The Book-to-Market Equity Ratio as a Proxy for Risk: Evidence from Australian Markets

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Abstract

Crucial to the interpretation of the Fama and French three-factor model, is the question of whether the book-to-market equity ratio should be assigned as a "risk-based," as opposed to a "mispricing" explanation of share price formation. In the context of Australian stock markets, we examine the role of the book-to-market equity ratio in the formation of stock returns. Notwithstanding the distinctive characteristics of Australian markets, our findings are complementary with findings for U.S. stocks. We succeed in revealing a strong association between stock returns and the firm's book-to-market equity ratio, and find strong evidence that the association derives from the book-to-market ratio's absorption of the implications of firm leverage as a risk factor.

Keywords: book-to-market effect, leverage effects, capital asset pricing model

JEL Classification: G12 and G14

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Crucial to the interpretation of the Fama and French three-factor model, is the question of whether the book-to-market equity ratio should be assigned as a "risk-based," as opposed to a "mispricing" explanation of share price formation. In the context of Australian stock markets, we examine the role of the book-to-market equity ratio in the formation of stock returns. Notwithstanding the distinctive characteristics of Australian markets, our findings are complementary with findings for U.S. stocks. We succeed in revealing a strong association between stock returns and the firm's book-to-market equity ratio, and find strong evidence that the association derives from the book-to-market ratio's absorption of the implications of firm leverage as a risk factor.

1. Introduction

The Fama and French (FF) three-factor model augments the single-market risk factor in the capital asset pricing model (CAPM) with two mimicking portfolios designed to capture additional risk premiums relating to book-to-market equity and firm size as risk factors. Notwithstanding the descriptive efficacy of the Fama-French model in accounting for the cross-sectional variation of U.S. stock prices ex post, a key concern remains the extent to which the book-to-market equity ratio and firm size do in fact act as proxies for risk. Unlike the CAPM, which was derived from underlying assumptions, the Fama-French model was derived empirically. Since its first proposal (Fama and French, 1993), there has been no strong theoretical justification as to why book-to-market and size should explain the cross-section of expected returns. The interpretation of the value factor as a systematic distress-factor has failed to identify economy-wide distress scenarios that coincide with price collapses.

"Behaviorists" such as Lakonishok, Shleifer and Vishny (1994) argue that the higher average returns of value stocks relative to growth stocks stem from irrational pricing. They argue that irrational investors underestimate the deterioration in profitability and growth (negative convergence) that occurs after stocks are allocated to growth portfolios and the improvement (positive convergence) after stocks are allocated to value portfolios. The result is lower than expected capital gains for growth stocks in the years following portfolio formation and high capital gains for value stocks as they converge to their true valuations. Broadly consistent with the Lakonishok et al. thesis, Arnott, Hsu and Moore (2005) point out that simply allowing that at any time many stocks are unbiasedly mispriced, and all else being equal, we can expect that stocks that are overpriced will tend to have low book-to-market ratio, whereas stocks that are underpriced will tend to have high book-to-market ratio. From the Arnott et al. perspective, a portfolio based on book-to-market equity weightings is one example of how their "fundamental" indexations are designed to take advantage of market mispricing.

From the outset, Fama and French have argued that the superior returns of small-sized firms and firms with high book-to-market equity are a premium obtained for increased distress risk that is undiversifiable. They view their model as a three-factor equilibrium pricing model consistent with the intertemporal CAPM (ICAPM) of Merton (1973) or the arbitrage pricing model (APT) of Ross (1976) (FF, 1993, 1995, 1996 and elsewhere). Chan and Chen (1991) offer support for a risk-based explanation for the book-to-market effect, arguing that high values of the ratio are likely to indicate firms that are financially distressed. Interestingly, more recent arguments of Fama and French in favor of a risk-based hypothesis are couched in terms of what they refer to as "convergence." Thus they suggest that companies allocated to growth portfolios tend to be highly profitable and fast growing with low costs of equity capital, but that as competition from other companies tends to erode these attributes, the price-to-book ratios of growth portfolios tend to fall in the years following portfolio formation. Conversely, price-to-book ratios of value portfolios tend to rise in the years following portfolio formation as some value companies restructure, improve in profitability, and are rewarded by the market with lower costs of equity capital and higher stock prices (FF, 2007). Thus from both the "risk-based" and "mispricing" perspectives, the book-to-market effect is viewed as the outcome of price adjustment as the ratio converges toward the norm from more extreme values.

