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Book-To-Market Decomposition, Net Share Issuance, and the Cross Section of Global Stock Returns

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Abstract: This paper provides global evidence supporting the hypothesis that expected return models are enhanced by the inclusion of variables that describe the evolution of book-to-market—changes in book value, changes in price, and net share issues. This conclusion is supported using data representing North America, Europe, Japan, and Asia. Results are highly consistent across all global regions and hold for small and big market capitalization subsets as well as in different subperiods. Variables measured over the past twelve months are more relevant than variables measured over the past thirty-six months, demonstrating that recent news is more important than old news.

Keywords: global return predictability; cross-section of returns; book-to-market; net share issues

JEL Classification: F20; F21; F30; G10; G11; G12; G15

1. Introduction

The international asset pricing research has identified a number of firm specific characteristics able to explain the cross-section of global equity returns. Arguably the strongest and most persistent predictor of global equity returns is the book-to-market ratio (B/M), where it has been found that high B/M stocks have high average returns and low B/M stocks have low average returns (Fama and French (1998, 2012), Hou et al. (2011), and Asness et al. (2013)). In the typical case, the cross-section of returns at time $t+1$ is regressed on the time t cross-section of B/M ratios along with other characteristics such as market capitalization and momentum.[1] While this approach has clearly demonstrated the efficacy of B/M in explaining the cross-section of returns, the empirical methodology inherently assumes that the time t observation of B/M contains the most relevant information for estimating expected returns. The alternative to this is that the history of B/M, the dynamic process by which B/M evolves from time $t-k$ to time t, contains relevant information that can be used to improve on the model's average return estimates. Using equity returns from twenty-three global markets over 1991–2016, we ask whether the inclusion of variables that describe the history of B/M improves empirical asset pricing models relative to models that include only the most recent realization of B/M.

To summarize our primary findings, we find strong support for the hypothesis that the evolution of B/M enhances the model's ability to explain average returns. Perhaps the most significant finding is the consistency of our results across all global regions. Following Fama and French (2008, hereafter referred to as FF), we decompose B/M into three terms—the change in price from month $t-k$ to month t, the change in book equity over $t-k$ to t, and B/M at time $t-k$. When $k = 12$ months, we find that

[1] It is standard to use accounting variables that are lagged by six months to ensure that the data is actually available to the researcher or practitioner at time t.

changes in book equity, changes in price, and lagged B/M ratios are all significant determinants of expected returns with the magnitudes of the coefficients on book equity and price changes being significantly larger than the coefficients on historic B/M. Using the t-statistic as the metric, changes in book values are the strongest predictors of returns of the three B/M components. Consistent across all regions, the three components remain significant when $k = 36$ months, with the coefficients on changes in price and in book equity continuing to be larger in magnitude than the coefficients on B/M; however, relative to when $k = 12$, nearly all coefficients for all regions move closer to zero, suggesting that recent information is more relevant than more distant information. To test robustness, we divide the sample into small and large market capitalization subsamples as well as first and second half subperiods. The B/M evolution hypothesis is supported in both the set of large cap stocks and small cap stocks as well as in both subperiods.

The firm's decision to repurchase or to issue new shares is directly related to the evolution of B/M via changes in total book equity and changes in total market value. Net share issues, the number of shares issued less the number of shares repurchased over the time interval $t - k$ to t, is therefore also included in our analysis as an additional variable describing the evolution of B/M. This is an important contribution of this paper.

Univariate sorts and Fama–MacBeth regressions show that net share issuance predicts the cross-section of returns in the global regions of North America, Europe, and Asia, but not in Japan. Positive net share issues (net increases in shares) have a significant negative effect on expected returns only in North America, Europe, and Asia. Net share issues are more informative for expected returns within the set of big stocks than within the set of small stocks and are more relevant over the recent half of the sample period relative to the early half of the sample. As with our previous results, returns are more sensitive to net share issues when $k = 12$ relative to when $k = 36$, demonstrating that recent information about issues and repurchases is more relevant than old information. We find no relation between net share issues and returns for Japan.

The paper continues as follows. We begin in Section 2 with a brief overview of the related literature. The data, methodology, and testable implications are described in Section 3. Section 4 provides a detailed discussion of the regression results pertaining to the book-to-market decomposition as well as the results for a series of robustness tests. Section 5 focuses on results pertaining to net share issues. We provide a brief discussion of results in Section 6 and a conclusion in Section 7.

2. Literature Review

This study builds on the lines of research related to the value premium, international asset pricing, and share issue and repurchase behavior. In this section, we briefly survey the literature related to these three lines and describe how this paper extends the research.

It is now well documented that stocks with high B/M ratios have larger average returns than stocks with low ratios (see the early study by DeBondt and Thaler (1985)). This finding challenges the capital asset pricing model (CAPM) and has led to the exploration of multifactor models which generally include a factor to specifically capture the value premium (Fama and French (1992, 1993)). While it is still not fully understood why B/M ratios impact expected returns, several theories have been proposed. Fama and French (1993) suggest a risk story, whereby value stocks are riskier than growth stocks, resulting in higher expected returns for value stocks, and Lakonishok et al. (1994) suggest an overreaction behavioral story. This paper follows a different route. Following Daniel and Titman (2006) and Fama and French (2008), we study the value effect by decomposing B/M into components to determine how the information about the evolution of B/M across time increases model performance.

A second line of research focuses on international asset pricing. While early studies tend to focus primarily on testing a world CAPM (Stehl (1977), Korajczyk and Viallet (1989), and Chan et al. (1992), for example), more recent studies have focused on multi-factor models and have debated whether global asset prices are best described using a world or a local model. Fama and French (1998) test a global version of their three-factor model, and Griffin (2002) finds that size and book-to-market factors perform well in explaining global stock returns. Studies by Fama and French (2012), Hou et al. (2011), and Asness et al. (2013) confirm the value effect in global markets.

This paper extends these two lines of literature by exploring the B/M evolution hypothesis using global stock returns. Our test focuses on twenty-three global markets divided into the regions of North America, Europe, Japan and Asia. Previous research has studied only single markets such as the U.S. or China (Fama and French (2008) and Cakici et al. (2015)), making this the most comprehensive study of the evolution hypothesis. We add to these studies by showing that the evolution of B/M indeed improves expected return estimates consistently across all global regions.

There is also literature describing the relation between share issuance and returns for the U.S. market (see, for example, Loughran and Ritter (1995), Daniel and Titman (2006), Pontiff and Woodgate (2008), and Fama and French (2008)). The seminal papers by Loughran and Ritter (1995) and Ikenberry et al. (1995) document respectively significant negative returns following IPOs and SEOs and abnormally high returns following repurchases in the U.S. market.

Aside from McLean et al. (2009) who find that net share issuance predicts the cross-section of returns across the pooled set of global markets, the research on share issuance in global markets is still in its infancy. We add to this literature by documenting several new results on global net share issuance. Different from McLean et al. (2009), we take a more detailed look at net share issuance at a regional level allowing for the possibility of cross-region differences.

A primary concern with this type of asset pricing research is data snooping (Lo and MacKinlay (1990)). One approach to alleviating such concerns is by conducting out-of-sample tests by either choosing a completely distinct sample or by selecting a different time period. By studying the four distinct global regions of North America, Europe, Asia, and Japan, our study is a series of out-of-sample tests of the B/M evolution hypothesis. Additionally, by implementing the same methodology as used by Fama and French in their investigation of B/M in the U.S. market, we further ensure our results are not a result of data snooping. Our consistent results across the four well-defined and distinct regions provides great confidence in the robustness of our results.

3. Methodology and Data

Our test of the B/M evolution hypothesis begins with a description of our primary measure for B/M evolution. Define BM_t as the time t log of B/M, $dB_{t-k,t}$ as the change in the log of book equity from time $t-k$ to t, and $dM_{t-k,t}$ as the change in the log of price between time $t-k$ and t. Following FF, we decompose B/M as

$$BM_t = BM_{t-k} + dB_{t-k,t} - dM_{t-k,t} \tag{1}$$

Hence, the decomposition demonstrates that B/M evolves from time $t-k$ to time t via changes in book equity and changes in price.

FF provide a rationale for why the evolution of B/M may be related to returns. Assuming clean surplus accounting, the dividend discount model can be written as

$$\frac{M_t}{B_t} = \frac{\sum_{\tau=1}^{\infty} E[Y_{t+\tau} - dB_{t+\tau-1,t+\tau}]/(1+r)^{\tau}}{B_t} \tag{2}$$

where M_t is the price at time t, B_t is the time t book value, Y_t is the equity earnings per share, $dB_{t-1,t} = B_t - B_{t-1}$ is the change in per share book equity (not log difference)[2], and r can be thought of as the long-term average expected stock return. Two observations are clear from Equation (2). First, controlling for expected earnings and expected changes in book equity relative to book equity, $(Y_{t+\tau} - dB_{t+\tau-1,t+\tau})/B_t$, B_t/M_t is positively correlated with the return r. This provides a rationale

[2] Only in this in instance is $dB_{t-1,t}$ measured as changes in book value. Everywhere else, $dB_{t-1,t}$ is the difference in log book values.

for including B/M into models of expected returns. Second, cross-sectional dispersion in expected cashflows, $E[Y_{t+\tau} - dB_{t+\tau-1,t+\tau}]/B_t$, obscures the relation between B/M and r, and hence, B/M is a noisy measure of returns. If $dB_{t-k,t}$ and $dM_{t-k,t}$ from Equation (1) contain information about expected cashflows or expected returns, then including them in the empirical asset pricing model will help to disentangle cashflows and expected returns thus improving expected return estimates.

3.1. Data

Stock return and fundamental data for twenty-three countries are from Datastream for the sample period January 1991 through December 2016 and include both large and small cap stocks as well as both active and inactive firms.[3] The twenty-three countries represent the developed markets as classified by MSCI. This is the same set of countries studied by Fama and French (2012), with the one exception that our set replaces Greece with Israel. Also consistent with Fama and French (2012), the countries are grouped into the four regions: North America (United States and Canada), Europe (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom), Japan, and Asia (Australia, New Zealand, Hong Kong, and Singapore). Individual stock returns that exceed 200% are considered missing. All returns are denominated in U.S. dollars and are in excess of the one-month U.S. Treasury rate.[4]

The stock characteristics used for our empirical tests are the market capitalization, book-to-market equity, momentum, and net share issues. MC_t is the log market capitalization computed by multiplying price by shares outstanding observed in month t. For book-to-market equity, we use the data item available in Datastream. Datastream constructs book-to-market each month using the most recently available book equity data divided by the current month's market capitalization. In all empirical tests, we use the log of book-to-market observed at a lag of six months which is denoted as BM_t. MOM_t is the cumulative return computed over months $t-12$ through $t-2$ (skipping month $t-1$), and $NS_{t-k,t}$ is the change in the total number of shares outstanding, adjusted for stock splits, over a k-month interval. $NS_{t-k,t}$ is positive when the number of shares issued is greater than the number of shares repurchased over the time interval and is negative if the opposite is true. Differences in log book values and differences in log prices over a k-month period are denoted as $dB_{t-k,t}$ and $dM_{t-k,t}$, respectively.

It is necessary for variables that are informative about the evolution of book-to-market to be measured over the same time period. To ensure that accounting data is available for use at time t, we lag the book-to-market ratio by six months. This then requires us to also lag $dB_{t-k,t}$, $dM_{t-k,t}$, and $NS_{t-k,t}$ by six months so that the changes in price, book value, and net share issuance are all measured over precisely the same interval. For example, when $k = 12$ and December 1990 is time t, we measure $dB_{t-k,t}$, $dM_{t-k,t}$, and $NS_{t-k,t}$ over the period June 1989 to May 1990. BM_t and BM_{t-12} are from May 1990 and June 1989, respectively. When $k = 36$, the data used for the empirical tests extends from January 1993 through December 2016. For the time t date of December 1992, we use the $dB_{t-k,t}$, $dM_{t-k,t}$, and $NS_{t-k,t}$ from June 1989 to May 1992. BM_t and BM_{t-36} are from May 1992 and June 1989, respectively.[5]

3.2. Regression Models

Our empirical tests are based on the well-used Fama and MacBeth (1973) regression framework where the cross-section of returns is regressed on a set of stock-specific characteristics. Following FF, we consider three regression models. The first is the empirical model where the time $t+1$ cross-section of individual stock returns is regressed on MC, BM, and MOM from time t:

$$R_{t+1} = a_{0,t+1} + a_{1,t+1}MC_t + a_{2,t+1}MOM_t + a_{3,t+1}BM_t + e_{t+1} \tag{3}$$

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3 The actual dataset is from June 1989 to December 2016. Nineteen months are required to construct the key variables.
4 Throughout the paper, returns are expressed in U.S. dollars. Issues related to exchange rate risk are assumed away.
5 Statistical details of the data may be found in the Appendix A.

where e_{t+1} is the error term.

This is the empirical model used by Fama and French (1992) but with the addition of momentum (Carhart (1997)). To simplify notation, we suppress the individual stock index that indicates the stock-specific returns and explanatory characteristics. The baseline regression model allows for straightforward comparisons with other international studies, provides fundamental insight into the global data used in this paper, and gives us a baseline to use as a comparison for when we decompose B/M.

Our primary research question is whether the time evolution of BM_t as measured by its three components increases the predictive power of the model relative to using only the most recent BM_t which does not include information regarding its own past. The null hypothesis is that the decomposition does not improve the explanatory power of the model. The alternative to the null is that the evolution of BM_t is informative and therefore past changes in book values and in prices do increase the predictive power of the model. This may be the case if historic changes in book values and in prices contain information about expected cashflows and expected returns. Our empirical test of this hypothesis relies on the Fama–Macbeth regression of individual stocks on the three book-to-market components along with a set of control variables—market capitalization (MC_t) and momentum (MOM_t).

