The relationship between firm value and long-term debt examining large S&P 100 companies

Azhar Uddin
Lamar University

James L Slaydon*
Lamar University

ABSTRACT

The effect of capital structure on firm value is one of the most debatable issues in corporate finance. Corporate managers focus on increasing the market value of the firm. Whether firms can increase their market value by altering their financing, and which part of the firm capital (debt or equity) plays the dominant role for that is still inconclusive. The relationship between leverage and firm value research has shown results ranging from positive influence to negative influence, with other factors showing no significant relationship at all. The part of the debt (short term vs. long term) that has greater influence on firm value and the direction of influence have not been conclusively established. This study examines the effect of long term debt on the market value of a firm. The study has been performed on a sample of 97 large blue chip companies under the S&P 100 index during the period of 2006–2014. Using multiple regression analysis, the results of the study indicate that a higher level of long term debt is negatively related to the firm value. The results focus on the risk averse nature of market participants in relation to the riskiness of debt.

Keywords: firm value, long-term debt, S&P, risk, firm capital

INTRODUCTION

Companies need capital for numerous reasons, such as expansion, entering into new markets, research and development, take over, acquisition, etc. Companies can fund their capital needs either from internally generated sources or from external sources. Issuing stocks and taking long term loans are the most common types of external sources. Since companies do not have access to both markets equally, companies face the dilemma about which source (or combination of sources) of funds they should use to maximize shareholders' wealth.

The capital structure decision related to the amount and type of debt used has been examined in numerous studies. Some studies conclude that the use of debt can increase firm value up to the optimal capital structure. Other studies indicate that the use of equity creates value. Some studies state that the use of both in a target ratio can maximize firm value. A number of studies have shown that the use of debt does not have any effect on a firm's value. The results from many studies conclude that the use of any one of these has a negative effect on a firm's value. In summary, the effect of capital structure on firm value is still inconclusive.

In the first seminar article, Modigliani and Miller (1958) stated that capital structure has no effect on the firm value in a world without taxes and bankruptcy. The assumptions of the MM Model (1963) make it unrepresentative of a real world firm. Five years later, in another study considering the presence of taxes, Modigliani and Miller (1963) stated that firm value can be increased with the use of debt because of the 'tax shield' effect. The second proposition of Modigliani and Miller (1963) states that the company should have 100 % debt finance to reach maximum market value. This proposition did not consider bankruptcy costs, which is essentially associated with the increased amount of debt. In the real world, bankruptcy costs do exist, which do not encourage companies to have 100% debt finance. An example of a firm that does have a high level of debt but does not worry about bankruptcy is Fannie Mae. Fannie Mae is not expected to fail, as it is a government-sponsored firm. Miller (1977) infers that there is a very small amount of tax benefits that exist on debt. The trade-off theory has found a positive correlation between capital structure and firm value. It states that, up to a certain point (target level), the use of debt can increase firm value as they trade off the rising bankruptcy cost with the savings from the tax shield. Beyond the target level, an additional amount of debt distorts firm value. Thus, the theory states that for every firm there is an optimal capital structure that would maximize its firm's value. Hovakimian, Opler, and Sheridan (2001) found that firms tend to move a target debt level in the long run, which is consistent with the trade-off theory.

The use of internally generated funds has been supported in many studies. In the real world, firms that are more profitable do not use external funds. These profitable firms use more internally generated funds, found Sunder and Myers (1999), and Fama and French (2002).

These authors have found debt has a negative impact on firm value. Therefore, a firm would be better off if it avoids debt as a choice of financing. Debt is negatively related to firm value, found Loncan and Caldeira (2014). Fama and French (1998) showed that a marginal relationship between leverage and firm value is negative. Increasing debt can produce negative performance in companies, as found by Rajan and Zingales (1995). Again, some researchers did not find any substantial relationship between capital structure and firm value (Raj and Ajit, 1996; El Kelish and Marshall, 2007).

