

Determinants of Capital Structure Choice: An Empirical Analysis

by

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Abstract

This study attempted to investigate the determinants of the capital structure behavior of a sample of firms in the food and beverages industry. It used profitability and business risk variables to empirically test the implications of the trade-off theory of capital structure. The results of the study indicate that the book value leverage ratio of the firms studied is negatively related to profitability at 0.10 level of significance. They also indicate that the same ratio is positively related to business risk at 0.05 level of significance. The results of the study tend to support the pecking order and bondholder wealth expropriation hypotheses.

A) Introduction

A firm invests in plant, property, and equipment to either maintain its

productive capacity, grow, or both. It is the responsibility of the Financial Manager to raise the funds needed for the firm's investments at the lowest cost. The firm may use internally generated funds or source funds externally by issuing debt and/or equity instruments. It may also use both internal and external sources of funds. The firm's earnings, profitable investment opportunities, and dividend policy determine the amount of money it will raise from external sources of funds.

The mix of the various sources of capital used by a firm is called capital structure. That is, capital structure refers to the combination of debt, internal equity, and new equity funds used to finance the firm's assets. Does the capital structure of a firm affect its value? More specifically, can a firm lower its cost of capital, and, thus, increase its value, by some thoughtful mix of its capital structure? Whether or not an optimal capital structure exists, the impact of the

firm's capital structure on its weighted average cost of capital, and the factors that determine its observed capital structure are important issues in financial management.

Researchers in the field of financial economics observed variations in the financing behavior of firms across and within industries. For instance, the 1995 debt to total assets ratio of the firms listed under the food and beverages sector of the Philippine Stock Exchange (PSE) ranges from about 15 to 60 percent. What may explain for the differences in these firms' financing decisions?

This study reviewed the theoretical and empirical literature on capital structure and tested the major implications of the trade-off theory that offered some possible explanations for the capital structure behavior of these firms.

The purpose of the study was to examine the fund raising behavior of publicly traded firms in the food and beverages industry. The study focused on the relationship between the observed capital structure of these firms and the profitability and risk variables. These variables have been suggested in the theoretical and empirical literature as being related to capital structure. Similar studies have been done in the United States, United Kingdom, Germany, Japan, and other countries. However, the results of this study could be different from those of other countries due to differences in tax structure, and the level of sophistication of the financial markets.

B) Hypotheses

The study's investigation of the determinants of capital structure was performed through the validation of the major implications of the trade-off theory by examining two specific hypotheses. The first hypothesis was concerned with the existence of a significant relationship between profitability and the book value debt ratio. The second hypothesis was there existed a significant relationship between business risk and book value debt ratio. Both hypotheses were to be tested at 0.05 level of significance.

C) Theoretical Foundation

The trade-off theory of capital structure is the theoretical foundation of these hypotheses. Modigliani and Miller (1958) put forward the proposition that, given a perfect market in which there are no taxes and transaction costs, a firm's value is independent of its capital structure. Considering the deductibility of interest payments and assuming away bankruptcy costs, Modigliani and Miller (1963) show that a firm can maximize its value by taking on more and more debt in financing its investments. Warner (1977) considers only direct costs of bankruptcy such as legal and accounting charges and reports that these costs are trivial, specially for large firms. Debt financing shields the firm's earnings from taxation if the government allows the deduction of interest expense before the assessment of taxable income. The deductibility of interest expense is valuable for it lowers the after-tax cost of debt. In other words, the tax shield is a form of subsidy in the

sense that it decreases the government's share of the firm's income and increases the total income available for the lenders and owners. The present value of the tax savings raises the leveraged firm's value. However, the present value of costs associated with financial distress and bankruptcy costs decreases the value of the firm as its financial leverage increases. Baxter (1967) was one of the first to suggest this possibility (Copeland and Weston, 1988, pp. 498). The implication of the theory is profitable firms would borrow more to shield their income from taxation, holding other factors constant.

There is a limit, however, to the advantage of the tax shield. As the firm uses more and more debt, the likelihood and costs of financial distress and eventually bankruptcy increase. The present value of bankruptcy costs decreases the firm's value. This implies high risk firms would borrow less, holding other factors constant.

