A FINANCIAL PROFILE OF THOSE FIRMS THAT MAINTAINED OR INCREASED MARKET VALUE DURING A PERIOD OF ECONOMIC RECESSSION AND FINANCIAL MARKET TURMOIL

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ABSTRACT

Most companies will lose value during any period of recession, whether that value is measured by equity prices, price earnings multiples, or the present value of invested capital. First, there is usually a diminished flow of revenue and cash to meet obligations and avoid potential bankruptcy. Secondly, in recessions and economic slowdowns both consumers and businesses try to conserve and retain sufficient liquid assets to meet their current obligations. The attempts to conserve cash often contribute to furthering a recession. For example, banks may stop or at least slow the rate of lending. Consumers sometimes slow the speed at which they repay loans. Such actions increase the cost of capital and in turn will slow capital investment and production resulting in lower values for most firms. However, there were firms that in the recession beginning in December 2007 and lasting until June 2009 that maintained their value and indeed some actually increased in value. This raises an obvious question. Who were these companies, and how were they different? The purpose of this study was to provide a financial analysis of those firms described by *Value Line* as having maintained or increased their value during this period. Specifically, the analysis tested for significant differences in the financial profiles of that group and companies selected at random, but from the same industries as the first group. A unique financial profile is established for the firms that maintained or increased their value and it is suggested that the profile may be used to identify firms that will maintain or increase value in future periods of economic downturn. **JEL Classification:** G32

INTRODUCTION

A fundamental principle of finance, as described in most all modern texts, states that the primary objective of the financial manager and the corporation (an artificial person), is to maximize the value of the firm (Gitman and Zutter 2011, Brigham and Ehrhardt 2010). The accomplishment of this objective should be a great deal more difficult during a period economic recession and financial market turmoil. Economic recessions and the efforts of companies and individuals to protect themselves from bankruptcy during recessionary periods have been of great interest to financial managers and financial scholars for years. In such a period there is first, a diminished flow of revenue and cash to meet obligations and avoid potential bankruptcy. Secondly, in recessions and economic slowdowns both consumers and businesses try to conserve and retain sufficient liquid assets to meet their current obligations. The attempts to conserve cash often contribute to furthering a recession. For example, banks may stop or at least slow the rate of lending. Consumers sometimes slow the speed at which they repay loans. Such actions increase the cost of capital and in turn will slow capital investment and production resulting in lower values for most firms. The diminished flow of revenue may also result in an unwanted buildup of inventories and layoffs of skilled employees. Thus, during any period of recession most companies may be expected to lose value whether that value is measured by equity prices, price earnings multiples, or the present value of invested capital. There were companies however, that during the recession beginning in December 2007 and lasting until June 2009, that maintained their value and indeed some actually increased in value. It is an understatement to say that this is unusual. The fortunes of those companies during that period were indeed unique. This raises an obvious question. Who were these companies, and how were they different?

The purpose of this study is to provide a financial analysis of those firms described by *Value Line* as having maintained or increased their value in the most recent period of economic recession and financial market turmoil. Specifically, the analysis will test for significant differences in the risk-return financial profiles of those firms that maintained or increased their value during the abovementioned recession and to compare those profiles with companies selected at random. A unique financial profile is estab¬lished for those firms that maintained value and it is suggested that the profile may be used to identify firms that will maintain or increase value in future periods of economic downturn. That is, if the two groups of firms have unique financial profiles, and the model can be validated without bias, it suggests that the unique profile may be used as a tool to forecast companies that will maintain value in future recessions. The use of such a new tool to forecast stable positions of value would have implications for investors, managers, lenders, investment counselors, and academicians.

