

[17] This methodology resolves the overlapping-data issue by running k regressions each year. The dependent variables are the year-t earnings yields, but the regressors are, first, those in year $t-1$, then in year $t-2$, and so forth. The sum of these k slope estimates measures the cumulative effect over the k-year window. By repeating the same procedure for every month, this methodology produces one time-series of coefficients that are based on non-overlapping dependent variables.

tributed capital-to-market, by contrast, is not informative. These results reconcile with our thesis that retained earnings are a proxy for expected returns, but are hard to reconcile with mispricing.

6.4 Future issuances and retained earnings versus contributed capital

The methodology in the prior sub-section can be used to predict future net share issuances and how they relate to retained earnings versus contributed capital. The findings are presented in Table 8. The findings indicate that retained earnings-to-market is a significant negative predictor of future net share issuances. In contrast, contributed capital has a significantly positive association with future share issuances. The findings are consistent across different prediction horizons. Interestingly, the coefficient on contributed capital scaled by the market value increases with the prediction horizon. Under a mispricing explanation the opposite pattern is expected because undervalued firms (i.e., high book-to-market) should exhibit more repurchases in the early years. Broadly, this evidence indicates that retained earnings and contributed capital reflect different economic forces. More specifically, the results suggest that replacing book-to-market ratio with retained earnings-to-market would alter assessments of the "net issuance anomaly" (Ikenberry et al., 1995; Loughran and Ritter, 1995; Daniel and Titman, 2006; Pontiff and Woodgate, 2008), because retained earnings and net issuances are alternative sources of finance.

7 Retained earnings and contributed capital factors

In our next set of tests, we construct factors that capture the relation between average returns and the major components of book value of equity. We augment the Fama and French (1993) three-factor model with these factors and then examine their information content. To construct the factors, we follow the six-portfolio methodology used in Fama and French (2015); this is also the methodology that Fama and French (1993) use to construct the HML factor. We first sort stocks by size into small and big sub-groups depending on whether a company is below or above the median NYSE market capitalization breakpoint. We then perform an independent sort of stocks into high (i.e., above the 70^{th} NYSE percentile breakpoint) and low (i.e., below the 30^{th} NYSE percentile

breakpoint) portfolios based on the ratio of the particular component of the book value of equity (i.e., retained earnings or contributed capital) to the market value of equity. We construct each factor by taking the average of the two high component portfolios minus the average of the two low component portfolios.

Panel A of Table 9 presents the average annualized returns, standard deviations, and t-values for HML and the factors based on the three components. We present these statistics for two versions of HML. The first is standard HML and the second is based on our sample (HML*). The two versions of HML have similar annualized average returns (4.05 and 4.08) and similar t-values (2.96 and 3.03). When we calculate a version of HML based on retained earnings-to-market value (HML_{RE}), the average return increases to 5.02 and the t-value to 3.43. By contrast, when we calculate a version of HML based on contributed capital-to-market (HML_{RE}), the average return is not significantly different from zero (0.46 with a t-value of 0.44).

Panel B presents correlations between the factors. There are several important takeaways from the correlations. First, the correlation between HML and HML_{RE} is 0.86, while the correlation between HML and HML_{CC} is only 0.45. Second, HML and HML_{RE} have similar correlations with MKT (-0.30 and -0.31), while the correlation between MKT and HML_{CC} is approximately zero. Third, HML and HML_{RE} have similar negative correlations with SMB (-0.23 and -0.30), while HML_{CC} is positively correlated with SMB (0.24). Although retained earnings and contributed capital represent similar proportions of the book value of equity, HML and HML_{RE} have similar correlations with the other factors, while HML and HML_{CC} do not.

Panel C measures the information content of HML, HML_{RE}, and HML_{CC} by reporting estimates of spanning regressions. In these regressions, the dependent variable is the monthly return on the factor of interest and the independent variables are the other factors. If the intercept is significant in these regressions, then the factor of interest (i.e., the dependent variable) is valuable to an investor who already trades the factors used as explanatory variables.

In the first two columns, the dependent variable is the monthly return on HML. In column 1, we include as explanatory variables MKT, SMB, and HML_{RE}. The intercept for this regression is

approximately zero with a t-value of 0.06. The insignificant intercept implies that if an investor already trades MKT, SMB, and HML_{RE}, there is no useful information in HML. In column 2, we replace HML_{RE} with HML_{CC}. The intercept of this regression is 0.44 with a t-value of 4.75, implying that there is useful information in HML if an investor already trades a factor based on the contributed capital-to-market along with MKT and SMB.

In the next two columns, we replace the dependent variable with the monthly return on the retained earnings-based factor (HML_{RE}). The intercepts are positive and significant with t-values of 2.52 and 4.89 when we include HML in column 3 and HML_{CC} in column 4. These regressions show that the HML_{RE} is valuable to an investor who already trades MKT, SMB, and either the standard or contributed capital-based HML factors.

