Going Negative: *What to Do with Negative Book Equity Stocks*

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A firm's book equity (BE) represents the difference between the firm's assets and liabilities. It is a measure of the equity held by a firm's ordinary shareholders.[1] Penman [1992] and Ohlson [1995] argued that BE is a fundamental index of firm value, and Fama and French [1992] used the cross-sectional dispersion of the ratio of BE to market value of equity (ME) to construct a value index for asset pricing.

Occasionally, BE is negative, but a firm's limited liability structure means that shareholders cannot have negative value; thus, negative BE is difficult to interpret. Consequently, academics and practitioners exclude negative BE stocks from their analysis with the argument that they are a high default risk.[2] This presents a paradox—if we exclude negative BE stocks, then continuity arguments suggest that we should also consider excluding high-growth stocks, which constitute the smallest category of BE relative to ME.

Another argument for excluding negative BE stocks is that such stocks are few and their omission should have an insignificant effect in any data application. But since the late 1980s, a greater incidence of firm losses has meant that the number of stocks with negative BE has increased dramatically; today approximately 5% of all listed stocks have negative BE. In addition, we argue that these stocks have a significant effect on value-based asset pricing models (e.g., Fama and French [1992]) because we expect that they constitute a much greater percentage of stocks falling in the extremes of the growth–value continuum.

So, if we are to include negative BE stocks in current asset pricing models, the challenge is to appropriately classify them into value groups. Because these stocks have no intuitive interpretation in terms of "value," to which value category should such stocks belong? According to the conventional method of sorting stocks into portfolios based on their BE/ME values, negative BE stocks, when not omitted altogether, are inevitably grouped into the same lowest BE/ME portfolio.[3] If they fall into the lowest BE/ME ratio, can it be assumed that they have the highest growth potential? Or, are they financially distressed firms that fall into some other classification? While many negative BE stocks are indeed financially distressed, reasons for reporting negative BE vary. This is why it is not obvious that negative BE should fall into any particular BE/ME classification.

Our contribution is to apply a simple approach to classifying negative BE stocks across the growth–value spectrum by considering how close their returns correspond to stocks that fit more obviously into this classification scheme. We neither discard these stocks nor arbitrarily assign them to the same lowest BE/ME portfolio. We draw upon a well-known procedure used to allocate mutual

funds and hedge funds into style categories (Brown and Goetzmann [1997, 2003]), and more recently used to group individual securities into basis asset portfolios used in asset pricing studies (Brown, Goetzmann and Grinblatt [1998]; Ahn, Conrad and Dittmar [2006]). To date, this procedure has not been applied to the problem of allocating individual stocks to value or growth classifications. Although we illustrate how this approach can be used to classify negative BE stock, it is general and may be used for any accounting data that are unavailable or difficult to interpret.

When we correctly classify negative BE stocks, we find that most do not fall into the highest growth classification, but are more similar to value stocks. Including these stocks in the value group leads to an enhanced value premium. There is an important caveat to this, however. Many of the stocks that enter the high-value category are indeed financially distressed, which is consistent with Fama and French's [1992] identifying value as a distress risk factor. As a practical matter, this confirms the wisdom of incorporating a default risk screen into any investment strategy designed to exploit the observed value premium.

The article is organized as follows. In the next section we provide details about our dataset, factor construction, and the procedure we propose to classify negative BE stocks. The third section discusses the results of our empirical analysis and the last section concludes.

DATA AND METHODS

In this section, we provide the details of our dataset as well as an explanation of the classification process of negative BE stocks and the construction of size and value indices.

Data

In order to facilitate comparison with the value premium documented in Fama and French [1993], we use a similar dataset. Monthly returns and relevant accounting information for stocks trading on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and NASDAQ are taken from the merged CRSP/COMPUSTAT database provided through the Center for Research in Security Prices (CRSP).