The commonality of "convergence" in both the behaviourist and risk-based explanations, anticipates difficulties when attempting to differentiate between the "risk-based" and "mispricing" explanations of the book-to-market effect. Nevertheless, Peterkort and Nielsen (hereafter, PN) (2005) develop a set of leverage-based diagnostic tests in order to differentiate between competing explanations. Assuming that the relation between average stock returns and market leverage is the result of the higher risk associated with higher financial leverage, PN interpret most of the book-to-market effect as a leverage effect – essentially financial risk, but supplanted by asset risk.

This study is motivated by the need to test the robustness of the PN findings in alternative settings. Australian markets provide an ideal setting for the following reasons. Firstly, Fama and French (1998) have found that out of thirteen major markets the "value" effect as captured by book-to-market equity ratio has been most pronounced in Australia, which increases the likelihood of finding a sufficiently strong effect as to be able to test the alternative "risk-based" and "mispricing" explanations. Secondly, the Australian markets provide the required different setting. The Australian market is much smaller (the 200th is firm is capitalized at approximately $150 million U.S. at the time of writing) and is highly concentrated with around 2,000 listed companies. These companies are confined to a relatively small number of industries, most specifically, financials and materials dominated by mining and resource stocks. Additionally, our data reveals a recurring *negative* association of returns with leverage. No rational theory is able to predict such an outcome. Our data, therefore, has markedly divergent characteristics from U.S. data. Such dissimilarities in the data mitigate against observing a systemic replication of the findings obtained for U.S. markets.

Additionally, the study contributes significantly to our understanding of the Australian market. The literature on the book-to-market equity effect in Australia remains sparse. To our knowledge, no previous study has been addressed exclusively on the question of interpretation of the book-to market effect in Australian firms, and the relevant studies are unresolved. For example, while Halliwell, Heaney and Sawicki (1999) find little evidence of a book-to-market equity explanation of share price formation, Gaunt (2004) reports that the book-to-market equity ratio plays an important role in a three-factor Fama and French model explanation of asset pricing.

Our paper's main outcomes may be summarized as follows. We conclude that the book-to-market effect in Australian markets cannot be divorced from underlying leverage as a risk factor, and we interpret the book-to-market variable as absorbing market leverage as a proxy for risk. We find also that momentum has a role to play in the determination of market leverage for the following reason. Momentum implies that as a stock price declines, increasingly higher leverage ratios are associated with continually dropping market returns. And similarly as a stock price increases, increasingly lower leverage ratios are associated with continually rising market returns. In other words, our data embodies an *inverse* relationship between returns and leverage. A particular degree of care is therefore required in isolating mispricing effects as momentum from the risk-based implications of observed leverage. In presenting our findings, the rest of the paper is structured as follows. Section 2 introduces the methodology and presents the data and summary statistics. Section 3 presents the empirical findings and Section 4 concludes.

2. Methodology, Data, and Preliminaries

Using Australian data, we follow the approach of Peterkort and Nielsen (2005) in constructing a sequence of diagnostic tests aimed principally at differentiating between risk-based and mispricing-based explanations of the relation between stock returns and the book-to-market (*B/M*) variable. Following a preliminary assessment of the variable characteristics and their correlations, we employ a bivariate sorting procedure aimed at demonstrating the relations among *B/M*, market leverage (*MLEV),* book leverage (*BLEV*) and average stock returns. Next, we carry out a univariate sorting analysis aimed at further demonstrating relations between the variables. Finally, we perform Fama-Macbeth and pooled time-series cross-sectional regressions of monthly stock returns on the *B/M and MLEV* variables.

Our data covers the period from June 1989 to January 2007. We use the Australian Graduate School of Management (AGSM) database for monthly share price data, firm market capitalization and number of shares outstanding. We use the Aspect Financial database for accounting data (including total assets, total intangible assets, total liabilities, total shareholder equity, and research and development) when needed to calculate book values of debt and equity. Firms with a negative book value of equity are initially excluded from our base sample, but are included in the later analyses.