Stock issues and repurchases also directly influence book-to-market and expected returns and are therefore an important part of its evolution. Research has found that net share issues predict the cross-section of returns in both the U.S. and in global markets (Pontiff and Woodgate (2008), McLean et al. (2009)). Firms that issue stock may do so because of the large investment opportunities available to them, while firms that repurchase may do so because they lack investment opportunities or to take advantage of potential undervaluation (Dittmar (2000) and Fama and French (2005)). To further disentangle the effects of net share issuances from changes in book value and changes in prices, we add net share issuances $NS_{t-k,t}$ to the right-hand side of the model. The empirical model we use is:

$$R_{t+1} = a_{0,t+1} + a_{1,t+1}MC_t + a_{2,t+1}MOM_t + a_{3,t+1}BM_{t-k} + a_{4,t+1}dM_{t-k,t} + a_{5,t+1}dB_{t-k,t} + a_{6,t+1}NS_{t-k,t} + e_{t+1}. \quad (4)$$

One of the issues we are particularly interested in is whether more recent information (new news) is more informative than older information (old news). One way of capturing this dynamic is through the choice of k. In our empirical study, we select $k = 12$ and $k = 36$. Comparing the estimated regression coefficients as well as their t-statistics for the different choices of k provides insight into how the market prices new versus old information. FF consider three time lengths, $k = 12$, $k = 36$, and $k = 60$, and find that current information is more relevant than older information for the U.S. markets. To save space, we focus only on two time periods—one year and three years.

Under the null that the origins of book-to-market contain no additional information over that already available using BM_t, the slope coefficients on the explanatory variables BM_{t-k}, $dM_{t-k,t}$, and $dB_{t-k,t}$ must be equivalent in magnitudes with positive coefficients on BM_{t-k} and $dB_{t-k,t}$ ($a_{3,t+1} > 0$, $a_{5,t+1} > 0$) but negative slope coefficients on $dM_{t-k,t}$ ($a_{4,t+1} < 0$). In this case, the three terms collapse to BM_t. Under the alternative that the components of book-to-market are useful in capturing unique dimensions of the cross-section of returns missed by BM_t, the magnitudes of the slope coefficients on BM_{t-k}, $dM_{t-k,t}$, and $dB_{t-k,t}$ will differ based on their individual respective abilities to explain expected cashflows and returns. Using the results from Model (4), we statistically test for differences between price changes and book value changes. If the difference is significant, then the test shows which of the variables exerts greater influence on expected returns. Finding that the difference is insignificant, indicating that the magnitudes are equivalent, is a necessary but not sufficient condition for the null hypothesis. It must also be the case that the magnitudes of the coefficients are equivalent to the slope on BM_{t-k}.

Under the alternative, where loadings on the different components differ, the interpretation of the results is an issue. What does it mean for asset pricing if historic changes in price are more important than historic changes in book value, or vice versa? Daniel and Titman (2006) posit that changes in book values are related to tangible information and changes in price are related to both intangible and tangible information. To disentangle the two types of information, Daniel and Titman use the residuals from regressing changes in price on B/M and on change in book value, thereby creating a new variable that is orthogonal to tangible information. They refer to the change in price residuals as a measure of intangible information. In the empirical framework used in this paper, we use the change in prices and change in book value without orthogonalizing. Hence, within Daniel and Titmans' interpretation, dM captures both tangible and intangible information; however, intangible information, I, can be estimated by subtracting dB from dM, $I_{t-k,t} = dM_{t-k,t} - dB_{t-k,t}$.

FF critique this interpretation, arguing that it is unclear that changes in book values are a result of tangible information and assert that it is more likely that book value changes are due to both tangible and intangible information. Therefore, tangible and intangible information cannot be distinguished using changes in book equity and prices. Based on Equation (2), Fama and French interpret changes in price or changes in book values to be informative about expected cashflows or expected returns, and finding that the coefficients on book value changes are larger than those for price changes (or vice versa) only indicates that changes in book value are more informative about cashflows and returns.

The key to testing the null hypothesis is to identify whether the slope coefficients on the three book-to-market components are equal. FF propose a simple, yet clever, test of this using a variation of Model (4) that substitutes BM_t for BM_{t-k},

$$\begin{aligned} R_{t+1} = b_{0,t+1} + b_{1,t+1}MC_t + b_{2,t+1}MOM_t + b_{3,t+1}BM_t + b_{4,t+1}dM_{t-k,t} \\ + b_{5,t+1}dB_{t-k,t} + b_{6,t+1}NS_{t-k,t} + e_{t+1} \end{aligned} \quad (5)$$

From the decomposition of book-to-market, we can write $BM_{t-k} = BM_t - dB_{t-k,t} + dM_{t-k,t}$. Substituting this identity into Model (4) and rearranging the terms yields the following relations between Models (4) and (5) that must hold. The intercept terms remain unchanged between the two models, $a_{0,t+1} = b_{0,t+1}$. Additionally, the slopes on MC_t, MOM_t and $NS_{t-k,t}$ are also the same: $a_{1,t+1} = b_{1,t+1}$, $a_{2,t+1} = b_{2,t+1}$, and $a_{6,t+1} = b_{6,t+1}$, respectively, and the slope on BM_{t-k} in Model (4) must equal the slope on BM_t in Model (5), $a_{3,t+1} = b_{3,t+1}$. What is different across the two models are the slopes on $dM_{t-k,t}$ and $dB_{t-k,t}$. It must be the case that $b_{5,t+1} = a_{5,t+1} - a_{3,t+1}$ and $b_{4,t+1} = a_{4,t+1} + a_{3,t+1}$. Under the null, the magnitudes of $a_{3,t+1}$, $a_{4,t+1}$, and $a_{5,t+1}$ in Model (4) must be equivalent in magnitudes with $a_{3,t+1}$, $a_{5,t+1} \geq 0$ and $a_{4,t+1} \leq 0$. This implies that if the data supports the null hypothesis then $b_{4,t+1}$ and $b_{5,t+1}$ in Model (5) must be statistically indistinguishable from zero. Hence, whereas Model (4) is used to identify the "true" slopes on the book-to-market components, the purpose of Model (5) is to specifically test whether the coefficients on $dM_{t-k,t}$ and $dB_{t-k,t}$ are of equal magnitude as the coefficient on BM_{t-k}.

In addition to estimating the two regression models for the set of all stocks over the 1991–2016 time period for both $k = 12$ and $k = 36$, we also provide results for different cuts of the data. FF find that results differ between the early subperiod 1927–1963 and the recent subperiod 1963–2006. Specifically, the coefficient on NS is negative and significant over the recent subperiod, implying that large net share issues are followed by low returns but NS is insignificant over the early half of the sample period. To test for possible differences across time, we divide our sample into two equal periods, January 1991 to December 2003 and January 2004 to December 2016.

FF also find differences between small stocks, referred to as microcaps, and big stocks, referred to as ABMs (all but microcaps). Changes in price play a much more important role for microcaps relative to the change in book value, while for ABMs, changes in price and in book value exert similar influence on expected returns. To test for difference in results due to size, we divide the sample into big and small subsets where big stocks are the set of large capitalization stocks that in aggregate account for 90% of total market capitalization. Small stocks account for the remaining 10% of total market capitalization.

As a final comment, our empirical methodology closely follows FF with minor differences. FF update their explanatory variables once each year in June; hence, the explanatory variables are held constant from July of year Y to June of year $Y + 1$. In contrast, our data is allowed to change from month to month. For example, the book-to-market ratio available from Datastream updates monthly due to changes in market prices. Our implementation of the methodology is consistent across all four global regions making the results easily comparable.

4. Book-To-Market Decomposition

4.1. Baseline Regressions

High average returns to value stocks is a widely accepted empirical phenomenon in the international asset pricing literature (Fama and French (1998, 2012), and Asness et al. (2013)). Before extending this result by investigating how the evolution of book-to-market across time affects the cross section of returns, it is important that we first see how B/M is related to average returns in our specific sample of countries over our particular sample period. Model (3) is the standard Fama–French–Carhart model where the cross-section of returns in month $t + 1$ is regressed on the log of market capitalization (MC_t), the log of book-to-market (BM_t), and momentum (MOM_t).

Table 1, Panel A summarizes the results when using the set of all stocks within each region. Values in parentheses below the regression coefficients are the Newey–West t-statistics. Results show the expected relations between returns and the three characteristics. Economically and statistically large abnormal returns, intercept terms, are found in North America, Europe, and Asia after accounting for size, book-to-market, and momentum. The coefficients on MC_t are negative for all regions showing that small cap stocks tend to yield higher returns than large cap stocks. Size, however, is only significant for North America and Asia, thus showing that the strength of the size effect has diminished. With the exception of Japan, momentum tends to be positive but is only significant in Europe. BM_t is positive and highly significant for all regions, indicating that the value effect, value stocks outperformance over growth stocks, remains a dominant cross-sectional return pattern across global markets.

Table 1 Panels B and C list results for the set of big and small stocks, respectively. For the set of big stocks, we first notice that the intercept terms are greatly reduced and are now only significant in North America. Size is also insignificant in all regions. Momentum continues to be positive in all regions though it is only significant in Europe and Asia. BM_t remains positive for all regions. It is highly significant in Japan and Asia but is marginally significant in North America and Europe. The magnitudes of the coefficients are much smaller relative to the results from Panel A.

Finally, Panel C shows substantially stronger results for small stocks relative to those found in the set of big stocks. The intercept terms are all large and highly significant. The size effect is quite strong in the small stocks with significantly negative coefficients on MC_t. Momentum continues to yield somewhat mixed results being strongly significant in Europe, marginally significant in Asia, insignificant in North America, and negative in Japan. BM_t, on the other hand, continues to be the dominant characteristic in the model with t-statistics ranging from a low of 4.63 (North America) to a high of 8.23 (Europe). The stronger results found in the small stocks relative to the large stocks is reminiscent of the results presented by Fama and French (2012).

The baseline model confirms the finding that the book-to-market ratio is a significant predictor of the cross-section of returns. The coefficients on BM_t are consistently positive and significant across all regions and for the sets, all stocks, small stocks, and big stocks. This strong result supports our motivation for seeking a greater understanding of how book-to-market relates to returns.

Table 1. Baseline Regressions. This table lists the results of Fama–MacBeth regressions using data representing twenty-three countries divided into the regions of North America, Europe, Japan, and Asia over the period 1991–2016. Market capitalization (MC_t), log book-to-market equity (BM_t), and momentum (MOM_t), all observed at time t, are used to predict $t+1$ returns in excess of the one-month Treasury rate. MC_t is the time t price multiplied by shares outstanding. MOM_t is the cumulative return measured over month $t-12$ to $t-2$, and BM_t is the book equity divided by market equity both observed in month $t-6$. R^2 is the average R-squared across all months. Values in parentheses are Newey–West t-statistics. Results in Panel A are based on the set of all stocks within each region. Panel B results are based on the set of big stocks defined as the stocks with the largest market capitalization comprising 90% of the total market capitalization, and Panel C results are from the set of small stocks which consists of the smallest market capitalization stocks that aggregate to 10% of the total market capitalization. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Panel A: All Stocks					
Region	**Intercept**	MC_t	BM_t	MOM_t	R^2
North America	3.80 (4.46) ***	−0.20 (−3.95) ***	0.40 (4.46) ***	0.24 (0.94)	0.03
Europe	1.15 (2.54) **	−0.03 (−1.28)	0.55 (7.63) ***	0.85 (3.28) ***	0.02
Japan	1.30 (1.51)	−0.08 (−1.66) *	0.40 (5.05) ***	−0.28 (−0.87)	0.04
Asia	3.64 (3.75) ***	−0.23 (−4.01) ***	0.65 (6.30) ***	0.40 (1.55)	0.03
Panel B: Big Stocks					
North America	1.81 (2.15) **	−0.07 (−1.53)	0.16 (1.79) *	0.42 (1.27)	0.05
Europe	0.67 (0.85)	−0.01 (−0.23)	0.16 (1.77) *	0.88 (2.36) **	0.06
Japan	0.03 (0.04)	0.02 (0.44)	0.45 (4.14) ***	0.24 (0.65)	0.06
Asia	0.18 (0.17)	0.03 (0.57)	0.24 (2.40) **	0.72 (2.27) **	0.06
Panel C: Small Stocks					
North America	5.20 (5.12) ***	−0.32 (−4.76) ***	0.43 (4.63) ***	0.24 (1.00)	0.03
Europe	1.88 (4.29) ***	−0.10 (−3.20) ***	0.60 (8.23) ***	0.88 (3.43) ***	0.02
Japan	3.24 (3.52) ***	−0.25 (−4.42) ***	0.41 (5.02) ***	−0.46 (−1.31)	0.03
Asia	7.06 (6.00) ***	−0.55 (−6.66) ***	0.78 (6.96) ***	0.46 (1.79) *	0.03

4.2. Book-To-Market Decomposition—All Stocks, 1991–2016

The previous section formally demonstrates the importance of book-to-market in explaining the cross-section of returns in global markets. We now test our hypothesis of whether the origin of book-to-market, its evolution through time, enhances global asset pricing models. In this section, we present the regression results for Models (4) and (5) for all stocks representing four distinct global regions over the period 1991–2016. For both models, we consider the case when $k = 12$ and $k = 36$. As previously mentioned, empirical evidence has clearly shown the importance of momentum in expected global return models, and therefore, we include momentum into the model specifications for Models (4) and (5).