In order for a stock to be included in the study, it must satisfy the following conditions consistent with Fama and French [1993]. The stock must have

- CRSP monthly prices for December of year $t-1$ and June of year t;
- COMPUSTAT book common equity for year $t-1$;
- shares outstanding in order to calculate its size;
- appeared on COMPUSTAT for at least two years in order to avoid the survivorship bias inherent in the COMPUSTAT database;
- ordinary common equity shares (i.e., share type 10 or 11 in the CRSP database), because American Depository Receipts (ADRs), Real Estate Investment Trust (REITs), and units of beneficial interest are excluded.[4]

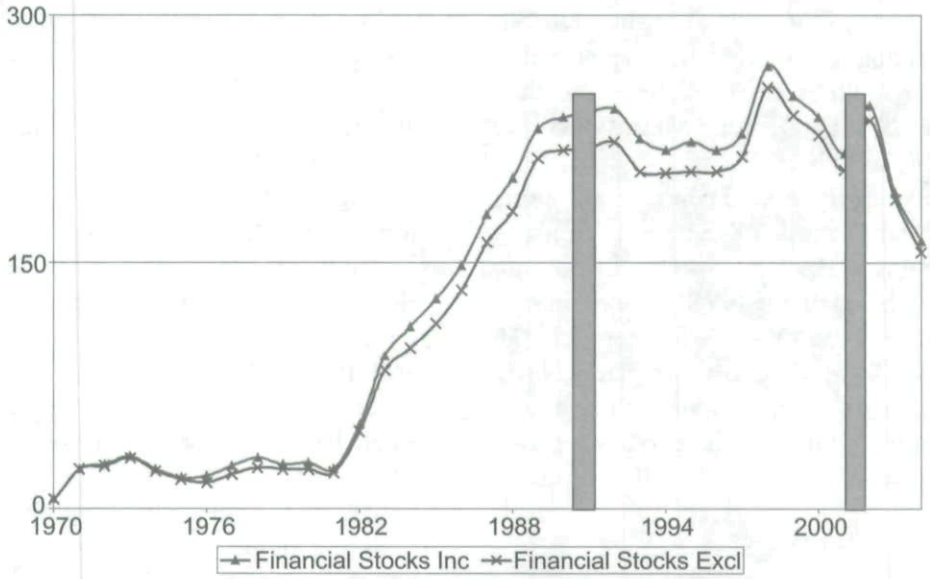
Unlike Fama and French [1992] who used data from as early as 1963, our study begins in 1986. Numerous reasons exist for choosing 1986 as the starting year. As Fama and French [1993] pointed out, negative BE stocks are rare before 1980. The number of negative BE firms has increased since 1980 because the incidence of firm losses has increased (Givoly and Hayn [2000]). This, in turn, may be caused by the growing accounting conservatism reported by Roychowdhury and Watts [2007]. As depicted in Exhibit 1, the number of negative BE stocks does not exceed 100 until 1985, but dramatically increases from 1986 onward. Therefore, the years prior to 1986 are relatively unimportant in the context of this study.[5]

Classification of Negative BE Stocks and Construction of Size and Value Indices

Book equity, as defined by Fama and French [1993], is the COMPUSTAT book value of stockholders' equity plus any deferred taxes and investment tax credits on the balance sheet minus the book value of preferred stock. The book value of preferred stock is estimated based on its redemption, liquidation, or par value (in this order), subject to availability.

Consider how the separate components of this definition can cause a firm to have negative BE. Shareholders' equity represents the capital received from investors in exchange for stock and retained earnings as recorded on the balance sheet. Firms in financial distress will typically accumulate negative retained earnings, and this negative retention may be large enough to imply a negative value for BE. It is possible, however, that a firm in an otherwise sound financial condition might record a negative value for BE. For example, negative BE can occur through the accounting treatment of goodwill when companies with

EXHIBIT 1
Number of Negative BE Stocks



Note: The shaded areas denote recession periods as defined by The National Bureau of Economic Research (NBER). The recession periods are July 1990–March 1991 and March 2001–November 2001. Because many negative BE stocks are distressed, their numbers would be expected to increase during recessions, although this is not always the case, as shown in this exhibit.

significant growth potential are taken over by larger companies.[6] Negative BE can also occur when start-ups with patents, but no products, "eat" into a firm's equity. But if the firm can easily raise capital, it is not truly distressed.

Inconsistencies can exist between balance sheet accounting and the method the government uses to measure a firm's tax liability. Accountants typically take the conservative position of making provisions for all tax that might be due. Essentially, the deferred taxes and investment tax credits on the balance sheet adjust this conservative accounting stance, so that the net tax liability in the financial statements is consistent with the firm's actual tax liability as stated by the government. It is possible for these adjustments to create negative BE for a firm.