In the final two columns, the dependent variable is the monthly return on the contributed capital-based factor (HML_{CC}). When we include HML as an explanatory variable, the intercept is negative and significant (t-value $= -2.29$), suggesting that investor who already trades MKT, SMB, and HML would be better off shorting HML_{CC}. In contrast, when we replace HML with HML_{RE} in column 6, the intercept is not significantly different from zero (t-value $= -0.52$).

Overall, the spanning regressions show that when combined with MKT and SMB, the retained earnings-based factor captures the valuable information in HML. By contrast, HML and HML_{CC} do not capture all of the information embedded in the retained earnings-based factor.

8 Predicting average returns over increasing horizons

We next compare how far ahead book-to-market and its retained earnings component predict returns. We modify the Fama and MacBeth (1973) regressions in Table 2 to assess the longevity of the information embedded in the two measures. We replace the current values of book-to-market and retained earnings-to-market with increasingly stale values, but retain the current values of the control variables. Thus, we assume the investor knows the current values of the control variables, but does not know the current values of the balance sheet measures. Would an investor still benefit from these stale measures? How far ahead do these measures predict the cross-section of returns?

Figure 1 plots average monthly Fama and MacBeth (1973) regression t-values for both variables, increasing the horizon in one-month increments up to ten years. The cross-sectional regressions are estimated for each month from July 1973 through December 2015. By starting in 1973, we ensure that the same left-hand side data are used for all lags. Control variables are updated each month, but the book-to-market and retained earnings-to-market variables are not. Figure 1 shows that both book-to-market and retained earnings-to-market reliably predict returns several years ahead. Book-to-market has significant explanatory power for approximately three years. The effect of retained earnings-to-market is stronger, and persists for approximately seven years.

These results are difficult to reconcile with the notion of book value being a benchmark for identifying market mispricing. Why would only one component of book value indicate mispricing of the entire equity? Why would the correction of mispricing occur gradually over an horizon that extends at least as far as seven years, especially bearing in mind that all this accounting information is made publicly accessible at essentially zero cost for all firms and all years? We interpret the results in Figure 1 as reflecting two factors. First, retained earnings incorporate past earnings, which proxy for expected future cash flows to investors and, when deflated by current market value of equity, proxy for expected returns (Ball, 1978; Berk, 1995). Second, the ability of variables deflated by current market values to predict stock returns inevitably declines over time. Consequently, the explanatory effect for future returns of retained earnings deflated by market value persists but also decays over time.

9 Conclusion

Generations of investors and scholars have calibrated the market value of a firm's equity against its book value to help identify market under- or over-valuation, or mispricing. The book-to-market ratio then is viewed as a crude indicator of whether prices have strayed from "fundamental" or "intrinsic" values. Consequently, book-to-market has been a common element of "value" investment strategies that have been popular at least since publication of Graham and Dodd's (1934) classic text. For example, Investopedia states: "The book-to-market ratio attempts to identify

undervalued or overvalued securities by taking the book value and dividing it by market value. In basic terms, if the ratio is above 1 then the stock is undervalued; if it is less than 1, the stock is overvalued."[18] Among scholars, many interpret the abundant evidence that book-to-market reliably predicts stock returns (Rosenberg, Reid, and Lanstein, 1985; Chan, Hamao, and Lakonishok, 1991) as indicating mispricing. For example, Lakonishok, Shleifer, and Vishny (1994, p. 1541) summarize their interpretation as follows:

> "For many years, scholars and investment professionals have argued that value strategies outperform the market. These value strategies call for buying stocks that have low prices relative to earnings, dividends, book assets, or other measures of fundamental value. While there is some agreement that value strategies produce higher returns, the interpretation of why they do so is more controversial. This article provides evidence that value strategies yield higher returns because these strategies exploit the suboptimal behavior of the typical investor and not because these strategies are fundamentally riskier."

We provide an entirely different interpretation. We decompose the book-to-market ratio into two economically different components: retained earnings and contributed capital, both deflated by the market value of equity. We expect one to contain substantial information about expected returns, but not the other. Consistent with this expectation, we show that, while retained earnings explain less than 50% of the book-to-market ratio's variance, they entirely subsume book-to-market in predicting returns. In contrast, contributed capital has no ability to predict future returns when controlling for retained earnings-to-market ratio.

We explore what drives the power of retained earnings to predict future returns. Our conclusion is that retained earnings-to-market is a good proxy for earnings yield, which has a direct conceptual link with expected returns. Our findings throughout the paper are inconsistent with the view that book-to-market predicts the cross section of expected returns because it identifies mispricing.

Our findings have important implications for asset pricing tests. Specifically, we suggest that running asset pricing regressions that rely on retained earnings-to-market is preferable to using book-to-market. Using retained earnings-to-market is particularly important when an investment

[18] http://www.investopedia.com/terms/b/booktomarketratio.asp, accessed on January 12, 2017.

strategy is correlated with the proportion of book value that is retained earnings versus contributed capital (i.e., with the firm's historical use of internal versus external finance).

