# USING QUANTILE REGRESSIONS TO EXAMINE THE CAPITAL STRUCTURE DECISION OF US FIRMS

Bala Arshanapalli, Indiana University Northwest
William Nelson, Indiana University Northwest

**ABSTRACT**

*The paper examines the capital structure decision of 3,432 US companies in the year 2006 and 2011. The paper employs quantile regression to explore the predictions of the trade-off and pecking order models. We find evidence of heterogeneity in the capital structure and the determinants of capital structure. We find the data more consistent with the trade-off theory than the pecking order theory in 2006 but find that only economic conditions matter in 2011.*

**JEL:** G32

**KEYWORDS:** Quantile Regression and Capital Structure

## INTRODUCTION

Ever since the groundbreaking work of Modigliani and Miller (1958) empirical capital structure research has been abundant. Yet a successful explanation of the wide variety of capital structures remains elusive. For example Frank and Goyal (2009) note "there is a surprising lack of consensus even about many of the basic empirical facts." Most of the research focused on testing two competing theories. Since neither of the theories claimed to provide an explanation of the capital structure decision for all circumstances this state of affairs is perhaps understandable.

This paper's contribution is twofold. First, Korajczyk and Levy (2003) show that economic conditions along with firm specific variables determine the capital structures. Thus we will examine the capital structure determinants for two very different years. The first year, 2006, was just before the recent US recession. A period some observers (the most well-known is Shiller (2005)) classified as a period of "irrational exuberance". The second year, 2011, a period shortly after the recession, is a period characterized by low interest rates and considerable risk aversion. This allows us to study the capital structure decision in different economic environments. Second, it has been shown that the distribution of leverage ratios is highly skewed with considerable kurtosis. These observed statistical properties may result in an incomplete picture of the relationship between the leverage ratio and the firm specific variables when least square regressions are used. A better suited methodology under these circumstances is quantile regressions. Introduced by Koenker and Bassett (1978), quantile regressions allow us to examine the impact of capital structure determinants across the whole distribution rather than only at the mean of the distribution.

The paper opens with a brief explanation of the two models of capital structure determination. The predictions of each model for the various determinants of capital structure are spelled out. The next section explains quantile regression. The following section describes our data source. Then the results are presented and discussed. The paper's conclusions are presented in the final section.

## LITERATURE REVIEW

Modigliani and Miller (1958) show that assuming away taxes, bankruptcy costs, agency costs and asymmetric information in an efficient market financial policy is irrelevant. Thus the trade-off theory focuses upon when these conditions are violated. The trade-off theory argues that firms weigh the benefits

of taxes and certain incentive effects against the direct and indirect costs of bankruptcy. The optimal capital structure precisely balances the costs and benefits of additional debt.

Corporate taxes in the Modigliani and Miller (1958) model provide a strong incentive for debt financing. Miller (1977) shows that personal taxes can mitigate or at least lessen this effect. DeAngelo and Masulis (1980) developed a model in which the benefits of the tax deductibility of interest are greater for profitable firms. They argue higher levels of nondebt tax shields may render the deductibility of the interest payments superfluous and thus lower the tax benefit of debt. They posit a negative relationship between the size of nondebt tax shields and book leverage. Because the tax shields may affect the market value of the firm the impact on leverage, measured in market value, is ambiguous. Furthermore their analysis implies that an increase in profitability allows a corporation to issue more debt. If leverage is measured using book values we may conclude there is a direct relationship between profitability and the debt ratio. The situation becomes more complex if we measure leverage using market values. Since increases in profitability may increase the market value of the firm, the effect on leverage is uncertain.

Jensen and Meckling (1976) and Jensen (1986) focus on the conflicts of interests between managers and stockholders. They argue that managers have a tendency to spend excess free cash flow on their interests at the expense of stockholder's interest. If a company choses a higher debt ratio the fixed obligations from debt commitments can reduce the free cash flow available for managerial self-dealing and help realign the interests of the managers and stockholders. These are also called agency costs. To the extent a firm has more investment opportunities it has less need for debt to control managerial behavior. In the trade-off theory increased investment opportunities are associated with a lower debt ratio.

On the other hand, there are also negative effects of debt on firm value. That is, leverage creates incentives for risk shifting, another type of agency cost. This is the tendency for stockholders to accept high risk projects to profit on the upside potential and allow bondholders to suffer the losses if the project fails. This reduces the willingness of lenders to supply funds. To the extent the firm's assets are tangible and can serve as good collateral this lessens the lender's risk and increases their willingness to provide funds. Thus firms with high levels of net fixed assets should employ more leverage.