The effect of preferred stock on BE must also be removed. If the redemption value of the preferred stock is larger than its book value, this can cause an otherwise profitable firm to have negative BE.

A brief analysis of the negative BE stocks in our sample reveals that 77% trade on the NASDAQ, 11% trade on the NYSE, and 12% trade on the AMEX. Furthermore, the top three industries represented by these stocks are computer programming (10%), pharmaceuticals (5%), and oil and gas extraction (5%). This industry breakdown makes sense in light of our earlier discussion of the causes of negative BE; often firms in these industries include start-ups which "eat" into the firms' capital.

Rather than simply discard negative BE firms, we classify these firms into Fama–French value categories based on the similarities in their return history to those of positive BE firms, which belong more obviously to the value categories. The classification approach, referred to as generalized style classification (GSC), was proposed by Brown and Goetzmann [1997] as a way to classify mutual funds into style categories based on return similarity on a month-by-month basis. Brown, Goetzmann, and Grinblatt [1998] and Ahn, Conrad, and Dittmar [2006] proposed using variants of this approach to classify individual securities into industry- or factor-related groupings.[7] Generalized style classification is an intuitive approach to allocating negative BE stocks into the conventional Fama–French BE/ME and size groupings; stocks with positive book value are first allocated to six classes stratified according to size and value using the procedure described in Fama and French [1993]. Each negative BE stock is then allocated to one of these groups, based on the similarity of its historical returns to those stocks already allocated to the group.[8]

We then construct Fama–French small-minus-big (SMB) and high-minus-low (HML) factors exactly as

described by Fama and French [1993]. We employ one exception, however; instead of discarding negative BE stocks, we include them in the analysis using the GSC approach just described. Using only NYSE-listed stocks, we calculate size rankings based on market capitalization in June of each year *t*. The median NYSE size is then used to split NYSE, NASDAQ, and AMEX stocks into two groups—small (*S*) and big (*B*).

These size rankings are used to construct size portfolios from July of year *t* to June of year *t* + 1. Similarly, the NYSE, NASDAQ, and AMEX stocks are divided into three BE/ME groups based on the NYSE breakpoints for the bottom 30% (*L*), middle 40% (*M*), and top 30% (*H*) of the ranked values of BE/ME. The value factor (*HML*) is formed from these six portfolios and is the equal-weighted average of the returns on the two portfolios of high BE/ME stocks minus those of the low BE/ME stocks:

$$HML=[((SH)+(BH))-((SL)+(BL))]/2$$

RESULTS

When we use the returns-based GSC procedure to allocate negative BE stocks to value classifications, we find that the Fama–French value premium is enhanced.

Panel A of Exhibit 2 shows the number of stocks and their size by year. Over time, the number of positive BE and negative BE stocks fluctuates. The median market capitalization (i.e., size), however, increases for both. The positive BE stocks greatly outnumber the negative BE stocks and the median size is consistently three to four times larger. Panel B of Exhibit 2 shows that the negative BE stocks account for 3.5% to 5.7% of all stocks. In the case of nonfinancial stocks, the percentage of negative BE stocks increases to between 3.6% and 6.2%.

Fama and French used market-value weighting in the construction of their HML portfolio because of the difficulty and cost of replicating an equal-weighted portfolio due to the allotments of small stocks that must be purchased. In terms of value weighting, the negative BE stocks represent from 0.38% to 1.57% of the portfolio (as shown in the second column of Exhibit 2, Panel B). If we exclude financial firms, this increased range is from 0.38% to 1.79%. This increase is expected because most negative BE stocks are small firms. Indeed, their median size is approximately one-third of that of positive BE stocks.

Initially, one might presume that such small value weightings would not play an important role in altering the value premium, HML. If, however, we break down the HML portfolio into its six constitute portfolios (SL, SM, SH, BL, BM, and BH), we find that negative BE stocks play a crucial role in changing the magnitude of the value premium, as illustrated in Exhibit 3.

