Can Book to Market Ratio Help in Choosing Long-Term Stock Investments?

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Introduction

In 1992, Fama and French found that there is a historical relationship between book to market ratio and yearly stock returns. This relationship was found by splitting up the stocks in the market into ten portfolios based on book to market decile and company size. The mean stock return for each portfolio (decile) was then calculated[1]. The yearly returns were then converted to monthly returns for the purpose of this portion of their study. They found that despite the difference in company sizes, the relationship between book to market ratio and one-year returns is significant. We are interested in determining if such book to market ratio can be used to make long-term investment decisions. In other words, we want to decide whether this value is significant beyond the one-year outlook.

In order to evaluate this significance, we will analyze a regression of multi-period stock returns with book to market ratio as the independent variable and select company fundamentals as the control variables. We will specifically focus on 5 year, 10 year, and 20 year data. However, we will also regress 1 year data to be able to compare the significance of the 1 year time frame to that of the longer time frames.

Hypothesis: Long-term returns on a stock investment may be predicted by the book to market ratio of the stock's underlying company at the time of purchase.

Data Collection Procedure

Data Source

Data was collected using the Wharton Research Data Services from the Wharton School of the University of Pennsylvania. Due to the nature of the required data, two databases were used,

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[1] Fama and French used CRSP and COMPUSTAT data for NYSE, NASDAQ , and AMEX stocks between July 1963 and July 1990.

COMPUSTAT North American Fundamentals Annual, and CRSP Monthly Stock File (hereafter COMPUSTAT and CRSP). The data from CRSP was aggregated before being joined to the COMPUSTAT data using the first six (6) digits of the CUSIP identifier in Excel. Once the data was joined to one table it was filtered and imported to Eviews for analysis.

The data imported from COMPUSTAT accounts for the explanatory variables in our analysis. Namely, it accounts for current assets, net income, number of employees, annual trading volume, industry classification code (SIC), book value per share, and annual price close. All data collected was from the year 1990. The ratio of book value per share and closing price was calculated to obtain the book to market ratio, our independent variable.

Dependent Variable Calculation

The dependent variables of our interest were imported from CRSP. However, the dependent variables were calculated from the data rather than obtained directly. Monthly data was collected for every North American company from 1990 to 2010. This represented over 1 million rows of data which consisted of month closing date, closing price, price adjustment factor, cash dividend paid on common stock, amount paid on delisting, and value-weighted market return. In order to calculate 1 year, 5 year, 10 year, and 20 year returns for each company, a multi-step method was followed using Excel and MATLAB.

Step 1: A variable was designated to be a count of the number of months the company has stepped through. At first, this step could seem redundant given the nature of the data. But it is important to note that companies could make multiple dividend payments over one month, creating two or more rows of data for the same month. Therefore one cannot simply assume that every subsequent row of data for the same company meant that a month had "passed".

Step2: In order to calculate the return of owning the stock for a given month multiple conditions must be considered. First, and most common, if the company existed in the previous month, was not being delisted, and only has one row of data for that given month, the return could simply be calculated as follows:

$$Monthly\ Return = (P_{cur} - P_{prev} + D_{cur})/(P_{prev} * (1 + m_{cur}))$$

Where **P** is the stock price, **D** is the cash dividend paid per common stock, and **m** is the value-weighted market return for that month. This monthly return is *relative to the market* since we are calculating it in part by dividing by the market return.

In the case where the stock has more than one row of data for the same month, the return for that month was calculated as:

$$Monthly\ Return = (P_{cur} - P_{prev} + \boldsymbol{\Sigma}(\ D_{cur}))/(P_{prev} * (1 + m_{cur}))$$

Here the sum of the dividends for the month was pre-calculated before introducing them into this formula. To accomplish this, a simple algorithm was written in Excel to catch cases where companies paid multiple dividends per month.

Another case was the event of the company delisting. Since for the purposes of return we are not interested in what reason the company was delisted, we only focus on the amount paid to the investor per share on the companies delisting month. The CRSP data, however, carried some redundancy with this figure. The delisting payment often represented dividends paid on the same month added with a delisting stock price paid to investors. For this reason, these cases were handled separately from the non-delisting cases by implementing a logical condition. In summary, when a company was identified to be delisting on a given month, only the amount paid on delisting is considered in the return calculation. The updated return equation is then:

$$Monthly\ Return = \begin{cases} \left(P_{cur} - P_{prev} + \boldsymbol{\Sigma}(\ D_{cur})\right)/\left(P_{prev} * (1 + m_{cur})\right), Delisting = FALSE \\ \left(Delisting\ Amount\right)/\left(P_{prev} * (1 + m_{cur})\right), Delisting = TRUE \end{cases}$$

The last and most simple condition is where the company is in its first observed month. In this condition the return was simply calculated as 1 since there was not any previously observable data.

Step 3: Once all month to month return data is calculated it is then used to calculate the equivalent annual rate of return for each company on a month to month basis.[2]

$$Annual\ Return_{\ j} = \left(\prod_{i=1}^{j} Monthly\ Return_i\right)^{\frac{12}{j}}$$

Where **j** is the number of months observed up to and including the current month. It is important to note that this figure represents the overall return of a company at a specific point in time if it were converted to the equivalent return on an annual basis. It is essentially a method to be able to draw comparisons between companies that have been observed for different amounts of time. One limitation, however, is that this figure tends to "smooth" as the number of observations increases. Therefore it is not a fair comparison to draw any conclusions from the variance of this figure within a given company.

Step 4: Since companies are observed for a varying number of months and our dependent data is organized as one row per company, the annual return values must be reorganized into rows by company and columns by date. This is achieved using the VLOOKUP function in Excel with a concatenation of the first 6 digits of the CUSIP company ID and the month of observation (formatted as

[2] Note: This assumes that any cash dividend received by the investor on this stock is immediately re-invested into the same stock.

yyyymm). This data was then filtered through a set of error checking tests in MATLAB to ensure consistency in calculation and elimination of erroneous calculations caused by bad data.

MATLAB is further used to account for the return of companies that have been delisted in the post-delisting time periods. We make the assumption that if an investor were to invest in a company, and the company is delisted, the investor would then transfer their investment to a security that earns the same amount as the value-weighted market. In other words, the investor would be able to re-invest the funds but not earn any more or less than the average investor in the market. This assumption is necessary for two reasons.

