LESS THAN BOOK VALUE! WHAT A BARGAIN?

How Helga learned to mistrust accountants

Helga, a psychologist, had always wanted to be an accountant. She bemoaned the fact that her discipline was subjective and lacked precision, and wished that she could work in a field where there were clear rules and principles. One day, she read an article in the *Wall Street Journal* on Global Telecom, whose stock, the report said, was trading at half of its book value. From her limited knowledge of accounting, Helga knew that book value represented the accountant's estimate of what the equity in the bank was worth. "If a stock is trading at less than book value, it must be cheap," she exclaimed, as she invested heavily in the stock.

Convinced that she was secure in her investment, Helga waited for the stock price to move up to the book value of equity. Instead, it moved down. When she took a closer look at Global Telecom, she learned that its management had a terrible reputation and that it had either lost money or made very little every year for the last 10 years. Helga still kept her faith in the accounting value, convinced that, at worst, someone would buy the firm for the book value. At the end of the year, her hopes were dashed. The accountants announced that they were writing down the book value of the equity to reflect poor investments that the firm had made in the past. The stock price no longer was lower than the book value, but the book value had come down to the price rather than the other way around. Helga never yearned to be an accountant again.

Moral: The book value is an opinion and not a fact.

The book value of equity is the accountant's measure of what equity in a firm is worth. While the credibility of accountants has declined over the last few years, there are many who continue to believe that accountants provide not only a more conservative but also a more realistic measure of what equity is truly worth than financial markets which they view as subject to irrational buying and selling. A logical consequence of this view is that stocks that trade at substantially less than book value are under valued and those that trade at more than book value are over valued. As you will see in this chapter, while this may sometimes be true, there are many stocks that deserve to trade at less than book value either because they have poor investments or high risk or both.

The Core of the Story

The notion that stocks that trade at less than book value are undervalued has been around for decades. It has been used as a value screen by investors and portfolio manager. Services that track mutual funds (Morningstar, Value Line and Lipper) have used it as their basis for categorizing funds into value and growth funds – value funds invest in stocks with low price to book value ratios and growth funds in stocks with high price to book value ratios. As with PE ratios, rules of thumb abound – stocks that trade at less than book value are under valued, whereas stocks that trade at more than twice book value are overvalued.

Why does this story carry so much weight with investors? There are several reasons and two are considered below:

- ❑ *Markets are less reliable than accountants when it comes to estimating value*: If you believe that markets are both volatile and irrational, and combine this with a trust in the inherently conservative nature of accounting estimates of value, it follows logically that you would put more weight on accounting estimate of values (book value) than on market estimates of the same (market value). Thus, when a firm trades at less than book value, you will be inclined to believe that it is markets that have a mistaken estimate of value rather than accountants.
- ❑ *Book value is liquidation value*: In addition to the trust that some investors have in accountants' estimates of value, there is also the embedded belief that a firm, if liquidated, would fetch its book value. If this is the case, proponents argue, a stock that trades at less than book value is a bargain to someone who can liquidate its assets and pay off its debt As investors, you can piggyback on such investors and gain as the stock price approaches book value.

The Theory: Price to Book Ratios and Fundamentals

In Chapter 3, you examined the variables that affect the price earnings ratio, by going back to a simple valuation model and deriving the determinants of the multiple. You will follow the same path with price to book ratios. You will begin again with the definition of the price to book ratio (and any variants thereof) and then evaluate the variables that may cause some companies to have high price to book ratios and others to have low price to book ratios.

Defining the Price to Book Ratio

The price to book ratio is the ratio obtained by dividing the market price per share by the book value per share at a point in time.

$$\text{PBV} = \text{Price to Book} = \frac{\text{Market Price per share}}{\text{Book Value per share}}$$

The price to book ratio is usually estimated using the current price per share in the numerator and the book value per share in the denominator. The book value per share is the book value of equity divided by the number of shares outstanding. There are far fewer variants of price to book ratios than there are in price earnings ratios. It is true that you can still compute book value of equity per share based upon the actual number of shares outstanding (primary book value per share) or upon potential shares outstanding, assuming that options get exercised (diluted book value per share). However, you do not have the variants on current, trailing and forward values as you did for price earnings ratio. It is conventional to use as updated a measure of book value of equity per share as you can get. If firms report earnings annually, this will be based upon the equity in the last annual report. If firms report on a quarterly basis, you can use the equity from the most recent quarterly balance sheet.

How accountants measure book value

To understand book value, you should start with the *balance sheet*, shown in Figure 4.1, which summarizes the assets owned by a firm, the value of these assets and the mix of financing, debt and equity, used to finance these assets at a point in time.

Figure 4.1: The Balance Sheet

Assets		Liabilities	
Long Lived Real Assets	Fixed Assets	Current Liabilties	Short-term liabilities of the firm
Short-lived Assets	Current Assets	Debt	Debt obligations of firm
Investments in securities & assets of other firms	Financial Investments	Other Liabilities	Other long-term obligations
Assets which are not physical, like patents & trademarks	Intangible Assets	Equity	Equity investment in firm

This is the accounting estimate of book value of equity

While this is the conventional format for balance sheets in the United States, there are mild variations in how they are set up elsewhere in the globe. In parts of Asia, the assets are shown on the right hand side and liabilities on the left hand side. German companies consolidate pension fund assets and liabilities in corporate balance sheets.

What is an asset? An asset is any resource that has the potential to either generate future cash inflows or reduce future cash outflows. While that is a general definition broad enough to cover almost any kind of asset, accountants add a caveat that for a resource to be an asset,

a firm has to have acquired it in a prior transaction and be able to quantify future benefits with reasonable precision. The accounting view of asset value is to a great extent grounded in the notion of **historical cost**, which is the original cost of the asset, adjusted upwards for improvements made to the asset since purchase and downwards for the loss in value associated with the aging of the asset. This historical cost is called the **book value**. This is especially true of fixed assets, such as land, building and equipment. While accountants are more amenable to revaluing current assets, such as inventory and accounts receivable, and some marketable securities at current market values, a process called marking to market, the book value of all assets on a balance sheet often will bear little or no resemblance to their market value.

Since assets are valued based upon historical cost, the liabilities suffer from the same absence of updating. Thus, the debt shown on a firm's balance sheet represents the original amount borrowed from banks or bondholders, rather than an updated market value. What about the book value of equity? The value of equity shown on the balance sheet reflects the original proceeds received by the firm when it issued the equity, augmented by any earnings made since (or reduced by losses, if any) and reduced by any dividends paid out during the period. While these three items go into what you can call the book value of equity, a few other items also end up in this estimate.

1. When companies buy back stock for short periods, with the intent of reissuing the stock or using it to cover option exercises, they are allowed to show the repurchased stock as treasury stock, which reduces the book value of equity. Firms are not allowed to keep treasury stock on the books for extended periods and have to reduce their book value of equity by the value of repurchased stock in the case of actions such as stock buybacks. Since these buybacks occur at the current market price, they can result in significant reductions in the book value of equity.

2. Firms that have significant losses over extended periods or carry out massive stock buybacks can end up with negative book values of equity.

3. If a firm has substantial amount invested in marketable securities, any unrealized gain or loss in marketable securities that are classified as available-for-sale is shown as an increase or decrease in the book value of equity in the balance sheet.

As part of their financial statements, firms provide a summary of changes in shareholders equity during the period, where all the changes that occurred to the accounting (book value) measure of equity value are summarized.

As with earnings, firms can influence the book value of their assets by their decisions on whether to expense or capitalize items – when items are expensed they do not show up as assets. Even when an expense is capitalized, the choice of depreciation method

can affect an asset's book value; firms that use accelerated depreciation – where more depreciation is claimed in the early years and less in the later years – will report lower book values for assets. Firms can have an even bigger impact on the book value of equity when they take restructuring or one-time charges. In summary, any investment approach based upon book value of equity has to grapple with these issues and the price to book ratio may not be a good indicator of value for many companies.

