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Linkages in Capital Structure Theory and Economics

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Abstract

The foremost purpose of this paper is to concisely explain to individuals teaching economics in an academic setting or using economics in a practical setting some of the basics of long run financial theory focusing on the capital structure of a corporation. The main motivation for this study is based on observations of economists being very deficient in the discipline of finance especially in long run financial concepts. Many times practitioners or academics educated in the area of economics lack any type of background in finance and therefore are deficient with their knowledge of financial theory and applications. This disconnect prevents using many financial applications in their own classes, in their own businesses or with their own research. This paper serves as an primer to some of the long run capital structure theories that individuals can use as a starting point to their additional research, study or use in teaching. Areas related to capital structure and financial theory in general can be utilized by economists in academia and the private sector to enhance and advance their professional careers.

Keywords: Capital structure, financial theory, economic education

1. Introduction

The disciplines of economics and finance share many commonalities. Economists employed in the private sector, the public sector or as professors in academia typically lack any sort of educational background in finance, especially with financial theory. This is especially true of those individuals who obtained their economics degrees from non-business colleges. The purpose of this paper is to offer some basic explanations of certain fundamental financial policy concepts with an emphasis on capital structure policy and also provide an overture to some of the "classic" research in these areas. This will serve as a bridge of sorts that economists (and others) can then employ in their own careers. There are many observable similarities between the disciplines of finance and economics. In many cases finance is merely just applied economic theory. The disconnect between economists and financial theory prevents many from utilizing various financial applications in their own classes, in their own businesses or with their own research. Hopefully this paper will serve as a starting point for anyone interested in key areas of finance and in particular in the area of capital structure theory.

2. Traditional and Older Capital Structure Theories

The traditionalist school of thought on capital structure was that it did impact a firms' value (Solomon, 1963). This view saw firm value as a concave function of the debt/equity ratio of a corporation. An optimal capital structure did exist and it was one comprised of both debt and equity.

In a classic paper on the cost of capital and the optimal capital structure of a firm, Modigliani and Miller (1958) tackle the problem of how a firm can go about maximizing the wealth of its' shareholders. The authors state that any investment that raises the market value of the outstanding shares should be undertaken. They view shares of stock that are in the same equivalent return classes to be substitutes for one another when these firms are not permitted to issue any debt instruments. Once debt issuance is allowed, the probability distribution of returns changes for each firm and thus they are no longer perfect substitutes for one another. This is due to the different degrees of leverage (financial risk) that each firm will possess. Assuming that all debt is risk free, they produce their famous Proposition One:

$$V_j = (s_j + d_j) = \overline{X}_j / p_k$$

Where V_j = the market value of the firm j

S_j = the market value of stock for firm j

D_j = the market value of bonds (debt) for firm j

$\overline{X}_j$ = the expected return on the assets of firm j

P_k = the expected rate of return for any firm in risk class k

This proposition states that the value of a firm is completely independent of its' capital structure. In other words, it does not matter how a firm finances their assets, only the actual return on the assets matter. A corollary suggests that the average cost of capital is also independent of the firm's capital structure. The basis of this proposition is that if it did not hold, then an arbitrage opportunity would exist. As investors take advantage of this opportunity, the condition will reestablish itself.

Their Proposition Two states that when Proposition One holds the cost of equity is a linear increasing function of the firms' debt/equity ratio. This portends that if a firm uses the cheaper debt instrument to finance its' assets, this would increase the cost of equity and thus leave the overall cost of capital the same.

The authors cite two previous studies that tend to offer empirical support for both their propositions. Their conclusion can be summed up by stating that the capital structure of a firm is irrelevant, since it has no bearing on the market value of a firm. This eventually became known as the capital structure irrelevancy theory.

3. Capital Structure Theory with Corporate Taxes

The traditional view of the optimal capital structure of the firm posits that a firm should finance their assets through using a combination of debt and equity. The appropriate mix would result in the maximization of the market value of the firm. Modigliani and Miller (1958) originally disagreed, but changed course with their article known as the "correction paper" a few years later (Modigliani and Miller, 1963). In this paper the authors acknowledge that they misjudged the beneficial effects of using debt, thus their view moved more towards the traditional view.