Warner (1977) found that the direct costs of bankruptcy were about 5.5% of the asset value of the firm and only 1.4% of the value five years prior to bankruptcy. When we consider the probability of bankruptcy this suggests the expected costs of bankruptcy are not large. However, the indirect costs of bankruptcy such as the effects on customers, suppliers, and employees may be quite substantial. Since the possibility of bankruptcy rises when profitability falls, this provides another rationale for a negative relationship between leverage (measured by book values) and profitability.

To the extent a firm a firm relies on tangible assets which can serve as collateral, the costs of bankruptcy and the costs of agency should be lower. Lenders should more willingly provide debt financing. Therefore, the greater the proportion of tangible assets, greater the expected leverage.

The Pecking order model of Myers and Majluf (1984) claims the high costs associated with issuing equity securities are the supreme consideration. There are two types of costs: transactions and asymmetric information. The transactions costs are the fees associated with issuing new securities. These are highest with new equity; debt securities are next, and retained earnings has no fees. The asymmetric information costs arise from the investors' belief that the managers have better information about the firm's prospect than investors. Thus, if prospects are good the management is unlikely to issue equity to share the profits with investors. Thus investors will interpret an equity issue as a negative signal and will underprice it. This problem is present for debt but in a much smaller degree. Since management understands investor's perception and wishes to avoid the underpricing they set a hierarchy of financing. The first choice is retained earnings. Next is debt and new equity is issued reluctantly.

In a single period pecking order model debt rises when investment needs exceed the retained earnings. Controlling for profitability, leverage is directly related to retained earnings. Similarly, controlling for investment needs, profit is inversely related to debt. In a dynamic model the relationships are less clear. In this case even if investment needs exceed retained earnings a firm may not wish to issue debt if it anticipates more profitable projects and a shortage of retained earnings in the future. This possibility is less likely for a firm paying dividends as they could lower their payout rate to preserve retained earnings. Nevertheless it cannot be dismissed. The empirical evidence of determinants of capital structure is mixed. For example, Huang and Ritter (2009) show that when the cost of equity is high, firms behave as if they are following pecking order theory. When the cost of equity is low, they show that pecking order does not explain the composition of the capital structure of the firms. The recent evidence by Cotei and Farhat (2009) and Mukherjee and Mahakud (2012) show that trade off and pecking order theories are complimentary than mutually exclusive.

Table 1 which draws from Fama and French (2002) summarizes our discussion. It contrasts predictions of the trade-off and pecking order theories and lists the proxies that we employ. It allows us to pull together our predictions of the determinants of leverage in the two models. First we examine predictions concerning profitability. In the pecking order model increases in profitability will lower the leverage ratio (for both book and market value measures of leverage). In the trade-off model increased profitability results in higher levels of leverage. The effect of profitability on market value measures of leverage is ambiguous as we discussed above. Second, we consider the impact of the availability of investment opportunities on leverage. The single period Pecking order model predicts the book leverage increases with the availability of investment opportunities. In the dynamic model the theory predicts that investment opportunities is inversely related to market leverage. Third, we consider the impact of tangible assets. The pecking order theory offers no prediction on their effect. The trade-off theory predicts the higher the proportion of tangible assets the greater is both book and market leverage. Finally, we consider nondebt tax shields. The pecking order theory offers no prediction of their impact on leverage. The trade-off theory suggests they will negatively impact the leverage and have ambiguous effect on market value.

Table 1: Summary of Predictions and Proxies of Pecking Order Models and the Trade-off Model

| | | **Pecking Order Model** | | **Dynamic Pecking Order** | | **Trade-off Model** | |
|---|---|---|---|---|---|---|---|
| Determinants | Proxies | Book | Market | Book | Market | Book | Market |
| Profitability | ET/A | - | - | - | - | + | |
| Investment Opportunities | V/A | + | + | - | - | | |
| Proportion of Tangible Assets | NFA/A | | | | | + | + |
| Non-debt Tax Shields | Dep/A | | | | | - | - |

*This table draws heavily from Fama and French (2002). ET/A, Preinterest, pretax earnings divided by assets. V/A The ratio of market to book value of assets. NFA/A Net fixed assets divided by total assets. Dep/A depreciation divided by total assets*

## DATA AND METHODOLOGY

The Data set comes from Damodaran's website, http://pages.stern.nyu.edu/~%20 adamodar/ New_Home_Page/data.html. This data is free of survivorship bias. It covers 6,176 companies in 101 industries. We considered the 3,432 companies for which we had complete data for both of the time periods, 2006 and 2011. The data are yearend annual data.