THE BACKGROUND

On November 26, 2008 then President-Elect Obama while introducing his new team of economic advisors said, “We are on the precipice of the greatest financial crisis since the great depression of the 1930’s.” (Rochelson, November 26, 2008). A few days later the Business Cycles Dating Committee of the National Bureau of Economic Research (NBER) announced that the United States was not only in a recession, but that it had started a year earlier in December 2007. (NBER, November 26, 2008). Moreover, the Dow Jones Industrial Average had fallen from 14,164 on October 9, 2007 to below 8000 on November 21, 2008 (Polsson April 2010). Some

large financial institutions such as Citigroup and American International Group (AIG) revealed major liquidity problems and seemed to be on the edge of bankruptcy. Those liquidity problems began in the real estate markets. The lack of regulation allowed institutions to lend money on real estate to customers that simply could not maintain the monthly payments. Thus, the institutions began foreclosures and their liquidity positions were adversely affected. Large and small banks across the country simply began limiting loans to customers with the very highest credit ratings resulting in a period of financial turmoil and high costs of capital for corporations. It was within this macroeconomic background that some companies maintained or increased their value. Payne, Wiggenhorn, and Daghestani (2008) identified the financial characteristics of firms that experienced high market value to book value ratios, but did not consider the macroeconomic background at the time of their study.

METHODOLOGY

The issues to be resolved are first, classification or prediction, and then evaluation of the accuracy of that classification. More specifically, can firms be assigned, on the basis of selected financial variables, to one of two groups: (1) firms that maintained or increased their value during a period of economic recession and economic turmoil and simply referred to here as maintained or increased value firms, (MIV) or, firms randomly chosen (FRC), but from the same industries as the first group? Multiple discriminant analysis (MDA) provides a procedure for assigning firms to predetermined groupings based on variables or attributes whose values may depend on the group to which the firm actually belongs.

If the purpose of the study were simply to establish a financial profile of each group of firms, simple ratios would be adequate. However, as early as 1968, in a seminal paper on the use of MDA in finance, Altman showed that sets of variables used in multivariate analysis were better descriptors of the firms, and had more predictive power than individual variables used in univariate tests.

The use of MDA in the social sciences for the purpose of classification is well known. MDA is appropriate when the dependent variable is nominally or ordinally measured and the predictive variables are metrically measured. In addition to its use in the Altman study to predict corporate bankruptcy, other early studies used MDA to, predict financially distressed property-liability insurance firms (Trieschmann and Pinches, 1973), growth (Payne, 1993), and the failure of small businesses (Edmister, 1982). This study also employs nominally measured dependent variables and metrically measured predictive variables. The nominally measured dependent variables are the group of MIV firms and the group of FRC firms. The computer program used to perform the analysis is SPSS 19.0 Discriminant Analysis (SPSS Inc., 2010).

Since the objective of the analysis is to determine the discriminating capabilities of the entire set of variables without regard to the impact of individual variables, all variables were entered into the model simultaneously. This method is appropriate since the purpose of the study is not to identify the predictive power of any one variable, but instead the predictive power of the entire set of independent variables (Hair et al, 1992, 99).

SELECTION OF SAMPLE AND INDEPENDENT VARIABLE

A popular measure of the value of the firm has always been the ratio of market value to the replacement value of assets (Tobin's q). That ratio has been

used to categorize firms as "value" firms. Various studies (Fama and French, 1992; Lakonishok, Shleifer and Vishney, 1994; Kim, Henderson, and Garrison, 1993) have incorporated the q ratios in the quest to determine the effects of financial variables on stock returns. Regardless of its previous popularity, Chung (1994) found that senior corporate financial analysts rarely relied on q in their real world analysis and suggested that book value would be a much more reliable method than using the replacement value of assets. Lewellen and Badrinath (1997) substituted a modified book value for replacement costs in the denominator of q. The measure developed by Lewellen and Badrinath (1997) is very similar to the ratio used by *Value Line* for years to identify the one hundred firms in their database selling at what the publication refers to as the "widest discounts from book value." Thus, the *Value Line* ratio is used to measure value in this study because of its availability and widespread use among financial analysts.

All data used in the analysis were gathered from *Value Line Ratings and Reports*. The sample selected for this study consists of two groups of 60 firms. The first group was identified by *Value Line* as the group of 60 firms in their database having the highest ratios of market value to book value during the aforementioned period. The second group is a group of 60 firms randomly selected from the *Value Line* database, but from the same industries as the first group.