A total of 1,479 firms survived our filtering criteria to be included in our sample. Panel A of Table 1 illustrates the distribution of firms and their market value on a yearly basis. For each firm at the end of each month, we calculated the following: book-to-market ratio, *B/M* (and the natural log of the book-to-market ratio, *ln*(*B/M*)); *m*arket leverage, *MLEV* = *D*/(*D*+*M*); and book leverage, *BLEV* = *D*/(*D*+*B*). *D* is calculated as book total assets minus book common equity, *B* is the firm's book value of equity, and *M* is the firm's market equity capitalization. In addition, the variables *SIZE* (*ln*(*M*)) and *PRICE* (1/share price) are used as in Peterkort and Nielsen (2005) to mitigate problems of bias in measured returns that result from transaction and liquidity costs.

The summary statistics and correlation matrix of the variables are presented in Panels B and C, respectively, of Table 1. Panel C allows for a preliminary assessment of the salient data characteristics as compared to those of Peterkort and Nielsen (2005). Consistent with PN, the panel shows that the book-to-market ratio (*B/M*) has a very high positive correlation with *MLEV* (81%, compared with 59% for PN). This may be regarded as our first crucial observation. It is not, after all, self-evident why *B/M* and *MLEV* should be strongly correlated. Fama and French (1998) explain the correlation in terms of the identity:

$$B/M \equiv \frac{Book\ Equity}{Market\ Equity} \equiv \frac{Debt/Market\ Equity}{Debt/Book\ Equity} \tag{1}$$

where *Debt/Market Equity* is market leverage and *Debt/Book Equity* is book leverage. The correlation of *B/M* with *MLEV* then relies on those variations in firm leverage (*Debt/Market Equity*) that occur due to changes in the *market* valuation of a firm's market equity (*M*) as opposed to those changes in firm leverage that occur due to *management* changes to the firm's debt structure (since in the latter case, "*Debt*" simply cancels in equation 1). Fama and French (1998) go on to suggest that firms possess a target book leverage (*Debt/Book Equity*), which acts as a measure of leverage policy, implying that the lower the *BLEV*, the higher the firm's perception of asset risk. Thus *BLEV* acts as an inverse measure of asset risk, allowing *B/M* as equation 1 to be viewed as a proxy for the product of the firm's financial and asset risks.

Despite this, we find that returns in our sample are weakly *negatively* correlated with both *MLEV* and *BLEV* (PN report the correlation of returns with both these variables as weakly positive). One explanation, to which we return, is that although we expect that higher *MLEV* should on average require higher investment returns as compensation for holding an increased exposure to financial risk, higher *MLEV* values that occur as the outcome of deteriorating market equity may presage yet lower investment returns.

We note also that the strong positive correlation between *MLEV* and *BLEV* as reported by PN (72%) is less striking in our data (24%). Interestingly, we note a strong negative correlation between *B/M* and *SIZE* (-71%, compared to -31% for PN) and a strong positive correlation between *BLEV* and *SIZE* (69%, compared to 6.5% for PN).

[Insert

Table 1 Here]

3. Empirical Findings

3.1 Bivariate Sorting

As in PN (2005), we employ a bivariate sorting procedure that allows us to demonstrate the relations among *MLEV, B/M*, *BLEV*, and average returns without the need to specify the functional form of the relations among the variables. The procedure consists of the following: (1) for each year in our sample we sort firms into 5 *MLEV* quintile portfolios; (2) we sort each of the *MLEV* quintile portfolios to create 5 *B/M* sub-quintile portfolios, providing 25 portfolios for each year in the sample; (3) the mean of *B/M*, *BLEV*, and average return are calculated for each portfolio for each year. The results are presented in Panels A, B and C of Table 2.