APPENDIX—issuances and repurchases

Share issuances

Par value shares have a face value assigned to them. Such shares may be issued at par, above par or below par. When par value shares are issued exactly at par, cash is debited and common stock or preferred stock account is credited. In case of issuance above par, cash account is debited for the total cash received by the company, common stock or preferred stock is credited for the par value multiplied by number shares issued and additional paid-in capital account is credited for the excess of cash received over the par value multiplied by number of shares issued. When par value shares are issued below par, cash is debited for the actual amount received, common stock or preferred stock is credited for the total par value, and discount on capital is debited for the excess of total par value over cash received. The discount on capital is part of shareholders' equity and it appears as a deduction from other equity accounts on balance sheet.

Share repurchases

How do share repurchases affect the book value of common equity? There are two governing legal principles involved:

- A corporation cannot be its own shareholder, so treasury stock cannot be recorded as assets. The debit therefore must be to reduce stockholders' equity.
- A corporation cannot create earnings through trading in its own capital stock, so treasury stock transactions generally increase or decrease contributed capital. Some treasury stock transactions decrease retained earnings, but never increase.

There are two methods of accounting for treasury stock: the cost method and the par method. Their use depends on what the company intends to do with the repurchased stock. The cost method is used when the company might want to reissue the shares in future. It records the amount paid to repurchase stock as increasing treasury stock, which is a contra account to stockholders' equity

and therefore has a debit balance. No distinction is made between par value and the premium paid in the purchase transaction. The corresponding credit reduces cash. If treasury stock subsequently is sold at a price greater than its repurchase cost, the gain is recorded as additional paid-in-capital (treasury stock). If a subsequent sale is at less than the repurchase cost, the loss is recorded as a reduction in additional paid-in-capital (treasury stock) and, if that account is fully depleted, the balance is a reduction in retained earnings.

The par method is used if the board retires the stock when it is repurchased. The stock is legally cancelled and common stock and additional paid-in-capital are reduced by the amounts recorded when the stock was originally issued to stockholders. If the repurchase price is greater than the amount originally received when the stock was issued, the "loss" reduces retained earnings. If it is less, the "gain" increases additional paid-in-capital.

The par value method permanently reduces the Stockholders Equity accounts. The cost method reduces them temporarily, using a contra account that is shown on the balance sheet as a deduction from Stockholders Equity.

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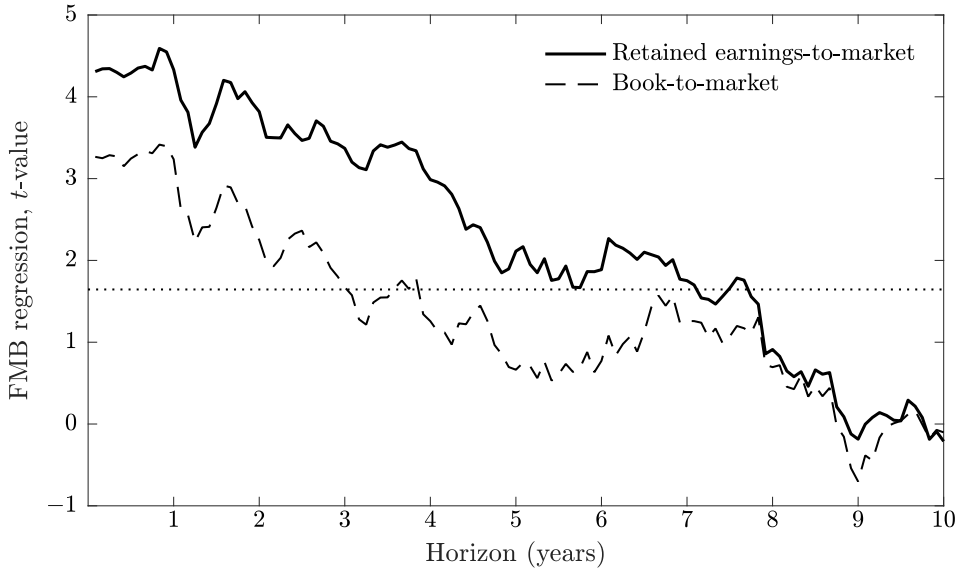

Figure 1: **Comparison of the predictive power of lagged BE/ME and lagged RE/ME.** This figure plots t-values associated with the Fama and MacBeth (1973) regression slopes for log(BE/ME) and log(RE/ME) from cross-sectional regressions that predict monthly returns. The regressions are estimated monthly using data from July 1973 through December 2015 for stocks with a market value of equity above the 20th percentile of the NYSE market capitalization distribution (All but microcaps). The regressions are estimated separately using book-to-market or retained earnings-to-market as the main regressor. The other regressors are: prior one-month return, prior one-year return skipping a month, and log-size. We lag all regressors by the value indicated on the x-axis. The estimates at $x = 2$, for example, explain cross-sectional variation in returns using the lagged values of log(BE/ME) and log(RE/ME) recorded 2 years earlier. The dashed line indicates the threshold for statistical significance at the 10% level.