The debt level at which the present values of the tax shield and bankruptcy costs are equal is said to be the theoretical optimal capital structure of the firm. In other words, the optimal capital structure exists the point where the marginal benefit and marginal cost of debt are equal. Altman (1984) considers both direct and indirect costs of bankruptcy and suggests the sum of these costs is large enough to give credibility to the theory of optimal capital structure. Stiglitz (1972), Kraus and Litzenberger (1973), and Kim (1978) all show the existence of optimal capital

structure as a trade-off between tax shield and bankruptcy costs.

The trade-off theory assumes the firm is profitable enough to avail of the advantage of the tax shield, ignores personal income taxes, and considers bankruptcy cost as non-trivial.

D) Data and Methodology

The data used in the study were gathered from the income statements and balance sheets of the sample of firms. The financial statements were obtained from the files of the Securities and Exchange Commission and the database of Technistock Corporation. A total of eight firms was selected for consistency of fiscal year, comparability of size, and availability of data. The firms were approximately of the same size as measured by the natural logarithm of total assets. The data on the firms were gathered for the period 1990 to 1995.

A cross-sectional approach was taken in an attempt to explain observed capital structure as a function of profitability and business risk. The book value debt ratio, computed for each firm as total liabilities divided by total assets, was used as a proxy for capital structure, the dependent variable. Book values were used instead of market values for two reasons. First, the book value debt ratio can be easily interpreted and better reflects a firm's reliance on borrowed funds for investments. Second, the use of book value data was necessitated by the lack of market value data on debt.

Earlier studies that also used book values include Weston (1963), Ferri and Jones (1979), and DeAngelo and Masulis (1980). Moreover, in rationalizing the use of book values Myers (1977, pp. 150) states "it is not that book values are more accurate than stock market values, but simply that they refer to assets already in place."

Profitability and business risk, the independent variables in the regression analysis, were measured by proxies. The ratio of operating income to total assets was used as an indicator of a firm's profitability. The standard deviation of the annual changes in operating income was used to quantify the business risk of a firm. Business risk was a proxy for the likelihood of bankruptcy. Ferri and Jones (1977), DeAngelo and Masulis (1980), Bradley et al (1984), Titman and Wessels (1988), and others have used these proxies for profitability and business risk or earnings volatility.

E) Analysis of the Results

With the SPSS statistical software, the following regression equation was obtained:

$$\text{Leverage} = 0.51 - 0.45 \text{ profit} + 0.03 \text{ Risk}$$

(R-square = 79.4%)

Where, Leverage = financial leverage or capital structure as measured by the debt ratio.

Profit = profitability or operating income divided by total assets.

Risk = Business risk or the standard deviation of changes in operating income.

p-value of the coefficient of profitability = 0.083

p-value of the coefficient of risk = 0.012

The estimated model is statistically satisfactory as shown below.

E.1) Test of Regression Relation

Ho: $B_1 = 0$ and $B_2 = 0$ (i.e., there is no connection between leverage and profit and risk variables).

Ha: Not both B_1 and B_2 are equal to zero.

Level of significance (α) = 0.05

The p-value of the F-statistic equals to 0.019. The p-value is the minimum level of significance at which the null hypothesis could have been rejected. Since the p-value < 0.05 the null hypothesis is rejected. So there is a connection between observed financial leverage and the firm's profitability and business risk.

The estimated model satisfies all the assumptions of the regression model. First, the scatter plot of residuals shows no consistent curvilinear pattern in the residuals. This confirms the linearity of the relationship between the variables

and the independence of the error terms. Second, the same scatter plot shows constant variance of the error terms; that there is no problem of heteroscedasticity. Third, the normal probability plot and histogram of residuals show that the variables are normally distributed. Normality of the distributions of the variables was necessary to use the F and t statistics. Fourth, the collinearity diagnostic test shows that the condition indices are much less than the usual threshold range of 15 to 30. Moreover, the variance inflation factor (VIF) values are less than 10 and the tolerance values indicate that collinearity does not explain more than ten percent of any independent variable's variance. Thus, there is no support for the existence of multicollinearity.