Reading across in Panel A confirms that *B/M* increases with *MLEV* (consistent with the observed high positive correlation in Table 1). However, each quintile of *MLEV* allows for quite a wide range of *B/M* (reading down in each column of Panel A). It is clear that *B/M* cannot be regarded simply as the outcome of market leverage. The implication of holding *MLEV* fixed is that market equity (*M*) and debt (*D*) are constrained to move in lock-step. Thus, the ranking of stocks on *B/M* (Panel A) implies a ranking on *B/D*, which is to say an inverse ranking on *BLEV*, as confirmed in Panel B. Panel C reveals that, holding *MLEV* constant, average returns generally tend to increase with increasing *B/M* (the pattern is not dissimilar from that of PN, Table 2). These results are consistent with the Fama and French (1992) finding that *B/M* appears to have additional explanatory power for returns over and above market leverage alone. However, the “mispricing” versus “risk-based” explanation remains unresolved at this stage since, as observed by PN, it is equally possible to interpret the increasing returns in Panel C with either increased “mispricing” as captured by *B/M* in Panel A or with increased “asset risk” as captured by the inverse of *BLEV* (Panel B). Consequently, further analysis would be required to differentiate the two explanations. Finally, we note that reading across in Panel C, there is a fairly pronounced positive relationship between average returns and market leverage (contradicting the weak negative correlation observed in Table 1). Overall, our results are consistent with those of PN at this stage.

[Insert Table 2 Here]

3.2 Quintile Portfolios Formed on B/M

We next examine the effect of the book-to-market (*B/M*) ratio by employing a univariate sorting analysis. First, annual quintile portfolios are created by sorting firms according to *B/M*. We then calculate the annual mean time series of returns, *B/M*, *MLEV, BLEV, SIZE,* and *PRICE* for each portfolio. This procedure enables us to demonstrate the relation between the variables and the book-to-market effect.

Panel A of Table 3 presents the results for our base total sample. Consistent with FF (1992) (and PN), average returns and *MLEV* both increase as *B/M* increases (*BLEV* decreases mildly whereas in PN, no discernable pattern is found). Thus a strong link between *MLEV* and *B/M* is again revealed (confirming the high correlation between these two variables in Table 1) and, by extension, a joint link is established between these variables and average returns. What remains unclear, however, is whether *B/M* is capturing information effects other than leverage (leaving aside whether such information might be evidence of mispricing or evidence of firm "stress" or an alternative risk factor). Hence it is unclear to what extent such effects are part of the explanation as to why *B/M* is positively associated with average returns.

Even if we could succeed in showing that *B/M* is acting by association with *MLEV* as a proxy for leverage, a risk-based explanation for the association of average returns with *B/M* is, at this stage, only one possibility. As we have observed, the high correlation of *B/M* with *MLEV* as represented by equation 1 derives from changes in leverage as the outcome of changes in market valuations (as opposed to changes in debt policy). An equally valid alternative to the hypothesis that *B/M* is acting as a proxy for leverage as a risk factor is that as stocks become over (under) priced, *B/M* and leverage are simultaneously reduced (increased), so that leverage acts as a proxy for *B/M* as mispricing.

[Insert Table 3 Here]

We attempt to distinguish between the competing hypotheses by considering stocks with no leverage. If the *B/M* effect is primarily an outcome of financial leverage, there should be no effect for all-equity firms. Alternatively, to the extent that the *B/M* effect captures a factor other than leverage itself, such as mispricing, we expect that the effect should persist for all-equity firms. Consistent with PN, we define all-equity firms as firms with *MLEV* and *BLEV* value less than 0.05. The justification is that we treat current liabilities as contributing to debt, which results in almost all firms in our sample having some level of debt. Panel B of Table 3 presents the results of our univariate sorting analysis for the all-equity sample. Similar to PN, we observe that average returns are no longer related to *B/M*. The mispricing explanation for the *B/M* effect would therefore appear to be discredited by its absence. Hence, we can conclude that market leverage in itself underpins the observed *B/M* effect. The only way in which the mispricing explanation can remain valid is if we hypothesize that the mispricing of firms is to a greater or lesser extent "fuelled by leverage," so that those firms that are essentially all-equity financed are actually more stable and tend to be more fairly valued. In other words, in Panel B, we are witnessing that particular class of firms that is exempt from the mispricing of its shares.

Finally, in the absence of leverage, we interpret a higher *B/M* value as indicating a true "value" stock (low growth prospects) as opposed to a high "growth" stock. It is therefore interesting that the market does not appear to differentiate returns between high and low growth firms in Panel B (PN report similar findings).

We next consider firms with negative book equity. The systematic mispricing explanation supposes that book-to-market (*B/M*) carries information of fundamental value. With a negative book equity, however, we might suppose that such interpretation can no longer distinguish between degrees of *B/M* value, in which case a mispricing explanation for the *B/M* effect should no longer be seen. Similarly, we have no reason to expect that book leverage will contain information about asset risk when book equity is negative. A leverage explanation for the variations in average returns should, however, persist.

