

A FINANCIAL PROFILE OF CASH GENERATING FIRMS

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ABSTRACT

The study clearly establishes a financial profile for firms that generate more cash than is necessary for dividends and capital replacement. This profile has implications for corporate managers, portfolio managers, and investors. Data were gathered from 120 firms and statistically analyzed. The cash generating firms were found to have higher systematic risk, and return to total capital, but lower unsystematic risk, price-earnings multiples, financial leverage, and dividend payout than firms in general.

Introduction

The importance of profit seeking corporations generating cash internally has been the subject of a great deal of recent academic literature and several studies. In a study of the W. T. Grant bankruptcy Largay and Stickney found that profitability, turnover, and liquidity ratios tended downward over the ten year period preceding bankruptcy, and that although working capital provided by operation remained stable through 1973, the most striking characteristic of the company was that during that decade it generated no cash internally [12].

The ability of a firm to generate cash has been identified as the most important item in determining the market value of the firm [19]. It has also been suggested that internally generated cash is the first thing considered in identifying takeover targets [10], and that the analysis of cash flow is the most critical issue of the 19-80's [15]. In addition, one of the Value Line screens in selecting investments is a list of companies that have earned more cash in the past five years than was required for capital replacement and the payment of dividends. In spite of all the interest in the generation of cash, there have been no attempts to establish a complete financial profile of the cash generating firm.

The purpose of this study will be to identify the financial characteristics of cash generating

firms. More specifically, the study is concerned with those variables that establish the value of the firm. That is, it would include measures of how the firms risk-return tradeoff character is perceived by professional investment counselors and investors at the margin. It is the action of this latter group in buying and selling that determines the value of the firm. As long as the goal of the financial manager is to maximize the value of the firm, and as long as investors prefer more wealth to less, and as long as portfolio managers have the fiduciary responsibility of maximizing the value of portfolios, and because previous studies have established a high degree of correlation between internally generated cash and value then establishing such a profile will have implications for corporate managers, portfolio managers, and investors.

Multiple Discriminant Analysis

The question to be resolved is one of classification and evaluation of the accuracy of that classification. More specifically, can firms be assigned on the basis of selected variables to one of two groups: (1) firms with heavily internally generated cash flows or (2) firms selected at random? Multiple discriminant analysis (MDA) provides a procedure for assigning firms to predetermined groupings on the basis of variables or attributes whose values may depend on the

group to which the firm actually belongs.

The use of MDA in the social sciences is well known. It is appropriate when the dependent variables are nominally or ordinarily measured and the predictive variables are internally measured. The variables used in this study are measured in that manner, therefore MDA is appropriate and its use in finance is well established.

Selection of Sample and Independent Variables

The sample consists of two groups of thirty firms. The first was selected randomly from the previously-mentioned Value Line screen. That is, firms that have earned more cash in the past five years than was necessary to build plant and pay dividends. The second is a group of firms selected at random, but from the same industries as the first group. In addition to the two groups used in the analysis, it was necessary to select an additional sixty firms to validate the test. The validation sample was chosen at random but again, from the same industries used for the first and second groups and with the same degree of concentration in each industry. The entire study then, involved 120 firms positioned in twenty-one industries.

Previous studies on this subject have chosen explanatory variables by various methods and logical arguments. A basic tenet of this study is that the value of the firm, i.e. the present value of invested dollars, is a function of the firms risk-return tradeoff character and how that character is perceived by investors at the margin and professional analysts. The group of explanatory variables chosen for analysis simply contains three well-known measures of risk, two measures of return and one multiple that indicates how the risk-return measures are viewed. The three measures of risk are the firms beta coefficient, used as a measure of market or systematic risk, the residual variance found in computing those betas used as a measure of company or unsystematic risk, and the debt to total capital ratio used as a measure of financial leverage. The two measures of return are return to total capital and the percentage dividend payout to cash flow ratio. The measure of return to total capital includes a return to creditors as well as owners, and recognizes that the value of the firm is affected by the cost of debt. A measure of return to equity

could properly be used but it would ignore the cost of debt and the fact that assets are financed by debt as well as equity. In order for changes in risk and return variables to have any change on the value of the firm, the changes must provoke some reaction from investors. To get an indication of that change, the analysis contains the price earnings multiple (P/E ratio). The multiple is established by the action of investors and their reaction to any change or perceived change in the firms risk-return character.

