2003

The capital structure puzzle: On the existence of an optimal capital structure

Mohamed Lahiani

THE CAPITAL STRUCTURE PUZZLE:

ON THE EXISTENCE OF AN OPTIMAL CAPITAL STRUCTURE

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Business Administration

---

by

Mohamed Lahiani

September 2003

THE CAPITAL STRUCTURE PUZZLE:

ON THE EXISTENCE OF AN OPTIMAL CAPITAL STRUCTURE

A Project

Presented to the

Faculty of

California State University,

San Bernardino

---

by

Mohamed Lahiani

September 2003

Approved by:

[redacted]

Dr. Dong Man Kim, Chair, Accounting & Finance

7/28/2003

Date

[redacted]

Dr. Taewon Yang

[redacted]

Dr. Otto Chang, Department Chair, Accounting & Finance

ABSTRACT

A perennial debate in corporate finance concerns the question of optimal capital structure: given the level of total capital necessary to support a company's activities, is there a way of dividing up that capital into debt and equity that maximizes current firm value? And, if so, what are the critical factors in setting the leverage ratio for a given company?

Corporate finance researchers have long been puzzled by low corporate debt ratios given debt's corporate tax advantage. What makes the capital structure debate especially intriguing is that the different theories represent such different, and in some ways almost diametrically opposed, decision-making processes. For instance, some researchers defend Miller and Modigliani by arguing that both capital structure and dividend policy are largely "irrelevant" in the sense that they have no significant, predictable effects on corporate financing. However, another school of thought holds that corporate financing choices reflect an attempt by corporate managers to balance the tax shields of greater debt against the increased probability and costs of financial distress, including those arising from corporate underinvestment. But if too much debt can destroy value by causing

financial distress and underinvestment, other schools of thought have argued that too little debt, at least in large, mature companies- can lead to overinvestment and low returns on capital.

The purpose of this paper is to present a literature survey about the capital structure puzzle theories and studies by different schools of thoughts over the past half a century. My concern is to illustrate the findings of capital structure studies and to present their contributions to the corporate finance literature, and to give my personal opinion about these results concluding by my estimation of the optimal capital structure. Thus, I am going to emphasize the role of corporate finance in supporting an interior optimum capital structure.

ACKNOWLEDGMENTS

I am deeply grateful to my advisor, Dr. Dong Man Kim, for abundant help and encourage along the way. This thesis would not have come to fruition without his insightful and thought-provoking inputs. I am also indebted to Dr. Taewon Yang for his continuous assistance and help during various stages of my dissertation effort.

I would like to genuinely thank my parents Mokhtar and Souad Lahiani for their assistance in all my studying stages and unlimited encouragements throughout my academic carrier groundwork. This, as well al my sisters Hanene, Raja and Nouha for their persistent support to myself and to my studies and works throughout all the previous years; it is thanks to their generously provided insights and contributions that I was able to finish up my master degree and thesis project. Finally, many thanks to all my MBA friends and colleagues who helped make out MBA program such a great learning and working place.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

Financing policy of firms requires managers to identify ways of finding new investment. The managers have three main alternatives; use retained earnings, borrow through debt instruments, or issue new equity shares. Hence, the standard capital structure of a firm includes equity (including retained earnings), and debt; these components of capital structure reflect firm ownership structure in the sense that the first component reflects ownership by shareholders while the second component represents ownership by debt holders. This pattern is found in developing and developed countries alike. Financing policy, capital structure and firm ownership are all strongly linked in explaining how economic agents form and modify their asset acquisition behavior through firms and capital markets, and thereby influence their incomes and returns to asset holdings, whether in the form of direct remuneration, capital gains or dividends.

Corporate capital structure has been one of the most popular issues in financial economics. Many theoretical and empirical studies have been done to examine the effects of corporate capital structure determinants

including taxes, profitability, firm size; type of assets, volatility, and business risk on the firm's financing decision. Two competing theories have been raised to explain corporate capital structure: The trade-off hypothesis and the pecking order theory.

In the trade-off hypothesis, firms choose their optimal debt ratio by weighing the benefits (tax of interest payment) and costs (potential bankruptcy costs) of debt financing. In this model, taxes are regarded as a potentially important factor. Since interest payments can be deducted in determining corporate taxable income, an incentive exists for the firm to use debt financing even if this incentive is reduced by the tax disadvantage of personal income taxes paid by the recipient on the interest payments.