The results of our univariate sorting analysis for the negative book equity firm sample are presented in Panel C of Table 3. The relationship between *MLEV* and *B/M* is negative (which is to be expected given a negative book equity). Stated alternatively, *MLEV* increases monotonically as negative *B/M* becomes more negative. This is consistent with the explanation that declining market values for a given book equity are simultaneously leading to more pronounced *B/M* ratios and higher *MLEV* values. Over the restricted range of our *B/M* values, the irregular but nevertheless mildly increasing average returns with increasing *MLEV* as *B/M* becomes more negative is not dissimilar from those of PN over this range. Over their extended range of *B/M*, however, PN are able to provide a more definite trend of increasing average returns as negative *B/M* becomes more negative. This is consistent with the leverage explanation on account of the strong implied positive relationship of both average returns and negative *B/M* with *MLEV* in their sample.

We note that the *MLEV* ratios here are much higher than for the total sample, which we interpret as the outcome of a strong association between negative book equity and deteriorating equity prices (high *MLEV*). We can note also that although the outcome average returns are increasing with *MLEV*, the returns are still much lower than the returns for a similar *MLEV* in the total sample (see panel A). Again, this may be interpreted as implying that *MLEV* has a double significance whereby, on the one hand, higher *MLEV* should require higher average investment returns, while on the other hand, higher *MLEV* as the outcome of deteriorating market equity may presage lower investment returns, an effect more likely to be observed in the case of negative book equity.

3.3 Fama-MacBeth and Pooled Time-Series Cross-Sectional Regressions

We use both the Fama-Macbeth (1973) regressions and pooled time-series cross-sectional regressions to further investigate the relative powers of *B/M* and *MLEV* in explaining the variation of stock returns. Specifically, the monthly stock returns series is regressed on *ln*(*B/M)*, *MLEV*, *SIZE* and *PRICE* (we use *SIZE* and *PRICE* to control for sample biases that result from transaction and liquidity costs). The results are presented in Table 4 and 5.

For the total sample, the results confirm that average returns are positively and significantly related to *B/M* (both Fama-MacBeth regressions and pooled time-series, Tables 4 and 5). We observe that average returns are significantly negatively related to *MLEV* (appearing again to confirm the equivocal relationship between returns and leverage in our data). We may note, however, that PN also report a negative relationship between average returns and *MLEV* when both *B/M* and *MLEV* are included in their regressions. In our data, when the explanatory variables *B/M* and *MLEV* are combined, the explanatory power of *B/M* is increased (with increased statistical significance) while that of *MLEV,* although it is reduced, remains highly significant (Tables 4 and 5). Again it appears that the dual significance of *MLEV* as encountered above (as a measure of increasing financial risk requiring higher investor returns, or as a reflection of continuing market downgrades leading to lower returns) may be difficult to disentangle. Thus, when *MLEV* is the single explanatory variable, the two effects are acting in opposite directions. When *B/M* and *MLEV* are combined, however, the negative relationship between leverage and returns is absorbed by *MLEV* while the positive relationship can be allocated to the *B/M* variable, thereby allowing for a stronger positive loading on *B/M*. Our overall interpretation, therefore, is that *B/M* is absorbing *MLEV* as a proxy for leverage as financial risk, but that *MLEV* is also an outcome of mispricing.

[Insert Table 4 here]

[Insert Table 5 here]

The results for the all-equity sample of the Fama-Macbeth (1973) and pooled time-series cross-sectional regression analyses are presented in Panel B of Table 3 and 5. We observe that *B/M* no longer has a significant relation with returns, confirming again that *B/M* as an explanatory variable of average returns is heavily leveraged-based. When *SIZE* and *PRICE* are included as controls for sample bias, we find little impact on the dependencies. (We note that PN report a *dependence* of returns on *B/M* in the first instance, thereby contradicting the leverage explanation, which is eliminated only by the device of including *SIZE* and *PRICE* "as controls for sample bias.") The exception to the irrelevance of *B/M* in our findings is that when we include both *B/M* and *MLEV*, both variables are significant. However, the degree of their significance is much less than in our base sample. Furthermore, the *B/M* effect also disappears once the control variables (*SIZE* and *PRICE*) are included in the regression. For this reason, we interpret our results here as offering strong supportive evidence for the leverage-based explanation.