The authors arrive at the following equation which shows the relationship between a levered firm and an unlevered firm.

$$V_L = V_U + tD_L$$

Where V_L = the value of a levered firm

V_U = the value of an unlevered firm

t = the corporate tax rate

D_L = the level of debt in a firms' capital structure

When a firm utilizes debt as opposed to equity, they can deduct the associated interest payments from their taxable income. Issuing equity does not have a tax advantage. The value of a firm would grow by the amount tD_L when using debt. Thus the optimal capital structure of a firm would be to use all debt or as much as the current laws allow. By using all debt this of course means that the firm would be minimizes its' average cost of capital which goes hand in hand with maximizing the market value of a firm. The authors do point out that if

other variables are investigated, such as personal taxes, the results might change.

4. Capital Structure Theory with Financial Distress Costs

Stiglitz (1969) shows that the original Modigliani-Miller invariance result will hold when bankruptcy costs are present, but only if there are not any transaction costs associated with the bankruptcy.

Kim (1978) looks at the effect that debt capacity has on the presence of an optimal capital structure. If a firms' debt capacity is less than the optimal amount of debt a firm should issue then finding an optimal capital structure is not a problem the firm has to address. Otherwise an optimal debt policy does exist. Corporate debt capacity is defined as the maximum quantity of debt a firm can issue in a perfect capital market given that they have already settled on a particular investment package. The author finds that debt capacity occurs prior to 100% debt financing due to the presence of bankruptcy costs. He also finds that firms have optimal capital structures which consist of debt levels below the capacity level. The optimal capital structure can be found by utilizing the following equation which is derived by setting dV(L)/drD = 0:

$$[\frac{R_f - 1}{R_f} + V(b)]\frac{dD}{drD} = (A - D)\frac{dV(b)}{drD} + \frac{1 - T}{T}\frac{dV(B)}{drD}$$

Where R_f is the risk free rate of interest, V(L) is the value of the levered firm, V(b) is the risk adjusted present value of one dollar associated with the occurrence of bankruptcy, D is the amount of debt, A is cost of investments, rD is the total end of period debt obligation (interest), and T is the corporate income tax rate. The optimal capital structure is found by setting rD to an amount that satisfies the equality.

When bankruptcy costs are found to be small, then they should not have any impact on a firm's capital structure decision (Warner, 1977). The author looks at the railroad industry from 1933 to 1955. He finds that bankruptcy costs rise along with the size of the firm, but the ratio of bankruptcy costs to firm value falls as the firm becomes larger. This suggests the presence of economies of scale. The author breaks bankruptcy costs into direct and indirect costs. Direct costs include legal fees, accounting fees and other administrative costs. Indirect costs include lost sales, agency costs, lost profits and other opportunity costs. Direct costs are easily measured while indirect costs are not. Previous studies have computed the bankruptcy costs to be as much as 20% of assets, but these studies focused on personal bankruptcies and not corporate bankruptcies. Three major problems arise in measuring bankruptcy costs. Firstly, the indirect costs must be somehow computed. Secondly, bankruptcy costs as a percentage of market value should be measured not at the time a bankruptcy begins, but before a bankruptcy occurs at the time financing decisions are made. This prevents an upward bias in measuring bankruptcy costs. Lastly, it is not the actual bankruptcy costs that potentially influences firms' managers, but the expected bankruptcy costs which would be equal to a percentage of the actual bankruptcy costs incurred, since a 100% probability of a

firm going bankrupt did not exist. The author measures bankruptcy costs in the railroad industry and finds then to be equal to significantly less than 1% of the market value of a firm, perhaps one twentieth of one percent. He concludes that the existence of bankruptcy costs plays no important role in influencing a firms' decision on which capital structure to use in order to maximize firm value.

5. Capital Structure Theory with Personal Taxes

Miller (1977) readdresses the capital structure problem. In this article he asserts that even taking into consideration the benefits of using debt, the value of a firm is independent of its capital structure. He ponders a current theory that supposes that the benefits of debt are in part offset by the bankruptcy costs associated with using debt. If these costs were significant then a firm would choose that level of debt where the marginal benefits (corporate tax rate) of using debt equals the marginal costs (bankruptcy costs) of using debt. The firm would have a mix of debt and equity in its capital structure. Miller suggests that the anticipated bankruptcy costs are small and thus can be disregarded by firms. If these costs were a problem a firm could simply issue income bonds which only require interest to be paid when a firm has enough earnings. This would avoid any bankruptcy costs. Miller notes that these are not used which seems to imply that bankruptcy costs are perceived by firm managers as being minute. If these are unimportant then why don't we see firms with a huge amount of debt as suggested by Modigliani and Miller (1963)? Miller claims that it is because the benefits of using debt have been vastly overstated.