The trade-off hypothesis focuses on the tax advantage of debt, thus, implying a positive relationship between a firm's value and its debt ratio. Moreover, every firm has its own optimal leverage target that maximizes its firm value, and a firm's actual leverage is expected to revert towards the target leverage.

In the pecking order theory, firms finance new investments in a specific order: First, with retained earnings, then with safe debt, then with risky debt, and

finally with equity to minimize asymmetric information costs. Compared to the trade-off hypothesis, the pecking order theory focuses on the profitability, implying a negative relationship between a firm's value and its debt ratio. Moreover, in this model, there is no optimal or target leverage.

Some writers argue that corporate managers making financing decisions are concerned primarily with the "signaling" effects of such decisions-for example, the tendency of stock prices to fall significantly in response to common stock offerings (which can make such offerings very expensive for existing shareholders) and to rise in response to leverage increasing recapitalizations. Building on this signaling argument, Stewart Myers has suggested that corporate capital structures are simply the cumulative result of individual financing decisions in which managers follow a financial pecking order-one in which retained earnings are preferred to outside financing, and debt is preferred to equity when outside funding is required.

According to Myers, corporate managers making financing decisions are not really thinking about an optimal capital structure that is, a long-run targeted debt-to-equity ratio they eventually want to achieve.

Instead, they simply take the "path of least resistance" and choose what then appears to be the low-cost financing vehicle-generally debt-with little thought about the future consequences of these choices.

The purpose of this study is to find the optimal corporate capital structure for firms. What is the optimal capital structure of a company? What factors make a company prefer debt financing to equity financing?

CHAPTER TWO

THE CAPITAL STRUCTURE PUZZLE

A firm consists of assets which produce a stream of cash flows. The *capital structure* decision determines how those assets will be paid for, and thus how the cash flows will be allocated among different claims (debt, equity, etc.).

The best way to think about an optimal firm structure is that the current owners of a firm are thinking about how to sell their firm today (Welch, 1996). Their goal is to design a corporate charter that maximizes the total market-value of their firm today, that is the price that new investors will be willing to pay to acquire the firm from the old investors. The corporate charter must not only specify the voting rules, the procedure to replace incumbent managers and how the charter can be changed in the future, but also how future earnings are to be split among different owners (such as bondholders and stockholders) and stakeholders (such as customers, workers, and suppliers). The agreement how to split up future earnings-either explicitly outlined or implicitly allowed to be changed in the future-is the firm's financial structure: rules that specify who receives the

proceeds of (possibly uncertain) future cash-flows (Welch, 1996).

Historically, corporations have been using bonds and stocks (equity). In general, bonds ("financial leverage") are like loans, promising certain payoffs. Equity is like ownership, receiving whatever is left over after the promises to bondholders have been honored. In addition, modern corporations can use a variety of financial instruments that promise different future payoffs to various buyers under various scenarios: convertible debt, equity, warrants, derivatives, leases and trade credit. Firms can also collateralize assets and/or borrow from banks. Our discussion will focus mostly on the choice between simple debt and equity, although the purpose of this study is to provide the necessary intuition to understand why other financial instruments can be useful.

Theory

The capital structure puzzle is intended to remind analysts about the Dividend puzzle and Fischer Black's well known saying: "What should the corporation do about dividend policy? We don't know." Stewart C. Myers, in his article entitled: "The Capital Structure Puzzle," started his argument by asking: "How do firms choose their capital

structure?" Again, the very usual answer is, "We don't know."

Researchers and analysts know more about the dividend policy puzzle than they do know about the capital structure one. John Lintner's model of how firms set dividends dates back to 1956, and it still seems to work in Stewart C. Myers' opinion. We know that stock prices are extremely sensitive to any unexpected dividend changes; this makes clear that dividends have information content; this information dates back at least to Miller and Modigliani, 1961. Myers argues that we do not know whether high dividend yield increases the expected return required by investors, as adding taxes to the Miller and Modigliani proof of dividend irrelevance suggests, but financial analysts are at least investigating and advancing at this concern.

We do not know that much about capital structure. We do not know how firms choose the debt, equity or securities they issue. There is not enough research and proof testing whether the relationship between financial leverage and the demanded return by investors is as the wholesome Miller and Modigliani theory foretells.