Exhibit 3 shows that adding the negative BE stocks into the six predetermined portfolios changes the portfolios' composition (i.e., market capitalization), although the magnitudes of such changes varies. First, for financial stocks, if we consider the effect on the size portfolios, we can see that the three small portfolios (SH, SM, and SL) are most affected. For example, the market capitalization of the SL portfolio changed by more than 10% in 1992, 1994, 1997, and 2004. Second, the value risk factor, HML, also changed by at least 10% (see Exhibit 3) for approximately half of the years in the sample: 1989, 1992, 1994, 1997–1999, and 2004. In other words, including negative BE stocks changes the composition of the HML portfolios and significantly influences overall return, even though negative BE stocks represent only 1.57% (at most) of the value of all stocks.

If nonfinancial stocks are considered, similar patterns are observed. As shown in Exhibit 2, the exclusion of financial stocks results in a 17% decrease in the number of stocks, but only a 7% drop in the number of negative BE stocks. The disproportionate decrease in the number of negative BE stocks results in the negative BE stocks having a larger impact on the value premium.

The impact of including negative BE stocks on the returns of the HML factor is shown in Exhibit 4. In the case of value-weighted portfolios that include financial stocks, the average difference between the value premium that includes positive stocks only (HML_{old}) and that which includes negative BE stocks (HML_{new}) is 0.9%. This difference is larger, 1.1%, in the nonfinancial case.[9]

Exhibit 4 illustrates that by adding negative BE stocks to the portfolios that constitute the HML factor, the value premium is increased, or "enhanced." This is to be expected because, if negative BE stocks are predominantly, but not exclusively, distressed stocks, they need higher returns to compensate for the risk of bearing them.

The 19 years of accumulated returns for HML_{new} and HML_{old} portfolios (over the 20-year data period, 1986–2005) are illustrated in Exhibit 5. The differences in HML returns for the portfolios that include and exclude financial stocks are 35% and 45%, respectively. The *t*-values estimated on annual returns are 2.4 and 2.8, respectively,

EXHIBIT 2
Sample Characteristics

Panel A. Sample Number and Size, by Year

	Financial Stocks Included						Financial Stocks Excluded					
	Positive BE Stocks			Negative BE Stocks			Positive BE Stocks			Negative BE Stocks		
		Size ($M)			Size ($M)			Size ($M)			Size ($M)	
Year	Stocks	Median	Mean	Stocks	Median	Mean	Stocks	Median	Mean	Stocks	Median	Mean
1986	4189	64	566	148	16	61	3732	55	546	133	16	58
1987	4354	58	622	179	18	90	3858	51	621	162	19	93
1988	4452	45	541	201	15	91	3931	41	543	181	13	94
1989	4345	52	614	231	13	182	3782	45	612	213	13	194
1990	4242	53	685	238	12	138	3693	46	694	218	12	146
1991	4246	54	720	241	16	153	3689	49	729	219	16	162
1992	4285	76	826	243	17	120	3695	68	826	223	18	122
1993	4586	90	921	225	27	207	3967	78	900	205	29	221
1994	5460	79	785	218	28	280	4346	79	824	204	28	287
1995	5703	90	936	223	39	289	4535	94	993	205	42	294
1996	5842	118	1161	218	56	321	4700	127	1211	205	60	329
1997	6209	123	1404	228	36	305	5090	121	1403	214	38	313
1998	5992	147	1880	269	50	468	4956	140	1821	256	52	490
1999	5548	136	2403	251	68	685	4566	134	2419	239	67	707
2000	5352	147	2879	238	85	766	4333	166	3080	227	89	792
2001	5192	163	2530	216	51	613	4175	189	2544	206	51	638
2002	4778	174	2292	245	43	397	3818	182	2249	236	43	404
2003	4473	208	2440	192	65	752	3524	223	2433	188	67	762
2004	4325	325	3021	163	101	853	3404	363	3028	156	101	866