Miller maintains that if a firm uses only debt then it forces interest income upon the owners of that debt. If instead the firm reinvests that money within the firm, then capital gains could accrue to the stakeholders in the firm. Depending upon the relative tax rates this might be preferred by investors. He arrives at the following model:

$$G_L = [1 - \frac{(1-Tc)(1-T_{PS})}{1-T_{PB}}]B_L$$

Where G_L = the gain from leverage

T_C = the corporate tax rate

T_{PS} = capital gains tax rate for individuals

T_{PB} = personal tax rate applied to income from bonds

B_L = market value of the levered firm's debt

When all the tax rates are set to zero then we arrive at the conclusion that the gains from leverage are zero, thus the original Modigliani and Miller (1958) results hold stating that the capital structure is irrelevant. If the tax rate on capital gains is identical to the tax rate on income, then the gain from leverage equals $T_C B_L$. This implies the firm should be all debt. When the capital gains rate is less than the income tax rate, then the gain from using leverage will be less than $T_C B_L$. In fact, when looking at all the possible combinations of the three tax

rates Miller also finds cases where the gain from leverage actually becomes negative. This mix of results leads him to conclude that since corporations never know what will happen to future tax rates, they simply disregard any tax effects when arriving at a capital structure, which is the right thing to do in this event.

Miller looks at the possibility of clientele effects existing. Different groups of investors in different tax rackets might favor a firm that is more or less leveraged than other firms. As long as at least some firms supply each clientele then no optimal capital structure for an individual firm would exist. The author points to casual evidence that suggests companies' debt to equity ratios over time have not changed that substantially as reinforcing his belief on the irrelevancy of leverage.

Angelo and Masulis (1980) form a model of capital structure choice which incorporates corporate and personal taxes as Miller (1977) above. They find that even in the presence of bankruptcy costs a firm has an optimal quantity of debt that is less than 100%. They glimpse at the effects of depreciation, depletion allowances and investment tax credits as substitutes for the benefits of using debt, i.e. the tax shield that exists since interest on debt is deductible for corporations.

Miller (1988) takes an historical perspective of the capital structure irrelevancy theory and produces more anecdotal evidence in support of that theory. He initially takes a macroeconomic viewpoint using t-accounts. The asset side of the account for firms consists of productive capital while the liabilities side consists of debts owed to households and equity in firms owned by households. The asset side of households is composed of the debts and equity in firms, the liability side comprised of net worth. If you consolidate the two balance sheet accounts for both sectors the only things left are productive capital on the asset side and household net worth on the liabilities side. Debt and equity vanish, thus the true value of the business sector to households is simply the value of productive capital, i.e. the investments that firms made.

The only problem remaining to resolve is based on the arbitrage proof which requires that households be able to replicate corporate capital structures on their own. If so, the capital structure would not impact the value of the firm. He finds that such replication can occur especially with the advent of various types of financial innovation brought forth during the 1980's.

In the eighties, leveraged buyouts (LBO's) became popular. Part of the credit for the popularity of the LBO was attributed to Merton Miller and his work on capital structures. Dr. Miller denies he should be credited in such a manner (Miller, 1991). Miller sees LBO's as nothing new. They occurred prior to 1980, but in a different form. Prior to 1980 most LBO's involved borrowing money to buy out an owner whose stock was not publicly traded. In the eighties, money was borrowed to buy publicly traded shares in order to gain control of the firm. The dollar magnitudes were thus bigger. Miller claims that his work on financial policies of firms suggest that LBO's are not a magic formula that automatically adds value to shareholders. His irrelevancy theories suggest quite the opposite. The fact remains that many LBO's added enormous value to stockholders portfolios. The author suggests that the source

of this value isn't in the debt that was issued to gain control of the firm, but in the restructuring that occurred after a successful LBO. Many individuals saw problems associated with the emergence of LBO's. Many thought that this "overleveraging" would result in financial calamities across various industries. Miller makes several points to render these worries moot. He makes the following points: default on junk bonds did not mean that overleveraging occurred, increased leverage by firms does not mean that the economy becomes riskier, financial distress incurred by some firms are a private costs, not a social costs for society to bear, and capital markets have built in protective market mechanisms which shield the overall economy against calamities due to firms leveraging upward.