Scholars and analysts have thought long and hard about what these insights imply for optimal capital

structure. Financial economists translated these theories of optimal capital structure into more or less definite advice to managers. However, their theories do not seem to explain actual financing behavior, and it seems bigheaded to advise firms on optimal capital structure when they are still far from explaining actual decisions.

There are two different ways of thinking about capital structure; the first is a static tradeoff framework that sees the firm as setting a target debt-to-total-assets ratio and gradually moving towards it, the same way that a company adjusts dividends to move towards a target payout ratio. The second way is an old-fashioned pecking order framework, in which the firm prefers a cheaper capital, and so it favors internal to external financing and debt to equity if it issues securities. In the unadulterated pecking order theory, the firm has no well-defined target debt ratio.

The Static Tradeoff Hypothesis

A company's optimal debt ratio is always seen as determined by a tradeoff of the costs and benefits of borrowing, holding the firm's assets and investment plans constant. The firm is portrayed as balancing the value of interest tax shields against various costs of bankruptcy or financial embarrassment. Of course, there is a

controversy about how valuable the tax shields are, and which, if any, of the costs of financial embarrassment are material. But these disagreements give only variations on a theme. The firm is supposed to substitute debt for equity, and equity for debt, until the value of the firm is maximized (Myers, 1984).

Costs of adjustment: if there were no costs of adjustment, and the static tradeoff theory was correct, then each firm's observed debt ratio should be its optimal ratio. On the other hand, there are costs and consequently lags, in adjusting to the optimum. Firms cannot instantly offset the unsystematic events that smack them away from the optimum, so there should be some cross-sectional spreading of actual debt ratio across a model of firms having the same target ratio (Myers, 1984).

Huge adjustment costs could possibly explain the observed broad variation in actual debt ratios, since firms would be forced into long expeditions away from their optimal ratios. Although there is nothing in the typical static tradeoff stories suggesting that modification costs are a first order concern-in fact, they are rarely brought up. According to Myers, "Invoking them without modeling them is a cop-out."

Any cross-sectional test of financing behavior should specify whether firms' debt ratios diverge because they have different optimal ratios or because their actual ratios deviate from optimal ones. It is easy to mix up the two cases. For example, Myers mentioned in his article, "The Capital Structure Puzzle" about the early cross-sectional studies which attempted to test Miller and Modigliani's proposition. These studies tried to find out if differences in leverage affected the market value of the firm or the market capitalization rate of its operating income. With observation, Myers affirmed we can quickly see the problem: if adjustment costs are small, and each firm in the sample is at its optimum or close to it, then the in sample dispersion of debt ratios must reflect differences in risk or in other variables affecting optimal capital structure. But then Miller and Modigliani's proposition I cannot be tested unless the effects of risk and other variables on firm value can be adjusted for. This shows how inflexible and tough it is to hold "other things constant" in cross-sectional regressions.

The easy way to make sense to these tests is to assume that adjustment costs are small, but managers do not know or care what the optimal debt ratio is, and thus

do not stay close to it. On the other hand, if we do not take such an assumption, then if adjustment costs are small, and firms stay near their target debt ratios, it will be tough to understand the observed diversity of capital structures across firms that seem similar in a static tradeoff framework. If adjustment costs are so large, that some firms take extended excursions away from their targets, then we ought to give less attention to refining our static tradeoff anecdotes and relatively more attention to understanding what the adjustment costs are, why they are so important, and how rational managers would respond to them.

The Pecking Order Theory

This theory is opposite to the former one with a competing popular story based on a financing pecking order, it assumes that:

1. Firms prefer internal finance
2. They adapt their target dividend payout ratios to their investment opportunities, although dividends are sticky and target payout ratios are only gradually adjusted to shifts in the extent of valuable investment opportunities.
3. Sticky dividend policies, plus unpredictable fluctuations in profitability and investment

opportunities, mean that internally-generated cash flow may be more or less than investment outlays. If it is less, the firm first draws down its cash balance or marketable securities portfolio. If it is more, the firm first pays off debt or invests in cash or marketable securities. If the surplus persists, it may gradually increase its target payout ratio.

4. If external finance is required, firms issue the safest security first, that is, they start with debt, then possibly hybrid securities such as convertible bonds, then maybe equity as a last resort. In this story, there is no well-defined target debt-equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom. Each firm's observed debt ratio reflects its cumulative requirements for external finance.