Consider the first alternative: The investor, upon the delisting of his/her current investment, does not reinvest the funds. The funds would then earn 0% for the subsequent years. This would introduce a bias in our sampling by relatively decreasing (increasing) the return of companies when the market increases (decreases). This effect would essentially over-represent 0% earning cash holding in a space where it should not be represented in the first place. We then consider the second alternative: The investor, upon the delisting of his/her current investment, reinvests the fund in a method that replicates the annual return he/she has received thus far. Aside from being more unrealistic than the first alternative, this would also introduce bias. For example, consider company ABC which is only observed for 3 years where it surges in price and is eventually bought out. It is completely unrealistic to assume that any investor who initially chose ABC as an investment could then perpetually continue to earn the same returns. Moreover, this assumption would introduce bias by over-representing the behaviors of companies that are delisted.

In order to implement the aforementioned assumption we use MATLAB to calculate the following function in situations where the equivalent annual return is not available:

$$Annual\ Return_{\,j} = \left(Annual\ Return_{\,j-1}\right)^{\frac{j-1}{j}}$$

Note that this function can only be calculated in chronological order. Also, since the annual return is relative to the market, for the purposes of this project, the market earns 0% annually (or a factor of 1 + 0% = 1).

Sample Construction

The return data is then joined to the corresponding explanatory data through the first six digits of CUSIP ID. This resulting table is then filtered for availability of explanatory variables. In addition the data is filtered to exclude stocks that have never traded at a price above $5.00 per share and exclude stocks that had a negative book value per share on 1990. These filters are based on our assumption that the investor is not interested in long-term investment in penny stocks or companies that have negative book value.

The individual explanatory variables are then analyzed individually. We find that the distribution for our explanatory variables tend to be positively (right) skewed. Therefore, we must apply a transformation to these variables. For total assets, number of employees, trading volume, and book to market ratio, we simply take the natural log of these variables to achieve a close to normal distribution for each. Net income, however, has the possibility to be negative. So we may not simply take the natural log of net income. Instead, we first add a constant to net income, and then take the natural log of the sum. In our case, we use $3,000,000 as our constant. The histograms for the explanatory variables before and after their transformations can be found in the “Tables and Figures” section of this document. This approach also has the added benefit that it is similar to the approach Fama and French used in "*The Cross-Section of Expected Stock Returns*"[3].

Since we are only interested in 1, 5, 10, and 20 year returns we eliminate return columns for all other year periods. We then Winsorize both the return data and the book to market data to eliminate influential outliers. In this process, we replace the upper 2.5% and lower 2.5% of values with the 97.5% percentile and 2.5% percentile values respectively.

[Insert Figures 1- 11 about here]

At this point, we also generate an additional explanatory variable as the first 2 digits of the company SIC code (hereafter SIC2) in order to represent the companies' high-level industry classification. This variable will be used to provide a fixed effect constant in some of our regression analysis. Below is a list of all of the variables discussed and their short-hand notations along with descriptive statistics for each variable.

[Insert Table 1 and 3 about here]

Empirical Analysis

First we take a look at the correlation between our variables. Table 2 shows that there is a strong correlation between the natural log of assets and the natural log of employees. For this reason we must be careful not to draw any conclusions about the coefficients associated with these two variables if we run both of them in a regression analysis. In other words, since they are strongly correlated with each other, there exists multi-collinearity and the coefficients associated with them will be unstable.

[Insert Table 2 about here]

[3] For example, they used natural log transformations on book to market ratio and market equity.

The correlation between the natural log of book to market ratio (hereafter LN_BTMRW) and the rest of the explanatory variables is very weak. This is a desirable feature in our model since it reduces the chances of other variables “taking away” the explanatory power from book to market ratio.

The correlation between the dependent variables and book to market ratio is weak. When we transform to obtain LN_BTMRW, we see that the correlation is slightly stronger with the 1 year return but weaker with the 5 year, 10 year, and 20 year returns. A matrix of scatter plots between the independent and dependent variables shows that there is not a linear relationship between any combination of book to market ratio and its transformations with the various returns.

[Insert Figure 12 about here]

We regress each of the four return variables against our five explanatory variables using five models. Model 1 regresses the return against LN_BTMRW and uses SIC2 as a dummy variable to represent industry classification. Model 2 regresses all of our explanatory variables with the exception of SIC2. Model 3 regresses all of the explanatory variables. Models 4 and 5 were designed to account for possible detrimental effects caused by the multi-collinearity of assets with number of employees in Models 2 and 3 (respectively).

[Insert Tables 4 – 7 about here]

As we can see in the results the highest R-square in any of our models with any of the four return variables is 0.22, which represents very low explanatory power. We do however have relatively consistent results for the LN_BTMRW coefficient throughout the models with one exception, Model 1. When regressing the returns greater than 1 year, we see that the coefficient estimate for LN_BTMRW is consistent throughout Models 2-5 but not in Model 1. Even though the R-square is low throughout, it is worth noting that as the return period gets higher the industry dummy variable, SIC2, might be taking too much of the explanatory power when there is only one other variable in the regression. This absorption of explanatory power by SIC 2 in Model 1 is also noticeable by observing that the significance level of the LN_BTMRW coefficient is lowest for the 5, 10, and 20 year return regressions.

Discussion

We do not have significant evidence to show that we can explain long-term stock results with book to market ratios. From regression analysis we have found that book to market ratios might have a stronger impact on shorter term returns of stocks. However, even though this impact is stronger, it is still not considered significant. Moreover, the effect of high book to market ratio on stocks appears to be generally negative from this study. This is inconsistent with the findings of Fama and French (1992). A caveat of our finding is that this study is only along one year. Perhaps 1990 is an outlier in terms of the distribution of book to market ratio effect on return from year to year.

From a practical standpoint book to market ratio can be interpreted as what the market is willing to pay for each dollar of the company's book assets. This can be interpreted as the markets prediction of the stock's future performance. By that approach it is intuitive to see why there would be a slight negative impact of book to market ratio on the prediction of a stocks future performance. The fact that the LN_BTMRW coefficients get smaller and smaller in each model as the return periods increase support this claim. In other words, the markets sentiment towards a stock might change over time and the feelings the market once had about a stock create less and less impact on that stocks performance as time moves forward.

Conclusion

This study shows that there was a lack of a linear relationship between book to market ratio of North American stocks in 1990 and long-term stock performance. Based on the low explanatory power of our regressions, we can safely reject our study's hypothesis. We found that book to market ratio *alone* is not enough to predict future stock returns. However, the topic of book to market ratio and stock performance merits a more meticulous investigation. An expansion of this study could possibly look for additional variables that, in interaction with book to market ratio, can help us make a more accurate prediction of future returns. Limiting the range of stocks studied by setting lower and upper limits on select fundamentals could help narrow down a more "predictable" sub set of stocks to analyze.