In periods of economic recession and financial turmoil all industries will not experience the same effects whether they are adverse or beneficial. It follows that for an unbiased study the effects of industry must be held constant. This was accomplished by matching the companies in the MIV group with companies from the same industry in the FRC group. For example, from the Soft Drink Industry, the Coca-Cola Bottling Company is in the MIV group, and the Pepsi-Cola Bottling Company is in the FRC group. From the Toiletries/Cosmetics industry, Avon Products is in the MIV group, and Elizabeth Arden Products is in the FRC group. From the Auto Parts Industry, Borg-Warner Corporation is in the MIV group, and the Eaton Corporation is in the FRC group. Merck and Company is in the MIV group from the Drug Industry, and Pfizer Incorporated is in the FRC group. In this manner each company identified by *Value Line* as having created strong positions of value during this period was matched with a randomly chosen company, from the same industry. Thus, the matching method of randomly choosing, and matching companies from the same industries eliminates any bias due to differences in industry listings.

Previous studies using this and other statistical methods have chosen explanatory variables by various methods and logical arguments. In this study the group of explanatory variables chosen for analysis includes two measures of return on investment, two measures of risk, one measure of what may be described as the lack of risk as perceived by investors at the margin (those willing and able to buy), and finally a measure of how institutional investors may regard the companies. An evaluation of these measures is needed to accomplish the purpose of this study. A basic tenet of this study is that investors at the margin "trade off" indicators of risk and return to establish the value of the firms. Following are the six explanatory variables:

X1 – One measure of return is return to total capital. Return to total capital includes a return to creditors as well as owners, and recognizes that value is affected by the cost of debt. A measure of return to equity could be used, but it would ignore the cost of debt and the fact that debt as well as equity is used to finance assets. This is consistent with the use of the debt to total capital ratio as a measure of financial leverage.

X2 – Growth may also be regarded as a return on capital, and indeed growth has been of interest to financial investors for years. *Value Line* measures changes in several variables over periods of ten years, five years, and forecasts of change five years into the future. In this study their five-year change in sales was used. Changes in revenue, cash flow, earnings and dividends are also given, but those variables are a long-term function of sales.

X3 –Long Term Debt to Total Capital (DTC) is used here as a measure of financial risk (financial leverage). There are other ratios that measure financial risk very well, but the long-term debt to total capital ratio again recognizes that the firm is financed by creditors as well as owners.

X4 –There is in any company both financial risk and operating risk (operating leverage). Sharpe's beta coefficients contain the effects of both operating and financial risk. It is customary in modern research to separate the two types of risk to identify and compare the sources of risk. The separation is accomplished by using Hamada's (1969) equation to "unlever" the published betas. "The unlevered beta resulting from Hamada's equation is used as a measure of operating or business risk that results from fixed operating costs, and the long-term debt to total capital ratio, as described above, is used to measure risk resulting from fixed financing costs.

X5 – The fifth explanatory variable used in the model is the *Value Line* rating for stock price stability[1]. This measurement is based on the ranking of the standard deviation of weekly percent changes in the price of a stock over the past five years. It is defined in more detail in endnote number one. The lack of price level volatility may be used as a measure of the absence of risk, or safety of investment. There is no aprori expectation that stock price stability would be characteristic of MIV companies. It simply is not known.

X6 –The activity of institutional investors has long been a favored topic in financial literature.The daily trading of such investors varied during this period between 50 and 70 percent of all daily trading on the New York Stock Exchange (Brancato and Rabimov, 2007). We include the buying activity of institutional investors during this period simply as an indicator of how the market or at least a significant part of the market regarded those firms.

In sum, there are six explanatory variables in the multiple discriminant model. They are as follows:

X1 - Return to Total Capital
X2 - The Five Year Growth Rate
X3 - Long Term Debt to Total Capital (Financial Risk)
X4 - Hamada's Unlevered Beta (Operating Risk)
X5 - *Value Line*'s Stock Price Stability
X6 - Institutional Investors Buying

The explanatory variable profile contains basic measures of common financial variables. They were chosen, as in any experimental design, because of their consistency with theory, adequacy in measurement, the extent to which they have been used in previous studies, and their availability from a reputable source.