Determinants of PBV ratios

Consider again the model presented in the last chapter for valuing a stock in a firm where the dividends paid will grow at a constant rate forever. In this model, the value of equity can be written as:

$$\text{Value per share today} = \frac{\text{Expected Dividend per share next year}}{\text{Cost of Equity} - \text{Expected Growth Rate}}$$

As a simple example, consider investing in stock in Consolidated Edison, the utility that serves much of New York City. The stock is expected to pay a dividend of $2.20 per share next year (out of expected earning per share of $3.30) the cost of equity for the firm is 8% and the expected growth rate in perpetuity is 3%. The value per share can be written as:

$$\text{Value per share of Con Ed} = \frac{\$2.20}{(.08 - .03)} = \$44.00 \text{ per share}$$

To get from this model for value per share to one for the price to book ratio, you will divide both sides of the equation by the book value of equity per share today. When you do, you obtain the discounted cash flow equation specifying the price to book ratio for a stable growth firm.

$$\frac{\text{Value per share today}}{\text{Book value of equity today}} = \text{PBV} = \frac{\dfrac{\text{Expected Dividend per share}}{\text{Book Value of Equity per share today}}}{\text{Cost of Equity} - \text{Expected Growth Rate}}$$

$$= \frac{\dfrac{\text{Expected Dividend per share}}{\text{Expected EPS next year}} * \dfrac{\text{Expected EPS next year}}{\text{Book Value of Equity per share today}}}{\text{Cost of Equity} - \text{Expected Growth Rate}}$$

$$= \frac{\text{Expected Payout Ratio} * \text{Return on Equity}}{(\text{Cost of Equity} - \text{Expected Growth Rate})}$$

Consider again the example of Con Ed introduced in the last chapter. Recapping the facts, the stock is expected to pay a dividend of $2.20 per share next year out of expected earnings per share of $3.30), the cost of equity is 8% and the expected growth rate in

perpetuity is 3%. In addition, assume that the book value of equity per share currently is $33. You can estimate the price to book ratio for Con Ed:

Price to Book Ratio for Con Ed

$$= \frac{\text{Expected Payout Ratio} * \text{Return on Equity}}{(\text{Cost of Equity} - \text{Expected Growth Rate})}$$

$$= \frac{(2.20/3.30) * (3.30/33)}{(.08 - .03)} = 1.33$$

The price to book ratio (PBV) will increase as the expected growth rate increases; higher growth firms should have higher PBV ratios, which makes intuitive sense. The price to book ratio will be lower if the firm is a high-risk firm and has a high cost of equity. The price to book ratio will increase as the payout ratio increases, for any given growth rate; firms that are more efficient about generating growth (by earning a higher return on equity) will trade at higher multiples of book value. In fact, substituting in the equation for payout into this equation:

Payout ratio = 1- g/Return on Equity

$$\text{Price to Book Ratio} = \frac{(1 - g/\text{Return on Equity}) * \text{Return on Equity}}{(\text{Cost of Equity} - g)}$$

$$= \frac{(\text{Return on Equity} - g)}{(\text{Cost of Equity} - g)}$$

The key determinant of price to book ratios is the difference between a firm's return on equity and its cost of equity. Firms that are expected to consistently earn less on their investments (return on equity) than you would require them to earn given their risk (cost of equity) should trade at less than book value.

As noted in the last chapter, this analysis can be easily extended to cover a firm in high growth. The equation will become more complicated but the determinants of price to book ratios remain the same – return on equity, expected growth, payout ratios and cost of equity. A company whose stock is trading at a discount on its book value is not necessarily cheap. In particular, you should expect companies that have low returns on equity, high risk and low growth potential to trade at low price to book ratios. If you want to find under valued companies then, you have to find mismatches – low or average risk companies that trade at low price to book ratios while maintaining reasonable returns on equity.

Looking at the Evidence

Some investors argue that stocks that trade at low price-book value ratios are under valued and there are several studies that seem to back a strategy of buying such stocks. You

will begin by looking at the relationship between returns and price to book ratios across long time periods in the United States and extend the analysis to consider other markets.

Evidence from the United States

The simplest way to test whether low price to book stocks are good investments is to look at the returns that these stocks earn, relative to other stocks in the market. An examination of stock returns in the United States between 1973 and 1984 found that the strategy of picking stocks with high book/price ratios (low price-book values) would have yielded an excess return of 4.5% a year.[1] In another analysis of stock returns between 1963 and 1990 firms were classified on the basis of price to book ratios into twelve portfolios, and firms in the highest price to book value class earned an average monthly return of 0.30%, while firms in the lowest price to book value class earned an average monthly return of 1.83% for the 1963-90 period. [2],

This research was updated to consider how well a strategy of buying low price to book value stocks would have done in from 1991-2001 and compared these returns to returns in earlier time periods. To make the comparison, the annual returns on ten portfolios created based upon price to book ratios at the end of the previous year were computed. The results are summarized in Figure 4.2.

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[1] Rosenberg, B., K. Reid, and R. Lanstein, 1985, *Persuasive Evidence of Market Inefficiency*, Journal of Portfolio Management, v11, 9-17.

[2] Fama, E.F. and K.R. French, 1992, *The Cross-Section of Expected Returns*, Journal of Finance, v47, 427-466. This study is an examination of the effectiveness of different risk and return models in finance. It found that price to book explained more of the variation across stock returns than any other fundamental variable, including market capitalization.

*Figure 4.2: PBV Classes and Returns - 1927-2001*
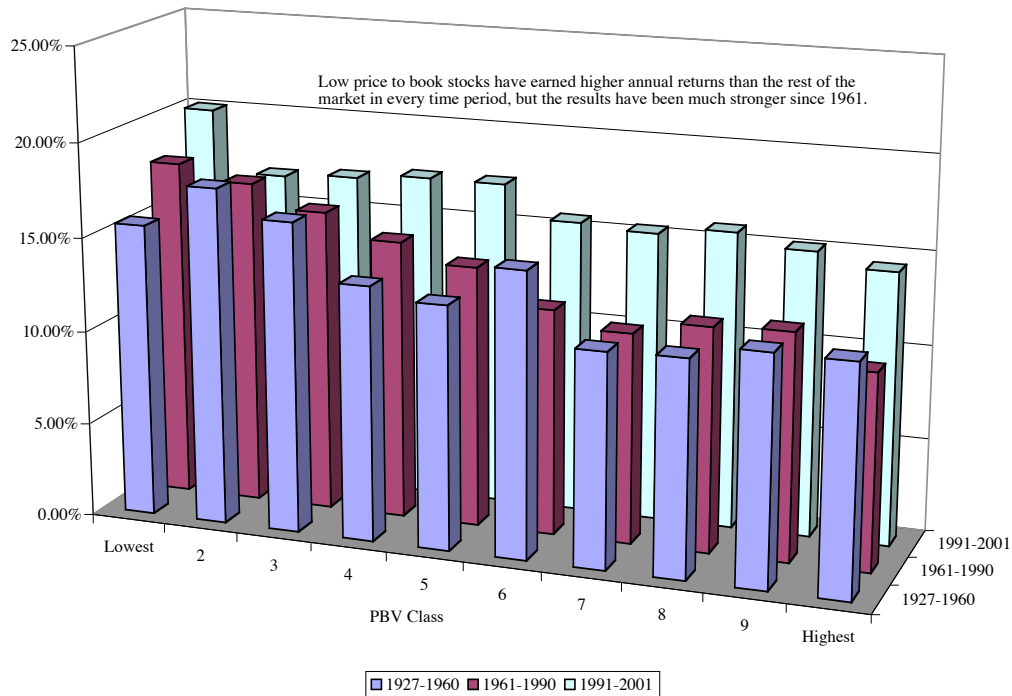
Data from Fama./French. The stocks were categorized based upon the ratio of price to book value at the beginning of each year and the annual returns were measured over the next year. The average annual return across each period is reported.