References

FAMA, E. F. and FRENCH, K. R. (1992), The Cross-Section of Expected Stock Returns. The Journal of Finance, 47: 427–465. doi: 10.1111/j.1540-6261.1992.tb04398.x

Vassalou, M. and Xing, Y. (2004), Default Risk in Equity Returns. The Journal of Finance, 59: 831–868. doi: 10.1111/j.1540-6261.2004.00650.x

Tables and Figures

Figures 1 – 11: Histograms of Explanatory Variables

The histograms below are used to illustrate part of the need to use natural log transformations for explanatory variables. Data stems from COMPUSTAT Annual Fundamentals data of North American firms in 1990. Only firms that have trade above $5.00 per share at any time between 1990 and 2010, have non-negative book value per share, and have a complete set of data are considered. The explanatory variables considered are total assets, employees, net income, trade volume, and book to market ratio.

Figure 1:

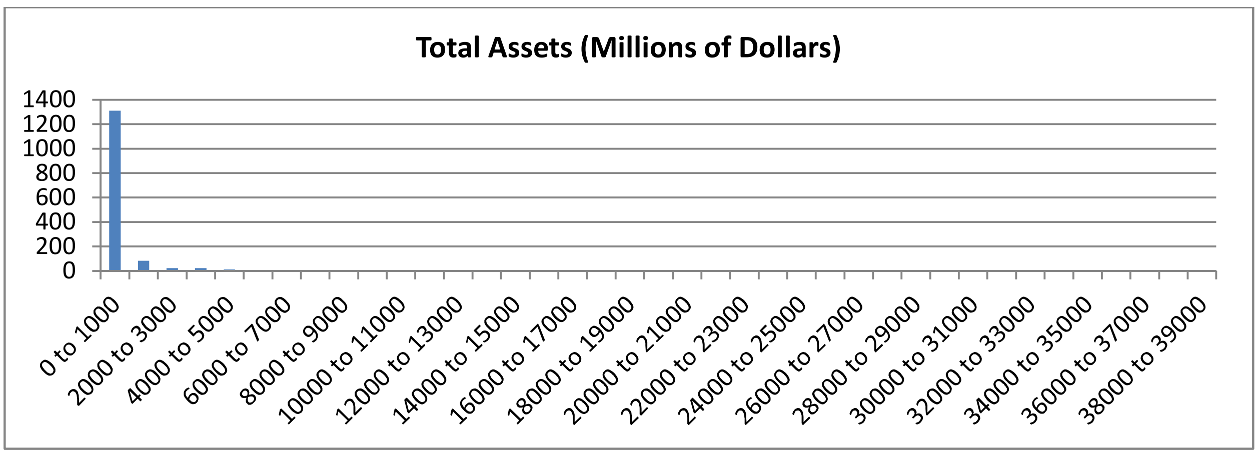


Figure 2:

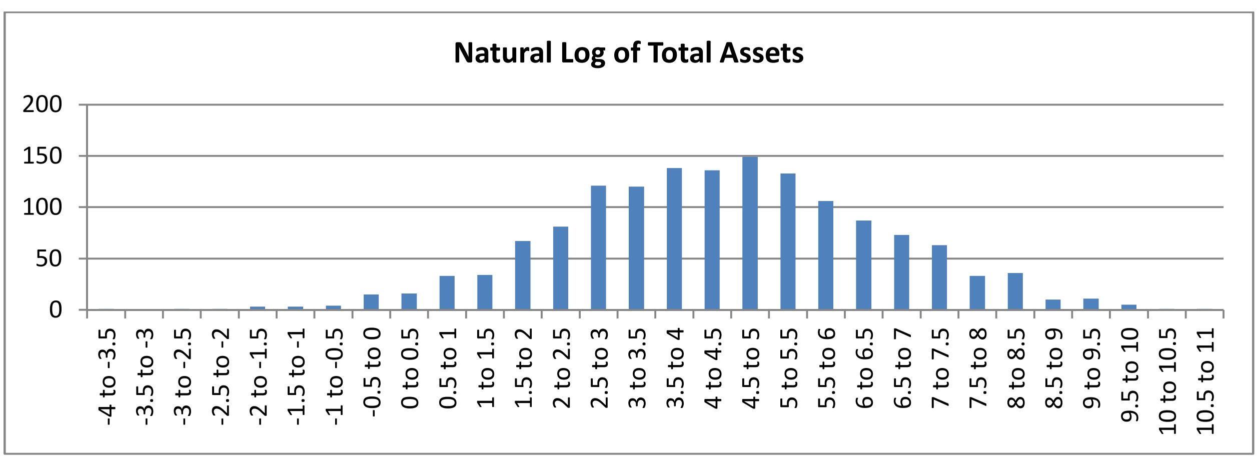


Figure 3:

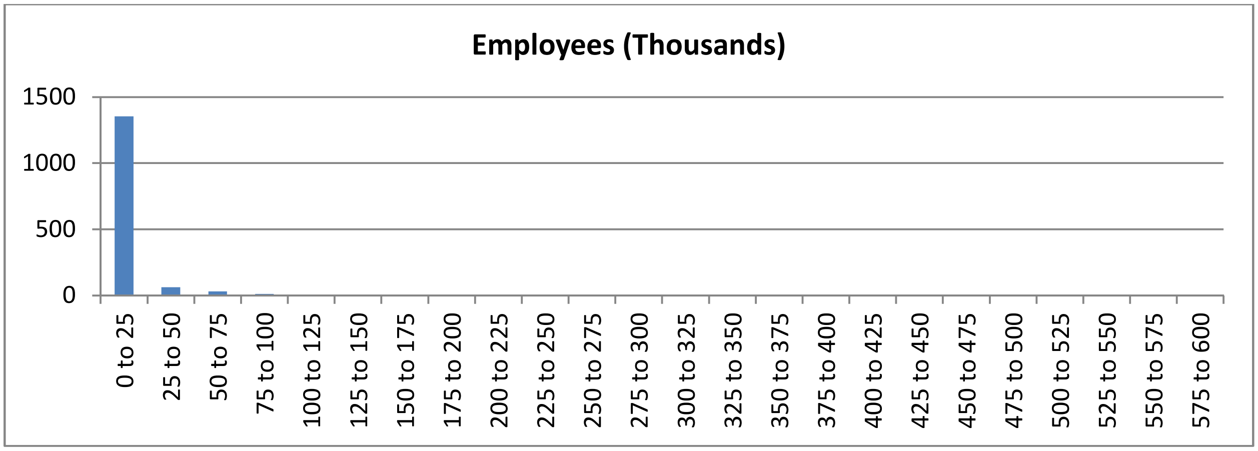


Figure 4:

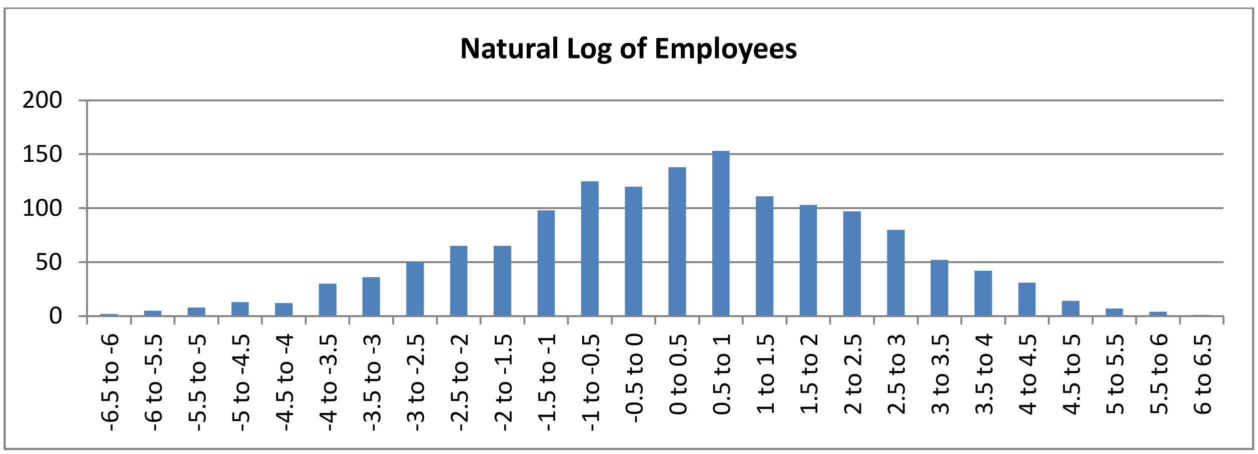


Figure 5:

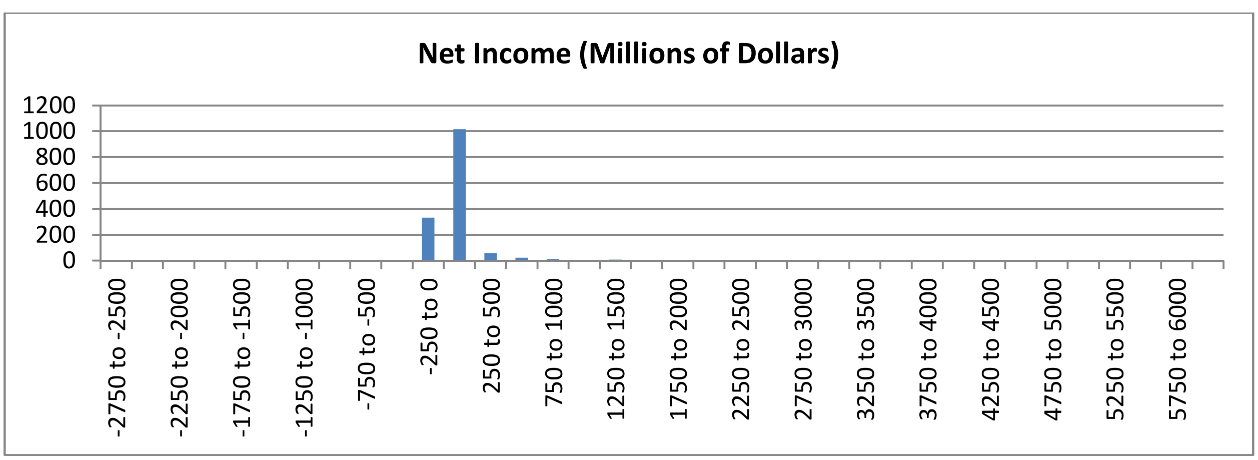


Figure 6:

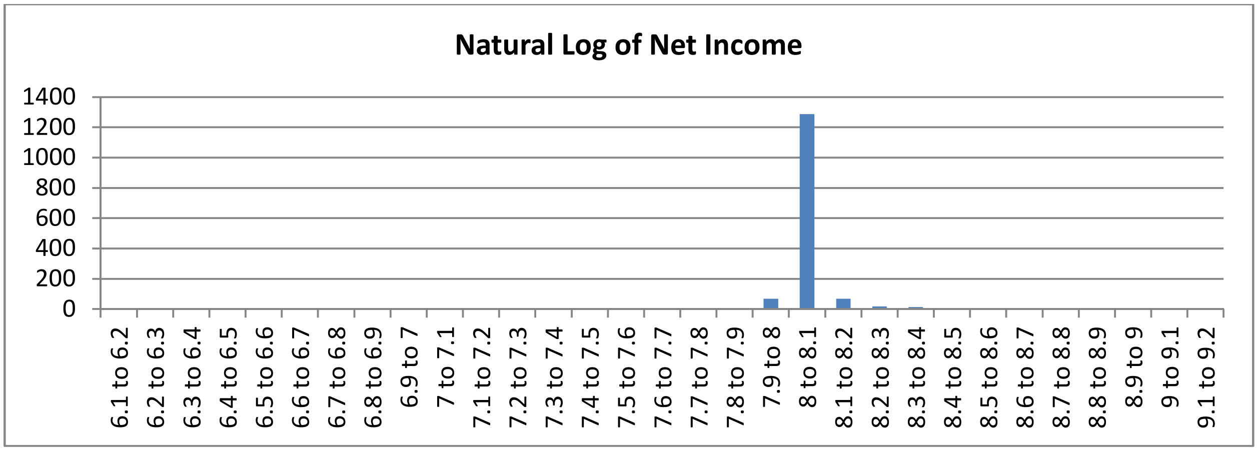


Figure 7:

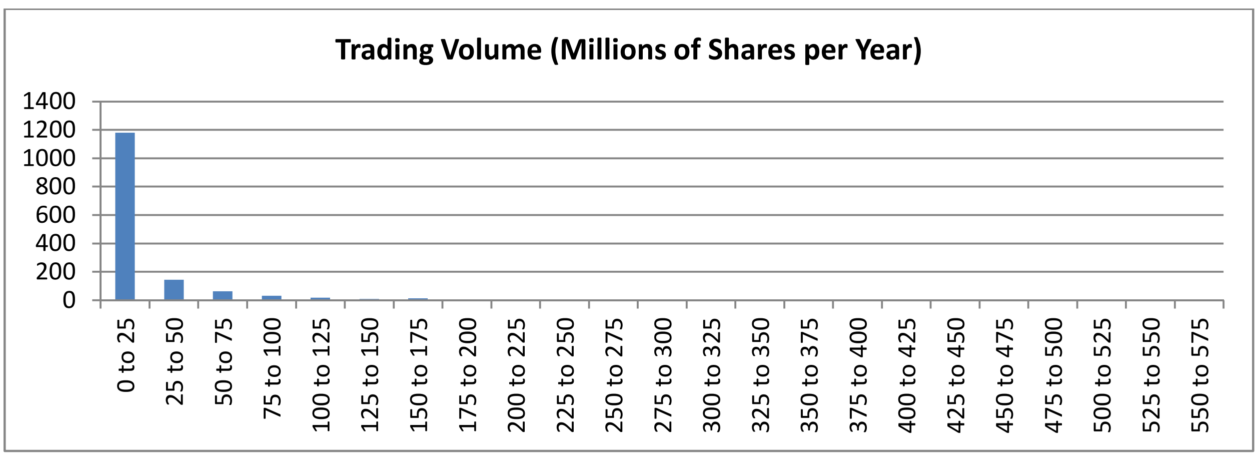


Figure 8:

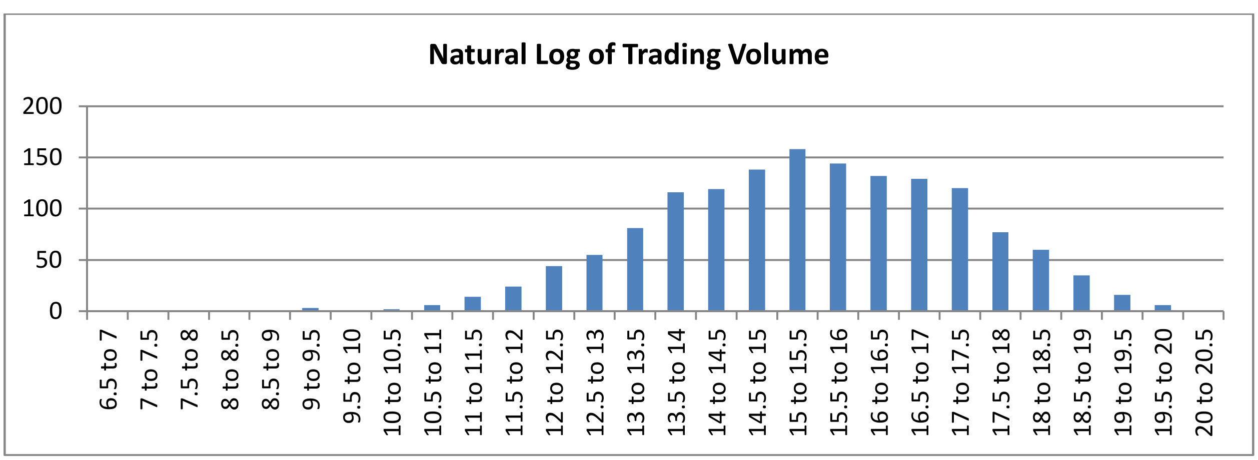


Figure 9:

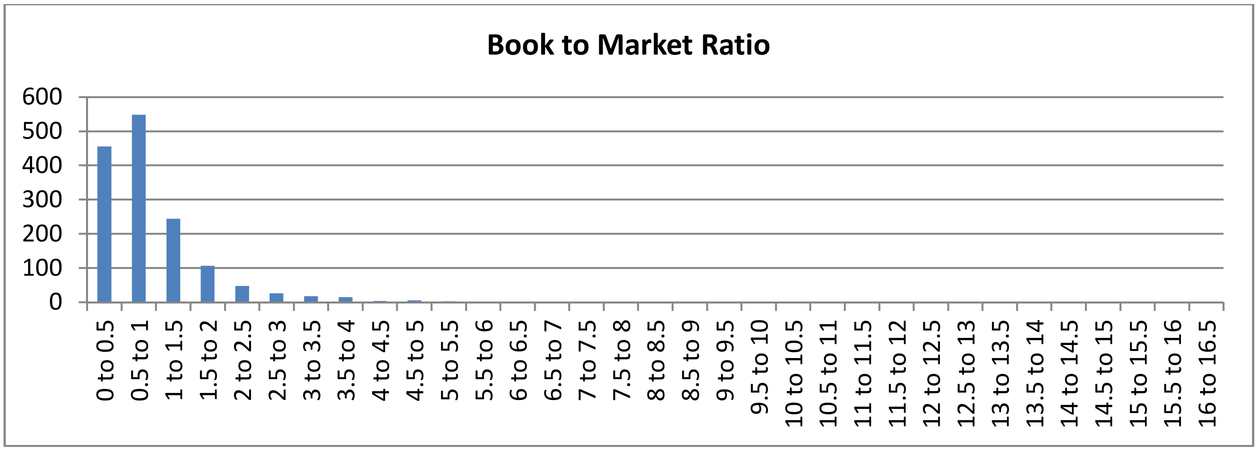


Figure 10:

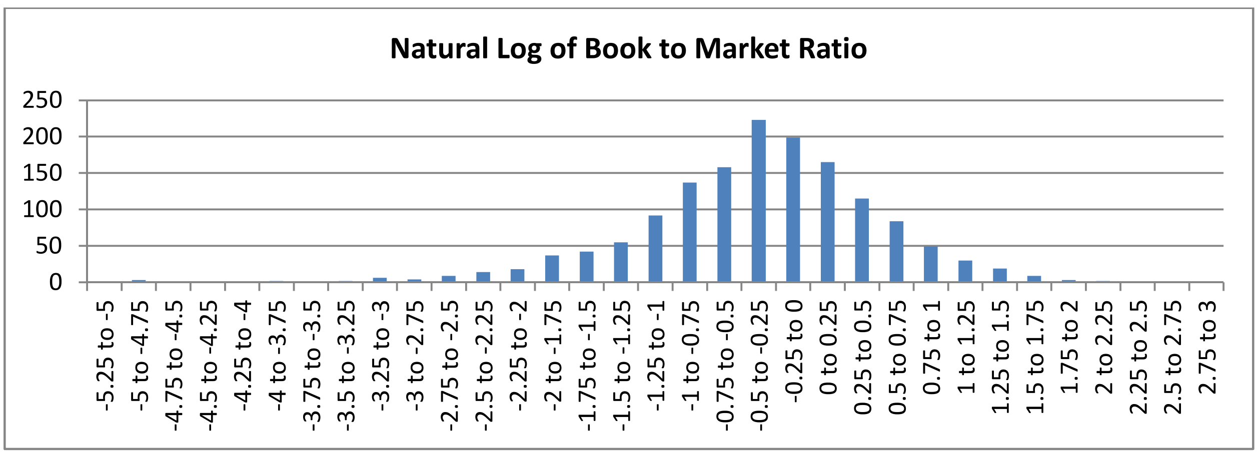


Figure 11:

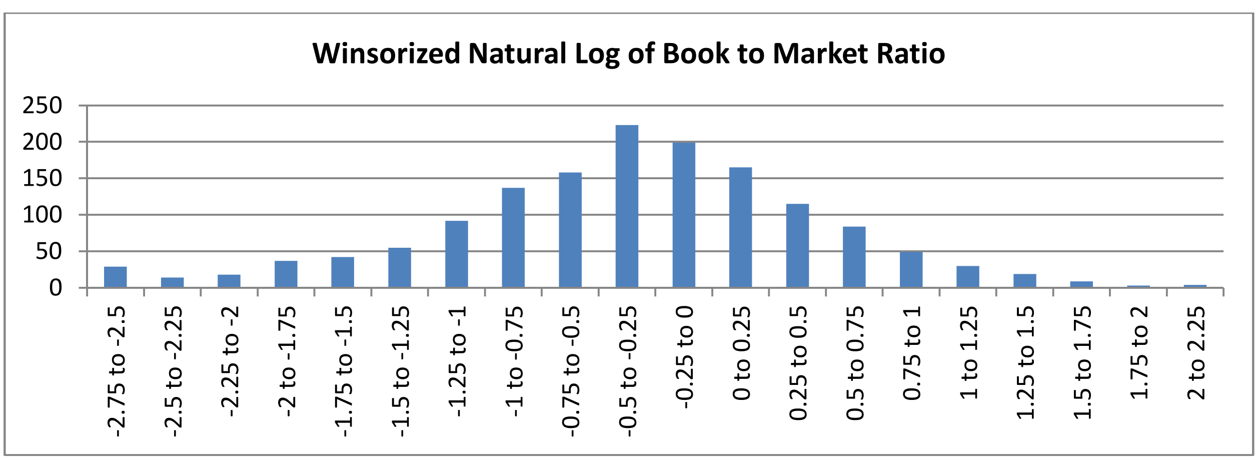


Table 1: Variable Definitions

This table serves as a reference for short-hand variables names throughout this document.

Short-hand	Definition	Type (used this research)
ACT	Total Assets	Explanatory Control
LNACT	Natural Log of Total Assets	
EMP	Employees	Explanatory Control
LNEMP	Natural Log of Employees	
NI	Net Income	Explanatory Control
LNNI	Natural Log of Net Income (plus 3 BB)	
VOL	Trading Volume per Year	Explanatory Control
LNVOL	Natural Log of Trading Volume per Year	
BTMR	Book to Market Ratio	Explanatory Independent
LN_BTMR	Natural Log of Book to Market Ratio	
LN_BTMRW	Winsorized Natural Log of Book to Market Ratio	
SIC	Four digit Standard Industry Classification code	Categorical Control (Dummy)
SIC2	First 2 digits of SIC	
YR1	1 Year Equivalent Annual Return	Dependent
YR5	5 Year Equivalent Annual Return	
YR10	10 Year Equivalent Annual Return	
YR20	20 Year Equivalent Annual Return	
YR1W	Winsorized 1 Year Equivalent Annual Return	
YR5W	Winsorized 5 Year Equivalent Annual Return	
YR10W	Winsorized 10 Year Equivalent Annual Return	
YR20W	Winsorized 20 Year Equivalent Annual Return	

Table 2: Correlation Matrices of Explanatory and Dependent Variables

This tables show the correlations between explanatory variables and dependent variables. The heat-map style coloring is used to show the positive or negative strength of the correlation. Variable definitions may be found in Table 1 (above). Note that the correlations between the dependent variables (YR1W, YR5W, YR10W, and YR20W) are not relevant to this study. Furthermore, because of the iterative nature of the calculation of these variables we can expect a strong correlation between them by construction.

The first table shows the correlation matrix before transforming the explanatory variables. The second correlation matrix is calculated with the transformed explanatory variables. Although the correlations tend to be low in the second matrix, they support the transformations executed since they are stronger than their pre-transformation counter-parts.

	ACT	EMP	NI	VOL	BTMR	YR1W	YR5W	YR10W	YR20W
ACT		0.67	0.80	0.57	-0.06	0.06	0.09	0.14	0.13
EMP	0.67		0.49	0.53	-0.06	0.04	0.10	0.13	0.11
NI	0.80	0.49		0.58	-0.12	0.10	0.10	0.14	0.14
VOL	0.57	0.53	0.58		-0.13	0.10	0.07	0.12	0.10
BTMR	-0.06	-0.06	-0.12	-0.13		-0.33	-0.08	-0.07	-0.10
YR1W	0.06	0.04	0.10	0.10	-0.33		0.50	0.42	0.37
YR5W	0.09	0.10	0.10	0.07	-0.08	0.50		0.78	0.66
YR10W	0.14	0.13	0.14	0.12	-0.07	0.42	0.78		0.80
YR20W	0.13	0.11	0.14	0.10	-0.10	0.37	0.66	0.80	

	LNACT	LNEMP	LNNI	LNVOL	LN_BTMRW	YR1W	YR5W	YR10W	YR20W
LNACT		0.89	0.38	0.62	-0.01	0.13	0.15	0.21	0.25
LNEMP	0.89		0.33	0.54	0.03	0.10	0.18	0.24	0.26
LNNI	0.38	0.33		0.32	-0.14	0.11	0.10	0.13	0.13
LNVOL	0.62	0.54	0.32		-0.31	0.19	0.03	0.04	0.06
LN_BTMRW	-0.01	0.03	-0.14	-0.31		-0.36	-0.04	-0.03	-0.04
YR1W	0.13	0.10	0.11	0.19	-0.36		0.50	0.42	0.37
YR5W	0.15	0.18	0.10	0.03	-0.04	0.50		0.79	0.66
YR10W	0.21	0.24	0.13	0.04	-0.03	0.42	0.79		0.80
YR20W	0.25	0.26	0.13	0.06	-0.04	0.37	0.66	0.80	