Table 1: Summary statistics and correlations for retained earnings, contributed capital, and book value of equity

Panel A presents distributions of book-to-market and the ratios of the components to market. Panel B presents distributions of the ratios of the components of the book value of equity to the total book value of equity. The components of the book value of equity are contributed capital (CC), retained earnings (RE), and other (OTH). Panel C presents the distributions of the ratios of the components to the total book value of equity for the six Fama and French portfolios. Panel D presents Pearson and Spearman correlations for the measures when they are deflated by the December market value of equity. Panel A includes all firms. Panels B through D include firms with positive book values of equity and require that each book-value-of-equity component is between −100% and 200% of the book value of equity. Our sample period starts in July 1963 and ends in December 2015.

Panel A: Distributions of book-to-market and retained earnings-to-market

				Percentiles				
Ratio	Mean	SD	Pct < 0	10th	25th	50th	75th	90th
Book-to-market	0.86	2.21	2%	0.20	0.40	0.72	1.14	1.72
Reported book-to-market	0.83	1.93	2%	0.20	0.39	0.68	1.08	1.66
Retained earnings-to-market	−0.05	3.47	24%	−0.78	−0.04	0.27	0.56	0.92
Contributed capital-to-market	0.88	2.89	3%	0.05	0.16	0.38	0.81	1.78
Other book-to-market	0.03	0.65	25%	−0.01	−0.00	0.01	0.05	0.15

Panel B: Distributions of the book value of equity components (%)

				Percentiles				
Component	Mean	Pct < 0	SD	10th	25th	50th	75th	90th
Retained earnings (RE)	42%	13%	40%	−10%	20%	47%	71%	87%
Contributed capital (CC)	53%	4%	41%	9%	24%	47%	75%	108%
Other (AOCI)	4%	21%	11%	−1%	−0%	2%	7%	17%

Panel C: Book value of equity components by Fama-French portfolios (%)

		RE			CC			AOCI		
		Mean	Median	Pct < 0	Mean	Median	Pct < 0	Mean	Median	Pct < 0
Small	Growth	29%	34%	24%	69%	63%	2%	2%	0%	24%
	Neutral	42%	46%	14%	55%	49%	3%	3%	1%	23%
	Value	41%	46%	13%	54%	48%	2%	4%	1%	21%
Big	Growth	62%	66%	6%	34%	30%	10%	4%	3%	20%
	Neutral	55%	57%	4%	37%	33%	6%	8%	6%	16%
	Value	44%	45%	7%	42%	38%	2%	14%	13%	12%

Panel D: Correlations among book value of equity components

	Pearson correlations				Spearman correlations			
	BE/ME	RE/ME	CC/ME	AOCI/ME	BE/ME	RE/ME	CC/ME	AOCI/ME
BE/ME	1				1			
RE/ME	0.53	1			0.56	1		
CC/ME	0.78	−0.09	1		0.61	−0.16	1	
AOCI/ME	0.35	0.01	0.22	1	0.26	0.24	−0.03	1

Table 2: Retained earnings and contributed capital in Fama-MacBeth regressions

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross sectional regressions that predict monthly returns. The regressions are estimated monthly using data from July 1963 through December 2015. The sample consists of All but microcap firms with positive book value of equity and non-missing values for retained earnings and contributed capital. Variables are trimmed at the 1st and 99th percentiles based on book-to-market, size, prior one-month return, and prior one-year return skipping a month. Regressors log(RE/ME), log(CC/ME), and log(AOCI/ME) are set to zero when RE ≤ 0, CC ≤ 0, or AOCI ≤ 0 is non-positive. Indicator variables at the bottom of the table identify these observations. The sample starts in July 1963 and ends in December 2015. Panel A presents our main results; Panel B presents results that use reported book value of equity instead of Fama and French (1992) book value of equity; and Panel C presents results for alternative samples.

Panel A: Main regressions

	Regression							
Regressor	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(ME)	−0.07	−0.09	−0.09	−0.09	−0.09	−0.10	−0.07	−0.09
	(−2.02)	(−2.77)	(−2.49)	(−2.66)	(−2.52)	(−2.85)	(−2.03)	(−2.61)
$r_{1,1}$	−3.39	−3.27	−3.49	−3.11	−3.45	−3.07	−3.47	−3.51
	(−7.78)	(−7.51)	(−8.17)	(−6.92)	(−8.04)	(−6.89)	(−8.02)	(−8.18)
$r_{12,2}$	0.94	0.91	0.93	0.88	0.93	0.90	0.93	0.90
	4.92	(4.78)	(4.93)	(4.52)	(4.92)	(4.61)	(4.87)	(4.78)
log(BE/ME)	0.24		0.06		0.35		0.24	
	(3.48)		(0.85)		(4.55)		(3.61)	
log(RE/ME)		0.20	0.18					0.20
		(4.92)	(5.27)					(5.31)
log(CC/ME)				0.01	−0.12			0.01
				(0.33)	(−4.48)			(0.41)
log(AOCI/ME)						0.01	0.00	0.00
						(1.50)	(0.08)	(0.51)
Indicator variables								
RE ≤ 0		−0.50	−0.44					−0.51
		(−2.48)	(−2.21)					(−2.52)
CC ≤ 0				0.12	0.22			−0.04
				(1.88)	(2.74)			(−0.63)
AOCI ≤ 0						−0.08	0.01	−0.02
						(−1.02)	(0.21)	(−0.36)
Pseudo t-value for joint sig. of add'l regressors		4.53	4.89	1.71	4.08	1.03	0.13	4.54
Avg. Adj. R^2	5.51	5.55%	6.15%	4.79%	5.84%	4.76%	5.78%	6.21%