Panel B. Percentage of Negative BE Stocks/Positive BE Stocks, by Year

	Financial Stocks Included		Financial Stocks Excluded	
	Equal Weight	Value Weight	Equal Weight	Value Weight
1986	3.5%	0.38%	3.6%	0.38%
1987	4.1%	0.59%	4.2%	0.63%
1988	4.5%	0.76%	4.6%	0.80%
1989	5.3%	1.57%	5.6%	1.79%
1990	5.6%	1.13%	5.9%	1.24%
1991	5.7%	1.21%	5.9%	1.32%
1992	5.7%	0.82%	6.0%	0.88%
1993	4.9%	1.10%	5.2%	1.27%
1994	4.0%	1.42%	4.7%	1.63%
1995	3.9%	1.21%	4.5%	1.34%
1996	3.7%	1.03%	4.4%	1.19%
1997	3.7%	0.80%	4.2%	0.94%
1998	4.5%	1.12%	5.2%	1.39%
1999	4.5%	1.29%	5.2%	1.53%
2000	4.4%	1.18%	5.2%	1.35%
2001	4.2%	1.01%	4.9%	1.24%
2002	5.1%	0.89%	6.2%	1.11%
2003	4.3%	1.32%	5.3%	1.67%
2004	3.8%	1.06%	4.6%	1.31%

Note: Size is measured as share price multiplied by shares outstanding in June of each year. Value weight is measured as total capitalization in June of negative BE stocks divided by total capitalization in June of positive BE stocks.

indicating that the returns between the new and old HML are significant at a 95% confidence interval.

In Li, Lajbcygier, Guo, and Chen [2007], we further analyzed these results. We considered the relationship between stock default risks, returns, and their BE/ME ratios.[10] Consistent with a risk–return interpretation of the value factor, we found that the negative BE stocks with the highest probability of default have higher average returns than all positive BE stocks. We found that not only do these stocks have a higher return than other stocks, but they also group into value–growth portfolios in such a way as to enhance HML returns. This enhancement represents an increased default premium consistent with the Fama and French [1992] interpretation of value as a distress factor. As a practical matter, this confirms the practical wisdom of incorporating a default risk screen into

EXHIBIT 3

Percentage of Capitalization (Negative BE Stocks/Positive BE Stocks)

	Financial Stocks Included						Financial Stocks Excluded					
Year	SH	SM	SL	BH	BM	BL	SH	SM	SL	BH	BM	BL
1986	0.6%	1.8%	1.3%	0.2%	0.2%	0.6%	0.6%	2.0%	1.4%	0.2%	0.1%	1.0%
1987	0.1%	0.0%	0.5%	1.2%	0.3%	0.0%	0.3%	0.0%	0.6%	1.6%	0.1%	0.0%
1988	1.4%	11.5%	3.1%	0.1%	0.2%	0.3%	1.7%	11.5%	2.6%	0.1%	0.2%	0.3%
1989	10.5%	11.6%	5.5%	0.8%	0.1%	0.2%	11.3%	14.0%	21.0%	0.6%	0.1%	0.0%
1990	0.4%	0.0%	0.3%	1.9%	1.5%	0.0%	0.16%	0.00%	0.30%	0.51%	2.59%	0.05%
1991	0.0%	0.2%	1.4%	0.1%	3.3%	0.0%	0.0%	0.2%	1.0%	3.8%	0.3%	0.0%
1992	0.0%	0.0%	22.6%	0.0%	0.1%	0.7%	0.0%	0.0%	24.3%	0.2%	0.0%	0.6%
1993	0.1%	0.0%	5.7%	2.4%	1.2%	0.1%	0.3%	0.0%	4.5%	6.9%	0.3%	0.2%
1994	0.0%	0.8%	37.5%	0.3%	0.0%	0.0%	0.0%	0.8%	39.9%	0.1%	0.1%	0.0%
1995	0.0%	0.1%	0.1%	0.3%	2.6%	0.0%	0.0%	0.1%	0.1%	1.0%	2.7%	0.0%
1996	1.6%	5.6%	1.1%	0.2%	0.0%	1.6%	12.7%	7.6%	1.0%	1.4%	0.1%	0.7%
1997	0.0%	0.0%	21.7%	0.3%	0.0%	0.1%	0.0%	0.0%	22.4%	1.0%	0.0%	0.0%
1998	0.7%	0.1%	1.5%	10.3%	1.1%	0.4%	0.9%	0.2%	0.8%	13.0%	2.2%	0.4%
1999	1.8%	2.8%	0.7%	23.2%	0.7%	0.0%	1.9%	1.9%	0.1%	18.5%	2.9%	0.1%
2000	1.9%	51.3%	5.1%	0.0%	0.3%	0.2%	6.3%	61.3%	4.6%	0.0%	1.1%	0.2%
2001	0.5%	2.0%	2.4%	2.5%	1.8%	0.5%	0.3%	2.8%	2.1%	3.3%	2.6%	0.6%
2002	0.9%	0.2%	1.0%	0.1%	0.4%	1.5%	0.1%	0.3%	1.1%	0.1%	0.7%	1.6%
2003	0.0%	0.0%	0.0%	0.1%	2.9%	0.3%	0.0%	0.0%	0.0%	0.3%	4.4%	0.1%
2004	0.0%	1.2%	11.1%	0.0%	0.0%	1.6%	0.1%	1.7%	12.2%	0.0%	0.0%	1.6%