In each of the three sub-periods that you looked at stock returns, the lowest price to book stocks earned higher returns than the stocks with higher price to book ratios. In the 1927-1960 period, the difference in annual returns between the lowest price to book stock portfolio and the highest was 3.48%. In the 1961-1990 sub-period, the difference in returns between these two portfolios expanded to 7.57%. In the 1991-2001 period, the lowest price to book stocks continued to earn a premium of 5.72% over the highest price to book stocks. Thus, the higher returns earned by low price to book stocks have persisted over long periods.

As noted with price earnings ratios though, these findings should not be taken as an indication that low price to book ratio stocks earn higher returns than higher price to book stocks in every period. Figure 4.3 reports on the difference between the lowest price to book and highest price to book portfolio, by year, from 1960 to 2001.

Figure 4.3: Lowest versus Highest Price to Book Stocks - 1927-2001
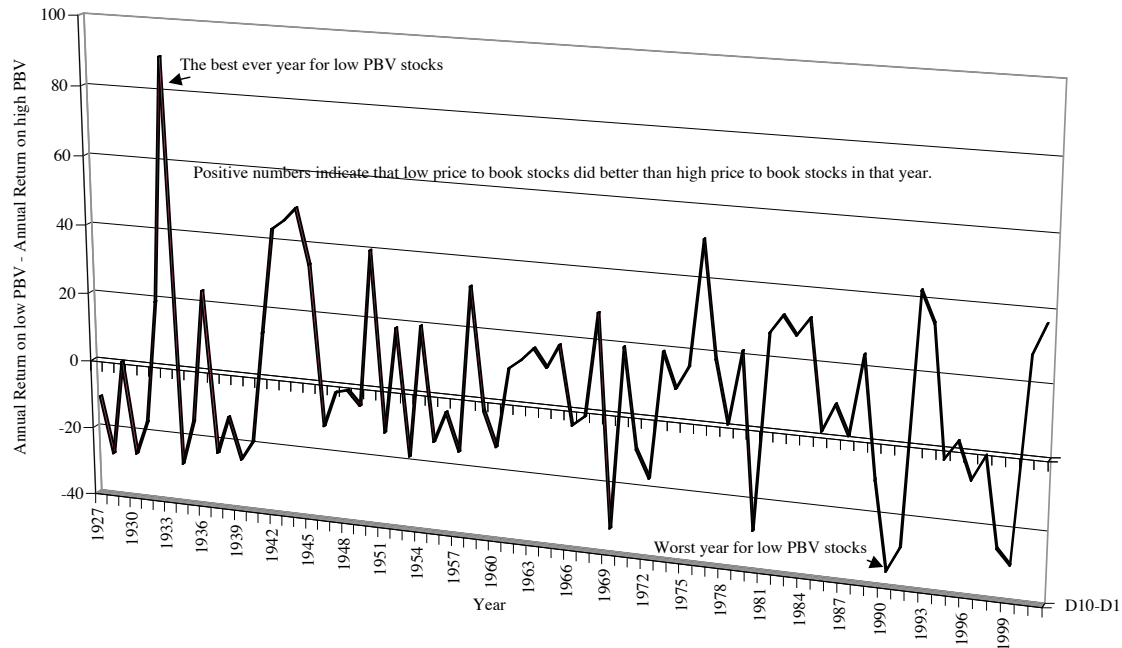
From Fama/French. This is the difference between the annual return on the lowest PBV stocks (bottom 10%) and the highest PBV stocks (top 10%).

While low price to book stocks have outperformed high price to book stocks, on average, there have been extended periods when they have underperformed as well. In fact, looking at the time periods where low price to book stocks have performed best – early in the 1930s, during the second world war, in the last 1970s and early in the 1990s – you can draw the conclusion that low price to book stocks perform best when the overall market is in the doldrums, reflecting their status as defensive stocks.

A concern in investing is transactions costs. One study examined the question of whether low price to book stocks generate excess returns after transactions costs.[3] The authors found that after adjusting for 1.0 percent transaction costs and annual rebalancing, investors would have outperformed the market by 4.82 percent over the 1963-1988 period, if they had invested in securities from small firms with low price to book ratios. They concluded that the optimal time period for rebalancing these portfolios, where the payoff to updating exceeded the transactions costs, was 2 years.

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[3] Patrick Dennis, Steven B. Perfect, Karl N. Snow, and Kenneth W. Wiles, "The Effects of Rebalancing on Size and Book-to-Market Ratio Portfolio Returns," *Financial Analysts Journal*, May-June 1995.

Evidence from outside the United States

The finding that low price to book stocks earn higher returns than high price to book stocks over extended periods is not unique to the United States. An analysis in 1991 found that the book-to-market ratio had a strong role in explaining the cross-section of average returns on Japanese stocks[4]. Extending the evaluation of price-book value ratios across other international markets, stocks with low price-book value ratios earned excess returns in every market that was examined between 1981 and 1992.[5] The annualized estimates of the return differential earned by stocks with low price-book value ratios, over the market index, in each of the markets studied is listed in Table 4.1:

Table 4.1: Return Premia for low Price to Book Portfolio by Country

Country	*Added Return to low P/BV portfolio*
France	3.26%
Germany	1.39%
Switzerland	1.17%
U.K	1.09%
Japan	3.43%
U.S.	1.06%
Europe	1.30%
Global	1.88%

Extending this analysis to emerging markets, a study of Korean stocks uncovered the same relationship between low price to book stocks and high returns.[6]

Thus, a strategy of buying low price to book value stocks seems to hold out much promise. Why don't more investors use it then, you might ask? You will consider some of the possible problems with this strategy in the next section and screens that can be added on to remove these problems.

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[4] Chan, L.K., Y. Hamao, and J. Lakonishok, 1991, *Fundamentals and Stock Returns in Japan*, Journal of Finance. v46. 1739-1789. They concluded that low price to book value stocks in Japan earned a considerable premum over high price to book value stocks.

[5] Capaul, C., I. Rowley and W.F. Sharpe, 1993, *International Value and Growth Stock Returns*, Financial Analysts Journal, 27-36.

[6] Sandip Mukherji, Manjeet S. Dhatt, and Yong H. Kim, *A Fundamental Analysis of Korean Stock Returns*, *Financial Analysts Journal*, May/June 1997.

Crunching the Numbers

In this section, you will begin by looking at the distribution of price to book ratios across companies in the United States and then consider differences in price to book ratios across sectors. Finally, you will generate a portfolio of stocks that have the lowest price to book ratios in the market, with the intention of taking a closer look at these stocks in the next section.

Distribution of Price to Book Ratios across the market

To get a sense of what comprises a high, low or average price to book value ratio, the ratio was computed for every firm listed in the United States and Figure 4.4 summarizes the distribution of price to book ratios in October 2002.