E.2) Tests of the Hypotheses

The first null hypothesis of no significant relationship between leverage and profitability at 0.05 level was accepted (since $p\text{-value} > 0.05$). It must be noted, however, that this relationship would be significant at 0.10 level of significance. The null hypothesis must be accepted since the level of significance was determined before the results were known. The statistical test does not therefore support the suspected significant relationship.

The second null hypothesis of no significant connection between leverage and business risk at 0.05 level of significance was rejected ($p\text{-value} < 0.05$). Thus, the statistical test supports

the suspected significant relationship between leverage and business risk.

F) Conclusion

This study investigated possible linkages between a firm's observed financial leverage or capital structure and its profitability and business risk. The study employed cross-sectional data of eight companies in the food & beverages industry. Financial leverage was regressed against profitability and business risk. The findings of the study may be summarized as follows:

1. The average firm in the food & beverages industry's use of debt financing is related to its profitability and business risk.
2. The relationship between leverage and profitability is negative and significant at 0.10 level of significance ($p\text{-value} = 0.083$). This is inconsistent with the positive relation expected in accordance with the trade-off theory of capital structure. The result implies that the tax benefit of debt is not valuable. One possible reason for this is the existence of sufficient non-debt tax shields such as depreciation expense. The availability of non-debt tax shields large enough to protect the firm's income from taxation would reduce the significance of the relative benefit of debt.

Donaldson (1961), Hurdle (1974), Myers (1977 and 1984), Carleton and Silberman (1977), Nakamura and Nakamura (1982), Long and Malitz

(1985), Titman and Wessels (1988), and Baskin (1989) found that profitability exerted a significant negative influence in regressions of debt ratios. The results of this study and the cited studies provide a strong empirical support for the pecking order hypothesis.

3. There is a significant positive relationship between the firms' leverage and business risk. This is again inconsistent with the trade-off theory. This finding lends support to the bondholder wealth expropriation hypothesis. The implication of this finding is a firm would borrow more, to increase its value, as its business risk and the likelihood of financial distress increase. The equity in a levered firm can be thought of as a European call option (Black and Scholes, 1973). Assuming away restrictive covenants, shareholders would maximize their payoff by taking on more debt. For instance, the firm could issue new debt and use the proceeds to repurchase the firm's outstanding shares, with no effect on its total assets. Masulis (1980) found highly significant announcement effects (a holding period return of 7.6%) for leverage-increasing exchange offers (Copeland and Weston, 1988, pp. 519).

4. The standardized coefficient values (or Beta values) indicate that business risk exerts a greater influence on leverage ratio relative to profitability.

G) Limitations of the Study

Capital structure is a difficult area of inquiry for several reasons. First, there

are measurement problems arising from the different applications by firms of the generally accepted accounting principles. For instance, some firms include contingent securities, deferred taxes, minority interests, and so on in the total of their liabilities. This makes it difficult to precisely measure the capital structure of such firms. Second, it is not now possible to obtain market value data on debt for lack of a bond market in the Philippines. Third, many firms whose shares are traded on the PSE were listed within the last five or so years. So it is difficult to get market value data on equity for an extended period of time, say 10 or 15 years, for many firms. Finally, some important variables such as the classification of assets into tangibles and the amount of non-debt tax shields cannot be accurately computed from the financial statements of many firms in the Philippines. The results of the study must therefore be considered in view of these unavoidable limitations.

H) Areas for Further Research

The results of the study tend to support the pecking order and bondholder wealth expropriation hypotheses. The trade-off theory may be incomplete as Myers (1984) pointed out. It is therefore suggested:

1. To expand the trade-off theory by including other variables, e.g. asset-type, non-debt tax shields, size of the firm, and so on, in the regression model. Other researchers suggested these variables and many other variables.

2. To expand the scope of the study by including other industries so as to make the results more generalizable.

3. To empirically test the pecking order and the bondholder wealth expropriation hypotheses.

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