Table 3: Descriptive Statistics for Independent Variables

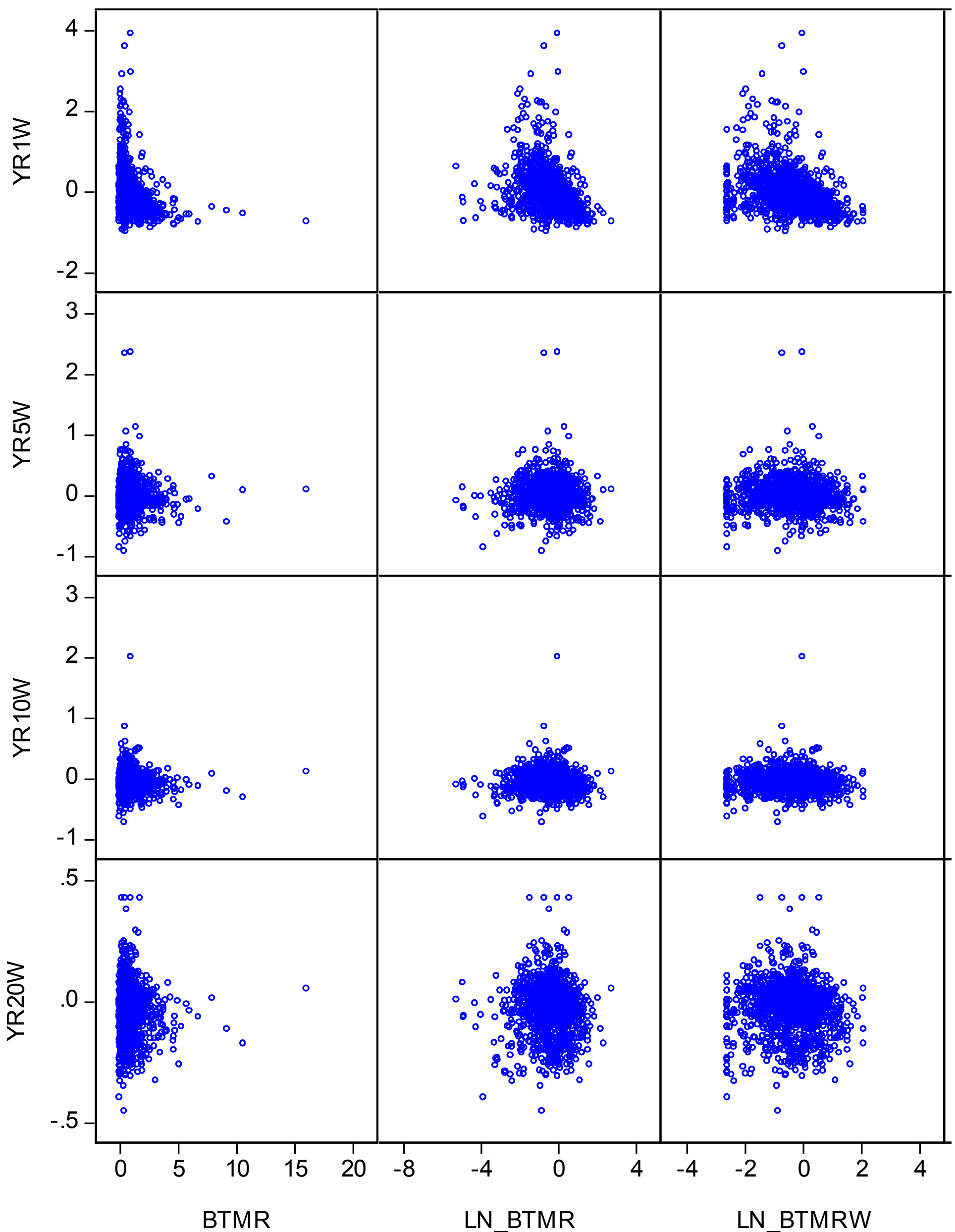
	Control Variables								Independent Variable		
	ACT	LNACT	EMP	LNEMP	NI	LNNI	VOL	LNVOL	BTMR	LN_BTMR	LN_BTMRW
Mean	564.5997	4.38806	9.38354	0.290557	86.33984	8.029627	20505430	15.419	0.967021	-0.382907	-0.368186
Median	78.835	4.367357	1.481	0.392718	5.5075	8.008202	5231388	15.47019	0.724025	-0.322929	-0.322929
Maximum	38920	10.56926	578.8	6.360957	6020	9.1072	572000000	20.16497	16.07173	2.777062	2.109469
Minimum	0.081	-2.513306	0.002	-6.214608	-2510.504	6.193376	1000	6.907755	0.00528	-5.243829	-2.576096
Std. Dev.	1944.159	2.053792	29.62511	2.15617	358.8209	0.099367	44704614	1.84949	0.979826	0.888544	0.832632
Skewness	9.718557	-0.027392	9.309289	-0.173904	7.701775	-1.131158	5.457082	-0.233727	5.137954	-0.78308	-0.284199
Kurtosis	140.2791	2.954848	131.8276	2.832333	101.4326	110.8245	45.21874	2.942125	55.63884	5.71061	3.366836
Jarque-Bera	1171023	0.307016	1032124	9.081608	604673.6	708536.4	115835.6	13.51514	175223.2	596.9992	27.87817
Probability	0	0.857694	0	0.010665	0	0	0	0.001162	0	0	0.000001
Sum	825444.7	6415.343	13718.73	424.7938	126228.8	11739.31	3E+10	22542.57	1413.785	-559.8094	-538.2878
Sum Sq. Dev.	5520000000	6162.585	1282242	6792.29	188000000	14.42549	2.92E+18	4997.514	1402.646	1153.475	1012.876
Observations	1462	1462	1462	1462	1462	1462	1462	1462	1462	1462	1462

	Dependent Variables			
	YR1W	YR20W	YR10W	YR5W
Mean	-0.013984	-0.025577	-0.054924	-0.00554
Median	-0.066081	-0.01083	-0.053053	-0.01096
Maximum	3.89996	0.424215	2.001652	2.35328
Minimum	-0.998059	-0.454472	-0.726006	-0.923317
Std. Dev.	0.482763	0.098326	0.155097	0.215648
Skewness	2.222221	-0.288652	1.712656	1.971587
Kurtosis	13.0559	4.966138	25.71422	23.63901
Jarque-Bera	7363.247	255.7877	32143.81	26895.76
Probability	0	0	0	0
Sum	-20.44515	-37.39301	-80.29914	-8.100115
Sum Sq. Dev.	340.5008	14.12494	35.14432	67.9423
Observations	1462	1462	1462	1462

Control and Independent Variables are obtained from COMPUSTAT North American Annual Fundamentals. Dependent variables are calculated from data obtained from CRSP Monthly Stock File. All data pertains or is in reference to the year 1990. Observations include all North American companies that existed in 1990, have ever been traded above $5.00 between 1990 and 2010, had positive book to market ratio in 1990, and had a complete set of data (i.e. data was available for all of these figures). Formal variable definitions are found on Table 1.