TESTS AND RESULTS

The canonical discriminant function used has the form:

$$Z_j = V_1X1_j+V_2X_{2j}+.....+V_nX_{nj} \quad (1)$$

Where:

X_{ij} is the firm's value for the ith independent variable.
V_i is the discriminant coefficient for the firm's jith variable.
Z_j is the jth individual's discriminant score.

The function derived from the data in this study and substituted in equation 1 is:

$$Z_j = -1.850 + 11.253X_1 - .195X_2 + .004X_3 + .052X_4 + .009X_5 - .004X_6 \quad (2)$$

Classification of firms is relatively simple. The values of the six variables for each firm are substituted into equation (2). Thus, each firm in both groups receives a Z score. If a firm's Z score is greater than a critical value, the firm is classified in group one (MIV). Conversely, a Z score less than the critical value will place the firm in group two (FRC). Since the two groups are heterogeneous, the expectation is that MIV firms will fall into one group and the FRC firms will fall into the other. The canonical discriminant functions evaluated at the group means (group centroids) were -.508 for the MIV group and .508 for the FRC group. Thus, the critical Z value is zero. This is discussed further in the section on the validation of the model.

Interpretation of the results of discriminant analysis is usually accomplished by addressing four basic questions:

1. Is there a significant difference between the mean vectors of explanatory variables for the two groups of firms?
2. How well did the discriminant function perform?
3. How well did the independent variables perform?
4. Will this function discriminate as well on any random sample of firms as it did on the original sample?

To answer the first question, SPSS provides a Wilk's Lamda – Chi Square transformation (Sharma, 1996, 252). The calculated value of Chi-Square is 26.77. That exceeds the critical value of Chi-Square 12.59 at the five percent level of significance, with 6 degrees of freedom. The null hypothesis that there is no significant difference between the financial profiles of the two groups is therefore rejected, and the first conclusion drawn from the analysis is that the two groups have significantly different financial characteristics. This result was of course, expected since one group of firms maintained or increased value in a period of economic recession and the and the other group was chosen randomly.

The discriminant function thus has the power to separate the two groups. However, this does not mean that it will in fact separate them. The ultimate value of a discriminant model depends on the results obtained. That is what percentage of firms as classified correctly and is that percentage significant?

To answer the second question a test of proportions is needed. Of the 60 firms in the MIV group, 37 were classified correctly. Of the 60 firms in the FRC group, 47 were classified correctly. That is, 84 firms or 70 percent were classified correctly. The results are shown in Table 1. The

correct classifications are in the northwest and southeast corners of the table.

Of course, it seems that 70 percent is significant, but formal research requires the proof of a statistical test. To test whether or not a 70 percent correct classification rate is statistically significant, the Press's Q test is appropriate (Hair et al, 1992, 106). Press's Q is a Chi-square random variable:

$$\text{Press's Q} = [N-(n \times k)]^2 / N(k-1) \qquad (3)$$

where:

N = Total sample size
n = Number of cases correctly classified
k = Number of groups

In this case:

$$\text{Press's Q} = [120 - (84 \times 2)]^2 / [120\,(2-1)] = 19.2 > \chi^2_{.05}\ 3.84 \text{ with one d. f.} \qquad (4)$$

The null hypothesis that the percentage classified correctly is not significantly different from what would be classified correctly by chance is rejected. The evidence suggests that the discriminant function performed very well in separating the two groups. Again, given the disparity of the two groups, it is not surprising that the function classified 70 percent correctly.

The arithmetic signs of the adjusted coefficients in Table 2 are important to answer question number three. A positive sign indicates that the greater a firm's value for the variable, the more likely it will be in group one, the MIV group. On the other hand, a negative sign for an adjusted coefficient signifies that the greater a firm's value for that variable, the more likely it will be classified in group two, the FRC group. Thus, according to Table 2, the greater the following variables: return to total capital, stock price stability, and debt to total capital, the more likely the firm would have maintained or increased value a period of economic recession. Conversely, the greater the levels of growth, operating leverage, and the more favored companies were by institutional investors, the less likely the firm would have maintained value.