6. Newer Capital Structure Theories

6.1 Agency Costs

Agency costs are found to influence the optimal capital structure of a firm (Jensen and Meckling, 1976). Agency costs arise when the principal contracts with an agent to perform duties on behalf of the principal. An example would be when shareholders elect the board of directors which in turn hire managers to operate the firm in the best interest of the shareholders. There is good reason to believe that the agent will not always carry out its' duties in the best interest of the principals. The costs associated with this problem consist mainly of monitoring costs which includes measuring and observing the agent and also controlling the agents through budget restrictions and compensation policies. When agency costs are substantial the authors show that an optimal capital structure would consist of a certain quantity of debt. In many ways agency costs are akin to bankruptcy costs except they encourage the use of leverage as opposed to discouraging it.

Option pricing models have been used to explain the optimal capital structure of a firm (Galai and Masulis, 1976). The authors use a combination of the capital asset pricing model and the option pricing model to explain the impact of using debt on the riskiness of equity. They find that using more debt, even with its' associated tax break, is not always the prudent course of action, because it makes the cost of equity rise.

6.2 Linear Structure Modeling

Titman and Wessels (1988) employ a different empirical method to analyze capital structure theory. The authors propose their method eliminates any measurement errors that have plagued past empirical work. The technique they apply is called linear structural modeling. This method assumes that many relevant variables may not be directly observable, but certain indicator variables that are linear functions of one or more attributes are observable and can be used as proxies. Their findings include that firms with unique or specialized products should use relatively low levels of debt, smaller firms utilize more short term debt than larger firms, and profitable firms seem to have lower debt/equity ratios.

6.3 Information Asymmetries

Informational asymmetries can result in a firm being biased to using internal funds over

external funds (Myers and Majlif, 1984). The authors also find that when shareholders and managers within a firm have different information sets firms tend to prefer using debt over equity. These biases can lead to adverse results for the firm, since the reluctance to use equity might mean a firm will pass up valuable investments that would actually increase shareholders wealth if undertaken.

6.4 Historical Modeling

The reluctance to use debt is analyzed by Graham (2000). He finds that conservative debt policies are persistent across industries. The author calculates the present value of tax benefits used by firms to be only 9.7% of firm value. This percentage falls by more than half when personal taxes are accounted for. If firms used more debt they could increase firm value by double these percentages listed above. He surprisingly finds that large, financially solvent firms with low bankruptcy costs use debt most conservatively. Factors such as future growth expectations, product factor markets and minimal asset collateral contribute to low debt usage.

Graham and Harvey (2001) survey 392 chief financial officers of corporations on issues including capital structure. They find that firms are sensitive about their financial flexibility and credit ratings when using debt. The same firms are concerned about earnings per share dilution and recent common stock appreciation when contemplating issuing equity. Their results support a pecking order theory of capital structure, but find no corporate concern for issues such as asset substitution, bankruptcy costs or personal taxes.

A survey of three competing models of capital structure was conducted by Myers (2001). The author initially points out some facts about financing. Most investment spending by corporations has been financed internally through using earnings. External financing normally covers less than 20% of all real investment in a given year. Out of this 20% the overwhelming choice of a financing instrument has been debt over equity. The quantity of leverage used varies across industries. Industries such as chemical, transportation and oil tend to use a generous amount of debt while industries such as pharmaceutical and automobile use low quantities of debt. Debt ratios tend to vary inversely with levels of business risk and profitability. The author scrutinizes the tradeoff theory, the pecking order theory and the free cash flow theory.

6.5 Tradeoff Model

The tradeoff theory suggests that a firm will weigh the marginal benefits of using debt, which are attributable to the tax deductible of corporate interest payments, against the marginal costs of financial distress, which consists of bankruptcy and agency costs. The theory implies a moderate level of leverage being employed by the firm. The free cash flow theory entails the firm increasing its' value by using high levels of debt despite incurring high financial distress costs as long as a firm's operating cash flow exceeds its profitable investment opportunities. The pecking order theory, which was first offered by Dr. Myers (1984), involves informational asymmetries. He assumes that investors do not know the actual value of existing assets or the present value of new investment opportunities, but the managers of

the firm do possess this information. Managers might offer a new sale of common stock for one of two reasons: if they think that these funds will be used to pursue a growth strategy resulting in investments with a positive net present value or if they think the assets already in place are currently being overvalued by the market, thus they can issue overvalued shares. Undervalued shares would never be issued if the mangers are seeking to maximize the value of current shareholder holdings, because if they did issue undervalued shares wealth would flow from the current owners to the new owners. Empirical evidence indicates that investors view the announcement of the issuance of new shares to indicate that managers are issuing overvalued shares in lieu of issuing shares in order to pursue good investment alternatives. Several studies cited seem to confirm that current stock prices fall when the firm announces that it will be issuing new shares in the future. Firms will therefore be reluctant to issue equity as long as debt is a viable option. The pecking order consists of the following:

1) Firms prefer internal financing over external financing.
2) Dividends are not cut by firms in order to finance investments.
3) Debt will be used before equity.
4) Preferred stock will be used before common stock.