Figure 4.4: Price to Book Ratios : U.S. Companies - October 2002
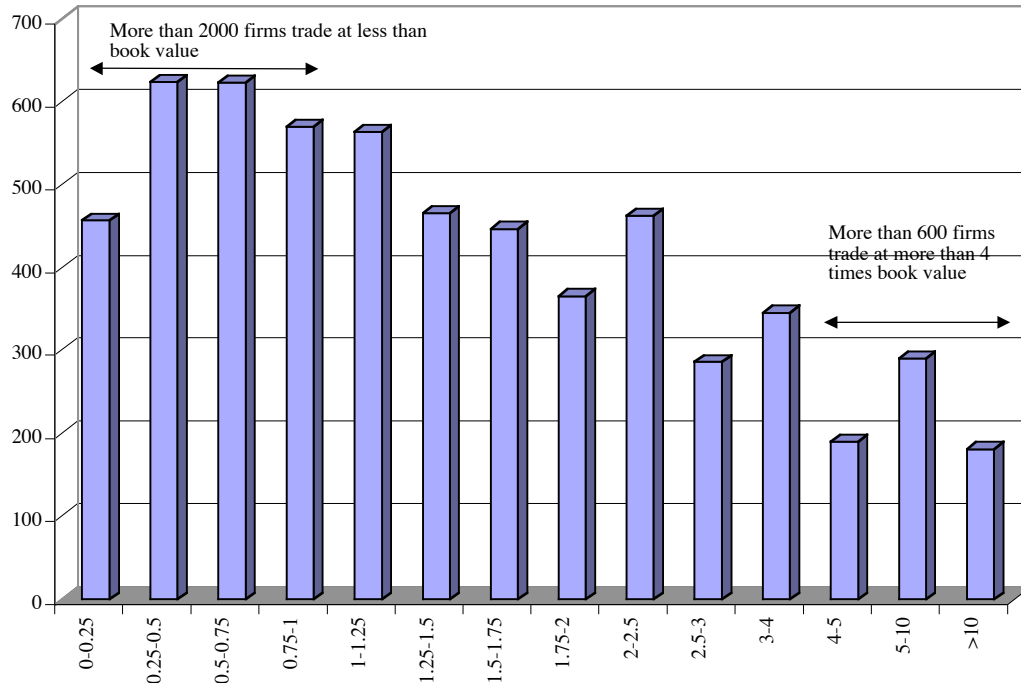
Data from Value Line. The number of firms in the U.S. market that trade in each price to book ratio class is reported.

The average price to book ratio across all U.S. stocks in October 2002 was 3.05, but this number is skewed by the presence of about 600 firms that trade at price to book ratios that exceed 4. A more meaningful measure is the median price to book ratio of 1.30; roughly half of all U.S. firms trade at price to book ratios that are less than this value.

Another point worth making about price to book ratios is that there are firms with negative book values of equity – the result of continuously losing money – where price to

book ratios cannot be computed. In this sample of 7102 firms, there were 1229 firms where this occurred. In contrast, though, 2045 firms had negative earnings and PE ratios could not be computed for them.

Price to Book Ratios by Sector

Price to book ratios vary widely across different sectors of the market. In some sectors, a large percent of stocks trade at below book value. In others, it is not uncommon to see stocks trading at 5 to 10 times book value. To examine differences in price to book ratios across sectors, the average price to book ratio was computed, by sector, for all firms in the United States in October 2002. Table 4.2 lists the ten sectors with the highest and lowest price to book ratios:

Table 4.2: Sectors with the Highest and Lowest Price to Book Ratios

Lowest Price to Book Sectors		Highest Price to Book Sectors	
Industry Name	*Price to Book*	*Industry Name*	*Price to Book*
Power	0.30	Biotechnology	4.27
Investment Co. (Foreign)	0.63	Educational Services	4.50
Maritime	0.74	Trucking/Transp. Leasing	4.51
Entertainment	0.83	Information Services	4.83
Electric Utility (West)	0.86	Pharmacy Services	4.84
Steel (Integrated)	0.87	Drug	5.84
R.E.I.T.	0.89	Medical Supplies	5.85
Foreign Telecom.	0.94	Beverage (Alcoholic)	6.04
Textile	0.98	Beverage (Soft Drink)	6.67
Tire & Rubber	0.99	Household Products	7.99

Why are there such large differences across sectors? The answer lies in the earlier analysis of the fundamentals that determine price to book ratios. In particular, you should expect that companies with high risk, low growth and, most importantly, low returns on equity to trade at low price to book ratios. In table 4.3, the average returns on equity, expected growth rates and market debt to capital ratios for the ten sectors with the highest and lowest price to book ratios are presented.

Table 4.3: Fundamentals of low price to book versus high price to book sectors

	ROE	*Beta*	*Debt to Capital*	*Expected growth rate*
Low PBV Sectors	1.90%	0.93	50.99%	12.28%

High PBV Sectors	13.16%	0.89	10.33%	20.13%

The results conform to expectations. The sectors with the lowest price to book ratios have average returns on equity well below those of the sectors with the highest price to book ratios, are exposed to more risk (especially financial leverage) and have much lower projected growth rates. In other words, there are good reasons why there are large differences in price to book ratios across sectors.

There is one more point that needs to be made about price to book ratios. Since book values are based upon accounting judgments, it should come as no surprise that the highest price to book ratios are in sectors where the most important assets are kept off the books. In particular, the expensing of research and development expenses at biotechnology and drug companies results in an book values being understated at these firms. For beverage and household product companies, the most important asset is often brand name, which is both intangible and not reflected in balance sheets. This, in turn, may explain why these companies report high returns on equity and trade at high price to book ratios.

A Low Price to Book Portfolio

If you picked the stocks that trade at the lowest price to book ratios in the market, what would you portfolio look like? To answer this question, all listed stocks in the United States in October 2002 that had a traded price available for them and positive book values of equity were examined. The price to book ratios were computed for each of the firms in this sample of 5883 firms, The 195 firms that trade at less than 40% of their book value of equity are listed in Table 4.4.

Table 4.4; Stocks with the lowest price to book ratios: October 2002 – United States