The relative contribution of each variable to the total discriminating power of the function is indicated by the discriminant loadings, referred to by SPSS as the structure canonical correlations, and given by the SPSS structure matrix. The loadings measure the simple correlation between each independent variable and the Z scores calculated by the discriminant function. The value of each loading will lie between +1 and -1. The closer the absolute value of the loading to 1, the stronger the relationship between the discriminating variable and the discriminant function (Sharma, 1996). These discriminant loadings (structure correlation coefficients) are given in the output of the SPSS 19.0 program, and shown here with their ranking in Table 2.

Table 2 reveals that the measure of return to total capital made the greatest contribution to the overall discriminating function. It is followed respectively by the measure of *Value Line*'s stock price stability, the measure of operating risk, the measure of financial risk, institutional investors buying, and finally the measure of growth.

Some multicollinearity may exist between the variables, since both return and risk could be reflected in the institutional investors buying activity. Hair, et al (1992)

wrote that this consideration becomes critical in stepwise analysis and may be the factor determining whether a variable should be entered into a model. However, when all variables are entered into the model simultaneously, the discriminatory power of the model is a function of the variables evaluated as a set and multicollinearity becomes less important. More importantly, the rankings of explanatory variables in this study were made by the canonical correlation coefficients shown in Table 2. As discussed the previous paragraph, those coefficients are unaffected by multicollinearity (Sharma, 1996).

VALIDATION OF THE MODEL

Before any general conclusions can be drawn, a determination must be made on whether the model will yield valid results for any group of randomly drawn firms. The procedure used here for validation is referred to as the Lachenbruch or, more informally, the "jackknife" method. In this method, the discriminant function is fitted to repeatedly drawn samples of the original sample. The procedure estimates (k – 1) samples, and eliminates one case at a time from the original sample of "k" cases (Hair et al, 1992, 98). The expectation is that the proportion of firms classified correctly by the jackknife method would be less than that in the original sample due to the systematic bias associated with sampling errors. The major issue is whether the proportion classified correctly by the validation test differs significantly from the 70 percent classified correctly in the original test. That is, is the difference in the two proportions classified correctly by the two tests due to bias, and if so is that bias significant? The jackknife validation resulted in the correct classification of 66.7 percent of the firms. Since there are only two samples for analysis the binomial test is appropriate:

$$t = r - n\,p \,/\, [n\,p\,q]^{1/2} \qquad (5)$$

Where:

t is the calculated t statistic
r is the number of cases classified correctly in the validation test.
n is the sample size.
p is the probability of a company being classified correctly in the original test.
q is the probability that a firm would be misclassified in the original test.

In this case:

$$80 - 120\,(.70) \,/\, [120\,(.70)\,(.30)]^{1/2} = -.797 \text{ is less than } t_{05}\ 1.645 \qquad (6)$$

Thus, the null hypothesis that there is no significant difference between the proportion of firms classified correctly in the original test and the proportion classified correctly in the validation test cannot be rejected. Therefore, it can be concluded that while there may be some bias in the original analysis, it is not significant. The procedure will classify new firms as well as it did in the original analysis.

In addition to the validation procedure, researchers usually address the question of the equality of matrices. One of the assumptions in using MDA is that the variance-covariance matrices of the two groups are equal. The SPSS program tests for equality of matrices by means of Box's M statistic. In this study Box's M transformed

to the more familiar F statistic of 31.2 resulted in a zero level of significance. Thus, the null hypothesis that the two matrices are equal cannot be rejected, and as stated earlier the midpoint value between the two group means can be defined as the critical Z value.

SUMMARY AND CONCLUSIONS

The purpose of this study was to establish a financial profile of measures that for those firms identified by *Value Line* as having maintained or increased their value in the most recent period of economic recession and financial market turmoil. A unique financial profile was estab¬lished for those firms that maintained value and the results suggest that since the model was validated without bias, it may be used as a tool to forecast companies that will maintain value in future recessions.