We begin with a discussion of Model (4). The regression results are listed in Table 2, Panel A for $k = 12$, and Panel B for $k = 36$. Starting in Panel A, a cursory glance over the results confirms a necessary condition of the null hypothesis. For all four global regions, coefficients on BM_{t-k} and $dB_{t-k,t}$ are positive and the coefficients on $dM_{t-k,t}$ are negative; however, the magnitudes of the coefficients are clearly not equal. For North America, the coefficient on BM_{t-k} is 0.20, which is significant with a t-statistic of 2.05. The estimated coefficient on $dM_{t-k,t}$ is −0.76 (t-stat = −4.35), three times the magnitude of the coefficient on BM_{t-k}. Changes in book value clearly dominate the other two B/M components with a coefficient of 1.09 and a t-statistic of 10.78. Summing the slopes of $dM_{t-k,t}$ and $dB_{t-k,t}$ (the column labeled $dB_{t-k,t} + dM_{t-k,t}$) provides a statistical test of whether the two slopes have equal magnitudes. With a sum of 0.33 and a t-statistic of 1.56, the hypothesis is not rejected and the positive value of the sum demonstrates that changes in book value has the same influence on average returns as changes in price.

Table 2. Model (4) Regression Estimates—1991–2016. This table lists the results of Fama–MacBeth regressions using data representing twenty-three countries divided into the regions of North America (NA), Europe (EUR), Japan, and Asia the period 1991–2016. The cross section of time $t + 1$ returns (less the return on the 1-month Treasury) is regressed on characteristics observed in time t. Market capitalization, MC_t, is the time t price multiplied by shares outstanding. Momentum, MOM_t, is the cumulative return measured over month $t - 12$ to $t - 2$. BM_{t-k} is the book equity divided by market equity both observed in month $t - k - 6$. $dM_{t-k,t}$ and $dB_{t-k,t}$ are changes in price and in book value over the k-month interval from $t - k - 6$ to $t - 6$, and $NS_{t-k,t}$ is the change in shares outstanding over from $t - k - 6$ to $t - 6$. R^2 is the average R-squared across all months. The column labeled $dB_{t-k,t}$ + $dM_{t-k,t}$ tests whether the sum is different from zero. Values in parentheses are Newey–West t-statistics. Results in Panel A report results for $k = 12$ and Panel B for $k = 36$. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Region	Const	MC_t	MOM_t	BM_{t-k}	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	$dB_{t-k,t} + dM_{t-k,t}$
Panel A: $k = 12$									
NA	3.92 (5.11) ***	−0.22 (−4.85) ***	0.29 (1.29)	0.20 (2.05) **	−0.76 (−4.35) ***	1.09 (10.78) ***	−0.41 (−2.79) ***	0.04	0.33 (1.56)
EUR	1.43 (3.35) ***	−0.07 (−2.57) **	0.76 (3.65) ***	0.39 (5.39) ***	−0.54 (−3.34) ***	1.25 (20.64) ***	−0.50 (−4.92) ***	0.03	0.70 (4.38) ***
Japan	1.40 (1.72) *	−0.09 (−2.03) **	−0.18 (−0.62)	0.29 (3.57) ***	−0.88 (−4.53) ***	1.31 (8.82) ***	0.18 (0.82)	0.05	0.43 (1.78) *
Asia	4.28 (4.85) ***	−0.29 (−5.53) ***	0.35 (1.37)	0.45 (4.29) ***	−0.62 (−2.88) ***	1.50 (8.91) ***	−1.02 (−4.60) ***	0.04	0.87 (3.43) ***
Panel B: $k = 36$									
NA	3.06 (4.57) ***	−0.15 (−3.87) ***	0.14 (0.59)	0.19 (2.01) **	−0.68 (−5.31) ***	0.41 (5.83) ***	−0.34 (−2.93) ***	0.03	−0.27 (−1.98) **
EUR	1.50 (3.89) ***	−0.05 (−2.17) **	0.76 (4.16) ***	0.39 (6.84) ***	−0.61 (−4.84) ***	0.78 (14.85) ***	−0.37 (−4.76) ***	0.03	0.17 (1.73) *
Japan	1.06 (1.39)	−0.06 (−1.49)	−0.31 (−0.97)	0.27 (3.39) ***	−0.70 (−4.74) ***	0.76 (7.01) ***	−0.19 (−1.09)	0.05	0.06 (0.34)
Asia	3.35 (3.82) ***	−0.21 (−3.95) ***	0.23 (0.74)	0.37 (3.32) ***	−0.84 (−4.81) ***	0.79 (6.12) ***	−0.62 (−3.47) ***	0.05	−0.05 (−0.38)

Results for Europe are similar in several regards. From Table 2, Panel A, the slope coefficient on BM_{t-k} is 0.39 which is significant with a t-statistic of 5.39. The slope on $dM_{t-k,t}$ is also highly significant.

It is the change in book value, however, that is particularly noteworthy. As with North America, the coefficient on $dB_{t-k,t}$ is large at 1.25 and highly significant with a t-statistic of 20.64. Changes in book value are clearly more relevant than changes in price as seen in the last column of Table 2. The sum $dB_{t-k,t} + dM_{t-k,t}$ is 0.70 with a t-statistic of 4.38.

Japan and Asia yield the same primary conclusions. For both regions, all three components are statistically significant. Whereas the slope on $dM_{t-k,t}$ is three times the magnitude of the slope on BM_{t-k} for Japan, the two coefficients are very close in magnitude for Asia. We again see the dominance of changes in book value. For Japan and Asia, the slopes on $dB_{t-k,t}$ are 1.31 (t-stat = 8.82) and 1.50 (t-stat = 8.91). For both regions, these values are more than three times the magnitude of the coefficients on BM_{t-k}. For Asia, the coefficient on $dB_{t-k,t}$ is statistically larger than the slope on $dM_{t-k,t}$ as seen from the final column of Table 2, but the magnitudes of the two changes are only marginally different (10% level) for Japan.

The results of Table 2, Panel A clearly support the alternative hypothesis that the evolution of book-to-market is indeed important for describing expected returns relative to the baseline model where only the current value of book-to-market is included, and it is the historic change in book value that is particularly influential. This is consistent across all four global regions. Current changes in book value appear to more relevant in explaining expected returns than historic values of book-to-market suggesting that new information contained in $dB_{t-k,t}$ is more important than the old information provided by BM_{t-k}.

Old versus new news can be formally tested in two different ways. First, from Model (4), finding that the magnitude of the coefficient on BM_{t-k} is closer to zero than the magnitudes for either $dB_{t-k,t-6}$ or $dM_{t-k,t}$ suggests that the newer information contained in price changes or book value changes is more important than the historic BM_{t-k}. Second, finding that coefficients move closer to zero as k increases also demonstrates that more recent information is more relevant for expected returns than older information.

Model (5) is used to test the first case. As described previously, the coefficients on $dB_{t-k,t}$ are interpreted as the difference between the true slopes of $dB_{t-k,t}$ from Model (4) and the true slope on BM_{t-k} from Model (4). The same interpretation holds for $dM_{t-k,t}$. If the $dB_{t-k,t}$ from Model (5) is positive and significant, then the true slope of BM_{t-k} (Model 4) must be closer to zero than the true slope on $dB_{t-k,t}$ (Model 4). In the same way, if the true slope on BM_{t-k} from Model (4) is closer to zero than the true slope on $dM_{t-k,t}$ from Model (4), then the regression coefficient on $dM_{t-k,t}$ from Model (5) should be negative and significant. Results for Model (5) are found in Table 3. We first observe that the regression coefficients listed for Model (5) in Table 3, Panel A are identical to those reported for Model (4) listed in Table 2, Panel A with the exception of the coefficient on $dB_{t-k,t}$ and $dM_{t-k,t}$. Results for $dM_{t-k,t}$ are mixed. The slopes on $dM_{t-k,t}$ are significant for North America and Japan but are not significant for Europe and Asia. This evidence generally suggests that changes in price are not any more relevant than historic book-to-market values. Confirming our previous observations, changes in book value, however, are more much more relevant than historic values of book-to-market. The differences in the true slopes as reported in Table 3 are 0.89 (t-stat = 8.21), 0.85 (t-stat = 13.15), 1.02 (t-stat = 6.55), and 1.05 (t-stat = 7.03) for North America, Europe, Japan and Asia, respectively. The conclusions are the same when momentum is included in the model. Consistent across all global regions, new news about the book value of assets is more valuable than old news about book-to-market ratios.

Another way of confirming this is to compare the true slope coefficients from Model (4) for increasing values of k. Table 2, Panel B shows the regression results for Model (4) when $k = 36$. These results are compared to those presented in Table 2, Panel A. We first observe that the evolution of book-to-market over the longer horizon of 36 months provides significant information about expected returns. All three components remain significant and the magnitudes of the coefficients on $dB_{t-k,t}$ are particularly larger than the coefficient on BM_{t-k}. Relative to $k = 12$, however, the magnitude of the $dB_{t-k,t}$ coefficient is substantially reduced when $k = 36$ for all regions, providing support for new news over old news. Interestingly, the slope on BM_{t-k} is nearly identical when moving from $k = 12$ to $k = 36$, suggesting a high degree of the persistence of information contained in the book-to-market ratio. Again, we find mixed results for $dM_{t-k,t}$, with some values exhibiting a mild increase and others exhibiting a mild decrease.

To summarize our results thus far, recent book-to-market values are important predictors of the cross-section of returns, and in our baseline model, B/M is the dominant characteristic across all regions. While this is the case, we also show that components of B/M that describe its evolution through time do enhance the model. Particularly, changes in book values are found to be more important determinants of expected returns than either historic values of book-to-market and changes in price. The large slope and t-statistics on $dB_{t-k,t}$ for all regions support this conclusion. The results are quite consistent across all global regions.

Table 3. Model (5) Regression Estimates—1991–2016. This table lists the results of Fama–MacBeth regressions using data representing twenty-three countries divided into the regions of North America (NA), Europe (EUR), Japan, and Asia the period 1991–2016. The cross section of time $t + 1$ returns (less the return on the 1-month Treasury) is regressed on characteristics observed in time t. Market capitalization, MC_t, is the time t price multiplied by shares outstanding. Momentum, MOM_t, is the cumulative return measured over month $t - 12$ to $t - 2$. BM_t is the book equity divided by market equity both observed in month $t - 6$. $dM_{t-k,t}$ and $dB_{t-k,t}$ are changes in price and in book value over the k-month interval from $t - 6 - k$ to $t - 6$, and $NS_{t-k,t}$ is the change in shares outstanding over from $t - 6 - k$ to $t - 6$. R^2 is the average R-squared across all months. Values in parentheses are Newey–West t-statistics. Results in Panel A report results for $k = 12$ and Panel B for $k = 36$. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Region	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2
Panel A: $k = 12$								
NA	3.92	−0.22	0.29	0.20	−0.55	0.89	−0.41	0.04
	(5.11)	(−4.85)	(1.29)	(2.05)	(−3.09)	(8.21)	(−2.79)	
	***	***		**	***	***	***	
EUR	1.43	−0.07	0.76	0.39	−0.15	0.85	−0.50	0.03
	(3.35)	(−2.57)	(3.65)	(5.39)	(−0.99)	(13.15)	(−4.92)	
	***	**	***	***		***	***	
Japan	1.40	−0.09	−0.18	0.29	−0.59	1.02	0.18	0.05
	(1.72)	(−2.03)	(−0.62)	(3.57)	(−2.80)	(6.55)	(0.82)	
	*	**		***	***	***		
Asia	4.28	−0.29	0.35	0.45	−0.17	1.05	−1.02	0.04
	(4.85)	(−5.53)	(1.37)	(4.29)	(−0.83)	(7.03)	(−4.60)	
	***	***		***		***	***	
Panel B: $k = 36$								
NA	3.06	−0.15	0.14	0.19	−0.50	0.23	−0.34	0.03
	(4.57)	(−3.87)	(0.59)	(2.01)	(−3.32)	(2.74)	(−2.93)	
	***	***		**	***	***	***	
EUR	1.50	−0.05	0.76	0.39	−0.21	0.39	−0.37	0.03
	(3.89)	(−2.17)	(4.16)	(6.84)	(−1.99)	(7.55)	(−4.76)	
	***	**	***	***	**	***	***	
Japan	1.06	−0.06	−0.31	0.27	−0.43	0.49	−0.19	0.05
	(1.39)	(−1.49)	(−0.97)	(3.39)	(−2.82)	(4.49)	(−1.09)	
				***	***	***		
Asia	3.35	−0.21	0.23	0.37	−0.48	0.42	−0.62	0.05
	(3.82)	(−3.95)	(0.74)	(3.32)	(−3.26)	(3.53)	(−3.47)	
	***	***		***	***	***	***	

4.3. Book-To-Market Decomposition—Big vs. Small, 1991–2016

Returns of large market cap stocks tend to behave differently than the returns of small cap stocks. Fama and French (2012) report that the value premium declines with size. To test for possible size related effects, we divide the sample into big and small subsets where small stocks are those with the smallest market capitalization that in aggregate account for 10% of the total market capitalization of the particular region and big stocks comprise the remaining 90% total market capitalization of each region. Since we do not find substantially different results when including momentum, all results hereon include momentum as a right-hand side control variable in Models (4) and (5).

We begin by discussing the results for the set of big stocks. Table 4, Panel A presents the regression results for Model (4) when $k = 12$.[6] Relative to the results presented for the full sample, results here show that big stocks are generally less sensitive to the book-to-market components. Slopes on BM_{t-k} are positive for all regions but are only significant for Japan and Asia. Coefficients on $dM_{t-k,t}$ are negative for all regions but though magnitudes tend to be larger than those for BM_{t-k}, the slopes are only significant for Japan and moderately significant for Europe. Consistent with our previous results, the slopes on $dB_{t-k,t}$ are both positive and significant for all regions. The larger magnitudes of the coefficients on $dB_{t-k,t}$ relative to $dM_{t-k,t}$, however, is not held by the data. The sums $dB_{t-k,t} + dM_{t-k,t}$ listed in the last column of Table 4, Panel A are statistically not different from zero for North America, Europe, and Japan. Only in Asia do we find the sum to be significant. Results from Model (5), summarized in Table 4, Panel A, show that $dB_{t-k,t}$ has a greater impact on expected returns than BM_{t-k}. This is seen by the positive and significant coefficients on $dB_{t-k,t}$; however, the same cannot be said for the coefficients on $dM_{t-k,t}$. The statistically larger coefficients on $dB_{t-k,t}$ relative to the slopes on BM_{t-k} verify that the book-to-market decomposition indeed enhances the expected return model for the set of big stocks.

