PRICE TO BOOK VALUE TRENDS IN THE STUDENT INVESTMENT FUND

A Project

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Madison Doris

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Approved by:

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Monica Lam, Ph.D.
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College of Business Administration
Abstract

of

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Statement of Problem

This project lays the groundwork for simplified performance measurement while incorporating price/book value data for further analysis.

Sources of Data

Portfolio holding data are obtained from Fidelity monthly account statements. Book value data are obtained from Mergent Online.

Conclusions Reached

The conclusions were generally inconclusive, and require further study as the Student Investment Fund matures.

_______________________, Committee Chair
Dr. David J. Moore

_______________________
Date
ACKNOWLEDGEMENTS

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Chapter 1

INTRODUCTION

The Student Investment Fund (SIF) is a student-run, faculty led, investment group which manages an endowment fund provided by the university. With an initial sum of $250,000, the SIF has grown that figure to over $325,000 in just over two and a half years, while providing students hands-on investment research experience with real funds. The fund has performed roughly on par with the market, and is benchmarked to the market as a whole, as well as sector-by-sector. This project seeks to follow one key metric in finance, the price to book ratio, through the course of the SIF’s life, from fall of 2010 through spring of 2013.

As students of entered into the group and graduated out, and as different instructors have provided guidance, the research and selection criteria for investments have evolved. Over the past year, Dr. David J Moore in particular has pushed one criterion that is emphasized heavily by investment professionals like Benjamin Graham, and his protégé, Warren Buffett. That criterion is the price to book ratio (P/B), which measures the current price of a share of stock divided by the book value per share. A lower ratio implies that the company may be undervalued relative to those with higher ratios, or in distress. Higher P/B ratios may reflect market expectations of higher future earnings, or irrational exuberance. In either case, Graham suggests P/B should be less than 1.33. Values higher than this leave your fortunes to “the changing moods and measurements of the market.”

It seems reasonable that as this was emphasized more in SIF meetings, that through time, the P/B of the portfolio should decrease, and if that ratio is a functional indicator of future returns, than portfolio returns should also increase through time.

This project aims to track the historic P/B of the SIF portfolio, while providing an easy means of measuring the P/B of all sector holdings. A big part of the project was to create a
working Excel spreadsheet that could be handed down to future SIF classes. The set-up was
designed to allow new students to easily input up-to-date figures, and be able to quickly calculate
the necessary ratios and portfolio value.

The following chapters will provide some background on the ratio in question, as well as explain the process taken to create a spreadsheet for the SIF. It will also examine and explain any findings.
Chapter 2

BACKGROUND OF THE STUDY

*Security Analysis*, by Benjamin Graham and David Dodd, is perhaps the most well-known textbook in finance. It is considered the foundation for what is now known as value investing, a key tenet of the SIF. The premise is that an average investor can beat the market by performing a full financial analysis of a company to derive an intrinsic value (price). If an asset’s derived intrinsic price is below the current market price, then it is undervalued and can be bought for a discount (Graham and Dodd, 494). An investor that routinely buys below market price to later sell when the market realizes the true value of the asset will earn returns greater than the market as a whole. Furthermore, P/B is a great indicator to an investor of how much is being paid for a company’s tangible assets, and how much of the price is a premium over these assets.

Warren Buffett, known as The Oracle of Omaha, was one of Graham’s students at Columbia University, and gained renown in the finance world for successfully investing using Graham’s teachings. He has written several books on his life and on investing, and continues to promote the merits of value investing.

Another investor/author who promotes the power of the P/B ratio in value investing is James O'Shaughnessy. In his book, *What Works on Wall Street*, he examines myriad investing strategies to determine what factors have led to superior returns in the past. By using metrics with the best return history, an investor will continue to create returns going forward (O'Shaughnessy). He dedicates an entire chapter to the study of P/B, and how it correlates with stock prices through time. In short, he finds that P/B does lead to superior returns in the long-run, however there are periods of time when this metric is not the best indicator, particularly during tough economic times such as recessions and depressions (O'Shaughnessy, 166). However, this
corresponds only to stocks in the lowest decile of P/B, as even during economic uncertainty, stocks in the second lowest decile continued to exhibit superior returns.

Despite these works, the P/B ratio has many critics as a guideline for investing. The first argument against, is that it fails to take into account intangible assets, such as brand value and working knowledge of a process or industry. Things that cannot be quantified on a balance sheet can still have great impacts on a company’s performance. It should be noted that an investor can attempt to value these intangible assets, and recalculate the P/B with these included. A second criticism focuses on the variance of P/B ratios across companies and sectors. This occurs because of differing business models and corporate structures. Typically highly capital-intensive companies have more assets, which lowers their P/B. Tech companies, which sometimes have no debt, and survive simply because of coding knowledge and patents, carry almost zero book value, and thus tend to trade at very high P/B ratios.

Investors are aware of these criticisms however and take steps to counter act them. For instance, the SIF does pay particular attention to P/B ratios, but that is not the only analysis performed, and a stock with the lowest P/B isn’t purchased simply for this reason. If another factor outweighs the benefit of the low P/B, the stock is not selected for purchase. Also, the fund uses the ratio on a relative basis, meaning P/B ratios are compared to industry and sector averages rather than across the market as a whole. That way, though some stocks may have higher P/B ratios when they are purchased, they will be lower than their peers.