Figure 12: Excerpt from Scatter Plot Matrix of Variables

In this figure we see the scatterplot of the book to market ratio plotted against each of the 4 outlook periods for return. It is apparent from these figures as well as the correlation matrix that the relationship between our main explanatory variable and the dependent variables is weak. Note: This is obtained used scatmat function in Eviews. Return data is calculated from CRSP Montlhy Stock File data. Book to market is calculated from COMPUSTAT North American Annual Fundamentals.



Tables 4 – 7: Regressions relating Stock Returns to Book to Market Ratio

These tables report results for 1 year, 5 year, 10 year, and 20 year stock returns (respectively) regressed with the natural log of book to market ratio. Control and Independent Variables are obtained from COMPUSTAT North American Annual Fundamentals. Dependent variables are calculated from data obtained from CRSP Monthly Stock File. All data pertains or is in reference to the year 1990. Observations include all North American companies that existed in 1990, have ever been traded above $5.00 between 1990 and 2010, had positive book to market ratio in 1990, and had a complete set of data (i.e. data was available for all of these figures). Formal variable definitions are found on Table 1.

Models 1, 3, and 5 use the first 2 digits of Standard Industry Classification (SIC) codes as the industry classification. Models 4 and 5 exclude natural log of employees due to its high correlation with the natural log of total assets. The list of constants associated with each industry classification is not reported.

Table 4: Regression Results for 1 Year Returns

	Dependent Variable: 1 Year Return				
	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
Constant		-0.67088		-0.65704	
		(1.02373)		(1.01975)	
LN_BTMRW	-0.22879***	-0.21110***	-0.22928***	-0.20903***	-0.22677***
	(0.01516)	(0.01541)	(0.01632)	(0.01523)	(0.01617)
LNACT		0.02752*	0.02453	0.02962	0.02300*
		(0.01372)	(0.01605)	(0.00768)	(0.00809)
LNEMP		0.00206	-0.00194		
		(0.01203)	(0.01454)		
LNNI		0.06257	0.13692	0.05940	0.13303
		(0.12885)	(0.13267)	(0.12838)	(0.13231)
LNVOL		-0.00289	-0.00224	-0.00266	-0.00209
		(0.00879)	(0.00910)	(0.00871)	(0.00901)
INDUSTRY DUMMIES	YES	NO	YES	NO	YES
Observations	1462	1462	1462	1462	1462
R-Squared	0.20558	0.14751	0.21811	0.14598	0.21522
Adj R-Squared	0.16970	0.14458	0.18053	0.14367	0.17803

***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

Table 5: Regression Results for 5 Year Returns

	Dependent Variable: 5 Year Return				
	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
Constant		-0.67202		-0.74530	
		(0.48279)		(0.48338)	
LN_BTMRW	-0.01251	-0.02264*	-0.02414***	-0.01900**	-0.02199***
	(0.00718)	(0.00727)	(0.00764)	(0.00722)	(0.00758)
LNACT		-0.00108	0.00205	0.02247***	0.02281***
		(0.00647)	(0.00752)	(0.00364)	(0.00379)
LNEMP		0.02578***	0.02247***		
		(0.00568)	(0.00681)		
LNNI		0.11543	0.12125	0.11144	0.12352*
		(0.06077)	(0.06214)	(0.06085)	(0.06201)
LNVOL		-0.01761***	-0.01937***	-0.01690***	-0.01905***
		(0.00414)	(0.00426)	(0.00413)	(0.00422)
INDUSTRY DUMMIES	YES	NO	YES	NO	YES
Observations	1462	1462	1462	1462	1462
R-Squared	0.10361	0.04979	0.14026	0.03515	0.13337
Adj R-Squared	0.06312	0.04652	0.09894	0.03254	0.09230

***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

Table 6: Regression Results for 10 Year Returns

	Dependent Variable: 10 Year Return				
	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
Constant		-0.62973		-0.68500	
		(0.34164)		(0.34257)	
LN_BTMRW	-0.00264	-0.01622***	-0.01343**	-0.01321**	-0.01170*
	(0.00514)	(0.00514)	(0.00536)	(0.00512)	(0.00532)
LNACT		0.00740	0.01087*	0.02295***	0.02448***
		(0.00458)	(0.00527)	(0.00258)	(0.00266)
LNEMP		0.01722***	0.01504**		
		(0.00402)	(0.00477)		
LNNI		0.09805	0.08872*	0.09606*	0.09091*
		(0.04300)	(0.04353)	(0.04313)	(0.04356)
LNVOL		-0.01660***	-0.01835***	-0.01600***	-0.01796***
		(0.00293)	(0.00299)	(0.00293)	(0.00297)
INDUSTRY DUMMIES	YES	NO	YES	NO	YES
Observations	1462	1462	1462	1462	1462
R-Squared	0.11533	0.08017	0.18429	0.06637	0.17612
Adj R-Squared	0.07537	0.07701	0.14509	0.06384	0.13708

***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

Table 7: Regression Results for 20 Year Returns

	Dependent Variable: 20 Year Return				
	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
Constant		-0.25009		-0.28047	
		(0.21464)		(0.21524)	
LN_BTMRW	-0.00398	-0.01302***	-0.01207***	-0.01105***	-0.01064***
	(0.00330)	(0.00323)	(0.00339)	(0.00322)	(0.00338)
LNACT		0.00778**	0.00758	0.01688***	0.01847***
		(0.00288)	(0.00334)	(0.00162)	(0.00169)
LNEMP		0.01009***	0.01196***		
		(0.00252)	(0.00302)		
LNNI		0.04417	0.02781	0.04270	0.02820
		(0.02702)	(0.02757)	(0.02710)	(0.02764)
LNVOL		-0.01115***	-0.01293***	-0.01077***	-0.01250***
		(0.00184)	(0.00189)	(0.00184)	(0.00188)
INDUSTRY DUMMIES	YES	NO	YES	NO	YES
Observations	1462	1462	1462	1462	1462
R-Squared	0.09732	0.09661	0.18624	0.08425	0.17595
Adj R-Squared	0.05655	0.09351	0.14713	0.08177	0.13690

***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.