Apergis and Sorros (2010) have found that long term loan has a negative effect on firm value. Their study concluded that the use of a long term loan decreases the market value of the company. Loncan and Caldeira (2014) found a significant negative relationship between firm

value and long term debt. On the other hand, Michael C. Dalbor, Seoki Lee, and Arun Upneja (2007) explored the impact of long term debt and firm value in the lodging industry and found a positive relationship between long term debt and the value of the firm.

Financing decisions for a corporation is a critical choice because the value of the corporation depends on its debt-equity mix (Pagano, 1993; Boyd and Smith, 1998; Hovakimian, Opler and Titman, 2001). In the study of security issues, done by UK companies between 1954 and 1974, Paul Mash (1982) stated that in selecting debt and equity, companies are heavily influenced by market conditions and its previous history of stock prices.

With the presence of personal taxes, Graham (1999) found debt use has a positive correlation with tax rates in each year between 1980 and 1994, with a statistically significant coefficient. Graham documents that personal taxes do not entirely negate the corporate tax benefit to leverage.

This study examines the effect of long term debt on the market value of a firm. The study has been performed on a sample of 97 large blue chip companies under the S&P 100 index during the period of 2006–2014. Using multiple regression analysis, the results of the study will indicate if higher levels of long term debt are positively or negatively related to the firm value.

DATA

The necessary data for this research were collected mainly from S&P Net Advantage. Stock prices came from Yahoo Finance. Part of the data was collected from 10K report of the companies and from Value Line (2014). This study used financial information mostly from 2006 to 2014 for 97 companies under the S&P 100 index, as of July 07, 2014. The study excluded the financial data for Heinz Inc., Dell Inc., and News Corporation because of information unavailability, due to either their internal changes (merger-acquisition and going private) or lack of information for subsequent years.

This study used multiple regression analysis to describe the relationship between firm value and long term loan (and other independent variables). It utilized Minitab statistical software for multiple regression analysis.

MODELS

The initial model for the study included natural log of total assets (LN TA), natural log of long term debt (LN LTD), debt-to-asset ratio (total liability divided by total asset- TL/TA), growth rate of total asset (GR TA), and growth rate of total revenue (GR REV).

The First Model is:

$$\text{Firm Value} = \alpha + \beta_1 \text{LN (TA)} - \beta_2 \text{LN (LTD)} + \beta_3 \text{LN (TL/TA)} + \beta_4 \text{GR (REV)} + \beta_5 \text{GR (TA)} + \epsilon$$

Where,
LN (TA) = Natural Log of Total Assets
LN (LTD) = Natural Log of Long term Debt
TL/TA = Debt-to-Asset ratio
GR (TA) = Growth Rate of Total Asset
GR (REV) = Growth Rate of Total Revenue
ϵ = Random error

The model adjusted r - squared equal to 57.60 percent. The results of the first model (Appendix C) show that the growth rate of total revenue (GR REV) and growth rate of total asset (GR TA) have p-values equal to 0.127 and 0.359, which are not statistically significant at alpha = 0.05 level. That means growth rate of total revenue (GR REV) and growth rate of total asset (GR TA) do not have any significant effect on market value of the firm. The F-test (236.65) indicates that the model is significant at alpha = 0.05 level. The results show natural log of total assets (LN TA) has the highest positive coefficient, which concludes, LN TA is the most influential factor for firm value. Logically, firm value increases with the amount of total assets. Natural log of long term debt (LN LTD) has a negative coefficient, which infers that firm value decreases with the extra amount of long term debt. This explains the logical risk averse behavior of the market. Large amounts of long term debt make the company riskier; as a result, the market value goes down. Debt-to-asset ratio (total liability divided by total asset- TL/TA) has a positive coefficient, which indicates that the market value is not much influenced by the short term liability. Growth rate of total asset (GR TA) and growth rate of total revenue (GR REV) have positive coefficients that state the market value of the firm will increase with the increase of the growth rate of total asset (GR TA) and growth rate of total revenue (GR REV). However, as the study mentioned earlier, these two variables are not statistically significant at the 1%, 5%, or 10% level.