The use the pre-interest after-tax earnings divided by the book value of assets is our proxy for profitability. This measure of profitability is not influenced by the company's choice of leverage. Our proxy for the availability of investment opportunities should reflect the firm's expectations for high future growth. Following Myers (1977) we use the ratio of the market to book value of assets as a proxy for expected future growth opportunities. The proportion of net fixed assets total assets measures the tangibility of the firm's assets. Finally we measure non-debt tax shield as the ratio of depreciation expense to total assets.

Table 2 provides basic descriptive statistics of the key variables for 2006 and 2011 periods. It is interesting that the leverage (market value of the debt to capital) in 2011 of 27% exceeds the ratio in 2006 of 16%. A couple of reasons could be offered for the growth in the leverage. First, the interest rates in 2011 were extremely low and may have encouraged firms to take on more leverage. Second, since we are using market leverage ratio, low interest rates could have pushed the market value of debt higher.

Table 2 shows the mean profitability measure was negative in both periods. In both periods the median value of profitability was positive and in both periods negatively skewed. This means some firms with large losses lowered the mean value. The median profitability in the 2011 period was lower than in 2006. This reflects the incomplete recovery from the recession. The remaining variables have significant skewness and kurtosis. The Jarque-Bera statistic strongly rejects the null hypothesis that any of the variables are normally distributed. Table 2 illustrates the heterogeneity of data on both the capital structures and the proposed determinants of capital structure.

Table 2: Descriptive Statistics of the Key Variables for 2006 and 2011 Periods

| | MARKET DEBT TO CAPITAL | PROFITABILITY | INVESTMENT OPPORTUNITY | NET FIXED ASSETS TO TOTAL ASSETS | NON- DEBT TAX SHIELD |
|---|---|---|---|---|---|
| **Descriptive Statistics for 2006)** | | | | | |
| Mean | 0.1576 | -0.0908 | 0.5054 | 0.2063 | 0.0370 |
| Median | 0.0913 | 0.0400 | 0.0013 | 0.1179 | 0.0288 |
| Maximum | 0.9961 | 3.525 | 380.04 | 1.000 | 3.000 |
| Minimum | 0.0000 | -17.500 | 0.0000 | 0.0000 | 0.0000 |
| Std. Dev. | 0.1861 | 0.7734 | 7.9840 | 0.2338 | 0.0674 |
| Skewness | 1.502 | -10.065 | 35.638 | 1.323 | 26.424 |
| Kurtosis | 5.123 | 149.90 | 1552.8 | 3.892 | 1101.4 |
| Jarque-Bera | 1935.9 | 3143984 | 343000000 | 1116.4 | 173000000 |
| Probability | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Descriptive Statistics for 2011** | | | | | |
| Mean | 0.2672 | -0.0793 | 2.918 | 0.2135 | 0.0389 |
| Median | 0.1721 | 0.0364 | 0.0061 | 0.1173 | 0.0305 |
| Maximum | 0.9999 | 3.920 | 2081.6 | 1 | 1.600 |
| Minimum | 0.0000 | -74 | 0.0000 | 0.0000 | 0.0000 |
| Std. Dev. | 0.2886 | 1.518 | 48.550 | 0.2426 | 0.0551 |
| Skewness | 1.0658 | -38.439 | 34.891 | 1.306 | 12.569 |
| Kurtosis | 3.108 | 1,738.1 | 1,355.8 | 3.707 | 290.33 |
| Jarque-Bera | 650.48 | 4,310,000 | 2,620,000 | 1,047.1 | 11,890,092 |
| Probability | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Observations | 3432 | 3432 | 3432 | 3432 | 3432 |

*The sample has 3432 companies for which we had complete data for the time periods, 2006 and 2011. Profitability: Pre-interest, after-tax earnings divided by book value of assets. Investment Opportunities: The ratio of market to book value of assets. Non-Debt Tax shield: Depreciation expense divided by book value of assets*

Most of the empirical tests of capital structure determinants focus on testing the implications of the two competing theories we outlined above: the trade-off model and the pecking order theory. These theories suggest many factors to explain the determinants of leverage. Frank and Goyal (2009) proposed 39 factors. Fama and French (2002) narrowed them down to 4 factors; profitability, investment opportunities, the tangibility of assets, non-debt tax shields and volatility. In their analysis volatility is measured over time as log of assets and it is not included in our analysis because our analysis is over the cross-section of firms. Previous studies have used different definitions of leverage. As noted by Frank and Goyal (2009) book values are determined by past economic activity whereas market values are determined by expected future economic activity. They note that while early studies employed book value definitions, more recent studies have focused on the market value. In this study we will focus on the market value. As in the previous studies the market value of leverage is defined as the ratio of market value of debt to market capitalization.