For the negative book equity sample, the results of the pooled and Fama-Macbeth (1973) time-series cross-sectional regression analyses are presented in Panel C of Table 3 and 5. Here we use *ln*(-*B/M)* as our proxy for book-to-market ratio (since the log of a negative value is undefined). In both regressions, and consistent with the weak quintile portfolio results of Panel C of Table 3, *B/M* is no longer significant as a single explanatory variable. Consistent with their own decile portfolio results, PN find here a strong negative book-to-market equity effect when *ln*(-*B/M*) is the only explanatory variable, which is consistent with the risk-based explanation. However, in our data, when *MLEV* and *ln*(-*B/M*) are both included as explanatory variables, the explanatory power of *B/M* is increased (and is significant in the pooled regressions). Moreover, *MLEV* is again (as in Panels A and B) strongly negatively related to the average returns. Our conjecture therefore remains that when *MLEV* and *ln*(-*B/M*) are both allowed as explanatory variables, rather than either *B/M* or *MLEV* absorbing the other, *MLEV* is freed to respond to the negative correlation of returns with leverage as discussed above, while the positive correlation of returns with leverage is absorbed by the *B/M* effect. Overall, we interpret the evidence as consistent with leverage as an explanatory variable of average returns, and that such leverage in its positive association with returns is absorbed by *B/M*. Here, PN find that the explanatory power of *ln*(-*B/M*) is absorbed by *MLEV*, consistent with their hypothesis that market leverage effects can now be expected to dominate over the weakened information significance of *B/M* given a negative book value.

4. Summary and Conclusions

The Fama and French three-factor model description of stock return performances has motivated our inquiry into the nature of the relationship between the book-to-equity ratio (*B/M*) and stock returns. In seeking to distinguish between the "risk-based" and "mispricing-based" explanations of the *B/M* effect, we have followed a set of leverage-based diagnostic tests using data from the Australian markets. The competing explanations are inherently difficult to disentangle. As observed in the introduction, both explanations view the *B/M* effect in terms of a reversal of more extreme *B/M* values to the mean. Further, we have revealed how deteriorating market equity valuations lead simultaneously to higher *MLEV* values and lower market returns, which is the inverse relation of that assumed to derive from *MLEV* as a measure of financial leverage. Nevertheless, we find conforming evidence for a number of conclusions. First, we confirm a strong positive relationship between average returns and book-to-market equity (*B/M*). Second, we demonstrate a strong positive association between *B/M* and market leverage (*MLEV*) as a risk factor. Third, insofar as *MLEV* represents a risk factor, we confirm the finding of Peterkort and Nielsen (2005) that *B/M* appears to absorb the explanatory power of *MLEV*.

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Table 1. Sample Characteristics and Summary Statistics.

Panel A. Sample Size and Market Value (Average), by Year

Year	Firm	Value $ Billion	Year	Firm	Value $ Billion	Year	Firm	Value $ Billion
1990	104	52.51	1996	307	233.88	2002	432	578.31
1991	129	73.43	1997	339	291.94	2003	467	588.46
1992	154	83.71	1998	317	317.99	2004	531	727.88
1993	200	126.81	1999	351	401.24	2005	630	909.39
1994	237	166.71	2000	405	480.73	2006	743	1,142.73
1995	247	184.99	2001	405	556.15			

Panel B. Summary Statistics

Sample Characteristic	Mean	Median	Standard Deviation
RETURN: Average monthly return (%)	2.292	2.597	3.587
B/M	0.703	0.659	0.163
ln(*B/M*)	-0.768	-0.797	0.292
MLEV: *D*/(*D*+*M*)	0.346	0.344	0.042
BLEV: *D*/(*D*+*B*)	0.472	0.469	0.030
SIZE: *ln*(M)	18.734	18.721	0.425
PRICE:1/share price	0.711	0.706	0.036

Panel C. Correlation Matrix

	RETURN	*B/M*	*ln*(*B/M*)	*MLEV*	*BLEV*	**SIZE**
B/M	-0.137					
ln(*B/M*)	-0.165	0.945				
MLEV	-0.187	0.812	0.799			
BLEV	-0.039	-0.294	-0.374	0.242		
SIZE	0.109	-0.713	-0.824	-0.438	0.693	
PRICE	-0.174	0.420	0.495	0.351	-0.320	-0.548

Table 2. Average Book-to-Market Ratio, Book Leverage, and Monthly Returns for Portfolios Formed on Market Leverage and Book-to-Market Ratio.