The study used the principle of parsimony in finding the best (final) model. The principle suggests taking the simpler model rather than a complex one. Best subset regression was performed to find the best model. Depending on the results of best subset regression , the study came up with the most parsimonious model, which has only two variables (natural log of total assets (LN TA), and natural log of long term debt (LN LTD), which was our final model.

The final model for LN (FV) is:

$$LN\ (FV) = \alpha + \beta_1\ LN\ (TA) - \beta_2\ LN\ (LTD) + \epsilon$$

Where,
LN (FV) = Natural log of Firm value
LN (TA) = Natural Log of Total Assets
LN (LTD) = Natural Log of Long Term Debt
ϵ = Random error

In this model, LN (FV) is the natural log of the firm value (FV). In the model, Firm Value (FV) is the product of stock price and number of stocks outstanding on the last day of each company's financial year, plus total liability. Like the previous model, LN (TA) and LN (LTD) are the natural logs of the amount of total assets and long term loan, which were also expressed in million dollars. The amounts of total assets and long term loan are in million dollars. Like the previous model, at first the study started with the same five initial variables. After excluding three extreme outliers, statistically insignificant variables (at alpha = 0.05 level), this study came with only two independent variables.

REGRESSION RESULTS

The initial model for the study included natural log of total assets (LN TA), natural log of long term debt (LN LTD), debt-to-asset ratio (total liability divided by total asset- TL/TA), growth rate of total asset (GR TA), and growth rate of total revenue (GR REV).

The final model results (Appendix I) adjusted r-squared equal to 62.40%, which are marginally lower than the previous models. The F-test of the final model results in an F-value of 575.99 and the P-value low at 0.00. The critical value of F on the F table is lower than the calculated value. Therefore, the study states the final model is significant at alpha = 0.05. odel:

Table 1:
Results for the Final Model

Intercept	LN(TA)	LN(LTD)	R2
- 2603278	288184	- 40067	62.5 %
(- 34.54)	(34.54)***	(- 9.84)***	

*** Statistical Significance at 1%. T-values are shown in the parenthesis.

Best subset regression was performed to find the best model for the study. Like previous model selections, this time the study also used the principle of parsimony in finding the best (final) model. Based on the principle, the study took the simpler model rather than a complex one. The study came up with the most parsimonious model, with only two variables, natural log of total assets (LN TA), and natural log of long term debt (LN LTD), which was our final model.

CONCLUSION

This study has empirically explored the relationship of long term debt with market value of a firm. Secondary data has been collected for 97 companies under the S&P 100 for a time duration from 2006 to 2014. The results demonstrate that long term debt has a strong negative effect on the market value of a firm. The results infer that the market does not consider long term debt as a positive factor for maximizing firm value. A large amount of debt is often associated with the risk of financial distress. This negative coefficient indicates the presence of typical risk averse behavior of the market. The results also show that total assets are the most dominant determinant of firm value. Total asset has a strong positive relationship with firm value. The study has incorporated five explanatory variables, such as natural log of total assets, natural log of long term debt, debt-to-asset ratio, growth rate of total asset, and growth rate of total revenue to explain a firm's market value. In order to make a strong model, the study removed three large residuals, one-by-one, and performed multiple regressions. After removing extreme outliers, the study dropped growth rate of total assets and growth rate of revenue from its final model because these variables were not statistically significant at alpha = 0.05. To get the simplest model, according to the principle of parsimony, the model dropped debt-to-asset ratio, since this variable has negligible contribution to the model. Interestingly, debt-to-asset ratio had a positive coefficient, which might show that the market is too much concerned about the short term liability, unless it is long term debt. Therefore, total debt has a positive effect on capital structure, but long term debt has just the opposite effect. The final model for the study comes with only two explanatory variables, which are natural log of total assets and natural log of long term debt. Results (Appendix I) show that these two variables can explain the 62.5% variation of the firm's market value for S&P 100 companies. Since the data for firm value were not normally distributed, to improve the residual plot the study used logarithmic transformation for firm value data. At that point, the study used natural log of firm value as a dependent variable and used the