Table 4. Models (4) and (5) Regression Estimates—Big Stocks, 1991–2016. Results presented in Panel A are based on the same analysis of Model (4) as described in Table 2, and results presented in Panel B are based on the same analysis of Model (5) as described in Table 3. Regressions here use the set of big stocks defined as the set of stocks with the largest market capitalization that in aggregate comprise 90% of the total market cap for each region. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Panel A: Model (4), $k = 12$									
Region	**Const**	MC_t	MOM_t	BM_{t-k}	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	$dB_{t-k,t} + dM_{t-k,t}$
NA	1.80 (2.18) **	−0.08 (−1.77) *	0.49 (1.72) *	0.07 (0.94)	−0.31 (−1.03)	0.79 (6.14) ***	−0.66 (−4.10) ***	0.08	0.48 (1.43)
EUR	0.58 (0.74)	−0.01 (−0.22)	0.96 (2.76) ***	0.10 (1.31)	−0.46 (−1.71) *	0.48 (4.11) ***	−0.42 (−2.64) ***	0.08	0.02 (0.07)
Japan	0.07 (0.08)	0.02 (0.30)	0.33 (1.00)	0.37 (3.32) ***	−1.00 (−4.04) ***	1.41 (5.39) ***	−0.21 (−0.54)	0.09	0.41 (1.09)
Asia	0.26 (0.26)	0.02 (0.40)	0.71 (2.29) **	0.23 (2.31) **	−0.30 (−1.09)	1.09 (3.43) ***	−0.95 (−3.15) ***	0.10	0.79 (2.04) **
Panel B: Model (5), $k = 12$									
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	
NA	1.80 (2.18) **	−0.08 (−1.77) *	0.49 (1.72) *	0.07 (0.94)	−0.23 (−0.81)	0.72 (4.88) ***	−0.66 (−4.10) ***	0.08	

[6] Results when $k = 36$ are available from the author upon request. These results support the overall conclusion that recent information is more informative than old information.

Table 4. *Cont.*

	Panel B: Model (5), $k = 12$							
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2
EUR	0.58 (0.74)	−0.01 (−0.22)	0.96 (2.76) ***	0.10 (1.31)	−0.36 (−1.47)	0.38 (3.59) ***	−0.42 (−2.64) ***	0.08
Japan	0.07 (0.08)	0.02 (0.30)	0.33 (1.00)	0.37 (3.32) ***	−0.63 (−2.38) **	1.04 (3.98) ***	−0.21 (−0.54)	0.09
Asia	0.26 (0.26)	0.02 (0.40)	0.71 (2.29) **	0.23 (2.31) **	−0.07 (−0.25)	0.86 (2.82) ***	−0.95 (−3.15) ***	0.10

We find some similarities and differences when comparing the results from the set of small stocks with those from the set of big stocks as seen in Table 5, Panel A. Different from big stocks, when $k = 12$, all components of the book-to-market decomposition are significant with the hypothesized sign. This is true for all regions. From visual inspection, the magnitudes of the coefficients on $dM_{t-k,t}$ tend to be larger than the coefficients on BM_{t-k}, and the coefficients on $dB_{t-k,t}$ are substantially larger than the coefficient on $dM_{t-k,t}$. From the last column of Panel A, the sums of the coefficients on $dB_{t-k,t}$ and $dM_{t-k,t}$ are positive and significant (though marginally significant for North America). Similar to the results for big stocks, recent changes in book value continue to be the dominant book-to-market component.

Table 5. Models (4) and (5) Regression Estimates—Small Stocks, 1991–2016. Results presented in Panel A are based on the same analysis of Model (4) as described in Table 2, and results presented in Panel B are based on the same analysis of Model (5) as described in Table 3. Regressions here use the set of small stocks defined as the set of stocks with the smallest market capitalization that in aggregate comprise 10% of the total market cap for each region. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

	Panel A: Model (4), $k = 12$								
Region	**Const**	MC_t	MOM_t	BM_{t-k}	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	$dB_{t-k,t} + dM_{t-k,t}$
NA	5.40 (5.93) ***	−0.36 (−5.74) ***	0.29 (1.36)	0.21 (2.06) **	−0.76 (−4.46) ***	1.16 (10.75) ***	−0.36 (−2.37) **	0.04	0.39 (1.81) *
EUR	2.33 (5.60) ***	−0.15 (−4.64) ***	0.78 (3.81) ***	0.42 (5.61) ***	−0.55 (−3.36) ***	1.33 (21.92) ***	−0.47 (−4.40) ***	0.03	0.79 (4.82) ***
Japan	3.37 (3.87) ***	−0.27 (−4.90) ***	−0.37 (−1.16)	0.30 (3.61) ***	−0.85 (−4.26) ***	1.35 (9.14) ***	0.27 (1.20)	0.04	0.51 (2.14) **
Asia	8.09 (7.61) ***	−0.65 (−8.59) ***	0.39 (1.50)	0.55 (4.71) ***	−0.64 (−2.70) ***	1.72 (10.19) ***	−0.97 (−4.17) ***	0.04	1.08 (3.91) ***
	Panel B:Model (5), $k = 12$								
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	
NA	5.40 (5.93) ***	−0.36 (−5.74) ***	0.29 (1.36)	0.21 (2.06) **	−0.55 (−2.97) ***	0.94 (8.65) ***	−0.36 (−2.37) **	0.04	
EUR	2.33 (5.60) ***	−0.15 (−4.64) ***	0.78 (3.81) ***	0.42 (5.61) ***	−0.13 (−0.80)	0.91 (12.97) ***	−0.47 (−4.40) ***	0.03	
Japan	3.37 (3.87) ***	−0.27 (−4.90) ***	−0.37 (−1.16)	0.30 (3.61) ***	−0.55 (−2.57) **	1.05 (6.97) ***	0.27 (1.20)	0.04	
Asia	8.09 (7.61) ***	−0.65 (−8.59) ***	0.39 (1.50)	0.55 (4.71) ***	−0.09 (−0.41)	1.17 (7.81) ***	−0.97 (−4.17) ***	0.04	

The regression results for Model (5) are listed in Table 5, Panel B. With positive and significant slope coefficients for all regions, the impact of $dB_{t-k,t}$ on expected returns are much greater than BM_{t-k}, and the differences are large. For North America, Europe, Japan, and Asia, the Model (5) coefficients on $dB_{t-k,t}$ are 0.94 (t-stat = 8.65), 0.91 (t-stat = 12.97), 1.05 (t-stat = 6.97), and 1.17 (t-stat = 7.81), respectively. The significant marginal influences of $dM_{t-k,t}$ over BM_{t-k} are also seen in Panel B for North America and Japan.

We find some differences in results relative to FF. Whereas FF find that all components are informative for the set of big stocks, we find that only changes in book values are relevant. Within the set of small stocks, FF find expected returns to be highly sensitive to changes in price and not statistically related to changes in book value. We find that small stocks are statistically related to both changes in prices and book values but with statistically greater sensitivities to book value changes. Regardless of these differences in results, the overall conclusions are the same. For both big and small stocks, the evidence presented support the conclusions that the evolution of book-to-market contains information relevant for the estimation of expected returns, and more recent information, particularly about changes in book values, is more informative than older information.

4.4. Book-To-Market Decomposition—Subperiods Analysis

As a final robustness test of our results, we split the sample into two equal subperiods, 1991–2003 and 2004–2016, to determine whether there have been any temporal changes in the relation between returns and the components of book-to-market. We begin with the first half of the sample period, 1991–2003. The regression results for both Model (4) and Model (5) are presented in Table 6. With the exception of BM_{t-k} for North Americas, all three components are significant for all regions. Similar to our previous results, the largest coefficients are on $dB_{t-k.t}$, while the slopes on BM_{t-k} are consistently the smallest in magnitudes. The sums $dB_{t-k.t} + dM_{t-k.t}$ are insignificant for North America, Europe, and Japan. It is marginally significant, at the 10% level, for Asia. Changes in book value are as relevant as changes in price for estimating expected returns during the first half of the sample.

Table 6. Models (4) and (5) Regression Estimates—Subperiod 1991–2003. Results presented in Panel A are based on the same analysis of Model (4) as described in Table 2, and results presented in Panel B are based on the same analysis of Model (5) as described in Table 3. Regressions here use the set of all stocks over the subperiod 1991 to 2003. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Panel A: Model (4), k = 12									
Region	**Const**	MC_t	MOM_t	BM_{t-k}	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	$dB_{t-k,t} + dM_{t-k,t}$
NA	4.78 (4.75) ***	−0.27 (−4.12) ***	0.74 (4.25) ***	0.18 (0.96)	−1.01 (−3.94) ***	1.10 (6.29) ***	−0.24 (−1.40)	0.04	0.09 (0.28)
EUR	1.48 (2.32) **	−0.07 (−1.62)	1.12 (4.28) ***	0.47 (3.50) ***	−0.89 (−3.47) ***	1.32 (13.52) ***	−0.29 (−1.75) *	0.04	0.43 (1.63)
Japan	0.39 (0.29)	−0.04 (−0.60)	−0.29 (−0.62)	0.29 (2.75) ***	−0.93 (−2.87) ***	0.95 (4.43) ***	0.08 (0.21)	0.06	0.02 (0.06)
Asia	3.68 (2.81) ***	−0.24 (−2.93) ***	0.57 (1.43)	0.40 (2.22) **	−0.80 (−2.05) **	1.61 (5.10) ***	−1.11 (−3.00) ***	0.06	0.81 (1.73) *
Panel B: Model (5), k = 12									
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	
NA	4.78 (4.75) ***	−0.27 (−4.12) ***	0.74 (4.25) ***	0.18 (0.96)	−0.83 (−3.00) ***	0.92 (5.28) ***	−0.24 (−1.40)	0.04	
EUR	1.48 (2.32) **	−0.07 (−1.62)	1.12 (4.28) ***	0.47 (3.50) ***	−0.42 (−1.67) *	0.85 (7.85) ***	−0.29 (−1.75) *	0.04	

Table 6. *Cont.*

Panel B: Model (5), k = 12								
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2
Japan	0.39 (0.29)	−0.04 (−0.60)	−0.29 (−0.62)	0.29 (2.75) ***	−0.64 (−1.91) *	0.66 (2.83) ***	0.08 (0.21)	0.06
Asia	3.68 (2.81) ***	−0.24 (−2.93) ***	0.57 (1.43)	0.40 (2.22) **	−0.40 (−1.10)	1.21 (4.64) ***	−1.11 (−3.00) ***	0.06

The magnitudes of the coefficients on $dM_{t-k.t}$ and $dB_{t-k.t}$ appear to be much larger than the coefficients on BM_{t-k}. Table 6, Panel B, which reports the regression results for Model (5), supports this observation. The Model (5) slopes on $dB_{t-k.t}$ are significantly different from zero for all regions, while the slopes on $dM_{t-k.t}$ are marginally significant (at the 10% level) for Europe and Japan, strongly significant for North America, and insignificant for Asia. Hence, while all three components tend to be important in explaining expected returns, changes in book values are still the dominant component of book-to-market.[7]

Results for the second half of the sample, Table 7, are much the same with one important difference. As with the first half of the sample, the coefficients on the three components of book-to-market are consistently significant for all regions with the exception of $dM_{t-k.t}$ for Europe (Table 7, Panel A). The primary difference between the early and recent subperiods is the decrease in the magnitudes of the $dM_{t-k.t}$ coefficients. Whereas the coefficients on $dM_{t-k.t}$ and $dB_{t-k.t}$ are similar in magnitudes for the early part of the sample, the slopes on $dB_{t-k.t}$ are significantly larger than the slopes on $dM_{t-k.t}$ for all regions over the latter half of the sample period.

Table 7. Models (4) and (5) Regression Estimates—Subperiod 2004–2016. Results presented in Panel A are based on the same analysis of Model (4) as described in Table 2, and results presented in Panel B are based on the same analysis of Model (5) as described in Table 3. Regressions here use the set of all stocks over the subperiod 2004 to 2016. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Panel A: Model (4), k = 12									
Region	**Const**	MC_t	MOM_t	BM_{t-k}	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	$dB_{t-k,t} + dM_{t-k,t}$
NA	3.06 (2.73) ***	−0.18 (−2.81) ***	−0.17 (−0.43)	0.23 (3.26) ***	−0.50 (−2.25) **	1.08 (10.33) ***	−0.57 (−2.49) **	0.03	0.57 (2.09) **
EUR	1.39 (2.53) **	−0.06 (−2.16) **	0.41 (1.31)	0.32 (6.05) ***	−0.20 (−1.15)	1.17 (15.91) ***	−0.72 (−6.80) ***	0.02	0.97 (5.84) ***
Japan	2.42 (2.72) ***	−0.14 (−2.48) **	−0.07 (−0.20)	0.30 (2.35) **	−0.83 (−3.86) ***	1.67 (9.70) ***	0.28 (1.19)	0.04	0.84 (3.37) ***
Asia	4.87 (4.18) ***	−0.34 (−5.32) ***	0.14 (0.43)	0.50 (4.53) ***	−0.45 (−2.33) **	1.39 (12.45) ***	−0.93 (−3.86) ***	0.02	0.93 (4.73) ***
Panel B: Model (5), k = 12									
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2	
NA	3.06 (2.73) ***	−0.18 (−2.81) ***	−0.17 (−0.43)	0.23 (3.26) ***	−0.28 (−1.29)	0.85 (6.65) ***	−0.57 (−2.49) **	0.03	

7 Results when $k = 36$ are available from the author upon request. These results support the overall conclusion that recent information is more informative than old information.