	MLEV Low	*MLEV* 2	*MLEV* 3	*MLEV* 4	*MLEV* High
Panel A. Average Book-to-Market Ratio: *B/M*					
B/M Low	0.077	0.110	0.149	0.189	0.276
B/M 2	0.186	0.248	0.313	0.404	0.533
B/M 3	0.363	0.400	0.464	0.597	0.759
B/M 4	0.701	0.654	0.671	0.826	1.133
B/M High	1.228	1.190	1.189	1.312	2.598
Panel B. Average Book Leverage: *BLEV*					
B/M Low	0.320	0.655	0.757	0.827	0.890
B/M 2	0.182	0.451	0.590	0.676	0.846
B/M 3	0.120	0.346	0.494	0.587	0.747
B/M 4	0.065	0.233	0.401	0.509	0.654
B/M High	0.038	0.150	0.291	0.418	0.599
Panel C. Average Monthly Return (%)					
B/M Low	0.962	0.740	1.465	1.751	1.858
B/M 2	0.683	0.756	1.280	1.390	1.516
B/M 3	1.204	0.948	1.085	1.601	1.562
B/M 4	1.174	1.299	1.512	1.083	1.379
B/M High	1.211	1.300	1.764	1.518	2.086

Note: In December of each year from 1989 through 2005, all stocks in the base sample are sorted into five MLEV decile portfolios. Each yearly MLEV decile portfolio is then sorted into five B/M sub-decile portfolios. Panels A, B, and C show the 17 yearly time-series average of the average values for B/M, MLEV, and average monthly returns for each of the sub-decile portfolios.

Table 3. Characteristics of Base Sample, All-Equity Sample, and Negative Book Equity Sample Portfolios Formed on Book-to-Market Ratio.

	B/M Low	*B/M* 2	*B/M* 3	*B/M* 4	*B/M* High
Panel A. Base Sample					
B/M	0.16	0.35	0.56	0.85	1.63
RETURN	1.19	1.35	1.41	1.37	1.61
MLEV	0.23	0.32	0.40	0.37	0.44
BLEV	0.55	0.52	0.52	0.41	0.38
PRICE	0.58	0.55	0.56	0.69	0.86
SIZE	19.19	19.21	19.17	18.78	17.93
Panel B. All-Equity Sample (*MLEV* and *BLEV* < 0.05)					
B/M	0.24	0.55	0.78	0.98	1.25
RETURN	1.66	0.39	-0.61	1.12	0.76
MLEV	0.01	0.02	0.02	0.02	0.02
BLEV	0.03	0.03	0.02	0.02	0.02
PRICE	0.95	0.80	0.89	0.81	1.14
SIZE	18.07	17.96	17.56	18.03	17.92
Panel C. Negative Book Equity Sample (*BE* < 0)					
B/M	-0.60	-0.18	-0.11	-0.06	-0.02
RETURN	0.91	1.02	1.51	0.78	0.82
MLEV	0.69	0.57	0.56	0.50	0.41
BLEV	1.24	1.29	1.12	1.09	1.10
PRICE	0.70	0.45	0.45	0.38	0.41
SIZE	19.59	20.03	20.01	19.92	20.11

Note: In Panel A, in December of each year from 1989 through 2005, all stocks in the base sample are sorted into five B/M decile portfolios. Values in the table are the 17 yearly time-series average of average values from each of the B/M decile portfolios. In Panels B and C, values are the averages of each variable in decile portfolios formed by sorting each sample (pooled time-series, cross-section) by B/M.

Table 4. Average Coefficient Estimates (t-statistics) from Monthly Fama-MacBeth (1973) Regressions of Monthly Stock Returns on ln(*B/M*) or ln(−*B/M*), *MLEV*, *SIZE*, and *PRICE*.