Note: Size is measured as share price multiplied by shares outstanding in June of each year.

EXHIBIT 4

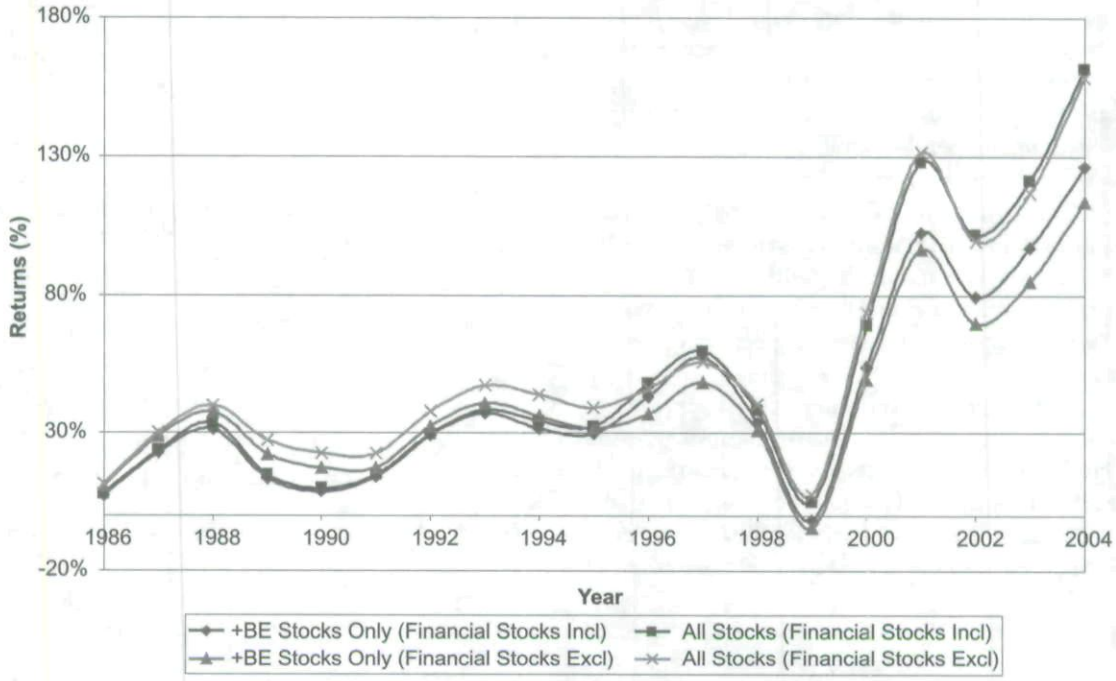
Annualized Returns for HML

Value-Weighted Annualized Returns of HML, by Year				
	Financial Stocks Included		Financial Stocks Excluded	
Year	Positive BE Stocks Only	All Stocks	Positive BE Stocks Only	All Stocks
1986	7.3%	7.9%	10.8%	11.5%
1987	14.5%	14.7%	16.4%	16.7%
1988	6.9%	7.9%	6.7%	7.7%
1989	–13.6%	–14.2%	–11.1%	–9.1%
1990	–4.2%	–4.3%	–4.1%	–3.8%
1991	4.9%	4.4%	0.0%	0.0%
1992	13.3%	13.0%	12.9%	12.4%
1993	6.3%	6.8%	6.3%	6.8%
1994	–4.1%	–2.9%	–3.3%	–2.2%
1995	–1.4%	–1.5%	–3.3%	–3.3%
1996	10.4%	11.8%	4.0%	5.1%
1997	9.9%	8.1%	8.4%	6.4%
1998	–15.0%	–13.6%	–11.7%	–9.7%
1999	–26.4%	–23.9%	–27.0%	–23.4%
2000	56.2%	61.1%	56.4%	61.6%
2001	31.7%	34.8%	31.4%	33.1%
2002	–11.4%	–11.5%	–13.5%	–13.8%
2003	9.8%	9.7%	8.9%	8.8%
2004	14.8%	18.2%	15.5%	19.1%