previous five explanatory variables (natural log of total assets, natural log of long term debt, debt-to-asset ratio, growth rate of total asset, and growth rate of total revenue) to explain firm value. After the logarithmic transformation of firm value, the study showed great improvement in R squared, F value, and residual plots. Like the steps that had been followed for the previous model, the study removed outliers to make a stronger model. After dropping the insignificant variables, the study again comes with two variables, which are natural log of total assets and natural log of long term debt for the final model. These are the same variables that showed significance for the first model. Results (Appendix O) show that these two variables can explain the 78.10 % variation in the natural log of firm value. The negative relationship between long term debt and firm value is consistent with the results found by Apergis and Sorros (2010), Fama and French (1998), Loncan and Caldeira (2014), and Kinsman and Newman (1998). The result of the study justifies why the companies of G7 countries have less reliance on debt (Atkin and Glen, 1992) and why US firms use more internally generated cash flows over external financing, compared to the companies of other industrially developed countries.

REFERENCES

Apergis, N., & Sorros, J. (2011). Long term debt and the value of the firm: evidence from international listed manufacturing firms. *Review of Economics & Finance, 1*, 60-72.

Atkin, M., & Glen, J. (1992). Comparing capital structures around the globe. *The International Executive. 34* (5), 369-387.

Barnett, V., & Lewis, T. (1994). *Outliers in statistical data* (3rd ed.). New York: Wiley.

Boyd, J., & Smith, B. (1998). The evolution of debt and equity markets in economic development. *Economic Theory, 12*, 519-560.

Dalbor, M., Lee, S., & Upneja, A. (2007). An investigation of long term debt and firm value in the lodging industry. *Advances in Hospitality and Leisure*, 3,195 - 204.

Fama, E., & French, K. (1998). Taxes, financing decisions, and firm value. *Journal of Finance, 53* (3), 819-843.

Graham, J. (1999). Do personal taxes affect corporate financing decisions? *Journal of Public Economics, 73*, 147-185.

Graham, J. (2000). How big are the tax benefits of debt? *Journal Finance, 55*(5), 1901-1941.

Hovakimian, A., Opler, T., & Sheridan, T. (2001). The debt-equity choice. *Journal of Finance and Quantitative Analysis, 36*, 1-24.

Judd, C. M., & McClelland, G. H. (1989). *Data analysis: A model comparison approach.* San Diego, CA.: Harcourt Brace Jovanovich.

Kinsman, M. & Newman, J. (1998). Debt tied to lower firm performance: Finding calls for review of rise in debt use. *Graziadio Business Review*, Graziadio School of Business and Management, Pepperdine University. Retrieved November 1, 2015**.**

Loncan, T., & Caldeira, J. (2014). Capital structure, cash holdings and firm value: A study of Brazilian listed firms. *Revista Contabilidade & Finanças – USP, São Paulo*, 25 (64), 46-59.

Marsh, P. (1982). The choice between equity and debt: An empirical study. *Journal of Finance, 37*(1), 121-144.

Miller, M. (1977). Debt and taxes. *Journal of Finance, 32*(2), 261-275.

Modigliani, F., & Miller, M. (1958). The cost of capital, corporation finance, and the theory of investment. *American Economic Review, 48*, 261-297.

Modigliani, F., & Miller, M. (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review, 53*, 433-443.

Pagano, M. (1993). The flotation of companies on the stock market: A coordination failure model. *European Economic Review, 37*, 1101-1125.

Pervan, M., & Višić, J. (2012). Influence of firm size on its business success. *Croatian Operational Research Review (CRORR), 3.*

Raj, S., & Ajit, S. (1996). Cost of capital, optimum capital and value of the firm: An empirical study of Indian companies. *Vikalpa: Journal of Decision Making, 21*(03), 29-36.

Rajan, R., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance, 50*(5), 1421–1460.

Rasmussen, J. L. (1988). Evaluating outlier identification tests: Mahalanobis D Squared and Comrey D. *Multivariate Behavioral Research, 23*(2), 189-202.

Sunder, L. & Myers, S. (1999). Testing static trade-off against pecking order model of capital structure. *Journal of Financial Economics, 51*, 219-244.