We test the predictions of the two models using the quantile regression developed by Koenker and Bassett (1978). The aim of simple classical regression analysis is to minimize the sum of squared errors given by

$$\min_{\alpha,\beta} \sum_{i=1}^{t} (y_i - \alpha - X_i\beta)^2 \quad (1)$$

where,
$y_i$ is the dependent variable
$X_i$ is the independent variable
and $\alpha$ *and* $\beta$ are the estimated intercept and slope parameters.

The objective is to find values of $\beta$ that would minimize the error. While the idea of quantile regression is similar, it aims at minimizing absolute deviations from $\tau^{th}$ conditional quantile and it is given as:

$$\min_{\beta \epsilon R_p} \sum_{i=1}^{T} \rho_\tau (y_i - \xi(X_i, \beta) \quad (2)$$

where
$\xi$ is the conditional quantile
$\rho_\tau$ is the so-called *check function* which weights positive and negative values asymmetrically (giving varying weights to positive and negative residuals)

For example to obtain conditional median parameter estimates, $\tau$ should be set at 0.5 (since this is the quantile that represents the median) and an optimization model is employed to find values of $\beta$ that minimizes the weighted sum of absolute deviations between the dependent variable and the independent variable. However the constraints imposed require that a linear programming must be used.

In a regression format the relationship between the dependent and independent variable can be summarized as:

$$\min_{\alpha^\tau \beta^\tau} \sum_{i=1}^{T} |y_i - \alpha^\tau - X_i\beta^\tau| \quad (3)$$

where
$\alpha^\tau$ is the intercept for a specified quantile and
$\beta^\tau$ is a slope coefficient
$\beta^\tau$ shows the relationship between $X_i$ and $y_i$ for a specified quantile. A linear program is used where different values of $\alpha$ and $\beta$ are plugged into the above equation until the weighted sum of the absolute deviations are minimized.

**RESULTS**

Table 3 presents both the OLS and quantile regression estimates of the leverage ratio for 2006 and 2011. The impact of profitability on leverage in 2006 is positive accept at low levels of leverage. In particular the impact of profitability was insignificant at the 20$^{th}$ quantile and positive with statistical significance at all of the other quantiles. In addition the coefficients increased monotonically as we moved to higher quantiles. This was not consistent with the Pecking Order model which predicted a negative coefficient

and potentially consistent with the Trade-Off model which made no prediction. The investment opportunities were statistically insignificant determinants according to OLS.

Table 3: Ordinary Least Squares and Quantile Regression Results for the Capital Structure