Panel B: Regressions using reported book value of equity

	Regression			
Regressor	(1)	(2)	(3)	(4)
log(ME)	−0.07	−0.09	−0.08	−0.07
	(−1.88)	(−2.46)	(−2.35)	(−1.99)
$r_{1,1}$	−3.37	−3.47	−3.44	−3.46
	(−7.72)	(−8.10)	(−7.97)	(−8.00)
$r_{12,2}$	0.94	0.92	0.93	0.93
	(4.87)	(4.85)	(4.89)	(4.85)
log(Reported BE/ME)	0.25	0.05	0.36	0.24
	(3.62)	(0.72)	(4.77)	(3.75)
log(RE/ME)		0.18		
		(5.31)		
log(CC/ME)			−0.13	
			(−4.61)	
log(AOCI/ME)				0.00
				(0.54)
Indicator variables				
RE ≤ 0		−0.44		
		(−2.17)		
CC ≤ 0			0.23	
			(2.78)	
AOCI ≤ 0				−0.04
				(−0.54)
Pseudo t-value for joint sig. of add'l regressors		4.94	4.21	0.19
Avg. Adj. R^2	5.42%	6.06%	5.75%	5.73%

Panel C: Alternative samples

	Include firms with negative book value of equity		Require firms to have positive retained earnings	
Regressor	(1)	(2)	(3)	(4)
log(ME)	−0.07	−0.09	−0.08	−0.09
	(−2.00)	(−2.46)	(−2.45)	(−2.65)
$r_{1,1}$	−3.38	−3.49	−3.82	−3.88
	(−7.80)	(−8.20)	(−8.73)	(−8.95)
$r_{12,2}$	0.95	0.93	0.85	0.85
	(4.97)	(4.98)	(4.22)	(4.28)
log(BE/ME)	0.24	0.06	0.19	0.01
	(3.48)	(0.88)	(2.88)	(0.08)
log(RE/ME)		0.17		0.19
		(5.20)		(5.49)
Indicator variables				
BE ≤ 0	0.09	0.37		
	(0.47)	(1.82)		
RE ≤ 0		−0.45		
		(−2.31)		
Pseudo t-value for joint sig. of add'l regressors		4.82		
Avg. Adj. R^2	5.55%	6.18%	5.45%	5.76%

Table 3: Returns on portfolios sorted by book-to-market, retained earnings, and contributed capital

This table reports value-weighted average excess returns and three-factor model alphas for portfolios sorted by operating profitability, accruals, and cash-based operating profitability, each scaled by the book value of total assets. We sort stocks into quintiles based on NYSE breakpoints at the end of each June and hold the portfolios for the following year. The sample starts in July 1963 and ends in December 2015.

	Book-to-market component			Book-to-market component		
Quintile	Total	Retained earnings	Contributed capital	Total	Retained earnings	Contributed capital
	Excess returns			***t*-values**		
1 (low)	0.46	0.32	0.53	2.37	1.41	3.03
2	0.52	0.48	0.46	2.90	2.82	2.44
3	0.56	0.58	0.51	3.20	3.42	2.72
4	0.65	0.73	0.54	3.74	4.10	3.06
5 (high)	0.81	0.75	0.60	4.10	3.80	2.96
H−L	0.35	0.43	0.07	2.60	2.73	0.54
	CAPM alphas			***t*-values**		
1 (low)	−0.07	−0.28	0.06	1.26	−3.42	1.17
2	0.03	0.02	−0.06	0.67	0.35	−1.49
3	0.10	0.12	0.00	1.59	2.39	0.00
4	0.21	0.27	0.07	2.74	3.82	1.17
5 (high)	0.32	0.26	0.10	3.34	2.77	1.01
H−L	0.39	0.53	0.04	2.87	3.42	0.32
	Three-factor model alphas			***t*-values**		
1 (low)	0.10	−0.10	0.15	−2.95	−1.53	3.62
2	−0.01	0.06	−0.05	−0.24	1.49	−1.19
3	−0.04	0.04	−0.06	−0.68	0.94	−1.15
4	−0.05	0.09	−0.08	−1.12	1.79	−1.51
5 (high)	−0.03	−0.06	−0.15	−0.69	−1.18	−1.96
H−L	−0.14	0.03	−0.29	−2.39	0.33	−2.95

Table 4: Two-way portfolio sorts: Book-to-market and retained earnings-to-market

This table reports CAPM alphas and t-values associated with those alphas for value-weighted portfolios sorted by book-to-market and retained earnings-to-market. Panel A sorts stocks first into quintiles by retained earnings-to-market and then, *conditional* on the retained earnings quintile, into quintiles by book-to-market. Panel B reverses the order of the sorts. Each sort uses NYSE breakpoints. The portfolios are rebalanced annually at then end of June. The sample starts in July 1963 and ends in December 2015.