Company Name	Price/BV	Company Name	Price/BV	Company Name	Price/BV	Company Name	Price/BV
SpectraSite Hldgs Inc	0.01	Digital Lightwave	0.33	SonicWALL Inc	0.35	TTM Technologies Inc	0.42
WorldCom Inc.	0.01	Net Perceptions Inc	0.32	Discovery Partners Intl Inc	0.40	Oglebay Norton Co.	0.42
Vina Technologies Inc	0.18	PECO II Inc	0.16	Integrated Silicon Solution	0.37	Standard Management Corp	0.43
Jupiter Media Metrix Inc	0.11	Ventiv Health Inc	0.26	Quanta Services	0.15	Chart Industries	0.43
Metawave Communications Corp	0.08	Lexent Inc	0.35	REMEC Inc	0.40	Technology Solutions	0.43
Beacon Power Corp	0.20	Travis Boats & Motors Inc.	0.14	eXcelon Corp	0.39	Tweeter Home	0.43
DDi Corp	0.07	AES Corp.	0.09	CyberOptics	0.32	Captaris Inc	0.43
Mississippi Chem Corp.	0.05	NMS Communications Corp	0.24	Olympic Steel Inc.	0.28	Net2Phone Inc	0.44
Sorrento Networks Corp	0.14	EOTT Energy Partners-LP	0.26	McDermott Int'l	0.29	Resonate Inc	0.44
BackWeb Technologies Ltd	0.14	Ceres Group Inc	0.28	Qwest Communic.	0.12	Chartered Semiconductor Mfg	0.44
Leap Wireless Intl Inc	0.02	ACT Teleconferencing	0.37	Metris Cos.	0.15	Massey Energy	0.44
SBA Communications Corp	0.02	Atlas Air Inc	0.14	Trans World Entertain	0.28	Oregon Steel Mills	0.44
TranSwitch Corp.	0.10	MetaSolv Inc	0.26	DiamondCluster Intl Inc	0.26	Caliper Technologies Corp	0.44
iBasis Inc	0.14	Management Network Grp Inc.	0.35	Dixie Group	0.37	Pinnacle Entertainment Inc	0.44
Alamosa Hldgs Inc	0.05	Sapient Corp.	0.37	Sierra Wireless Inc	0.36	Proxim Corp Cl A	0.44
UbiquiTel Inc	0.13	Electroglas Inc.	0.15	FPIC Insurance	0.37	Innotrac Corp	0.44
Inktomi Corp	0.09	SatCon Technololgy	0.38	Alcatel ADR	0.20	R.J. Reynolds Tobacco	0.44
Cylink Corp	0.31	KANA Software Inc	0.36	Park-Ohio	0.33	SportsLine.com Inc.	0.45
ATS Medical	0.10	Pegasus Communications	0.29	Aquila Inc.	0.26	Sonus Networks Inc	0.45
T/R Systems Inc	0.20	SIPEX Corp.	0.22	Integrated Elect. Svcs	0.28	Stolt-Nielsen ADR	0.45
AHL Services	0.09	Factory 2-U Stores Inc	0.21	AAR Corp.	0.40	JNI Corp	0.45
724 Solutions Inc	0.16	Aspen Technology Inc.	0.24	Milacron Inc.	0.33	Point 360	0.45
Gilat Satellite	0.05	America West Hldg	0.08	HEALTHSOUTH Corp.	0.38	Books-A-Million	0.45
Critical Path	0.35	Mail-Well Inc.	0.28	Hi/fn Inc	0.38	Cirrus Logic	0.45
Petroleum Geo ADR	0.05	Pantry Inc.	0.26	MPS Group	0.35	Zygo Corp.	0.46
Genaissance Pharmaceuticals	0.19	Armstrong Holdings	0.07	Three-Five Sys.	0.37	Edge Petroleum	0.46
Synavant Inc	0.16	Mirant Corp.	0.08	Sierra Pacific Res.	0.32	Fleming Cos.	0.46
Evergreen Solar Inc	0.12	Ditech Communications Corp	0.23	Allegheny Energy	0.20	Goodyear Tire	0.47
Therma-Wave Inc	0.08	eBenX Inc	0.37	Advanced Micro Dev.	0.34	Callon Pete Co	0.47
Corvis Corp	0.27	Analysts Int'l	0.35	Applica Inc	0.39	PDI Inc.	0.47
Finisar Corp	0.13	Quovadx Inc	0.27	United Rentals	0.35	IMCO Recycling	0.47
Airspan Networks Inc	0.15	Aclara Biosciences Inc	0.37	Cont'l Airlines	0.27	Chesapeake Corp.	0.47
Seitel Inc.	0.07	Metalink Ltd	0.34	Bally Total Fitness	0.39	Docent Inc	0.47
i2 Technologies	0.23	Value City Dept Strs	0.28	AmeriCredit Corp.	0.37	Salton Inc.	0.47
Mobility Electronics Inc	0.37	QuickLogic Corp	0.34	Gentiva Health Services Inc	0.32	DigitalThink Inc	0.48
Time Warner Telecom Inc	0.09	Corning Inc.	0.26	Allmerica Financial	0.18	RSA Security	0.49
Vascular Solutions Inc	0.28	Artesyn Technologies Inc	0.28	Sea Containers Ltd. 'A'	0.37	Deltagen Inc	0.49
Optical Communication Prods	0.39	Digi Int'l	0.35	Avnet Inc.	0.30	Applied Extrusion Tech.	0.49
Allegiance Telecom	0.15	MicroFinancial Inc	0.20	Dura Automotive 'A'	0.36	Vignette Corp	0.49
SMTC Corp	0.14	Calpine Corp.	0.28	Westar Energy	0.39	Marimba Inc	0.49
Dynegy Inc. 'A'	0.06	EXFO Electro-Optical Engr	0.25	Delta Air Lines	0.28	TELUS Corporation	0.49
Charter Communications Inc	0.15	MasTec Inc.	0.30	Carpenter Technology	0.38	Arris Group Inc	0.50
Lucent Technologies	0.24	Hypercom Corp	0.37	TXU Corp.	0.38	MSC.Software	0.50
U.S. Energy Sys Inc	0.31	Champion Enterprises	0.39	Integrated Information Sys	0.22	answerthink inc	0.50
Braun Consulting Inc	0.32	Tesoro Petroleum	0.15	Click Commerce Inc	0.25	Ascential Software	0.50
Latitude Communications Inc	0.24	Hawk Corp	0.32	G't Atlantic & Pacific	0.41	CNH Global N.V.	0.50
AXT Inc	0.13	Spectrian Corp.	0.24	XETA Corp.	0.41	Maxtor Corp	0.50
Digital Generation Sys	0.34	Trenwick Group Ltd	0.35	Interface Inc. 'A'	0.41		
Titanium Metals	0.10	GlobespanVirata Inc.	0.26	RWD Technologies	0.41		
Pemstar Inc	0.22	Spartan Stores Inc	0.22	Descartes Sys Group Inc	0.42		

The Rest of the Story

There are stocks that trade at low prices, relative to book value, that are not under valued. As noted earlier in the chapter, low price to book ratios can be attributed to high risk or low returns on equity. In this section, you will consider the characteristics of the stocks in the low price to book portfolio and examine potential problems for investment strategies.

High Risk Stocks

Is it possible that the higher returns earned by low price to book stocks can be explained by the fact that they are riskier than average? Some of the studies referenced in the last section attempted to test for this hypothesis by computing returns adjusted for risk – excess returns. The earlier ones did so by estimating the betas and returns after adjusting for differences in betas for low price to book stocks and concluded that these stocks still made excess returns. Thus, stocks with low price to book value ratios earn excess returns relative to high price to book stocks, if you use conventional measures of risk and return, such as betas.

In recent years, other researchers have argued that these conventional measures of risk are imperfect and incomplete. Low price-book value ratios may operate as a measure of risk, since firms with prices well below book value are more likely to be in financial trouble and go out of business. Investors therefore have to evaluate whether the additional returns made by such firms justifies the additional risk taken on by investing in them.

In Figure 4.5, you compare how stocks in the low price to book ratio portfolio that you constructed at the end of the last section measure up against the rest of the market on three measures of risk.

> *Beta*: Beta operates as a standardized measure of how a stock moves with the market. A beta greater than one indicates a stock with above-average risk.
>
> *Standard deviation in stock prices over the past 3 years*: Unlike beta, which measures how a stock moves with the market, the standard deviation is a measure of stock price volatility.
>
> *Ratio of total debt to book value of capital:* This is computed by dividing the total book value debt (short term and long term) by the book value of both debt and equity (capital). It is a measure of how much a firm owes and is of importance if you are concerned about distress and bankruptcy.