| **Results for 2006** | **OLS** | **Q(.20)** | **Q(.40)** | **Q(.50)** | **Q(.60)** | **Q(.80)** |
|---|---|---|---|---|---|---|
| Independent Variables | | | | | | |
| Constant | 0.1373 | -0.0003 | 0.0182 | 0.0621 | 0.1085 | 0.2576 |
| | 31.607** | -0.1924 | 7.006** | 9.279** | 16.161** | 21.616** |
| Profitability | 0.0098 | 0.0000 | 0.0027 | 0.0062 | 0.0108 | 0.0214 |
| | 2.305** | -0.0338 | 2.272** | 3.319** | 4.709** | 6.931** |
| Investment Opportunities | -0.4267 | 0.0018 | -0.0228 | -0.2809 | -0.2216 | -0.5621 |
| | -1.076 | 0.0307 | -0.3070 | -1.007 | -2.255** | -7.142** |
| Net Fixed Assets/Total Assets | 0.1298 | 0.0563 | 0.1861 | 0.1963 | 0.2006 | 0.1580 |
| | 9.405** | 4.945** | 11.652** | 10.128** | 8.629** | 5.232** |
| Non-Debt Tax shield | -0.1451 | -0.0531 | -0.1264 | -0.2515 | -0.2180 | -0.1425 |
| | -2.940** | -1.020 | -1.661 | -1.688 | -1.718 | -0.5107 |
| R-squared/Pseudo R-squared | 0.03 | 0.01 | 0.04 | 0.03 | 0.03 | 0.02 |
| **Results for 2011** | **OLS** | **Q(.20)** | **Q(.40)** | **Q(.50)** | **Q(.60)** | **Q(.80)** |
| Independent Variables | | | | | | |
| Constant | 0.2400 | -0.0011 | 0.0400 | 0.1079 | 0.2049 | 0.4884 |
| | 34.444** | -0.2790 | 7.369** | 10.122** | 14.375** | 26.842** |
| Profitability | -0.0070 | -0.0003 | -0.0019 | -0.0075 | -0.0365 | -0.1648 |
| | -1.762 | -0.0928 | -0.4342 | -0.5260 | -0.4710 | -0.6241 |
| Investment Opportunities | -0.2290 | -0.0110 | -0.1117 | -0.2450 | -0.4431 | -0.2030 |
| | -1.923** | -0.0843 | -0.5590 | -0.9717 | -1.579 | -3.168** |
| Net Fixed Assets/Total Assets | 0.1488 | 0.1291 | 0.3034 | 0.2971 | 0.2778 | 0.0683 |
| | 7.041** | 6.565** | 14.979** | 10.069** | 8.538** | 0.8393 |
| Non-Debt Tax shield | -0.1116 | -0.1201 | -0.1656 | -0.2270 | -0.5282 | -0.2675 |
| | -1.145 | -1.001 | -1.171 | -0.9291 | -1.446 | -0.3093 |
| R-squared/Pseudo R-squared | 0.02 | 0.02 | 0.04 | 0.03 | 0.02 | 0.01 |

*The dependent variable is market leverage ratio (D/A). The independent variables include Profitability, Investment Opportunities, Net Fixed Assets/Total Assets and Non-Debt Tax shield. The sample has 3432 companies for which we had complete data for the time periods, 2006 and 2011. The first figure in each cell is the estimated coefficient. The second figure in each cell is the t-statistic. We show the R-squares for OLS and the pseudo R-squares quantile regression. ** Statistically significant at 5% significance level*

At the lower end of quantiles investment opportunities were also insignificant. However, at the higher end of quantiles, the investment opportunities exerted a statistically significant downward influence on leverage. This implies that the firms with higher leverage would invest in new opportunities by using equity. Moreover, the order of magnitude of the coefficients generally increased as we moved to higher quantiles. This is consistent with both the dynamic Pecking Order theory and the trade-off model. This illustrates the advantage of the quantile regression. OLS would simply have assigned no significance to investment opportunities. The proportion of tangible assets has a strong statistically significant positive impact on leverage both in OLS and across all of the quantiles. This is not predicted by the pecking order model but is predicted by the Trade-Off theory. Finally non-debt shields are negatively statistically significant in OLS. In quantile regressions non-debt tax shields have no statistical significance across the distribution. The results of 2006 are more supportive or consistent with the tradeoff model.

In 2011 profitability had a negative marginally significant impact on leverage in the OLS model. However, as we examine the impact across the quantiles we observed no statistically significant impact but the sign of the coefficient is negative. Because the Trade-Off theory makes no predictions the result is not inconsistent with the theory. The OLS results are consistent with the Pecking Order theory but they are not confirmed across the quantiles. Since the median profitability is lower in 2011 and further the economy was in the process of coming out of a deep recession the firms made no attempt to alter their leverage. The investment opportunities, unlike 2006, are marginally significant in OLS. But, the coefficient obtained statistical significance only in the highest (80th) quantile. In 2011 investment opportunities do not seem to be important determinants of capital structure. The proportion of tangible assets again enters positively and

is statistically significant in OLS and all of the quantiles except the highest quantile. Perhaps in economically uncertain times, highly leveraged firms were unable to increase their leverage even with additional collateral. This result is consistent only with the Trade-off theory. Finally, the nondebt tax shields failed to obtain any statistical significance in either OLS or across the quantiles. Soon after the great recession, we find little support for either theory. It makes sense because in an uncertain economic time period, the only thing that matters is having good collateral. Finally, the table shows the R-squares and the pseudo R-squares of OLS and quantile regressions respectively. The pseudo R-squares should be interpreted cautiously.