Note: A stock's size is calculated by multiplying its price by its shares outstanding. NYSE stocks are ranked according to their size. The median is then used to split all the NYSE, AMEX, and NASDAQ stocks into two groups—small (S) and big (B). Similarly, the NYSE, NASDAQ, and AMEX stocks are sorted into three BE/ME groups based on the breakpoints for the bottom 30% (L), middle 40% (M), and top 30% (H). Book common equity (BE) for the fiscal year ending in calendar year t − 1 is defined as the COMPUSTAT book value of stockholders' equity plus any deferred taxes and investment tax credits on the balance sheet minus the book value of preferred stock. The book value of preferred stock is estimated based on its redemption, liquidation, or par value (in this order), subject to availability. For the fiscal year ending in calendar year t − 1, market equity (ME) is obtained by multiplying a stock price in December of year t − 1 by its shares outstanding. From July of year t to June of year t + 1, six value-weighted portfolios (SL, SM, SH, BL, BM, and BH) are created through the intersection of size and BE/ME groups. HML is the difference between the average return of the two highest BE/ME portfolios and the two lowest BE/ME portfolios. The returns in the exhibit are annualized based on monthly returns.

EXHIBIT 5

Accumulative HML With and Without Inclusion of Negative BE Stocks



any investment strategy designed to exploit the observed value premium.

CONCLUSION

The research presented in this article creates an innovative platform to analyze the impact of negative BE stocks on the value premium, HML, by appropriately classifying these stocks into value groups. Both practitioners and academics typically discard negative BE stocks from any subsequent analysis. This omission is significant. By using past returns to classify these stocks into appropriate value strata, we show that, once included, negative BE stocks significantly enhance the HML premium. We believe this occurs because many negative BE stocks are, in fact, in financial distress.

If we interpret the HML premium as a kind of default premium, then to the extent that negative BE stocks have higher default risk than other stocks, we should expect that the HML premium would increase when these stocks are included. Indeed our results show that including these stocks leads to an increase in the value premium that is both statistically and economically significant. Although we illustrate how this approach can be used to classify negative book equity stock, the approach is quite general and may be used whenever certain accounting data are unavailable or otherwise suspect.

ENDNOTES

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[1]Preferred stock is normally included in book equity; however, in this context, it is excluded.

[2]Following Fama and French [1992], most empirical research in accounting and finance (e.g., Vassalou and Xing [2004] and Griffin and Lemmon [2002]) excludes negative BE stocks for this reason.

[3]Chan, Hamao, and Lakinishok [1991] conducted one of the few studies that did not simply omit negative BE stocks, but did, however, classify them within the lowest value category.

[4]Although Fama and French [1992] excluded financial firms, we considered the implications of including the stocks of such firms on the results we report.

[5]Fama and French [1992] used 1990 as the last year in their study. We, however, chose 2005 as the last year of our study because these were the latest data available.

[6]*Goodwill* is an accounting term used to reflect the portion of the market value of a business entity not directly attributable to its assets and liabilities. For example, when AOL acquired Time Warner, it recorded goodwill of $126.9 billion, which was equal to the difference between the price paid and the value of net assets acquired In 2002, AOL adopted accounting standard SFAS No. 142, which stated that companies should self-examine their book value goodwill relative to its fair value and, if overstated, recognize the difference as a lump sum *goodwill impairment loss*. This occurred in January 2002 when $54.24 billion of goodwill was written off by AOL.

[7]The technique is a natural fit with the theoretical returns-generating process for stocks and is consistent with a variety of asset pricing paradigms (see the appendix of Brown and Goetzmann [1997]).