Table 7. *Cont.*

Panel B: Model (5), k = 12								
	Const	MC_t	MOM_t	BM_t	$dM_{t-k,t}$	$dB_{t-k,t}$	$NS_{t-k,t}$	R^2
EUR	1.39 (2.53) **	−0.06 (−2.16) **	0.41 (1.31)	0.32 (6.05) ***	0.12 (0.74)	0.85 (11.19) ***	−0.72 (−6.80) ***	0.02
Japan	2.42 (2.72) ***	−0.14 (−2.48) **	−0.07 (−0.20)	0.30 (2.35) **	−0.53 (−2.12) **	1.37 (7.92) ***	0.28 (1.19)	0.04
Asia	4.87 (4.18) ***	−0.34 (−5.32) ***	0.14 (0.43)	0.50 (4.53) ***	0.05 (0.25)	0.88 (6.45) ***	−0.93 (−3.86) ***	0.02

The regression results from Model (5) further support this finding. As seen in Table 7, Panel B, with the exception of Japan, due to the decline in the magnitudes of the true slopes on $dM_{t-k,t}$, there is statistically no difference in the magnitudes of the coefficients on BM_{t-k} and $dM_{t-k,t}$. The true slopes on $dB_{t-k,t}$, however, remain statistically larger than the true slopes on BM_{t-k}. Whether the first half or the second half of the sample, the data rejects the hypothesis that only the current value of book-to-market is relevant for explaining expected returns. Instead, the data supports the alternative hypothesis that the origins of book-to-market are important. This result holds for all four global regions.

5. Net Share Issuance

Previous studies have identified negative returns following positive net share issues in the U.S. (Daniel and Titman (2006), Pontiff and Woodgate (2008), and Fama and French (2008)) as well as internationally (McLean et al. (2009)). Since net share issues ($NS_{t-k,t}$) have a direct impact on changes in total book and market values as well as expected returns, we include $NS_{t-k,t}$ in Models (4) and (5).

5.1. Regression Analysis—Models (4) and (5)

Estimated coefficients are listed in Tables 2–7 for different cuts of the data. We summarize the results for $NS_{t-k,t}$ in Table 8. Consistent with the literature, we find a negative and significant relation between net share issues and expected returns. This is true for North America, Europe, and Asia. Issuing new shares results in a decline in returns. Interestingly, returns in Japan are unrelated to net share issues and this is the case for all cuts of the data. The slope on $NS_{t-k,t}$ for Japan is always insignificant.

Table 8. Net Share Issues—Summary. This table summarizes the estimated regression coefficient on net share issues ($NS_{t-k,t}$) from Tables 2 and 4–7. $NS_{t-k,t}$ coefficients for all stocks over 1991–2016 are from Table 2, big stocks are from Table 4, small stocks are from Table 5, all stocks for the subperiod 1991–2003 are from Table 6, and all stocks for the subperiod 2004–2016 are from Table 7. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Sample	Period	Lag	North America	Europe	Japan	Asia
All Stocks	1991–2016	k = 12	−0.41 (−2.79) ***	−0.50 (−4.92) ***	0.18 (0.82)	−1.02 (−4.60) ***
Big Stocks	1991–2016	k = 12	−0.66 (−4.10) ***	−0.42 (−2.64) ***	−0.21 (−0.54)	−0.95 (−3.15) ***
Small Stocks	1991–2016	k = 12	−0.36 (−2.37) **	−0.47 (−4.40) ***	0.27 (1.20)	−0.97 (−4.17) ***
All Stocks	1991–2003	k = 12	−0.24 (−1.40)	−0.29 (−1.75) *	0.08 (0.21)	−1.11 (−3.00) ***
All Stocks	2004–2016	k = 12	−0.57 (−2.49) **	−0.72 (−6.80) ***	0.28 (1.19)	−0.93 (−3.86) ***

Net share issues are strongly significant for both big and small stocks. There is no clear pattern in the magnitudes of the coefficients on $NS_{t-k,t}$ between small and big stocks. For North America, the slope is larger in magnitude for big stocks (−0.66) than it is for small stocks (−0.36); however, for Europe and Asia, magnitudes are just slightly larger for small stocks relative to big stocks. Using the t-statistic as the metric, FF find that net share issuances are the most powerful predictor of returns for the set of ABM (big) stocks. This is not the case here. As seen in Tables 2, 4 and 5 for all stocks, big stocks, and small stocks, respectively, changes in book value are clearly the most powerful explanatory variable in Model (4). This is consistent across all regions.

Results differ across the first half (1991–2003) and second half (2004–2016) of the sample. In the first half of the sample, slopes are negative but tend to have t-statistics that are close to zero. When $k = 12$, the slope for North America is insignificant with a t-statistic of −1.40, Europe has a modestly significant t-statistic of −1.75, and Asia has a significant slope as shown by the large t-statistic of −3.00. The second half of the sample yields stronger results. Excluding Japan, all slopes are negative and have large t-statistics that range from −2.49 to −6.80.

5.2. Net Shares Issued by Year

We take a deeper look into net share issuances in order to identify changes that may lead to stronger sensitivities in the more recent period. For each year, from 1991–2016, Tables 9–12 detail statistics regarding net share issuances for North America, Europe, Japan, and Asia, respectively. For these four tables, net share issuances are measured on an annual basis. Columns 2–4 list the fraction of firms that repurchase shares (negative net share issuances) denoted as 'Neg', issue shares (positive net share issuances) denoted as 'Pos', and the fraction of firms that have zero net issues denoted as '0'. Columns 5–7 list the percent of total market cap of stocks of firms that repurchase (Neg), issue (Pos), or have no change in shares. The last five columns list breakpoints of net share issues. For repurchases, which tend to be much smaller than issuances, we report only then median (−50%). For issues, we list the quintile breakpoints: 20, 40, 60, and 80%. At the bottom of each of the four tables, we list the column averages over the first half, 1991–2003 denoted as '91–03', the second half, 2004–2016 denoted as '04–16', and the full period denoted as '91–16'.

Starting with North America, Table 9, we first notice that on average approximately 95% of firms are either net issuers or repurchasers every year and the number of firms that issue is two to three times the number of firms that repurchase. Comparing the first half with the second half, we find a small increase in issuances from 67.22 to 70.23% and a small decrease in repurchases from 28.83 to 26.62%. There is a clear cyclicality to repurchases and issues. Repurchases surge and issuances decline during times leading up to crisis periods such as the technology bubble and the global credit crisis. In the periods following crises, issuances rise and repurchases fall. The size of issuing firms, in terms of market capitalization, falls steadily across time, while the average market capitalization of repurchasers rises. Comparing the first half with the second half, there is a 10% average increase in the aggregate market capitalization of repurchasers and the equivalent 10% drop in average aggregate market cap of issuers.

Table 9. Net Shares Issues—North America 1991–2016. For North America, net share issues (the number of shares issued minus repurchased) are computed for all stocks on an annual basis. Columns 2–4, % of Stocks, list the fraction of all stocks that are net repurchasers (Neg), net issuers (Pos) and that have zero net issues (0). Columns 5–7, % of Market Cap, list the percent of total market capitalization of net repurchasers, net issuers, and firms that do not repurchase or issue. The last five columns list the median percent share repurchase (−50%), as well as the quintile breakpoints for issues. The last three rows provide averages over the full sample, '91–16', and over two subperiods, '91–03' and '04–16'.

Year	% of Stocks			% of Market Cap			Net Shares Issued				
	Neg	**0**	**Pos**	**Neg**	**0**	**Pos**	**−50%**	**20%**	**40%**	**60%**	**80%**
1991	34.01	5.21	60.77	45.93	3.25	50.82	−1.95	0.20	0.67	1.70	5.99
1992	29.52	5.68	64.80	36.67	3.50	59.82	−1.22	0.21	0.72	2.00	8.61
1993	22.47	5.31	72.22	28.10	3.12	68.78	−0.93	0.24	0.81	2.17	8.59
1994	21.65	4.85	73.50	26.80	5.80	67.40	−1.09	0.30	0.95	2.79	9.98
1995	23.01	4.10	72.90	32.99	3.99	63.02	−1.47	0.29	0.92	2.72	10.24
1996	25.99	4.45	69.55	35.26	4.82	59.92	−1.29	0.28	0.97	2.75	11.59
1997	26.39	4.09	69.53	39.04	6.89	54.07	−1.75	0.38	1.31	3.74	14.90
1998	27.37	3.22	69.41	40.55	4.51	54.94	−2.17	0.51	1.53	4.11	15.47
1999	29.35	2.87	67.78	35.07	3.14	61.79	−1.94	0.47	1.44	3.82	14.32
2000	37.87	2.75	59.38	33.58	3.26	63.16	−2.46	0.38	1.29	3.73	13.87
2001	38.06	2.89	59.05	32.85	3.12	64.03	−2.52	0.41	1.56	4.58	14.88
2002	31.08	2.46	66.45	36.58	3.89	59.53	−1.90	0.47	1.60	4.00	13.10
2003	28.06	3.43	68.50	45.40	6.31	48.29	−1.28	0.39	1.12	2.83	11.49
2004	26.49	3.07	70.45	40.30	5.19	54.51	−1.48	0.45	1.34	3.25	12.60
2005	20.17	3.10	76.73	42.01	4.96	53.03	−1.40	0.68	1.77	4.15	14.65
2006	23.35	3.15	73.50	48.02	4.50	47.48	−1.89	0.65	1.70	4.07	14.34
2007	25.13	2.84	72.04	51.63	5.52	42.85	−2.08	0.69	1.87	5.29	19.49
2008	28.45	2.89	68.66	54.79	6.17	39.04	−2.59	0.61	1.72	5.40	20.11
2009	34.20	2.91	62.89	53.32	5.63	41.04	−2.34	0.44	1.35	4.35	16.31
2010	26.30	3.18	70.52	33.94	7.91	58.15	−1.22	0.38	1.15	4.15	18.23
2011	22.02	3.34	74.64	32.47	8.12	59.41	−1.42	0.51	1.48	5.75	23.15
2012	25.63	3.11	71.27	45.00	5.58	49.42	−1.85	0.47	1.42	5.10	20.70
2013	28.09	3.51	68.40	45.48	5.74	48.79	−1.80	0.40	1.18	3.65	15.76
2014	26.89	3.32	69.80	48.42	5.89	45.69	−1.67	0.46	1.35	4.33	17.32
2015	28.09	3.38	68.52	54.55	5.06	40.39	−1.97	0.46	1.38	4.91	18.82
2016	31.30	3.10	65.60	55.07	4.77	40.17	−2.03	0.41	1.29	4.55	17.66
91–03	28.83	3.95	67.22	36.06	4.28	59.66	−1.69	0.35	1.15	3.15	11.77
04–16	26.62	3.15	70.23	46.54	5.77	47.69	−1.83	0.51	1.46	4.53	17.63
91–16	27.73	3.55	68.73	41.30	5.03	53.67	−1.76	0.43	1.30	3.84	14.70

The breakpoints listed in the last five columns of Table 9 are the percent change in shares outstanding. The median repurchase remains nearly the same from the first half of the sample (−1.69%) to the second half (−1.83%). Similarly, we see little change in the 20 and 40% breakpoints across time. There is a little increase in the 60% breakpoint, 3.15 to 4.53%, and a larger increase in the 80% breakpoint, 11.77 to 17.63%. Whereas the lower tail of the distribution has remained much the same over the sample period, the right tail has grown with time.

Net share issues in Europe, Table 10, are a little different. As with North America, there are substantially more firms issuing each year than repurchasing but, different from North America, a larger fraction of firms (approximately 16%) neither issue nor repurchase. This is more than four times more than what we observe in North America. The numbers of repurchases and issues are quite flat across time and the large cyclical pattern around crises observed in North America is not as present in Europe. The size of issuers in terms of market capitalization has become dramatically smaller in recent years falling from 64.16% of total market cap over 1991–2003 to 46.34% of total market cap over 2004–2016. At the same time, repurchasers have increased in size from 15.23 to 28.42% of aggregate market cap. Looking at the distribution of repurchases and issues, we find very little difference in breakpoints from the first half to the second half. The 80% breakpoints are highly volatile, ranging from 7.71 to 17.73% depending on the year, and the average 80% breakpoint over the second half was of 13.62%, approximately 2.6% larger than the average over the first half of 10.96%.

Table 10. Net Shares Issues—Europe 1991–2016. For Europe, net share issues (the number of shares issued minus repurchased) are computed for all stocks on an annual basis. Columns 2–4, % of Stocks, list the fraction of all stocks that are net repurchasers (Neg), net issuers (Pos) and that have zero net issues (0). Columns 5–7, % of Market Cap, list the percent of total market capitalization of net repurchasers, net issuers, and firms that don not repurchase or issue. The last five columns list the median percent share repurchase (−50%), as well as the quintile breakpoints for issues. The last three rows provide averages over the full sample, '91–16', and over two subperiods, '91–03' and '04–16'.