Figure 4.5: Low PBV versus Other Stocks
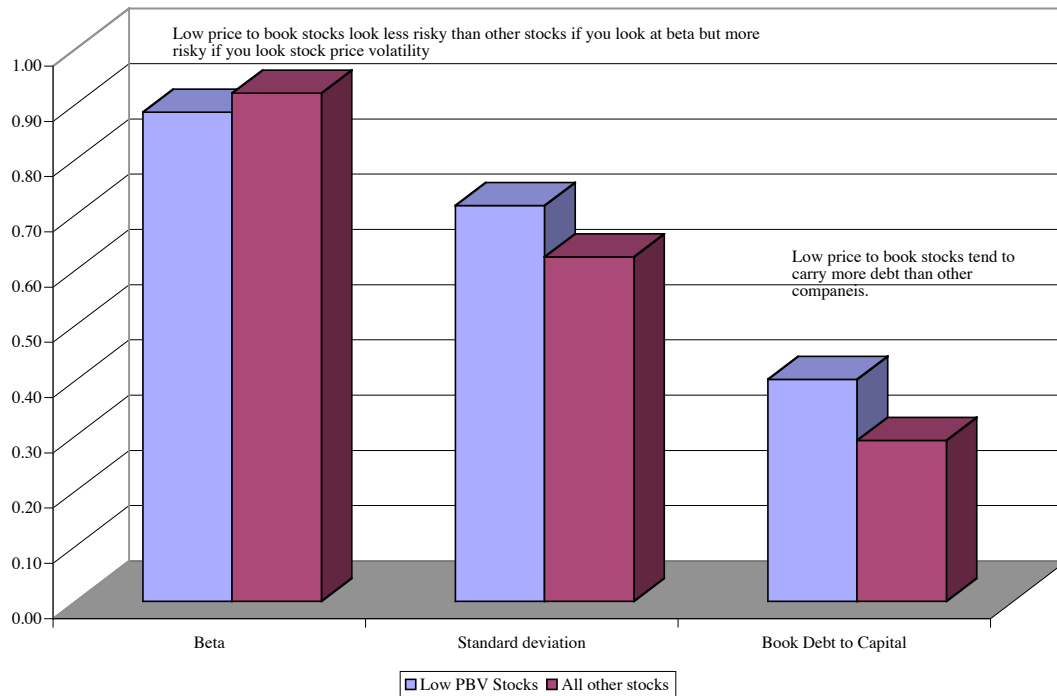
Data from Value Line. The averages are reported for the low price to book portfolo and the market on three variables – the beta and standard deviation estimated over 3 years and the ratio of book debt to book capital.

Low price to book stocks do not look excessively risky on a beta basis since the average beta across these stocks is slightly lower than the average beta across all other stocks. They do look more risky than other stocks on the two other measures of risk – stock price volatility and debt to capital ratios.

To screen the low price to book portfolios and remove stocks with excessive risk exposure, you can screen the stocks on all three measures of risk, using different levels of the measure for screens. The number of stocks that you will lose as a result of each of these screens is listed in Table 4.5:

Table 4.5: Stocks Screened for Risk

Screen	*Number of firms that fail screen*
Beta less than 1	162
Beta less than 1.25	129
Beta less than 1.5	93
Standard deviation less than 60%	169
Standard deviation less than 70%	152

Standard deviation less than 80%	127
Debt ratio less than 50%	61
Debt ratio less than 60%	47
Debt ratio less than 70%	21

A large number of the 195 stocks in the portfolio, are lost when the standard deviation and beta screens are employed. Fewer firms are lost with a debt to capital ratio screen. If you adopt a composite risk measure that includes all three screens - stocks with betas that are less than 1.5, standard deviations in stock prices that are lower than 80% and debt to capital ratios smaller than 70%- the number of stocks in the low price to book portfolio drops to 51 stocks.

Low Priced Stocks

Stocks that trade at low price to book ratios often do so because their stock prices have dropped precipitously. It should come as no surprise that a large number of low price to book ratio stocks trade at very low prices and that many trade at less than a dollar per share. Why would this matter? The transactions costs associated with buying stocks that trade at low prices is often much higher than average or high priced stocks for three reasons:

a. The brokerage costs associated with buying stocks is generally a fixed cost for even lots (lots of 100 shares) and this cost will increase as a percent of the investment as stock prices drop. If you trade through a broker who charges you $ 30 for an even lot trade, the brokerage commission would increase from .3% of your investment, if you were buying 100 shares at $ 100 per share, to 3% if you were buying 100 shares at $ 10 per share to 30% if you were buying 100 shares at $ 1 per share. Institutional and individual investors may be able to negotiate a reduction in brokerage costs as they increase the number of shares they buy but the costs will still increase as stock prices drop.

b. As stock prices drop below a certain level, institutional investors will often abandon a stock. This will reduce the liquidity in the stock and increase the price impact that you have when you trade a stock. You will push up the stock price as you buy and down as you sell, even with small trades.

c. The spread between the bid price (at which you can sell the stock) and the ask price (at which you can buy) tends to become a larger percent of the stock price as the price drops. The loss of liquidity as investors flee the stock exacerbates the problem.

How big are the transactions costs associated with buying low priced stock? If you consider all three components of the cost – the commissions, the bid-ask spread and the price impact, the – the total costs can easily exceed 25% of your investment for stock trading at less than one dollar and 15% for stock trading at less than two dollars. Since you can spread these costs out over time, the drag on your returns will be smaller the longer your time horizon. An investor with a ten-year horizon, for instance, will be able to spread the cost over ten years, making a 25% up-front cost into a 2.5% cost per year.

The portfolio of low price to book stocks is examined in Figure 4.6, with stocks categorized based upon price levels, and the number of stocks that trade at different price levels is reported:

Figure 4.6: Price per share - Low PBV Portfolio
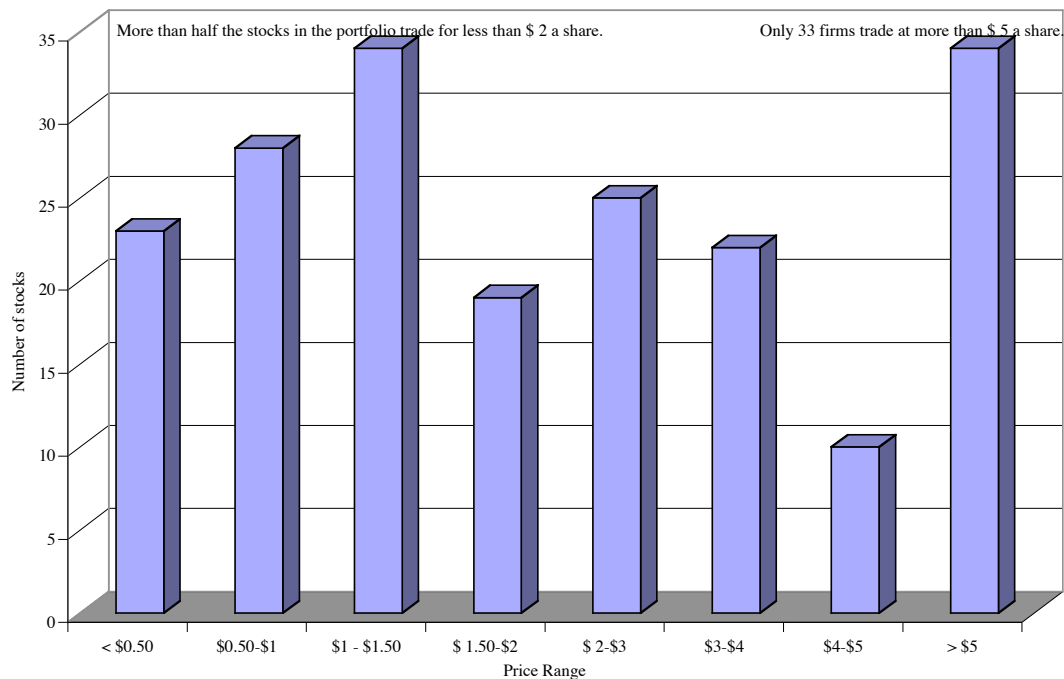
Data from Value Line. Many institutional investors avoid stocks that trade at less than $ 5 per share, because the transactions costs are so high.

Note that 50 stocks, roughly a quarter of the entire portfolio, trade at less than a dollar a share and another 50 stocks trade at between $ 1 and $ 2. If you invested in this portfolio, you would face substantial transactions costs and it is likely that these costs will wipe out any advantages to this strategy, at least in the short term.

It does make sense to screen the stocks in this portfolio for stock price levels. In Table 4.6, the number of companies that would survive a variety of price screens in the low price to book portfolio are listed.