The results of the statistical analysis indicated first, that there was a significant difference in the financial profiles of the two groups of firms. The fact that the discriminant function separated two heterogeneous groups, and classified a significant proportion correctly is no surprise. In fact, the two groups of firms were so diverse in the matter of maintaining value during that time period that it would certainly have been a surprise if the discriminant function had not been so efficient.

According to Table 2, the greater the return to total capital, stock price stability, and financial leverage, the more likely the firm would have maintained or increased their value in a period of recession and financial turmoil. Conversely, the greater the levels of fixed operating costs to total costs, the rate of growth, and level of institutional investor buying activity, the less likely the firm would have created a strong position of maintaining value.

Three of these results may have been expected, two had no apriori expectations and, one was simply a surprise. Explanations as to why the variables are associated with one group or the other are beyond the scope of this study. However, a few comments on the findings may be in order.

High returns to total capital, and strong levels of price stability may have been expected to be characteristics of firms that maintained or increased value. Likewise, high levels of fixed operating costs during a period of recession were expected to be associated with companies that did not maintain value. Indeed, one of the first remedies tried by firms in such periods is to cut fixed operating costs and conserve capital.

Table 2 further indicates that the greater the measure of financial leverage the more likely the firm would be classified as maintaining value, conversely the greater the level of institutional investor buying activity the less likely the firm would be classified as maintaining value. There were no aprori expectations concerning these variables. Their effects were simply not known. However, the model now establishes that financial leverage is characteristic of firms that maintained value and institutional investor buying is characteristic of the group that did not.

The study resulted in one surprise. The five year rate of growth was not characteristic of firms that maintained value. Value is established in the market place where growth is considered especially by investors with long term horizons many as a very desirable characteristic. No explanation of this empirical result can be offered here, and it may indeed defy logic. However, that finding as well as the other conclusions of the study is rich in content for needed further research.

This study has resulted in a contribution toward the construction of a theory that describes the financial characteristics of firms that have maintained or increased value in a period of economic recession and financial market turmoil. It is further suggested that since the model was validated without bias, it can be used to predict firms that may again maintain value in a similar period in the future. In order to make a more complete contribution to the theory, the aforementioned further research is needed. The construction of a complete theory would aid managers, investors, academicians, and investment counselors by providing greater of knowledge on which to base financial decisions.

ENDNOTES

[1]*Value Line* Stock Price Stability This is a measurement based on the ranking of the standard deviation of weekly percent changes in the price of a stock over the past five years. The lower the standard deviation, the more stable the stock. The higher the standard deviation, the more volatile the stock. The most stable stocks, those in the top 5%, have a Price Stability Index of 100. The next 5% are ranked 95, and so on down to 5. Stocks with ranks of 50 and 55 are average. http://www.valueline.com/sup_glosss.html

As a group, each of the *Value Line* ratings have historically outperformed the next lowest rated group (the one hundreds have outperformed the nineties, which outperformed the eighties, etc.). *Value Line* results have outperformed the DOW by 15 to 1 over the last 35-years. (Investor Home, 1999). The impressive performance of the rating system, and apparent defiance of the efficient market hypothesis, have led many to refer to it as part of the "*Value Line* Anomaly," or the "*Value Line* Enigma." http://www.valueline.com/video/edu/eduvlis20.aspx

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TABLE 1

CLASSIFICATION RESULTS

MIV - FRC Classification

Actual Results	MIV	FRC
MIV	37	23
FRC	13	47

TABLE 2
RELATIVE CONTRIBUTION OF THE VARIABLES

Discriminant Variables	Coefficient	Rank
X1 - Return to Total Capital	.944	1
X5 - *Value Line*'s Stock Price Stability	.444	2
X4 - Hamada's Unlevered Beta (Operating Risk)	-.304	3
X3 - Debt to Total Capital (Financial Risk)	.163	4
X6 - Institutional Investors Buying	-.120	5
X2 - Five Year Growth Rate	-.061	6