Year	% of Stocks			% of Market Cap			Net Shares Issued				
	Neg	0	Pos	Neg	0	Pos	−50%	20%	40%	60%	80%
1991	24.52	14.70	60.78	14.30	15.52	70.19	−0.06	0.06	0.44	2.29	13.22
1992	26.93	19.25	53.82	12.86	21.44	65.69	−0.06	0.04	0.18	1.49	13.24
1993	25.52	16.46	58.02	12.24	17.71	70.05	−0.06	0.05	0.31	1.55	11.47
1994	26.41	16.48	57.12	13.40	18.38	68.22	−0.06	0.05	0.27	1.59	14.36
1995	25.36	16.51	58.13	11.86	16.72	71.42	−0.06	0.05	0.32	1.73	14.81
1996	24.78	17.64	57.58	12.13	24.76	63.12	−0.05	0.05	0.27	1.18	7.71
1997	25.43	17.75	56.83	12.71	25.24	62.05	−0.06	0.04	0.26	1.16	8.12
1998	25.93	18.79	55.28	12.85	26.51	60.64	−0.06	0.04	0.22	1.05	8.82
1999	27.30	16.87	55.83	11.50	22.86	65.65	−0.07	0.04	0.20	1.15	9.15
2000	28.70	15.74	55.55	13.21	18.68	68.11	−0.07	0.04	0.19	1.14	9.92
2001	28.17	14.26	57.57	16.20	19.45	64.34	−0.07	0.05	0.25	2.11	13.78
2002	30.25	13.35	56.40	24.39	19.32	56.29	−0.10	0.05	0.22	1.40	9.82
2003	33.38	13.06	53.56	30.32	21.41	48.27	−0.12	0.05	0.18	0.89	8.12
2004	32.90	13.49	53.61	32.81	20.41	46.78	−0.14	0.05	0.20	1.13	10.21
2005	28.30	14.93	56.78	32.13	21.78	46.10	−0.12	0.06	0.29	1.58	12.14
2006	26.44	16.16	57.40	33.78	22.21	44.01	−0.12	0.06	0.42	2.35	14.53
2007	25.23	16.84	57.93	30.88	24.86	44.26	−0.12	0.08	0.54	2.95	16.86
2008	26.11	16.96	56.93	32.92	24.67	42.41	−0.13	0.07	0.55	3.49	17.73
2009	31.65	14.44	53.90	37.49	20.84	41.67	−0.18	0.06	0.29	1.57	11.54
2010	30.69	14.15	55.16	24.01	23.09	52.90	−0.14	0.06	0.28	1.95	16.82
2011	28.59	15.41	56.01	21.84	28.47	49.69	−0.13	0.06	0.32	2.11	15.62
2012	29.09	15.89	55.02	24.01	25.41	50.58	−0.14	0.06	0.29	1.53	12.47
2013	30.36	15.61	54.03	27.96	24.34	47.70	−0.16	0.06	0.29	1.36	10.82
2014	28.59	16.70	54.71	22.44	30.30	47.25	−0.15	0.06	0.31	1.69	12.42
2015	28.10	17.62	54.28	22.87	31.34	45.79	−0.15	0.07	0.37	2.01	13.17
2016	27.74	17.73	54.53	26.29	30.49	43.22	−0.16	0.06	0.34	1.77	12.68
91–03	27.13	16.22	56.65	15.23	20.62	64.16	−0.07	0.05	0.25	1.44	10.96
04–16	28.75	15.84	55.41	28.42	25.25	46.34	−0.14	0.06	0.35	1.96	13.62
91–16	27.94	16.03	56.03	21.82	22.93	55.25	−0.11	0.05	0.30	1.70	12.29

We find a surprising difference in Japan relative to both Europe and North America. As seen in Table 11, on average there is little difference in the number of firms that repurchase and the number of firms that issue, and more than 99% of firms either issue or repurchase annually. Over the entire sample period, 46.23% of firms repurchase as compared to 53.49% of firms that issue and, on average, 0.28% of firms neither repurchase nor issue. Additionally, the average number of issuers and repurchasers is fairly steady from the first half to the second half of the sample. The size of firms that repurchase and issue is also very similar across the first and second half of the data as compared to Europe and North America. The average size of repurchasers comprise 44.99% of the total market capitalization, while the average size of issuers comprise 53.99%. There is approximately a 5% decrease in the size of issuers and a similar 5% increase in the size repurchasers from the first to second half of the sample. As with Europe and North America, the −50, 20 and 40% breakpoints are very similar across time, while there is some increase in the 60 and 80% breakpoints. In these two cases, we see a rapid increase in the 80% breakpoint that peaks in the early 2000s followed by a decrease over the following years.

Table 11. Net Shares Issues—Japan 1991–2016. For Japan, net share issues (the number of shares issued minus repurchased) are computed for all stocks on an annual basis. Columns 2–4, % of Stocks, list the fraction of all stocks that are net repurchasers (Neg), net issuers (Pos) and that have zero net issues (0). Columns 5–7, % of Market Cap, list the percent of total market capitalization of net repurchasers, net issuers, and firms that don't repurchase or issue. The last five columns list the median percent share repurchase (−50%), as well as the quintile breakpoints for issues. The last three rows provide averages over the full sample, '91–16', and over two subperiods, '91–03' and '04–16'.

Year	% of Stocks			% of Market Cap			Net Shares Issued				
	Neg	0	Pos	Neg	0	Pos	−50%	20%	40%	60%	80%
1991	39.37	0.60	60.02	36.80	1.03	62.17	−1.08	0.52	1.19	2.34	5.04
1992	33.04	0.34	66.62	32.97	0.75	66.27	−1.92	0.96	2.30	4.73	9.34
1993	45.54	0.28	54.18	44.51	0.63	54.86	−2.26	0.75	1.83	3.82	8.44
1994	46.03	0.31	53.66	44.41	0.90	54.69	−2.25	0.70	1.74	3.82	8.28
1995	44.50	0.42	55.08	44.80	0.72	54.48	−1.94	0.62	1.63	3.67	7.85
1996	44.77	0.39	54.84	43.12	0.55	56.33	−1.97	0.65	1.70	3.77	8.19
1997	45.17	0.30	54.53	42.00	0.53	57.47	−2.43	0.79	1.99	4.36	8.88
1998	45.99	0.20	53.81	41.91	0.65	57.44	−3.74	1.18	2.93	6.16	12.61
1999	48.17	0.17	51.66	41.06	0.39	58.55	−5.14	1.35	3.60	7.62	15.41
2000	46.84	0.18	52.98	44.26	0.61	55.13	−5.46	1.67	4.48	9.27	18.69
2001	48.88	0.21	50.90	43.12	1.19	55.69	−5.67	1.48	4.04	8.69	18.36
2002	51.36	0.18	48.47	46.70	1.09	52.21	−6.67	1.55	4.26	9.20	19.50
2003	50.56	0.16	49.29	46.83	0.53	52.63	−6.27	1.62	4.25	8.62	17.92
2004	45.29	0.16	54.56	45.12	0.69	54.19	−5.28	1.71	4.47	9.40	19.10
2005	43.98	0.20	55.82	43.13	0.47	56.40	−4.14	1.44	3.89	8.02	15.89
2006	42.46	0.26	57.28	42.68	1.15	56.17	−3.46	1.27	3.39	7.42	15.37
2007	44.56	0.29	55.15	40.65	1.17	58.18	−3.48	1.12	3.07	6.63	13.87
2008	47.80	0.31	51.89	48.67	2.00	49.34	−4.15	1.13	3.10	6.74	14.55
2009	50.46	0.23	49.31	51.85	1.19	46.96	−5.13	1.22	3.34	7.28	15.40
2010	47.66	0.24	52.10	48.35	1.16	50.49	−4.65	1.38	3.81	8.23	17.95
2011	47.36	0.33	52.31	47.90	1.92	50.18	−4.31	1.22	3.41	7.33	15.71
2012	48.53	0.27	51.21	49.02	1.13	49.85	−3.87	1.11	3.04	6.51	14.01
2013	49.93	0.29	49.79	49.49	1.48	49.03	−3.79	1.02	2.68	5.80	13.03
2014	46.94	0.30	52.76	46.56	2.05	51.39	−3.62	1.06	2.89	6.42	13.88
2015	48.00	0.32	51.68	52.13	1.09	46.78	−3.51	0.98	2.72	6.00	12.94
2016	48.76	0.32	50.92	51.70	1.57	46.73	−3.62	0.92	2.56	5.69	12.27
91–03	45.40	0.29	54.31	42.50	0.74	56.76	−3.60	1.06	2.76	5.85	12.19
04–16	47.06	0.27	52.68	47.48	1.31	51.21	−4.08	1.20	3.26	7.04	14.92
91–16	46.23	0.28	53.49	44.99	1.02	53.99	−3.84	1.13	3.01	6.44	13.56

Asia exhibits many similarities with Europe and North America. There are approximately three times more net issuers (70.49%) than net repurchasers (23.96%), and the number of firms that neither issue nor repurchase is small, on average 5.56%. Across time, the fraction of firms that repurchase remains rather steady, fluctuating between 17 and 29%, and the number of firms that issue is similarly stable, fluctuating between 65 and 78%. The fractions of the total market cap of both repurchasers and issuers are also surprisingly constant across time. The average percent of total market cap for repurchasers drops from 18.83% in the first half to 18.05% in the second half of the sample. For issuers, the percent of market cap barely rises from 68.87% over the first half and is 69.52 over the second half. Again, we see that the −50, 20, and 40% breakpoints stay fairly constant across time, but the 60 and 80% breakpoints exhibit a substantial increase. On average, the 60% breakpoint increases from 4.57 to 10.48% from the first to second half of the sample, and the 80% breakpoint increases from 15.67 to 28.73% from the first half to second half.

To summarize, while there are a number of commonalities across North America, Europe, and Asia, Japan is noticeably different. This could explain why the slopes on $NS_{t-k,t}$ are insignificant for Japan but tend to be highly significant for the other three regions. We only observe one common difference between the first and second half of the sample. The right tail of the distribution of issuances has expanded over time. The increase in the 80% breakpoint is most significant for Asia (13% increase) and is much smaller for North America (5.86%) and Europe (2.66% increase). Large issuers are issuing more shares.

Table 12. Net Shares Issues—Asia 1991–2016. For Asia, net share issues (the number of shares issued minus repurchased) are computed for all stocks on an annual basis. Columns 2–4, % of Stocks, list the fraction of all stocks that are net repurchasers (Neg), net issuers (Pos) and that have zero net issues (0). Columns 5–7, % of Market Cap, list the percent of total market capitalization of net repurchasers, net issuers, and firms that do not repurchase or issue. The last five columns list the median percent share repurchase (−50%), as well as the quintile breakpoints for issues. The last three rows provide averages over the full sample, '91–16', and over two subperiods, '91–03' and '04–16'.

Year	% of Stocks			% of Market Cap			Net Shares Issued				
	Neg	0	Pos	Neg	0	Pos	−50%	20%	40%	60%	80%
1991	24.12	9.83	66.06	18.81	8.96	72.24	−0.09	0.10	0.77	3.15	10.18
1992	22.31	8.70	68.99	15.67	12.57	71.76	−0.08	0.10	1.02	4.35	15.38
1993	21.90	9.24	68.86	14.94	11.65	73.41	−0.08	0.09	0.77	4.49	15.67
1994	20.44	7.37	72.19	14.21	11.92	73.87	−0.07	0.11	1.04	4.46	12.15
1995	18.80	8.75	72.45	13.70	15.69	70.62	−0.08	0.12	0.90	3.36	11.01
1996	23.19	9.42	67.39	16.93	13.54	69.53	−0.09	0.11	0.72	3.38	9.69
1997	22.50	8.37	69.13	13.95	8.98	77.08	−0.09	0.09	0.70	3.14	12.11
1998	22.72	6.95	70.34	20.98	11.02	68.01	−0.14	0.14	1.19	5.51	17.94
1999	29.55	5.32	65.13	24.74	8.91	66.35	−0.24	0.13	0.89	3.38	13.30
2000	28.07	4.91	67.03	23.50	15.01	61.49	−0.26	0.18	0.89	3.60	15.39
2001	27.05	4.51	68.44	21.11	14.73	64.16	−0.31	0.19	1.10	5.43	19.56
2002	28.75	3.87	67.38	23.86	14.07	62.07	−0.31	0.20	1.10	5.38	21.79
2003	26.93	3.24	69.84	22.33	12.90	64.77	−0.43	0.29	1.78	9.81	29.48
2004	25.52	3.02	71.46	23.76	10.87	65.36	−0.38	0.31	1.76	9.08	26.38
2005	22.19	3.50	74.32	23.17	9.88	66.95	−0.30	0.35	1.81	9.40	25.48
2006	22.57	3.49	73.94	18.62	8.94	72.44	−0.30	0.31	1.75	9.55	27.09
2007	21.20	4.29	74.52	16.43	9.08	74.49	−0.28	0.35	2.28	12.04	30.94
2008	17.21	4.16	78.62	13.27	12.53	74.19	−0.24	0.49	3.77	14.51	33.70
2009	24.88	3.58	71.54	13.86	15.10	71.04	−0.36	0.32	1.89	9.79	25.99
2010	24.16	3.64	72.20	14.36	12.85	72.79	−0.33	0.31	2.43	14.03	37.10
2011	21.40	4.12	74.47	15.86	15.60	68.53	−0.25	0.30	2.17	12.55	32.26
2012	24.38	4.18	71.45	20.56	10.20	69.23	−0.28	0.25	1.62	9.65	27.98
2013	26.43	5.06	68.51	19.22	14.71	66.07	−0.33	0.22	1.31	8.52	26.27
2014	25.67	5.28	69.05	15.60	17.28	67.12	−0.30	0.22	1.26	8.73	25.96
2015	25.61	4.96	69.44	17.98	13.74	68.28	−0.31	0.23	1.28	8.86	26.93
2016	25.33	4.73	69.94	21.98	10.76	67.26	−0.33	0.25	1.48	9.52	27.46
91–03	24.33	6.96	68.71	18.83	12.30	68.87	−0.17	0.14	0.99	4.57	15.67
04–16	23.58	4.15	72.27	18.05	12.43	69.52	−0.31	0.30	1.91	10.48	28.73
91–16	23.96	5.56	70.49	18.44	12.37	69.20	−0.24	0.22	1.45	7.53	22.20

5.3. Net Share Issuances and the Cross-Section of Returns

Tables 13 and 14 examine how abnormal returns vary with net share issuances. Abnormal returns, the residuals from the baseline regression Model (3), are sorted by $NS_{t-k,t}$. Using the residuals allows us to control for return patterns associated with book-to-market, size, and momentum effects. For net repurchases, abnormal returns are sorted into two bins, below the median, large repurchases, '<−50%' and above the median, small repurchases, '−50%'. Issues are sorted into quintile portfolios using the 20, 40, 60, and 80% breakpoints, and zero net share issues are placed in a separate bin. In all tables, we additionally report the difference in abnormal returns between the fifth and first quintiles (H-L) of the positive net issuers. Tables 13 and 14 list the average abnormal returns of all stocks within each bin for the full period 1991–2016 (Table 13), for the two subperiods 1991–2003 and 2004–2016 (Table 14, Panels A and B), and for large and small stocks (Table 14, Panels C and D). Throughout this section, our discussion will primarily focus on North America, Europe, and Asia as our previous results have shown no relation between returns and net share issues in Japan.