Panel A: Conditional portfolio sorts on retained earnings-to-market and book-to-market

	BE/ME (Conditional sort)					
RE/ME	Low	2	3	4	High	H − L
			Monthly CAPM alphas			
Low	−0.34	−0.25	−0.20	−0.14	−0.11	0.22
2	0.06	−0.01	−0.15	−0.10	0.12	0.06
3	0.14	−0.09	0.11	0.16	0.29	0.15
4	0.30	0.21	0.35	0.28	0.26	−0.04
High	0.29	0.22	0.29	0.26	0.52	0.23
H − L	0.63	0.47	0.49	0.40	0.63	
			***t*-values**			
Low	−2.48	−2.31	−2.07	−1.29	−0.84	1.08
2	0.75	−0.11	−1.67	−1.02	1.16	0.43
3	1.72	−1.11	1.25	1.67	2.55	1.13
4	3.50	2.07	3.40	2.58	2.23	−0.34
High	2.97	1.85	2.45	1.87	3.49	1.58
H − L	3.14	2.57	3.04	2.36	3.57	

Panel B: Conditional portfolio sorts on book-to-market and retained earnings-to-market

	RE/ME (Conditional)					
BE/ME	Low	2	3	4	High	H − L
			Monthly CAPM alphas			
Low	−0.45	−0.21	0.01	−0.01	0.11	0.56
2	−0.17	−0.12	−0.04	0.17	0.20	0.37
3	−0.23	0.03	0.08	0.32	0.18	0.41
4	0.00	0.28	0.29	0.23	0.25	0.26
High	0.23	0.30	0.35	0.33	0.34	0.10
H − L	0.69	0.51	0.34	0.34	0.23	
			***t*-values**			
Low	−3.34	−1.88	0.14	−0.08	1.35	3.14
2	−1.70	−1.30	−0.48	2.05	2.24	2.64
3	−2.10	0.31	0.79	3.29	1.75	2.72
4	−0.01	2.61	2.90	2.02	2.11	1.77
High	1.63	2.47	2.72	2.72	2.19	0.60
H − L	3.43	2.64	1.92	2.21	1.34	

Table 5: Retained earnings, contributed capital, and payout policy in Fama-MacBeth regressions

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross sectional regressions that predict monthly returns. The regressions are estimated monthly using data from July 1963 through December 2015. The sample consists of All but microcap firms with positive book value of equity and non-missing values for retained earnings and contributed capital. All but microcap firms are stocks with market values of equity at or above the 20^{th} percentile of the NYSE market capitalization distribution. log(Cum. dividends/ME) is the ratio of cumulative dividends distributed since the firm's IPO to the current market value of equity. Variables are trimmed at the 1^{st} and 99^{th} percentiles based on the four explanatory variables used in the first column: book-to-market, size, prior one-month return, and prior one-year return skipping a month. Our sample period starts in July 1963 and ends in December 2015.

	Regression	
Regressor	(1)	(2)
log(ME)	−0.09	−0.09
	(−2.50)	(−2.66)
$r_{1,1}$	−3.51	−3.62
	(−8.22)	(−8.52)
$r_{12,2}$	0.93	0.92
	(4.95)	(4.93)
log(BE/ME)	0.06	0.06
	(0.86)	(0.97)
log(RE/ME)	0.18	0.17
	(5.25)	(5.04)
log(Cum. dividends/ME)		−0.01
		(−1.28)
Indicator variables		
RE ≤ 0	−0.43	−0.41
	(−2.21)	(−2.14)
Cum. dividends $= 0$		0.02
		(0.15)
Pseudo t-value for joint sig. of add'l regressors	4.86	4.12
Avg. Adj. R^2	6.16%	6.55%

Table 6: Fama-MacBeth regressions with cumulative earnings.

Each line shows estimates from a separate set of Fama-MacBeth regressions in which we accumulate earnings over different windows. Our measure of accumulated earnings is the natural logarithm of the sum of earnings over the window deflated by the most recent market value of equity. The regressions include as (unreported) controls size, prior one-month return, and prior one-year return skipping a month. The sample consists of All but microcap firms with positive book value of equity and non-missing values for retained earnings and contributed capital. All but microcap firms are stocks with market values of equity at or above the 20^{th} percentile of the NYSE market capitalization distribution. In the regressions that accumulate earnings up to five years, the sample consist of firms with at least five years of earnings data. The regressions that accumulate ten years of earnings include firms with at least ten years of earnings data. Panel A presents results based on using net income as the measure of earnings and Panel B uses income before extraordinary and special items. The sample starts in July 1973 and ends in December 2015.