[8]The generalized style classification (GSC) approach of Brown and Goetzmann [1997] is a quasi-*k*-means clustering algorithm. The main difference between GSC and the traditional *k*-means is that the GSC algorithm adjusts for heteroskedasticity by taking into consideration both time-series and cross-sectional variances, reducing the effect of outliers in the classification.

[9]Barber and Lyon [1997] confirmed that the inclusion of financial stocks has minimal impact on value factor returns.

[10]As a proxy for a stock's default risk, we adopted an options-based default risk model that predicts the probability of bankruptcy.

REFERENCES

Ahn, D., J. Conrad, and R. Dittmar. "Basis Assets." Working paper, 2006.

Barber, B.M., and J.D. Lyon. "Firm Size, Book-to-Market Ratio, and Security Returns: A Holdout Sample of Financial Firms." *Journal of Finance*, 52 (1997), pp. 875–883.

Brown, S., and W. Goetzmann. "Mutual Fund Style." *Journal of Financial Economics*, 43 (1997), pp. 373–399.

——. "Hedge Funds with Style." *Journal of Portfolio Management*, 29 (2003), pp. 101–112.

Brown, S., W. Goetzmann, and M. Grinblatt. "Positive Portfolio Factors." Working Paper No. F-57, Yale School of Management, 1998. Available at http://ssrn.com/abstract=79373.

Chan, L.K., Y. Hamao, and J. Lakinishok. "Fundamentals and Stock Returns in Japan." *Journal of Finance*, Vol. 46, No. 5 (1991), pp. 1739–1764.

Cheng, K. "The Impact of Goodwill on Earnings." *Journal of Corporate Accounting and Finance*, Vol. 14, No. 2 (2003), pp. 63–67.

Daniel, K., S. Titman, and K.C. John Wei. "Explaining the Cross Section of Stock Returns in Japan: Factors or Characteristics?" *Journal of Finance*, Vol. 56, No. 2 (2001), pp. 743–766.

DeBondt, W., and R.H. Thaler. "Further Evidence on Investor Overreaction and Stock Market Seasonality." *Journal of Finance*, Vol. 42, No. 3 (1987), pp. 557–581.

Drew, M.E., T. Naughton, and M. Veeraraghavan. "Firm Size, Book-to-Market Equity and Security Returns: Evidence from the Shanghai Stock Exchange." *Australian Journal of Management*, Vol. 28, No. 2 (2003), pp. 118–141.

Fama, E.F., and K.R. French. "The Cross Section of Expected Stock Returns." *Journal of Finance*, 47 (1992), pp. 427–465.

——."Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics*, 33 (1993), pp. 3–56.

——."Size and Book-to-Market Factors in Earnings and Returns." *Journal of Finance*, Vol. 50, No. 1 (1995), pp. 131–155.

Givoly, D., and C. Hayn. "The Changing Time-Series Properties of Earnings, Cash Flows and Accruals: Has Financial Reporting Become More Conservative?" *Journal of Accounting and Economics*, 29 (2000), pp. 287–320.

Griffin, J.M., and M. Lemmon. "Book-to-Market Equity, Distress Risk, and Stock Returns." *Journal of Finance*, 57 (2002), pp. 2317–2358.

Li, B., P. Lajbcygier, S. Guo, and X. Chen. "Default Risk, Return, and Negative Book Equity Stock." Working paper, 2007. Available at http://ssrn.com/abstract=1009426.

Merton, R.C. "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates." *Journal of Finance*, Vol. 29, No. 2 (1974), pp. 449–470.

Ohlson, J.A. "Earnings, Book Values, and Dividends in Security Valuation." *Contemporary Accounting Research*, 11 (1995), pp. 661–687.

Penman, S. "Return to Fundamentals." *Journal of Accounting, Auditing, and Finance*, 7 (1992), pp. 465–483.

Roychowdhury, S., and R. Watts. "Asymmetric Timeliness of Earnings, Market-to-Book and Conservatism in Financial Reporting." *Journal of Accounting and Economics*, 44 (2007), pp. 2–31.

Vassalou, M., and Y. Xing. "Default Risk in Equity Returns." *Journal of Finance*, Vol. 59, No. 2 (2004), pp. 831–868.