Table 4.6: Price level Screens and low Price to Book Stocks

| Screen	Number of firms that fail screen
Price greater than $ 10	186
Price greater than $ 5	160
Price greater than $ 2	104

Which of these screens should you adopt? Your screens will have to become stricter (higher stock price minimums) as your time horizon becomes shorter. Assuming a five-year time horizon, you should use at least a $ 2 minimum price screen. Consolidating this screen with the risk screens in the last section, the portfolio of 195 stocks that you began the analysis with would have dropped to 39 firms.

Poor Projects: Low Return on Equity

The most significant limitation of a strategy of buying low price to book value stocks is that the low book value multiples may be well deserved if companies earn and are expected to continue earning low returns on equity. In fact, the relationship between price to book value ratios and returns on equity was considered earlier in this chapter. Stocks with low returns on equity should trade a low price to book value ratios. In summary, then, as an investor you would want stocks with low price to book ratios that also had reasonable (if not high) returns on equity and limited exposure to risk.

Considering the low price to book portfolio of 195 stocks again, the returns on equity at these companies in the most recent year were examined. Figure 4.7 presents the distribution of returns on equity across these stocks:

Figure 4.7: ROE for low Price to Book Stocks
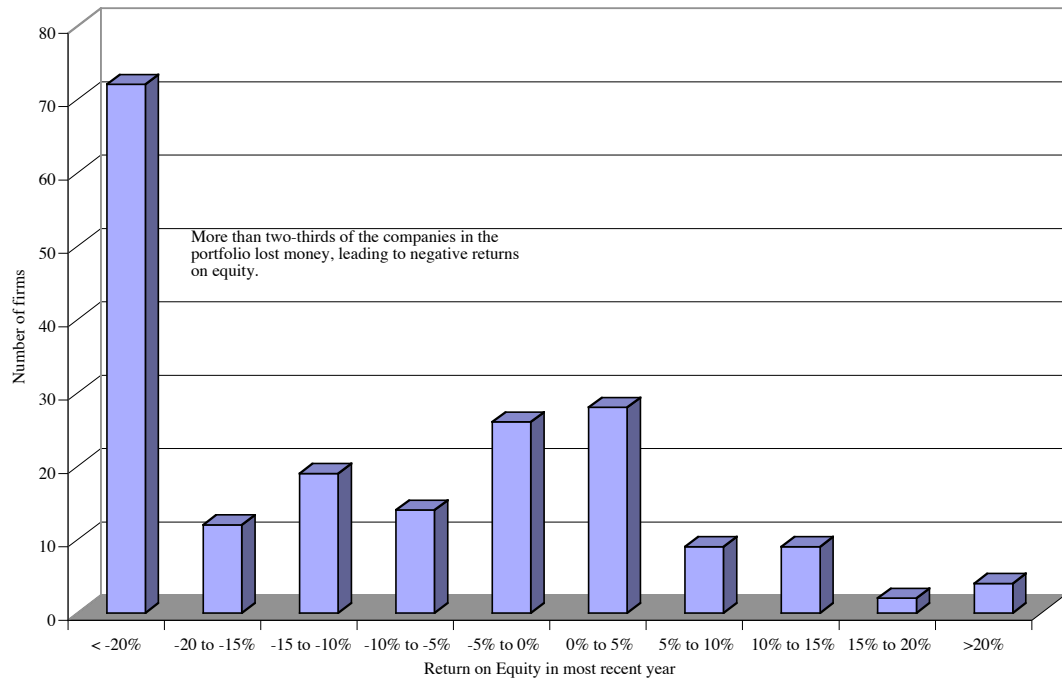
Data from Value Line. The return on equity for each company is computed by dividing the net income in the most recent four quarters by the book value of equity at the beginning of the year.

It is quite clear that a large number of stocks in this portfolio are coming off a woeful earnings year. In fact, 143 of the 198 firms had negative returns on equity and 71 of these firms had returns on equity that were –20% or worse. If you compare the returns on equity on these firms to the average return on equity (of about 10%) for the entire U.S. market, only 15 firms in the sample did better than average. It is true that one year's return on equity can be misleading, especially when the most recent financial year (2001) was a recession year. You could have looked at average returns on equity over the last five years, but it is unlikely to change the overall conclusion. Stocks with low price to book ratios trade at the levels they do because they have low or negative returns on equity.

Any investor interested in a low price to book strategy would be well served applying a return on equity test to the portfolio. Table 4.7 summarizes the number of stocks that would have made the cut with a number of return on equity screens:

Table 4.7: Return on Equity Screens and low Price to Book Stocks

Screen	Number of firms that fail screen
ROE greater than 0%	143
ROE greater than 5%	171

ROE greater than 10%	180

If you require a minimum return on equity of 10% in conjunction with the minimum price constraint ($2) and eliminate firms that are excessively risky (beta >1,5; standard deviation > 80% or debt to capital ratios that exceed 70%), you are left with only 7 firms from the original sample of 195 firms. These firms are listed in Table 4.8:

Table 4.8: Low Price to Book Stocks that meet price level, growth and ROE tests

Company Name	Price	PBV	ROE	Beta	Standard Deviation	Debt/Capital
R.J. Reynolds Tobacco	$42.20	0.44	7.41%	0.70	44.01%	17.26%
McDermott Int'l	$3.16	0.29	5.06%	1.25	74.42%	28.69%
Healthsouth Corp.	$4.72	0.38	8.59%	1.25	67.81%	44.36%
Bally Total Fitness	$6.92	0.39	13.67%	1.20	48.64%	56.47%
Allegheny Energy	$5.86	0.20	11.77%	0.80	40.56%	64.05%
Westar Energy	$10.47	0.39	11.79%	0.50	0.00%	64.87%
MicroFinancial Inc	$2.09	0.20	14.74%	0.75	46.20%	65.20%

Even among these 7 firms, there are potential red flags. With R.J. Reynolds, it takes the form of potential liabilities in lawsuits associated with tobacco, and with the energy companies, it is the overhang of accounting scandals (at other energy companies such as Enron).

Lessons for Investors

If low price to book value ratio stocks are riskier than average or have lower returns on equity, a more discerning strategy would require you to find mismatches – stocks with low price to book ratios, low risk and high returns on equity. If you used debt ratios as a proxy for default risk and the accounting return on equity in the last year as the proxy for the returns that will be earned on equity in the future, you would expect companies with low price to book value ratios, low default risk and high return on equity to be undervalued.

This proposition was partially tested by screening all NYSE stocks from 1981 to 1990, on the basis of both price-book value ratios and returns on equity at the end of each year and creating two portfolios - an 'undervalued' portfolio with low price-book value ratios (in bottom quartile of all stocks) and high returns on equity (in top quartile of all stocks) and an overvalued portfolio with high price-book value ratios (in top quartile of all stocks) and low returns on equity (in bottom quartile of all stocks)- each year, and then estimating excess returns on each portfolio in the following year. Table 4.9 summarizes returns on these two portfolios for each year from 1982 to 1991.

Table 4.9: Returns on Mismatched Portfolios: Price to Book and ROE

Year	Undervalued Portfolio	Overvalued Portfolio	S & P 500
1982	37.64%	14.64%	40.35%
1983	34.89%	3.07%	0.68%
1984	20.52%	-28.82%	15.43%
1985	46.55%	30.22%	30.97%
1986	33.61%	0.60%	24.44%
1987	-8.80%	-0.56%	-2.69%
1988	23.52%	7.21%	9.67%
1989	37.50%	16.55%	18.11%
1990	-26.71%	-10.98%	6.18%
1991	74.22%	28.76%	31.74%
1982-91	*25.60%*	*10.61%*	*17.49%*

The undervalued portfolios significantly outperformed the overvalued portfolios in eight out of ten years, earning an average of 14.99% more per year between 1982 and 1991, and also had an average return significantly higher than the S&P 500. While default risk was not adjusted for in this test, you could easily add it as a third variable in the screening process.