Panel A: Accumulated net income to price

Horizon,	log(BE/ME)		log(Earnings/ME)		Earnings < 0		Avg.
years	EST	t-value	EST	t-value	EST	t-value	adj. R^2
			Regressions without log(BE/ME)				
1			0.165	3.01	−0.665	−2.93	5.30%
2			0.134	2.21	−0.475	−2.18	5.44%
3			0.155	2.48	−0.360	−1.74	5.51%
4			0.150	2.40	−0.355	−1.71	5.61%
5			0.156	2.51	−0.337	−1.63	5.63%
10			0.188	3.02	−0.127	−0.64	5.80%
			Regressions with log(BE/ME)				
·	0.188	3.04					5.20%
1	0.134	2.46	0.108	2.52	−0.554	−2.78	5.92%
2	0.136	2.61	0.065	1.36	−0.366	−1.89	5.97%
3	0.119	2.37	0.091	1.78	−0.283	−1.51	5.98%
4	0.108	2.18	0.090	1.68	−0.297	−1.54	6.05%
5	0.094	1.88	0.108	1.99	−0.301	−1.53	6.05%
10	0.001	0.03	0.199	3.07	−0.105	−0.52	6.18%

Panel B: Accumulated income before extraordinary and special items to price

Horizon,	log(BE/ME)		log(Earnings/ME)		Earnings < 0		Avg.
years	EST	t-value	EST	t-value	EST	t-value	adj. R^2
			Regressions without log(BE/ME)				
1			0.204	3.47	−0.843	−3.22	5.46%
2			0.216	3.34	−0.648	−2.68	5.57%
3			0.205	3.07	−0.499	−2.18	5.64%
4			0.205	3.05	−0.503	−2.26	5.69%
5			0.201	3.00	−0.535	−2.45	5.72%
10			0.197	3.07	−0.190	−0.85	5.91%
			Regressions with log(BE/ME)				
·	0.188	3.04					5.20%
1	0.126	2.18	0.145	3.07	−0.733	−3.08	6.06%
2	0.106	1.96	0.160	3.03	−0.583	−2.61	6.07%
3	0.088	1.67	0.157	2.73	−0.450	−2.11	6.09%
4	0.073	1.42	0.163	2.80	−0.482	−2.30	6.09%
5	0.071	1.37	0.155	2.54	−0.509	−2.42	6.11%
10	0.038	0.67	0.166	2.44	−0.177	−0.80	6.28%

Table 7: Predicting earnings yield

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross sectional regressions that predict earnings yield. The regressions are estimated annually using data from 1963 through 2015. The sample consists of All but microcap firms with positive book value of equity and non-missing values for retained earnings and contributed capital. All but microcap firms are stocks with market values of equity at or above the 20^{th} percentile of the NYSE market capitalization distribution. Size, book-to-market, retained earnings-to-market, and contributed capital-to-market are winsorized at the 1^{st} and 99^{th} percentiles. Regression 1 includes log-size and log-book-to-market; Regression 2 includes log-size, log-retained earnings-to-market, and log-contributed capital-to-market. Logs of non-positive values are replaced with zeros and the two indicator variables, RE ≤ 0 and CC ≤ 0 indicate these observations. Earnings yield is the net income in year $t+k$ over the market value of equity in year $t+k-1$. We estimate the regressions for one- to ten-year horizons. In a K-horizon regression, we estimate K regressions of y in year t against year $t-1,\ldots,t-K$ predictors, and take the sum of the slope estimates to form a time series of non-overlapping observations (Jegadeesh and Titman, 1993).

	Regression 1		Regression 2				
Horizon	log(ME)	log(BE/ME)	log(ME)	log(RE/ME)	RE ≤ 0	log(CC/ME)	CC ≤ 0
				Coefficients			
1	0.006	0.011	0.003	0.012	−0.077	−0.002	0.015
2	0.016	0.025	0.009	0.026	−0.156	−0.004	0.034
3	0.027	0.040	0.016	0.040	−0.250	−0.008	0.051
4	0.042	0.048	0.027	0.052	−0.361	−0.014	0.071
5	0.056	0.061	0.038	0.055	−0.449	−0.010	0.093
10	0.133	0.091	0.099	0.089	−0.900	−0.033	0.182
				t-values			
1	6.52	2.22	3.33	4.72	−10.54	−0.65	2.50
2	7.76	2.34	5.55	4.05	−7.04	−0.78	2.65
3	8.36	2.46	6.30	3.72	−5.77	−0.89	2.56
4	8.69	2.23	6.44	3.36	−5.41	−1.10	2.53
5	8.19	2.21	6.33	3.44	−4.53	−0.71	2.50
10	7.97	1.58	6.58	3.05	−5.79	−0.97	2.03