Intercept	Ln(*B/M*)	*MLEV*	*SIZE*	*PRICE*	Avg. Adj. R^2
Panel A. Base Sample					
0.0117	0.0026				0.0105
(6.17)	(2.79)				
0.0264		-0.0319			0.0108
(8.11)		(-7.85)			
0.0578	0.0041		-0.0016	-0.0241	0.0387
(6.37)	(4.10)		(-3.33)	(-14.32)	
0.0200	0.0042	-0.0201			0.0158
(9.01)	(4.61)	(-6.96)			
0.0589	0.0059	-0.0224	-0.0012	-0.0239	0.0441
(6.40)	(6.21)	(-7.92)	(-2.44)	(-14.28)	
Panel B. All-Equity Sample (*MLEV* and *BLEV* < 0.05)					
0.0081	0.0034				0.0656
(3.10)	(0.76)				
0.0457		-1.2362			0.0058
(6.09)		(-5.36)			
0.1000	-0.0046		-0.0040	-0.0222	0.0343
(1.36)	(-0.64)		(-1.02)	(-2.85)	
0.0260	0.0112	-0.8957			0.0698
(3.30)	(1.97)	(-2.62)			
5.2694	-0.5480	4.5972	-0.2949	0.1074	0.0329
(0.96)	(-0.95)	(0.76)	(-0.96)	(0.84)	
Panel C. Negative Book Equity Sample (*BE* < 0)					
0.0071	-0.0006				0.0195
(1.13)	(-0.27)				
0.0697		-0.1011			0.0717
(5.60)		(-4.86)			
0.0211	0.0020		0.0001	-0.0206	0.1136
(0.38)	(0.44)		(0.04)	(-0.54)	
0.0714	0.0055	-0.0894			0.0792
(3.98)	(1.88)	(-3.95)			
0.1568	0.0036	-0.1331	-0.0032	0.0071	0.1839
(1.87)	(0.89)	(-3.29)	(-0.89)	(0.25)	

Note: Observations are monthly. Coefficient estimates are the time-series average of 204 monthly cross-sectional regressions. The t-statistics are estimated from the time-series variation in the monthly coefficient estimates.

Table 5. Coefficient Estimates (White-Corrected t-statistics) from Pooled Regressions of Average Monthly Return on ln(*B/M*) or ln(−*B/M*), *MLEV*, *SIZE*, and *PRICE*.

Intercept	Ln(*B/M*)	*MLEV*	*SIZE*	*PRICE*	Avg. Adj. R^2
Panel A. Base Sample					
0.0128 (22.43)	0.0031 (7.35)				0.0009
0.0297 (35.44)		-0.0380 (-18.71)			0.0057
0.0474 (8.25)	0.0046 (10.54)		-0.0009 (-3.11)	-0.0262 (-24.41)	0.0145
0.0226 (23.68)	0.0048 (10.85)	-0.0245 (-12.82)			0.0038
0.0495 (8.62)	0.0067 (14.75)	-0.0284 (-14.83)	-0.0004 (-1.33)	-0.0261 (-24.37)	0.0183
Panel B. All-Equity Sample (*MLEV* and *BLEV* < 0.05)					
0.0087 (3.35)	0.0041 (1.63)				0.0005
0.0545 (13.08)		-1.4543 (-7.37)			0.0126
-0.0250 (-0.74)	0.0033 (1.32)		0.0031 (1.77)	-0.0264 (-5.56)	0.0185
0.0242 (4.68)	0.0103 (3.35)	-0.6955 (-3.47)			0.0042
-0.0207 (-0.61)	0.0091 (2.95)	-0.6350 (-3.18)	0.0036 (2.04)	-0.0249 (-5.22)	0.0215
Panel C. Negative Book Equity Sample (*BE* < 0)					
0.0126 (3.20)	0.0015 (1.02)				1.35×10^{-5}
0.0564 (9.07)		-0.0759 (-6.85)			0.0149
0.0404 (1.17)	0.0026 (1.78)		-0.0007 (-0.44)	-0.0221 (-3.62)	0.0073
0.0566 (5.71)	0.0055 (3.31)	-0.0636 (-4.83)			0.0095
0.0591 (1.71)	0.0063 (3.78)	-0.0604 (-4.55)	0.0003 (0.21)	-0.0181 (-2.95)	0.0156