In summary, there are three areas for comparison: (1) return on investment, (2) risk, and (3) how the risk-return tradeoff characteristics are perceived by investors and investment counselors. The six variables chosen to measure the three above-mentioned areas are as follows:

X(1) Market Risk. Sharpe's Beta is used as a measure of market or systematic risk. In this study the source for all data was the Value Line Data Base II.

X(2) Company Risk. The residual variance from the regression equations used to determine the beta coefficients is used as the measure of company or unsystematic risk.

X(3) Percentage Dividend Payout to Cash Flow. The percentage dividend payout to cash flow is used as a measure of return.

X(4) Debt to Total Capital. Used as a measure of financial leverage.

X(5) Return to Total Capital. The percentage return on total capital is used as a measure of return.

X(7) Price-Earnings Multiple. The price earnings multiple is used as an indicator of how all investors at the margin view the firms risk-return character.

The final variable profile does not contain the most significant variables on a univariate basis. Moreover, the variables chosen may not be the best measures of those characteristics that they purport to measure. The dilemma, however, is to choose that combination of variables that not only adequately measures the attributes, but that also has a relatively low degree of correlation with each other and is available in a usable fo-

rm. This final variable profile is that desired combination, and the individual variables have been discussed extensively in financial literature.

Test and Results

The computer program used for analysis was the Biomed 04M Discriminant Analysis for two groups [6]. The program defines a discriminant function of the form:

$$\{1\} Z(j) = V(1) X(1j) + V(2) X(2j) + \dots + V(n) X(nj)$$

Where:

$X(ij)$ is the j th company's value for the i th independent variable.

$V(i)$ is the discriminant coefficient for the i th variable.

$Z(j)$ is the j th individual's discriminant score.

The discriminant function derived from the data in this study is:

$$\{2\} Z(j) = .06044(X1) - .86664(X2) - .19555(X3) - .20261(X4) + .22719(X5) - .00033(X6)$$

Classification of firms is relatively simple. The values of the ten variables for each firm are substituted into equation {2}. Thus, each firm in both groups receives a Z score. If a firm's Z value is greater than a defined value, the firm is classified in group one (cash generating firms). Conversely, if a firm's Z score is less than the defined critical Z value, the firm is classified in group two (non cash generating firms). Since the two groups are heterogeneous, it is expected that all firms in the cash generating group will fall into one group and non cash generating firms will fall into the other. The variances of the two groups are statistically equal. Therefore, the value midway between the two group means can be defined as the critical value. This is the value that minimizes overlap and the probability of misclassification. The parameters for the two distributions are shown in Table 1. The mean Z value for group one is -.07316; the mean Z value for group two is -.16463; and the critical Z value is -.04768 to -.13813.

Of the thirty firms in the group of cash gener-

ating firms, 28 were classified correctly, and two were misclassified. Of the thirty firms chosen at random, 29 were classified correctly, and one was misclassified.

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

1. Is there a significant difference in the mean vectors of 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 samples?

One of the output quantities of the Biomed 04M program is Mahalanobis D-squared statistic. This statistic may be defined as "a generalized distance between two groups, where each is characterized by the same set of n variables and the variance-covariance structure is the same for both groups" [5]. The D-squared statistic transformed to the more familiar F statistic can be used to determine whether or not there is a significant difference between the two mean vectors. In this analysis:

$F = 12.12$ with 6 & 53 degrees of freedom is greater than $F_{.05} = 2.58$.

The null hypothesis is therefore rejected, and the first conclusion of this study is that there is a significant difference in the financial characteristics of groups of firms that were classified as cash generating and firms selected at random. The discriminant function in this case does have the power to separate the two groups. However, this does not mean that it will in fact, separate them. This raises the next question.

How well did the discriminant function perform? That is, what percentage of firms were classified correctly, and is that percentage significant? In the discriminant analysis 57 firms or 95 percent were classified correctly. The results are shown on the diagonal in Table 2.

In the test of proportions, such as this, a chi-square test is appropriate. In this case:

Chi = 48.65 is greater than Chi (.05) = 3.84 \bar{c} 1 d.f.

The null hypothesis is therefore rejected and the conclusion can be drawn that the discriminant function is not only capable of separating the two groups but it did in fact separate them well.