As the P/B ratio was covered more thoroughly in SIF meetings, it played a bigger part in the stock selection process. It follows then, that as the fund has matured, it’s weighted-average P/B should decline. The analysis that follows seeks to determine if that is true or not.
Chapter 3

ANALYSIS OF THE DATA

P/B ratios are relatively easy to find and calculate, however the main point of this project was to have a tangible spreadsheet to hand down to future SIF members. While the final analysis did not require advanced statistics, significant time was required to develop a working and easy-to-use spreadsheet.

The first step in this process was to develop and fill an Excel database to store all of the SIF account data and historical P/B ratios. Two different data ranges were developed, one which held the basic account statement data, and another for P/B ratios. The P/B ratios table was constructed to the side of the SIF account data. It contains the stock ticker on the left most column, followed by the sector immediately to the right, and then historical P/B ratios. This format makes it simple to add a new month’s worth of data by simply inserting a new column, labeling the date at the top, and entering the data for the corresponding ticker (this is explained in greater detail in the last chapter). The SIF was not proactively tracking P/B ratios since its inception, so some estimation had to be used to fill the table. Historical price ratios were gathered from Mergent Online, an online financial database provided free by the school. This database houses a plethora of data, including historical quarterly P/B ratios. It was assumed that each stock carried same ratio for the three months of the quarter.

The account statement data table is set up slightly differently, with dates in descending order down the left most column. The ticker, followed by the month’s share quantities and prices follow. Dividends are also taken from the account statements, but this column is near the right hand side of the table.

Other data points in the table are calculated. The first was the sector, which required a relatively simple Excel formula called VLOOKUP. This allows the cell to use one data point as a
reference to pull a data point from a determined range somewhere else in Excel; in this case, the sector is pulled from the historical ratios range. Locking the formula to the data range allows the formula to be copied down the entire column. This makes it easier when entering the next month’s data. The “Sector Value” column was the trickiest formula to create. This cell allows the data to be calculated on a weighted average basis for each sector individually, and for the portfolio as a whole. It sums the total value of all of the stocks in a given sector using a SUMIF formula. This formula works by using a reference to the sector for the stock in that row, then providing the sum of all other stock values with the same sector name. The formula will sum, if the data meets a certain criteria, in this case, if the sector matches. This formula requires special attention when inputting new data, as the range it references must correspond to the new month’s data only, and it will only be entered in the future. Weights were then calculated by dividing each stock’s total value to first the sector value just mentioned, and in a separate column, the entire portfolio value. The P/B is calculated using the same VLOOKUP formula as used for the sector. The next column is “MV *P/B” which is market value multiplied by the P/B ratio. This calculation is meaningless in finance, but serves to make the analysis easier.

All of this data is easily summarized in a PivotTable on the next tab of the excel spreadsheet. The table turned out to be more difficult than it would appear. Pivot Tables allow users to input formulas into the table, but the order of operations is not normal. The PivotTable is proficient at adding data points together, however when it needs to multiply or divide, it sums all of the data first, and then multiplies it by the requested field. Unfortunately, the data needed to be multiplied and then summed, as a weighted average is the sum of each average times its relative weight. The work around was to create a column in the data table to do the multiplication first, and then rely on Excel to perform the necessary summations. The result is the “MV*P/B” column in the first tab, and a PivotTable that properly calculates the weighted average. This does
not need to be recreated every time new data is entered, but can be refreshed with simply the click of a button after the data is entered (explained in greater detail below).
Chapter 4

FINDINGS AND INTERPRETATIONS

Once the PivotTable was created, it was a simple matter to examine the results. To initial
surprise, the P/B of the portfolio actually increased from inception to early 2012, from which
point it has generally decreased. This is counter to what was assumed would occur, however
there are a multitude of explanations for this outcome.

The simplest, is that at the fund’s inception, the only holding was a mutual fund designed
to mirror the market. From there, the SIF diversified from the market “spider” to sector “spiders”
(mutual funds designed to track a certain benchmark), before eventually selling the mutual funds
in favor of individual stocks from the appropriate sectors. These funds however have book values
very close to one, as their value is derived from the underlying stocks, not an underlying business
as would be the case with an individual stock. This means that the mutual fund’s price is directly
derived from its assets, meaning a one-to-one relationship with the price and the book value of
assets. A P/B of one is very low compared to the market. Certain sectors average well over
double digits. This means that even as the SIF was choosing stocks with relatively low P/B
ratios, they were still higher than one, raising the fund’s P/B.

There does appear to be a marked decrease since early 2012, as the use of P/B as a
measure of undervaluation increased in the SIF. I believe that as the fund continues to grow that
this ratio will continue to decrease before leveling off. The ratio will then see ups and downs as
stocks are purchased with a low P/B, to be sold later at a higher P/B due to price appreciation.
When one stock is sold, it will be replaced by a stock with a lower P/B.
Chapter 5
APPLICATIONS GOING FORWARD

This project was designed to be the initial step in a more thorough examination of the SIF portfolio through time. The Excel spreadsheet was developed with future users in mind. The spreadsheet was designed to be utilized by those who have never seen the work before, and may not know what P/B even is at the time of this writing. What follows is a step-by-step guide for filling in the spreadsheet and calculating results.