Table 8: Predicting net share issuances

This table presents average Fama and MacBeth (1973) regression slopes and their t-values from cross sectional regressions that predict net share issuances. The regressions are estimated annually using data from 1963 through 2015. The sample consists of All but microcap firms with positive book value of equity and non-missing values for retained earnings and contributed capital. All but microcap firms are stocks with market values of equity at or above the 20^{th} percentile of the NYSE market capitalization distribution. Size, book-to-market, retained earnings-to-market, and contributed capital-to-market are winsorized at the 1^{st} and 99^{th} percentiles. Regression 1 includes log-size and log-book-to-market; Regression 2 includes log-size, log-retained earnings-to-market, and log-contributed capital-to-market. Logs of non-positive values are replaced with zeros and the two indicator variables, RE ≤ 0 and CC ≤ 0 indicate these observations. Net share issuances is the log-change in the adjusted number of shares outstanding over fiscal year $t+k$. We estimate the regressions for one- to ten-year horizons. In a K-horizon regression, we estimate K regressions of y in year t against year $t-1,\ldots,t-K$ predictors, and take the sum of the slope estimates to form a time series of non-overlapping observations (Jegadeesh and Titman, 1993).

	Regression 1		Regression 2				
Horizon	log(ME)	log(BE/ME)	log(ME)	log(RE/ME)	RE ≤ 0	log(CC/ME)	CC ≤ 0
			Coefficients				
1	−0.006	−0.005	−0.002	−0.012	0.044	0.010	−0.029
2	−0.011	−0.005	−0.004	−0.019	0.075	0.020	−0.055
3	−0.016	−0.003	−0.006	−0.026	0.103	0.030	−0.080
4	−0.022	0.000	−0.009	−0.031	0.130	0.041	−0.104
5	−0.028	0.004	−0.013	−0.034	0.155	0.051	−0.129
10	−0.060	0.021	−0.034	−0.046	0.263	0.094	−0.259
			***t*-values**				
1	−7.06	−2.56	−3.10	−9.18	7.56	10.66	−8.51
2	−7.09	−1.38	−3.19	−7.91	7.34	11.08	−8.41
3	−7.25	−0.68	−3.21	−7.36	7.39	11.16	−8.51
4	−7.35	0.05	−3.44	−6.70	7.22	11.11	−8.56
5	−7.82	0.55	−3.97	−6.14	7.08	10.51	−8.59
10	−10.26	1.63	−5.49	−4.45	6.48	9.44	−8.80

Table 9: Information content of HML-factors based book value of equity, retained earnings, and contributed capital.

Panel A shows the annualized average returns and standard deviations of the monthly factors. Panel B shows the Pearson correlations. The factors are the market return minus the risk free rate, MKT; size, SMB; value, HML; and two factors constructed from the retained earnings and contributed capital components of the book value of equity, HML_{re} and HML_{cc}. These additional factors are formed using the same six-portfolio methodology as standard HML. HML is the factor provided by Ken French; HML^* is constructed using our sample. Panel C measures the information content of HML, HML_{RE} and HML_{CC} by reporting estimates from spanning regressions. The left-hand side variable is the monthly return on each of these factors. The explanatory variables are the market and size factors, and one of the HML factors. The sample starts in July 1963 and ends in December 2015.

Panel A: Average returns and standard deviations

	Factor					
	MKT	SMB	HML	HML^*	HML_{RE}	HML_{CC}
Average annualized return	5.99	2.75	4.05	4.08	5.02	0.46
Standard deviation	15.39	10.75	9.90	9.75	10.59	7.52
t-value	2.82	1.85	2.96	3.03	3.43	0.44

Panel B: Correlations

	Factor				
Factor	MKT	SMB	HML	HML_{RE}	HML_{CC}
MKT	1				
SMB	0.30	1			
HML	−0.30	−0.23	1		
HML_{RE}	−0.31	−0.30	0.86	1	
HML_{CC}	−0.02	0.24	0.45	0.09	1

Panel C: Spanning regressions

	Dependent variable					
	HML		HML_{RE}		HML_{CC}	
Regressor	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.00	0.44	0.16	0.55	−0.17	−0.04
	(0.06)	(4.75)	(2.52)	(4.89)	(−2.29)	(−0.52)
MKT	−0.03	−0.13	−0.02	−0.16	0.02	−0.03
	(1.89)	(−5.91)	(−1.67)	(−5.95)	(1.00)	(−1.50)
SMB	0.04	−0.27	−0.10	−0.26	0.24	0.21
	(2.09)	(−8.35)	(−4.88)	(−6.73)	(10.09)	(7.43)
HML			0.89		0.41	
			(39.56)		(15.72)	
HML_{RE}	0.81					0.12
	(39.56)					(3.95)
HML_{CC}		0.68		0.21		
		(15.72)		(3.95)		
N	630	630	630	630	630	630
Adj. R^2	74.4%	35.8%	75.5%	16.2%	32.7%	8.4%