The relative contribution of each variable may be obtained by adjusting the discriminant coefficients for differences in the units of measure of the original variables. The adjustment is made arithmetically, by multiplying the square root of the diagonal elements of the variance covariance matrix for each variable by the discriminant coefficient of that variable. The product of the multiplication gives the relative contribution of each variable to the total discriminating power of the function [1]. The adjusted coefficients are shown in Table 3. An examination of Table 3 reveals that return to total capital to be the variable with the greatest contribution to the overall discriminating function, followed by percentage dividend payout to cash flow, unsystematic risk, debt to total capital, systematic risk, and the price earnings ration, respectively.

Before any general conclusions can be drawn, it must be determined whether or not the model can be expected to work for any group of randomly drawn firms. The possibility that the difference between the two groups is the result of sampling errors or search bias must be eliminated. This involves validating the model. The procedure used to validate the model is a modification of the split sample approach [9].

Validation of the Model

The model classified 95 percent of the sample firms correctly. That test is biased because the discriminant function was applied to the same two groups used to derive the discriminant coefficients. The validation procedure involved gathering information for sixty new firms. It is expected that the proportion of firms classified correctly in the validation sample will be less than that in the original sample due to the systematic bias associated with sampling errors. The fact that the validation test is expected to classify a smaller proportion is not important. The major question is: Will the proportion classified correctly by the validation test differ significantly from the original test? In other words,

the difference in the two proportions classified correctly by the two tests is due to bias. The objective is to see if this bias is significant. The values of the variables for the sixty new firms were substituted into equation {2}. This procedure resulted in the correct classification of 55 firms or 91.7 percent. Since there are only two groups the binomial test is appropriate.

$$\frac{55. - 60.(.95)}{\sqrt{60. (.95) (.05)}} = -1.18 \text{ is less}$$

than $t(.05) - 1.645$

Thus the null hypothesis cannot be rejected, and it can therefore be concluded that while there was some bias in the original analysis, it was not significant. The procedure will classify new firms as well as it did in the original analysis.

Conclusion

The purpose of this study was to clearly establish a financial profile for firms that generate more cash that is necessary to pay dividends and build plant. An important finding of the study is that the free flow cash generating firms do in fact, have a unique financial profile. That is, they can be distinguished from firms selected at random on the basis of variables that determine value.

The arithmetic signs of the adjusted coefficients in Table 3 are important. The coefficients for systematic risk and return to total capital are positive, and the coefficients for unsystematic risk, dividend payout to cash flow, debt to total capital and the price earnings multiple are negative. The analysis therefore, indicates that free flow cash generating firms are more likely to have high levels of systematic risk and higher returns to total capital than firms chosen at random. On the other hand, the higher a firms values for unsystematic risk, dividend payout to cash flow, debt to total capital, and the price earnings multiple the more likely the firm will not be a free flow cash generator.

The conclusion that firms with higher cash flows have higher systematic risk and higher returns to total capital is not surprising. It is axiomatic that in order to earn a higher return, a

Table I
Parameters of the Group Distributions
of Z Values

	<u>Cash Generating Firms</u>	<u>Non Cash Generating Firms</u>
Group Means	-.07316	-.16563
Group Variances	.00118	.00198

Table 2
Classification Results

	<u>Actual Results</u>	<u>Predicted Results</u>
Cash Generating	28	1
Non Cash Generating	2	29

Table 3
Relative Contribution of the Variables

<u>Variable</u>	<u>Adjusted Coefficient</u>	<u>Rank</u>
Systematic Risk	.004596	5
Unsystematic Risk	-.075108	3
Percentage Dividend Payout to Cash Flow	-.086202	2
Debt to Total Capital	-.072139	4
Return to Total Capital	.281391	1
Price Earnings Ratio	-.000257	6

higher degree of risk must be assumed. It was however, surprising to find that the cash generating firms have less unsystematic risk than firms chosen at random. It is even more surprising to learn that firms with heavy cash flows have lower price earnings multiples than firms chosen at random. The reason for this is, of course, speculative. However, if earnings are highly correlated with cash flows, then it would result in lower multiples for the cash generating companies. Moreover if "trading on equity" results in higher earnings and the earnings have a high correlation with cash flows, then it is surprising to find that the higher leveraged firms have lower cash flows. Obviously the reasons for some of the unexpected results warrant further study.

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