To begin, open the file, which will titled first with the four digit year and two digit month, followed by “20XXXSSIF_Holdings_Book_Value”. The June, 2013 file, the latest at the time of writing, is “201306SIF_Holdings_Book_Value”. Once open, notice that there two tabs, one labeled “Monthly Data”, the other, “Weighted Average PBV” (note, that Excel tabs do not allow the backslash symbol in ‘P/B’). The first tab is designed to hold all of the data to be used for evaluation in the second tab.

In “Monthly Data”, there is a data range that is updated monthly by SIF students. “Monthly Data” consists of the month and year, the stock’s sector, ticker, share quantity, share price, and various calculated fields designed to help in evaluation. These include columns for measuring the dollar value of each investment, the value all investments in a sector, the weight of the investment in the sector holdings, the weight of the investment in the portfolio, dividends, P/B, and a unique measure, market value multiplied by P/B. This last measure was designed as a work around to an order of operations issue within Excel which will be described in more detail later. To the right of this is a second data range which stores all of the historical P/B ratios for each investment, and must also be updated on a monthly basis.

To update the file, begin by selecting and copying all of the previous month’s entries in the main data range. This will start in cell A2, and extend to the “Cash” row in Column O,
labeled “Portfolio Value”. Next, right-click to the left of cell A2 (Where you would click to select an entire row), and choose “Insert Copied Cells”, and when subsequently prompted, choose to shift cells down. This will create a duplicate of the previous month’s account statement. This allows us to adjust all of the necessary data points, while not having to re-enter the stock ticker, and sector, or copy and paste formulas from previous months.

Change the date in the top two entries following the format provided, four-digit year and two-digit month. Select the second entry, and copy it down to the “Cash” row. To help prevent errors, change all of the price and dividend data to 0 to easily indicate whether a stock has been updated or not. This will alter the attached formulas, which will readjust as you enter new data, another useful way to find errors.

Next, work through the Monthly Account Statement provided by Fidelity, which lists SIF holdings and month-end prices. Enter all of the prices next to the corresponding stock ticker, while ensuring that share quantity has not changed during the month. The later pages of the account statement show trades executed during the month, and will provide another chance to look for errors (this is also where you will find dividend data). To input a new holding, select the next row down in the range, from column A to column O, right-click, and select “Insert”, then shift cells down. Input the date, ticker, share quantity, share price, and dividend in the blank row. The range will have blank spots and errors, but these will auto-populate after the P/B data range is also updated.

Before moving on to updating the P/B data range, there is one formula that must be updated in the monthly data range. The “Sector Value” column contains a formula which draws data from a locked range of cells. When copying and inserting in the initial step, this formula stays locked on the previous month’s data. To update it, simply alter the formula in the bottom-most stock to utilize this month’s range of data. The formula reads
“=SUMIF($B$2:$B$30,B2,$F$2:$F$30); to properly update it, ensure that the first locked range
in the formula ($B$2:$B$30) corresponds to the list of sectors in that month’s data, and that the
second range ($F$2:$F$30) also relates only to the current month. The numbers should match at
the beginning and end of each range (B2 to F2, and B30 to F30). Once the bottom stock’s
formula is updated, simply copy the formula to the other month’s cells above. Note that you can
start in any cell, but choosing the bottom and copying up eliminates some formatting issues.

To input a new stock into the P/B data range, follow a similar methodology. Select the
entire entry in the data range one row below where the data should be inputted (the stocks are
listed alphabetically by ticker), right-click, and select insert and shift cells down. Enter the ticker
in the empty row, followed by the sector (obtained from common knowledge or the internet;
make sure the spelling matches previous iterations). Finally, enter the monthly historical P/B
data, which for consistency, should be obtained from Mergent Online (an online stock database
provided free by the school). Consult a fellow SIF student or professor for information on how to
access this data, or search for historical P/B ratios.

Each month a new column must be added to the same data range, as each stock will now
have a new month’s worth of historical P/B data. To do this select the entire column in P/B range
from the latest month, right-click, and select insert, followed by shift cell right. Label this
column with the new month, and insert the new P/B for each stock (obtained from the Mergent
Online).

After all of the “Monthly Data” tab is entered, the next step is to update the evaluation
tab. Simply select a cell in the pivot table and hit Alt+F5 to refresh the PivotTable. This should
recreate the table, but with the newly inputted monthly data in the far right column. You can
manually hit refresh the table, by selecting “Refresh” in the “PivotTable Tools” tab of the Excel
ribbon, under “Options”.
Following these steps should provide the SIF an easy way to track the Fund’s P/B as it progresses. Hopefully, as time goes on, the Fund’s weighted average P/B decreases, while returns increase, consistent with Graham’s and Buffett’s teachings on value investing.
WORKS CITED