Going back the entire sample of stocks, a series of screens were constructed to devise a portfolio that meets multiple criteria in October 2002:

Step 1: Only stocks with price to book ratios that were less than 0.80 were considered. This screen is a little looser than the one used to get the 195 stocks in the previous section but it allows you to use tighter screens for risk and return on equity.

Step 2: To control for risk, all firms that have betas greater than 1.5 or debt to capital ratios (in market value terms) that exceeded 70% were eliminated. The market value test was adopted instead of the book value test because it is a stricter test for these stocks where the market value of equity is less than the book value of equity. Screening for stocks with low standard deviations was considered but relatively few firms were eliminated. Hence, this screen was not included.

Step 3: To control for price level, all firms that trade at prices less than $3 were eliminated. This test again is slightly stricter than the $2 minimum price level test that was used in the last section, but it will reduce the overall transactions costs of the strategy.

Step 4: To screen for a minimum return on equity, all firms that had returns on equity of less than 8% in the most recent financial year were eliminated. This is looser than the 10% screen used in the prior section.

The resulting portfolio of 53 stocks is included in the appendix.

Conclusion

There are many investors who believe that stocks that trade at a discount on their book values are bargains. Their argument is based upon the belief that the book value of equity represents a more reliable measure of what the equity of the firm is worth or that book value is a measure of liquidation value. The empirical evidence seems to back them since low price to book ratio stocks have historically earned much higher returns than the rest of the market. The peril in this strategy is that book value is an accounting measure and that it may have nothing to do with either the value of the assets that the firm possesses or what it will receive in liquidation from these assets. In particular, accounting decisions on depreciation and whether to capitalize or expense an item can have significant effects on book value as will decisions on buying back stock or taking restructuring charges.

Looking at the fundamentals that determine value, you should expect firms with high risk, poor growth prospects and negative or low returns on equity to trade at low price to book ratios. These firms are not under valued. As an investor, you should therefore be looking for stocks that trade at low prices relative to their book values without the contaminants of high risk or poor returns on projects. In this chapter, you considered how best to accomplish this by screening low price to book stocks for risk exposure and project returns. The resulting portfolio should allow investors much of the upside of a low price to book strategy while protecting them from some of the downside.

Appendix: Undervalued Stocks with Price to Book Screens

Company Name	Ticker Symbol	Price	PBV	ROE	Market Debt Ratio	Beta
Aecon Group Inc	ARE.TO	$4.59	0.74	20.81%	52.11%	0.55
AirNet Systems Inc	ANS	$4.70	0.71	9.49%	38.82%	0.85
Amer. Pacific	APFC	$8.42	0.56	10.95%	41.94%	0.50
Americas Car Mart Inc	CRMT	$13.68	0.72	15.06%	35.46%	0.80
Anangel-American Shipholdings	ASIPF	$5.00	0.46	9.92%	63.89%	0.45
Andersons Inc	ANDE	$12.70	0.68	9.29%	67.81%	0.45
Atl. Tele- Network	ANK	$14.45	0.74	15.61%	10.38%	0.70
Badger Paper Mills Inc.	BPMI	$7.24	0.34	18.81%	41.52%	0.75
Building Materials	BMHC	$14.06	0.62	8.78%	50.39%	0.85
California First Natl Bancorp	CFNB	$10.75	0.76	11.96%	56.93%	0.75
Carver Bancorp Inc	CNY	$10.89	0.58	8.60%	0.00%	0.70
Cascades Inc.	CAS.TO	$15.32	0.74	13.35%	47.47%	0.80
Chromcraft Revington	CRC	$13.47	0.76	8.73%	0.00%	0.50
CKF Bancorp Inc	CKFB	$18.61	0.75	8.17%	0.00%	0.55
Classic Bancshares	CLAS	$24.49	0.75	10.00%	0.00%	0.40
Clean Harbors	CLHB	$15.80	0.64	12.09%	33.23%	0.55
Cont'l Materials Corp	CUO	$26.10	0.71	13.49%	26.21%	0.50
Department 56 Inc.	DFS	$13.51	0.72	10.18%	34.29%	0.95
Everlast Worldwide Inc	EVST	$4.12	0.53	16.37%	33.10%	1.25
Finlay Enterprises Inc	FNLY	$11.96	0.69	12.42%	64.52%	0.95
First Cash Inc.	FCFS	$10.05	0.76	10.81%	31.32%	0.65
Hampshire Group Ltd.	HAMP	$20.40	0.47	12.58%	22.93%	0.60
Harris Steel	HSG/A.TO	$23.00	0.69	16.52%	2.27%	0.45
Hawthorne Fin'L Corp.	HTHR	$28.50	0.78	14.42%	19.82%	0.70
Ilx Inc	ILX	$6.10	0.55	8.65%	65.50%	0.50
Integramed Amer Inc	INMD	$5.83	0.41	20.95%	13.58%	1.05
Jos A Bank Clothiers Inc	JOSB	$22.80	0.72	12.48%	10.83%	0.95
Korea Electric ADR	KEP	$8.78	0.66	13.60%	66.44%	1.00
Lakes Entertainment Inc.	LACO	$6.03	0.48	14.86%	12.62%	0.85
Logansport Finl Corp	LOGN	$17.00	0.77	8.03%	7.44%	0.45
Maxcor Finl Group Inc	MAXF	$6.09	0.6	30.92%	1.46%	0.90
McGraw-Hill Ryerson Ltd.	MHR.TO	$32.00	0.67	12.17%	0.00%	0.50

National Sec Group Inc	NSEC	$14.88	0.68	9.20%	5.30%	0.50
Northwest Pipe Co	NWPX	$14.46	0.78	9.39%	40.70%	0.50
Novamerican Steel	TONS	$6.84	0.51	8.04%	59.92%	0.40
Nutraceutical Intl	NUTR	$9.75	0.49	10.75%	23.32%	0.95
O.I. Corp.	OICO	$4.06	0.73	12.65%	0.00%	0.40
Ohio Casualty	OCAS	$13.19	0.64	12.19%	0.00%	0.75
Old Dominion Freight	ODFL	$25.48	0.65	8.71%	33.98%	0.60
Paulson Capital	PLCC	$4.80	0.49	21.24%	0.09%	0.95
PC Mall Inc	MALL	$4.05	0.48	10.19%	9.75%	1.45
Q.E.P. Company Inc	QEPC	$4.06	0.56	8.94%	65.75%	0.60
Racing Champions	RACN	$15.50	0.63	12.84%	23.29%	1.35
Reitmans (Canada) Ltd.	RET.TO	$23.50	0.79	11.94%	0.00%	0.45
Seaboard Corp.	SEB	$230.00	0.59	10.11%	52.75%	0.65
Sportsmans Guide Inc	SGDE	$7.17	0.56	16.84%	0.04%	0.95
Stackpole Ltd.	SKD.TO	$23.05	0.75	9.11%	11.99%	0.75
Stratasys Inc	SSYS	$8.30	0.66	8.02%	5.66%	0.75
Supreme Inds Inc.	STS	$4.50	0.72	8.91%	25.87%	0.80
Todd Shipyard Cp Del	TOD	$14.20	0.67	10.63%	0.00%	0.50
Todhunter Int'l	THT	$10.70	0.7	10.13%	51.57%	0.40
Tommy Hilfiger	TOM	$7.28	0.77	8.98%	48.50%	1.30
United Auto Group	UAG	$13.37	0.67	8.67%	65.84%	1.20