Table 13. Univariate Sorts by Net Share Issues. For North America (NA), Europe (EUR), Japan, and Asia, the cross section of stock returns are regressed on market capitalization, book-to-market, and momentum each month and then sorted into bins on a monthly basis according to net share issues (shares issued less shares repurchased). For negative net share issues, stocks are sorted into two bins relative to the median—large repurchases (<−50%) and small repurchases (−50%). Stocks with zero net issues are sorted into a separate group, and positive net issues are divided into quintile portfolios using the 20, 40, 60, and 80 percentile breakpoints. Each month, average abnormal returns, residuals from the regression, are computed for each bin and then averaged across all months. Low and high refers to the average return of the lowest and highest net issue portfolio, respectively. 'H-L' is the different in return between the high and low portfolios. All values in parentheses are Newey–West t-statistics. Panel A computes net share issues over 12-month intervals, while Panel B computes net share issues over 36 months. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Panel A: k = 12									
Region	**Repurchases**		**Zero Issuance**	**Issues**					
	<−50%	**−50%**	**0**	**Low**	**2**	**3**	**4**	**High**	**H-L**
NA	0.14 (1.83) *	0.08 (1.16)	−0.16 (−1.82) *	−0.04 (−0.80)	0.12 (2.80) ***	0.18 (2.90) ***	−0.01 (−0.07)	−0.42 (−3.27) ***	−0.38 (−2.25) **
EUR	0.22 (5.83) ***	0.00 (0.01)	0.09 (1.54)	−0.01 (−0.16)	0.07 (1.84) *	0.20 (3.22) ***	−0.13 (−1.43)	−0.55 (−4.72) ***	−0.54 (−3.28) ***
Japan	0.00 (0.08)	0.03 (0.94)	0.27 (1.27)	0.02 (0.50)	0.01 (0.41)	−0.06 (−1.49)	−0.12 (−2.98) ***	0.07 (0.94)	0.05 (0.48)
Asia	0.44 (3.99) ***	−0.06 (−0.64)	0.16 (1.35)	0.10 (1.06)	0.26 (3.40) ***	0.12 (1.49)	−0.25 (−2.92) ***	−0.60 (−4.26) ***	−0.70 (−3.27) ***
Panel B: k = 36									
NA	0.11 (1.38)	0.03 (0.38)	−0.01 (−0.06)	0.05 (0.83)	0.19 (3.69) ***	0.09 (1.67) *	−0.10 (−1.17)	−0.35 (−2.45) **	−0.40 (−2.07) **
EUR	0.24 (5.09) ***	0.02 (0.25)	0.03 (0.39)	0.08 (1.05)	0.23 (4.02) ***	0.07 (1.31)	−0.25 (−3.38) ***	−0.44 (−4.06) ***	−0.52 (−2.97) ***
Japan	0.04 (1.09)	0.03 (0.66)	0.02 (0.09)	0.00 (0.08)	0.04 (0.93)	−0.02 (−0.62)	−0.05 (−1.05)	−0.06 (−0.62)	−0.06 (−0.49)
Asia	0.35 (2.82) ***	0.01 (0.04)	0.25 (1.75) *	0.14 (1.31)	0.33 (4.99) ***	0.02 (0.36)	−0.17 (−1.95) *	−0.57 (−3.43) ***	−0.71 (−2.80) ***

Table 14. Univariate Sorts by Net Share Issues—Subperiod and Size Analysis. This table presents results identical to Table 13 but using different subsamples. Results in Panel A are based on data over the subperiod 1991–2003 for k = 12. Results in Panel B rely on the data over the subperiod 2004–2016 for k = 12. Panels C and D subdivide the sample into big stocks and small stocks, respectively. Big stocks have the largest market capitalization comprising 90% of the total market capitalization. ***/**/* indicates significance at the 1, 5, and 10% level, respectively.

Panel A: k = 12, 1991–2003									
Region	**Repurchases**		**Zero Issuance**	**Issues**					
	<−50%	**−50%**	**0**	**Low**	**2**	**3**	**4**	**High**	**H-L**
NA	0.05 (0.44)	−0.05 (−0.49)	−0.36 (−2.78) ***	−0.08 (−0.93)	0.15 (2.65) ***	0.21 (2.09) **	0.10 (0.84)	−0.27 (−2.04) **	−0.20 (−0.99)

Table 14. *Cont.*

Region	Repurchases		Zero Issuance	Issues					
	<−50%	**−50%**	**0**	**Low**	**2**	**3**	**4**	**High**	**H-L**
Panel A: k = 12, 1991–2003									
EUR	0.15	−0.06	0.03	−0.04	0.10	0.17	−0.03	−0.37	−0.33
	(2.37) **	(−0.61)	(0.32)	(−0.38)	(1.73) *	(1.77) *	(−0.21)	(−2.00) **	(−1.21)
Japan	−0.04	0.03	0.21	0.08	−0.01	−0.02	−0.10	0.07	−0.01
	(−0.97)	(0.46)	(0.65)	(1.34)	(−0.20)	(−0.36)	(−1.57)	(0.78)	(−0.09)
Asia	0.35	−0.12	0.23	0.16	0.24	0.10	−0.17	−0.60	−0.77
	(2.37) **	(−0.85)	(1.43)	(1.15)	(1.73) *	(0.70)	(−1.39)	(−3.06) ***	(−2.57) **
Panel B: k = 12, 2004–2016									
NA	0.23	0.21	0.03	−0.01	0.10	0.15	−0.11	−0.57	−0.56
	(2.19) **	(2.09) **	(0.30)	(−0.15)	(1.44)	(2.05) **	(−0.89)	(−2.64) ***	(−2.10) **
EUR	0.29	0.06	0.15	0.02	0.04	0.23	−0.22	−0.73	−0.75
	(7.62) ***	(0.79)	(2.06) **	(0.35)	(0.81)	(2.98) ***	(−2.54) **	(−5.53) ***	(−4.32) ***
Japan	0.03	0.04	0.33	−0.04	0.04	−0.09	−0.14	0.06	0.10
	(1.18)	(0.96)	(1.29)	(−0.78)	(0.83)	(−2.02) **	(−2.98) ***	(0.57)	(0.77)
Asia	0.52	0.00	0.10	0.04	0.29	0.15	−0.33	−0.60	−0.64
	(3.25) ***	(0.01)	(0.54)	(0.31)	(3.93) ***	(1.68) *	(−2.77) ***	(−3.00) ***	(−2.09) **
Panel C: Big Stocks 1991–2016									
NA	0.17	−0.01	−0.05	−0.05	−0.01	0.08	−0.07	−0.24	−0.20
	(2.01) **	(−0.18)	(−0.35)	(−0.75)	(−0.11)	(1.17)	(−0.72)	(−2.79) ***	(−1.64)
EUR	0.17	−0.07	0.07	0.08	0.01	0.03	−0.08	−0.28	−0.36
	(2.86) ***	(−1.12)	(1.50)	(1.75) *	(0.13)	(0.46)	(−1.14)	(−3.95) ***	(−4.08) ***
Japan	0.00	0.03	0.76	0.06	−0.06	−0.05	0.00	−0.04	−0.10
	(0.03)	(0.61)	(2.47) **	(1.02)	(−0.90)	(−1.05)	(−0.01)	(−0.41)	(−0.78)
Asia	0.30	0.08	0.15	0.05	0.13	−0.06	−0.20	−0.27	−0.32
	(2.79) ***	(0.77)	(1.35)	(0.61)	(1.61)	(−0.68)	(−2.31) **	(−2.32) **	(−1.92) *
Panel D: Small Stocks 1991–2016									
NA	0.07	0.05	−0.18	−0.03	0.14	0.27	−0.01	−0.39	−0.36
	(0.89)	(0.55)	(−1.65) *	(−0.50)	(3.26) ***	(4.24) ***	(−0.10)	(−2.94) ***	(−1.99) **
EUR	0.20	0.01	0.10	0.00	0.04	0.22	−0.11	−0.56	−0.56
	(4.80) ***	(0.20)	(1.57)	(−0.02)	(0.96)	(3.24) ***	(−1.15)	(−4.38) ***	(−3.06) ***
Japan	−0.02	0.05	−0.26	0.04	0.01	−0.09	−0.09	0.07	0.03
	(−0.66)	(1.14)	(−0.64)	(0.71)	(0.22)	(−1.97) **	(−2.04)	(0.93)	(0.30)
Asia	0.33	0.01	0.11	0.15	0.26	0.14	−0.25	−0.63	−0.78
	(2.65) ***	(0.09)	(0.68)	(1.28)	(2.52) **	(1.18)	(−2.23) **	(−4.12) ***	(−3.18) ***

For the full sample, Table 13, Panel A, large repurchases are associated with large abnormal returns. The average abnormal return of stocks with large repurchases (less than the median) is 0.14% (t-stat = 1.83), 0.22% (t-stat = 5.83), and 0.44% (t-stat = 3.99%) for North America, Europe and Asia, respectively. This result holds when $k = 36$ (Table 13, Panel B), with smaller average returns for North

America and Asia, but a slightly larger average return for Europe. Japan is different with an average abnormal return of 0.00%.

Table 13, Panel A also shows significant declines in average abnormal returns for large issues. This can be seen from the column labelled 'H-L' which lists average abnormal return differentials of −0.38% (t-stat = −2.25), −0.54% (t-stat = −3.28), and −0.70% (t-stat = −3.27) for North America, Europe and Asia, respectively. Surprisingly, when extending to $k = 36$, the abnormal return differentials are nearly equal in magnitude as when $k = 12$ for all regions (except Japan), demonstrating the long-lasting effect that net share issues have on returns.

While the high minus low abnormal return differentials are significant, there appears to be a non-monotonic relation between issue size and abnormal returns. Abnormal returns for the first quintile are close to zero. Average abnormal returns increase, reaching a peak in quintile 3 for North America and Europe and quintile 2 for Asia. The peaks are statistically greater than zero for all three regions. Abnormal returns then drop severely, reaching their minimum in the fifth quintile. Average abnormal returns in the fifth quintile are −0.42% (t-stat = −3.27), −0.55% (t-stat = −4.72), and −0.60% (t-stat = −3.43) for North America, Europe and Asia, respectively. Hence, the significant H-L abnormal return differential is driven by the poor performance of the largest issuers and not by strong performance of small, first quintile, issuers. Additionally, medium-sized issues lead to significantly positive average abnormal returns, showing that the market does not penalize stocks issues in general but does penalize large issues.

Table 14, Panels A and B show results when cutting the sample into the early and recent periods for $k = 12$. In the early period, large repurchases tend to result in positive abnormal returns particularly in Europe and Asia while small repurchases are met with negative but insignificant abnormal returns. For positive net share issues, H-L is consistently negative but not significant except for Asia during the early part of the sample. We still observe the non-monotonic pattern in abnormal returns where the returns are near zero for quintile 1, positive and sometimes significant for quintiles 2 and 3, and then negative for quintiles 4 and 5.

In the recent half of the sample (Table 14, Panel B), cross-sectional return patterns associated with net share issues are much stronger. Large abnormal returns following large repurchases of 0.23 (t-stat = 2.19), 0.29 (t-stat = 7.62), and 0.52 (t-stat = 3.52) for North America, Europe, and Asia, respectively, are observed. Also, large H-L abnormal return differentials associated with issues are negative and significant. For North America, Europe, and Asia, H-L differentials are −0.56 (t-stat = −2.10), −0.75 (t-stat = −4.32), and −0.64 (t-stat = −2.09). For North America and Europe, these differentials are twice those observed during the first half of the sample but, for Asia, the differential is a little lower during the latter half of the sample. We continue to see near zero abnormal returns for the first quintile of issues but significantly positive abnormal returns in either the second or third quintiles before dropping into negative returns for the fifth quintile.

As a final look into the cross-section of returns, we investigate whether small stocks drive the results. Table 14, Panel C summarizes the results for big stocks when $k = 12$ for the entire sample, and Table 14, Panel D shows the result for small stocks. For big stocks, large repurchases lead to positive and significant returns for North, America, Europe and Asia. We do observe a cross-sectional pattern in returns related to issues that are primarily driven by the large negative returns from the largest issues (quintile 5). H-L is marginally significant for North America and Asia and is highly significant for Europe.

For small stocks, Table 14, Panel D, large repurchases lead to significant abnormal returns for only Europe and Asia (Panel A). Over the entire sample, H-L for the small stocks is significant for North America, Europe, and Asia, again driven by the negative and significant abnormal returns from the largest issuers. We again see the interesting pattern of significant positive returns for quintiles 2 or 3 followed by a substantial drop in returns for quintiles 4 and 5.

The market timing theory explaining why firms issue or repurchase shares asserts that management issues new shares when the stock price is too high and repurchases when the stock price is too low.

Three observations make this explanation suspect. First, we find weak results in the early half of the sample and stronger results in the more recent subperiod suggesting that timing repurchases and issues must be a recent innovation.[8] Second, our net share issue measure is computed at a six months lag relative to time t in order to align with our estimates of book-to-market and changes in book value and market prices. Our results show a significant relation between time $t + 1$ returns and net share issues computed over $t - 6 - k$ and $t - 6$ implying that the market is very slow to react to management's mispricing signal. Third, for issuers, we observe positive and significant returns for small to mid-size issues (quintiles two and three), indicating that some issues lead to price increases.