The author cites several studies that tend to reinforce the pecking order theory over the competing theories, although he admits that it is not in any way a general theory that can be applied at all times to all firms.

6.6 Information Effects

Additional information on the role of information in determining capital structures is provided by Easley and O'Hara (2004). They separate information into publicly known information and privately known information. Investors are aware of the public information, but are not cognizant of private information which is known only to corporate insiders. The authors illustrate that companies that have a greater share of private information are required by investors to possess a higher rate of return. This occurs because uniformed investors have a disadvantage in being able to alter their portfolios when new information arises. Firms can shape their cost of capital by adopting features such as accounting treatments, analyst's coverage and market microstructure.

Many empirical results have emerged from looking at informational asymmetries in the realm of financial policy (Klein, O'Brien & Peters, 2002). The authors review the major models of the capital structure of a firm and concentrate on how adding the assumption of informational asymmetry impacts capital structure choice. Some of the more important results they obtain are:

1) On average stock prices decrease in response to a seasoned stock offering.
2) Holding the investment policy of a firm fixed results in positive correlation between the use of leverage and stock prices. This suggests an informational content associated with the capital structure of a firm.

3) The above changes in stock prices occur with a lag, sometimes a considerable lag.

4) Firms seem to adopt a type of market timing. They tend to issue new securities around dates when they announce earnings and other relevant information.

Rajan and Zingales (1995) report that U.S debt levels as a percentage of capital are usually lower than for other countries. They contribute this difference mainly to accounting differences which arise in the various countries. When they make adjustments to the data they find no significant difference among debt levels.

6.7 Market Timing Model

A market timing theory of capital structure is proffered by Baker and Wurgler (2002). They view a capital structure of a firm as being the result of the cumulative product of past attempts to time the equity market. Firms prefer to issue stock when they believe that the share price is historically high and prefer to repurchase shares when they believe the prices are low. This is what is meant by market timing. The authors believe that the results of this market timing are what determine the present capital structure of the firm.

6.8 Other Models

One way to reduce financial distress costs is to use derivatives, such as options (Graham and Rogers, 2002). The authors check to see if firms hedge in order to use more debt which would allow them to reap the implicit tax subsidy associated with interest payments. They assume a convex tax function. They find evidence that firms do not use derivatives in order to increase debt capacity, but corporations do use derivative items to hedge against anticipated financial distress costs.

Cross sectional regressions can be used to assess the value of the debt tax shield (Kemsley and Nissim, 2002). The authors perform an ordinary least squares regression using future profitability as the dependent variable and firm value and debt as the independent variables. Usually, firm value is the dependent variable. This reverse regression softens bias and allows the authors to use known market information to oppress the dissimilarities in risk and expected growth. They conclude that the value for the tax shield is approximately 10% of firm value after adjusting for the personal tax disadvantage of debt for investors.

Korajczyk and Levy (2003) investigate how macroeconomic conditions affect a firm's choice of a capital structure. They regard the capital structure of a firm as being a function of not only firm specific variables, but macroeconomics variables as well. The authors break their data into a constrained sample and an unconstrained sample based on the current financial conditions of the firms. They find that the target amount of leverage in a firm is cyclical for constrained firms, but counter cyclical for the unconstrained firms. They conclude that unconstrained firms time their security issuance with macroeconomic conditions that are good while the constrained firms do not.

Nam, Ottoo, and Thornton Jr. (2003) look at how managerial incentives in the form of stock options impact the leverage of a firm among other variables. During the past few decades firms have used stock options as a form of managerial compensation. This is partly in

response to the existing agency problem that widely held corporations inherently have. The authors test how sensitive these managerial stock option portfolios are to stock return volatility and stock prices. They find that higher sensitivity estimates result in firms choosing higher levels of leverage and higher levels of research and development spending. They conclude that managerial incentives that enable managers to bear risk perform an important role in determining the capital structure of a firm. Their conclusions are especially strong when firms have a relatively low level of outside monitoring.

The political party affiliation of the current President of the U.S. influences returns in the stock market (Santa-Clara and Valkanov, 2003). The authors find that under Democratic presidents stocks have higher real rates of return accompanied by lower real rates of interest. This difference cannot be explained by variances in the level of riskiness or by business cycle fluctuations. The authors don't compose a theory why this difference in excess returns exists.

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