## CONCLUDING COMMENTS

This paper examines capital structure in the US for 2006 and 2011. The paper employs quantile regression analysis to explore the determinants of capital structure. We find convincing evidence of heterogeneity in the debt ratios of firms. There is also strong evidence of heterogeneity in the determinants of capital structure.

In 2006 we find profitability had a positive statistically significant impact on capital structure across the distribution. The investment opportunities had a statistically negative impact on capital structure as predicted by the Trade-off theory only in the highest quantiles. Relying only on only OLS would have missed this evidence that supports the Trade-off theory. The proportion of tangible assets had a statistically significant positive impact on the capital structure consistent with the trade-off theory. The non-debt tax shields had a statistically significant negative impact on capital structure only in OLS. Examining the impact of nondebt tax shield across the distribution reveals that there is marginal statistical significance only in the middle of the distribution and no significance at the extreme. The OLS results are consistent the trade-off theory whereas the quantile regressions while supportive suggest a more mixed picture.

In 2011 the only determinant of capital structure was the tangible asset ratio. The recession and the accompanying economic uncertainty were probably important considerations in setting capital structure than the usual determinants. The capital structure theories work well in normal economic conditions but not as well when the economy is coming out of a distressed economic period. A note of caution is in order. First, our study is limited only for two years, is cross sectional and we examined only one situation of distressed economic period. This study can be extended to include time series data to see if our results hold. Second, our study can also be extended to include other distressed economic time periods to test the validity of our findings.

## REFERENCES

Cotei, C., and J.Farhat (2009) "The Trade-off Theory and the Pecking Order Theory: Are They Mutually Exclusive?" *North American Journal of Finance and Banking Research*, vol. 3 p.1-16.

DeAngelo, H., and R. Masulis (1980) "Optimal Capital Structure Under Corporate and Personal Taxation," *Journal of Financial Economics,* vol. 8, p. 3-29.

Fama, E. and K. French (2002) "Testing trade-off and Pecking Order Predictions about Dividends and Debt," *Review Financial Studies* vol. 15, p. 1-33.

Frank, M., and V. Goyal (2009) "Capital Structure Decisions: Which Factors Are Reliably Important?" *Financial Management* vol. 38, p.1-37.

Huang, R. and J. Ritter (2009) "Testing Theories of Capital Structure and Estimating the Speed of Adjustment," *Journal of Financial and Quantitative Analysis* vol. 44, p. 237-271

Jensen, M.C., (1986) "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review* vol. 76, p. 323-329.

Jensen, M.C.and W.H. Meckling (1976) "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics* vol. 3, p.305-360.

Koenker, R., and G. Bassett (1978) "Regression Quantiles," *Econometrica* vol. 46, p. 33-50.

Korajczyk, R.A., and A. Levy (2003) "Capital Structure Choice: Macro Economic Conditions and Financial Constraints," *Journal of Financial Economics* vol. 68, p. 75-109

Miller, M., (1977) "Debt & Taxes," *Journal of Finance* vol. 32, p. 261-275.

Modigliani, F., and M. Miller (1958) "The Cost of Capital, Corporation Finance and the theory of Investment," *American Economic Review* vol. *4*8, p. 261-297.

Mukherjee, S., and J. Mahakud (2012) "Are Trade-off and Pecking Order Theories of Capital Structure Mutually Exclusive?" *Journal of Management Research* vol. 2, p. 41-55

Myers, S., (1977) "Determinants of Corporate Borrowing," *Journal of Financial Economics* vol. *5,* p. 147-175.

Myers, S., and N. Majluf (1984) "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have," *Journal of Financial Economics* vol. 13, p. 187-221.

Schiller, R. (2005). Irrational Exuberance, Second Edition, Princeton University Press.

Warner, J., (1977) "Bankruptcy Costs: Some Evidence," *Journal of Finance.* vol. 32, p. 337-347

## ACKNOWLEDGEMENT

The authors acknowledge the helpful comments of two anonymous reviewers and the editor.

## BIOGRAPHY

Bala Arshanapalli is Professor of Finance and Gallagher-Mills Chair in Business and Economics. His research appears in journals such as *Journal of Banking and Finance, Journal of Portfolio Management, Journal of Money and Finance and Journal of Risk and Uncertainty*. He can be reached at barshana@iun.edu.

William Nelson is Professor of Finance and Associate Dean of School of Business and Economics at Indiana University Northwest. His research appears in journals such as *Journal of Finance, Southern Economics Journal, Journal of Portfolio Management* and *Industrial and Labor Relations Review.* He can be reached at wnelson@iun.edu