To summarize the results of this section, large repurchases tend to be rewarded by significant abnormal returns, while large issues are penalized by significant negative abnormal returns. Interestingly, small- to mid-sized issues (quintiles 2 and 3) lead to significant positive returns, showing that investors do not consider all stock issues negatively. This pattern is observed in North America, Europe, and Asia. Consistent with our previous results, we find that our results are strongest in the most recent half of the sample relative to the earlier half. The H-L abnormal return differentials are driven by the large negative returns from the fifth quintile, and these returns are much more significant in the later period. It is also in the fifth quintile where we see the largest change in issue size (80% breakpoint). As the largest issuers are issuing larger quantities of new shares, investors are more harshly penalizing the firms by driving down the stock price.

6. Discussion

Focusing on four global regions, we find consistent evidence showing that including information regarding the evolution of B/M into asset pricing models enhances model performance. These findings coincide with conclusions reported in FF for the U.S. market and in Cakici et al. (2015). Indeed, the estimated coefficients for North America's big stocks reported here bear close resemblance to those reported in FF for the ABM (all but micro) stocks. Returning to Equation (1), FF argue that cross-sectional differences in future cash flows obscure the relation between B/M and returns. The significance of both $dM_{t-k,t}$ and $dB_{t-k,t}$ suggests that these variables contain information about future cashflows that is otherwise masked when using only B/M rather than the decomposition of B/M. Interestingly, FF state that "there is no reason that all this works out in the same way for different kinds of firms." This makes the consistency in results across the four global regions even more interesting.

A second set of results compare the estimated coefficients for different lags k. Also consistent with FF and Cakici et al. (2015), we find that more recent information ($k = 12$) yields coefficients that have larger magnitudes than when using longer lags ($k = 36$). The implication of this is that more recent information is more useful for explaining returns than old information.

Our results, however, differ from FF in one important respect. FF conclude that a 1% change in book value has the same impact on returns as a 1% change in price. While our results for North America agree with FF for the U.S. market, we find that changes in book value have significantly greater impact on returns than price changes for Europe, Japan, and Asia. This result is observed for the full sample in the most recent period but not in the early period and in the set of small stocks but not in the set of big stocks. Cakici et al. (2015) also find that changes in book value dominate changes in price in their study of the Chinese market.

Our final test investigates whether net share issuance impacts average returns since it has a direct impact on both $dM_{t-k,t}$ and $dB_{t-k,t}$. We find this to be the case for North America, Europe and Asia, but not for Japan. FF find net share issuance to be the strongest explanatory variable for the U.S. market (using the t-statistic as the metric). Similarly, McLean et al. (2009), studying the global market in aggregate, find that net share issuance has greater significance than both size and momentum but

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[8] Studying the U.S. market, Fama and French (2008) find net share issues to be unrelated to returns in the early part of their sample from 1927–1963, and Pontiff and Woodgate (2008) find an insignificant relation in the period preceding 1970.

has a similar significance level as B/M. By studying separate regions rather than the global market in aggregate, we find cross-sectional differences in the importance of net share issuance relative to other factors; however, by decomposing B/M into components, our results consistently show changes in book value to have greater significance than all other variables, including net share issuance.

As a final comment, it is curious that Japan yields net share issuance results that are inconsistent with the other regions. The literature on issue and repurchase behavior in Japan is quite sparse and appears to be a fruitful ground for future research. Two papers, however, provide some insight. Kerins et al. (2007) study the underpricing of initial and secondary issues in Japan to test prominent theories shown to have some explanatory ability for the U.S. market, namely, the winner's curse, signaling, information production, and ownership dispersion. They find no evidence to suggest that these theories are able to explain the observed underpricing in Japan. It is further noted that Fama and French (2012) find different results for Japan relative to other global regions in their study of momentum and value effects. These findings combined with our results suggest that the issuance and return behavior in Japan is different from other countries and suggests the need for additional research.

7. Conclusions

The results reported in this paper provide consistent, global support for the book-to-market evolution hypothesis. Understanding how book-to-market has evolved over time indeed enhances average return estimates.

Decomposing book-to-market into three components, our full sample results find that all three components are significant determinants of returns; however, changes in book value play a noticeably more powerful role in the model than other variables. Moreover, supporting the view that recent news is more relevant for expected return estimation than old news, we find that changes over the more recent twelve months are more relevant to expected returns than changes over the longer past thirty-six months period. These results are supported using the set of small and big market capitalization subsets and for two distinct subperiods.

For North America, Europe, and Asia, we find that positive net share issues are negatively related to expected returns. This result also holds for all specifications of the model—big and small stocks as well as the early and recent time periods. The results, however, are considerably stronger in the recent subperiod relative to the early subperiod. Japan is different. For all model specifications and all cuts of the data, we find that net share issues are unrelated to expected returns in Japan.

A more in-depth study of net share issues reveals that a vast majority of firms either issue or repurchase on an annual basis. The average returns of quintile portfolios sorted by positive net share issues reveal significant cross-sectional differences in returns. Firms that issue large quantities of shares yield returns that are significantly smaller than firms that issue small quantities of shares. Closer inspection reveals that the return differential is completely driven by the large negative average returns generated by the largest share issuers (quintile 5).

One of the most interesting and important findings is the high level of consistency across the four distinctly defined global regions. Finding similar results across four distinct global regions over the same time period and using the same methodology goes a long way in easing concerns about data mining. Further, we add to the previous research on book-to-market decomposition by showing that the results of Fama and French (2008) are globally generalizable. The results presented here clearly demonstrate that expected return models across global markets are enhanced by the inclusion of variables that describe the evolution of book-to-market.

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Appendix A

Appendix A.1. Descriptive Statistics

Table A1 provides descriptive statistics for each of the four regions. For each year, 1991–2016, the table lists the average log of market capitalization, *logsize*, average book-to-market (B/M), average changes in price when $k = 12$, dM, average changes in book-to-market when $k = 12$, dB, and the number of stocks in the sample, N.

Table A1. Descriptive Statistics. Twenty-three global markets are divided into the regions of North America, Europe, Japan, and Asia. This table provides descriptive statistics of the data which extends from 1991 through 2016. *LogSize* is the average log market capitalization, B/M is the average book to market equity ratio, $dM_{t-k,t}$ is the average change in market price from time t−k to t for k = 12, $dB_{t-k,t}$ is the average change in book value of equity over t−k to t for k = 12, and N is the number of stocks in the sample.

Year	North America					Europe				
	logSize	B/M	$dM_{t-k,t}$	$dB_{t-k,t}$	N	*logSize*	B/M	$dM_{t-k,t}$	$dB_{t-k,t}$	N
1991	5.42	0.96	−0.14	0.03	2254	4.60	0.91	−0.07	0.12	3165
1992	5.58	0.81	0.17	0.03	2269	4.51	0.99	−0.12	−0.08	3424
1993	5.68	0.73	0.09	0.03	2460	4.52	1.15	−0.16	−0.03	3488
1994	5.70	0.65	0.13	0.06	2686	4.81	0.84	0.14	−0.11	3508
1995	5.77	0.69	0.00	0.09	2873	4.87	0.81	0.08	0.10	3609
1996	5.74	0.63	0.18	0.09	3387	4.93	0.85	0.02	0.05	3707
1997	5.77	0.62	0.09	0.08	3842	5.07	0.81	0.06	0.01	3737
1998	5.78	0.54	0.20	0.05	4047	5.03	0.71	0.08	−0.03	4065
1999	5.69	0.64	−0.16	0.04	4104	4.84	0.79	−0.06	0.07	4356
2000	5.59	0.72	−0.01	0.07	4143	4.83	0.80	−0.04	0.00	4355
2001	5.48	0.80	−0.10	0.03	4360	4.63	0.80	−0.16	−0.08	4523
2002	5.48	0.75	−0.06	−0.03	4595	4.40	0.87	−0.33	−0.10	4819
2003	5.59	0.83	−0.16	0.01	4618	4.43	1.08	−0.19	0.05	4744
2004	6.00	0.61	0.32	0.10	4467	4.87	0.87	0.29	0.10	4453
2005	6.11	0.57	0.11	0.09	4602	5.10	0.75	0.19	0.12	4389
2006	6.16	0.57	0.13	0.09	4784	5.26	0.69	0.14	0.05	4436
2007	6.03	0.63	0.08	0.10	5105	5.34	0.72	0.17	0.16	4840
2008	5.66	0.69	−0.05	0.02	5216	4.93	0.81	0.01	0.10	5215
2009	5.16	1.15	−0.65	−0.14	5453	4.49	1.33	−0.70	−0.20	5318
2010	5.51	0.91	0.09	0.01	5335	4.72	1.17	0.06	−0.03	5109
2011	5.70	0.79	0.15	0.03	5405	4.88	1.10	0.05	−0.01	4964
2012	5.56	0.84	−0.10	−0.03	5544	4.76	1.18	−0.16	−0.06	4821
2013	5.60	0.91	−0.09	−0.05	5581	4.97	1.20	−0.09	−0.09	4651
2014	5.75	0.87	0.03	−0.06	5528	5.22	1.14	0.17	0.02	4435
2015	5.78	0.84	−0.06	−0.09	5442	5.19	1.19	−0.07	−0.10	4300
2016	5.82	1.07	−0.23	−0.08	5475	5.25	1.24	−0.11	−0.09	4192
Avg	5.70	0.76	0.00	0.02	4368	4.86	0.95	−0.03	0.00	4332

Table A1. *Cont.*

Year	Japan					Asia				
	logsize	B/M	$dM_{t-k,t}$	$dB_{t-k,t}$	*N*	*logsize*	B/M	$dM_{t-k,t}$	$dB_{t-k,t}$	*N*
1991	6.73	0.38	−0.20	0.12	1289	5.28	1.07	−0.11	0.02	328
1992	6.13	0.48	−0.17	0.08	1652	5.39	0.99	0.08	0.01	358
1993	6.10	0.62	−0.19	0.08	1932	5.49	0.96	0.04	0.02	405
1994	6.22	0.54	0.26	0.11	2008	5.75	0.77	0.30	0.09	450
1995	6.11	0.57	0.05	0.11	2062	5.65	0.90	−0.05	0.10	469
1996	6.11	0.62	−0.11	−0.04	2152	5.72	0.94	0.01	0.05	532
1997	5.64	0.65	−0.18	−0.13	2239	5.62	0.86	0.10	0.05	695
1998	5.18	1.02	−0.49	−0.11	2271	4.80	1.05	−0.27	−0.13	868
1999	5.33	1.24	−0.19	−0.02	2393	4.86	1.69	−0.50	−0.12	927
2000	5.01	1.25	0.23	0.16	2796	4.88	1.28	0.22	0.02	905
2001	4.82	1.38	−0.20	−0.03	3002	4.35	1.39	−0.28	−0.14	1072
2002	4.66	1.47	−0.23	−0.11	3000	3.91	1.35	−0.23	−0.12	1465
2003	4.74	1.61	−0.10	0.06	3058	3.55	1.41	−0.15	−0.05	2110
2004	5.14	1.32	0.30	0.12	3046	3.92	1.03	0.27	0.09	2154
2005	5.32	1.07	0.23	0.10	3246	4.01	0.94	0.04	0.03	2322
2006	5.40	0.83	0.16	−0.01	3420	4.15	0.93	−0.01	0.01	2525
2007	5.19	0.90	−0.16	0.00	3535	4.64	0.85	0.16	0.12	2613
2008	4.91	1.11	−0.19	0.04	3561	4.32	0.74	0.14	0.11	2735
2009	4.83	1.63	−0.33	0.04	3421	3.92	1.52	−0.89	−0.25	3067
2010	4.97	1.57	0.10	0.08	3292	4.43	1.12	0.25	0.07	2886
2011	5.06	1.64	0.06	0.12	3326	4.62	1.04	0.09	0.07	3046
2012	5.08	1.69	0.05	0.09	3282	4.46	1.25	−0.23	−0.04	3160
2013	5.19	1.62	0.02	−0.03	3246	4.48	1.29	−0.16	−0.11	3220
2014	5.26	1.34	0.09	−0.09	3262	4.54	1.26	−0.14	−0.16	3191
2015	5.28	1.18	0.04	−0.05	3325	4.54	1.18	−0.11	−0.17	3173
2016	5.30	1.17	−0.01	−0.02	3365	4.64	1.26	−0.23	−0.16	3235
Avg	5.37	1.11	−0.04	0.03	2815	4.69	1.12	−0.06	−0.02	1843

Market capitalization for each region tends to be fairly flat across time with some time variation primarily around the global financial crisis. Average market cap reaches a 26-year peak in the years just prior to the global financial crisis for North America, Europe, and Asia. It then dips down during the crisis but reverts back over the remainder of the sample. Japan, not surprisingly, is different. Japan's average market cap peaks at the beginning of the sample but then steadily declines until 2002. It has since trended upward though with a setback during the financial crisis.

There are time series and cross-sectional differences in B/M. B/M in Europe and North America is highly correlated with peaks near the beginning of the sample, after the technology bubble crash, and after the global financial crisis. B/M tends to be much higher in Asia and with larger swings in magnitude. The ratio starts low and then jumps substantially in 1998 and 1999. It then trends down until the global financial crisis, where it again experiences a substantial jump. Japan, again, is quite different. B/M in Japan begins low but steadily rises until 2003, mirroring the decline in average market capitalization. It then falls as a result of the technology bubble, recovers, and then falls well after the global financial crisis.

Changes in price, *dM*, and changes in book value, *dB*, tend to be highly correlated within each region, with *dM* being more volatile than *dB*. For example, the correlation between the two change variables in North America is 0.72, but *dM* swings between −0.65 and 0.32, while *dB* ranges from −0.14 to 0.10. Of the four regions, changes in both book value and prices have the highest volatility in Asia and the lowest volatility in North America.

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