According to Donald H. Chew, Jr. in his book "Corporate Finance, Where Theory Meets Practice", the pecking order signaling theory says that financing decisions are based at least in part, on management's perception on the "fairness" of the market's current

valuation of the stock. Declared as simply as possible, the theory suggests that, in order to minimize the information costs of issuing securities, a company is more likely to issue debt than equity if the firm appears undervalued, and to issue stock rather than debt if the firm seems overvalued.

The pecking order theory takes this argument one step farther, suggesting that the information costs associated with issuing securities are so large that they dominate all other considerations. According to this theory, companies maximize value by systematically choosing to finance new investments with the cheapest available source of funds. Specifically, the companies prefer internally generated funds being typically the retained earnings, to external funding. If outside funds are necessary, the companies prefer debt to equity because of the lower information costs associated with debt issues. Chew confirms as Myers did that companies issue equity only as a last resort, when their debt capacity has been exhausted.

The pecking order theory would thus suggest that companies with few investment opportunities and substantial free cash flow will have low debt ratios- and that high-growth firms with lower operating cash flows

will have higher debt ratios. In this sense, the theory suggests not only that interest tax shields and the costs of financial distress are at most a second-order concern but also that the logic of the pecking order actually leads to a set of predictions that are precisely the opposite of those offered by the tax and contracting cost arguments presented earlier.

The preference of public corporations for internal financing and the relative infrequency of stock issues by established firms have long been attributed to the separation of ownership and control and the desire of managers to avoid the *discipline of capital markets*. According to Myers (1984), managers who maximize market value will avoid external equity financing if they have better information than outside investors are rational.

The pecking order theory explains why the bulk of external financing comes from debt. It also explains why more profitable firms borrow less: not because their target debt ratio is low- in the pecking order they don't have a target- but because profitable firms have more internal financing available. Less profitable firms require external financing, and consequently accumulate debt.

Of course, the pecking order theory can be quickly rejected if we require it to explain everything. Myers authenticates that there are plenty of examples of firms issuing stock when they could issue investment-grade debt. But if we consider aggregates, we find that the heavy reliance on *internal finance* and *debt* is clear. For all non-financial corporations over the decade 1973-1982 (Myers, 1984), internally generated cash covered on average 62 percent of capital expenditures, including investment in inventory and other current assets. The bulk of demanded external financing comes from borrowing.

Stewart C. Myers confirms that writers on "managerial capitalism" have interpreted firms' reliance on internal finance as a by-product of the separation of ownership and control: professional managers avoid relying on external finance because it would subject them to the discipline of the capital market. Donaldson's 1969 book was not primarily about marginal capitalism, but it nevertheless states that the financing decisions of the firms he studied were not directed towards maximizing shareholder wealth, and that scholars attempting to explain those decisions would have to start by recognizing the managerial view of corporate finance (Myers, 1984). This conclusion is natural given the state of finance theory in

the 1960s. Today, it is not so obvious that financing by a pecking order goes against shareholders' interests.

An argument can always be made for internal financing to avoid issue costs, and if external finance is needed for debt to avoid the still higher costs of equity. But issue costs in themselves are not big enough to override the costs and benefits of leverage emphasized in the static tradeoff story.

Discussion of the Theory and its Evidence

In investigating corporate finance behavior and how that behavior affects security returns, Myers (1984) presented two approaches to understanding capital structure that are evaluated with respect to 5 aspects of financing behavior: 1) internal versus external financing, 2) timing of security issues, 3) borrowing against intangibles and growth opportunities, 4) exchange offers and 5) issue or repurchase of shares. A static trade-off framework is presented in which the firm is viewed as setting a target debt ratio and gradually moving toward it, in much the same way that a firm adjusts dividends to move toward a target payout ratio. In contrast, a pecking order approach in which the firm prefers internal to external financing and debt to equity if it issues

securities is developed. In the pure pecking model, the firm has no well-defined target debt ratio. A modified pecking order strategy, incorporating those elements of the static trade-off model which have clear empirical support, provides a better approach to understanding corporate financing behavior.

The way I am going to start discussing this theory of "Capital Structure Puzzle" and its evidence is by listing what we know about financing behavior and by trying to make sense of this knowledge in terms of the two hypotheses stated earlier. My discussion and analysis will be based on financial economists and researchers' findings. I will start by stating some facts about financing behavior, before generalizing them.

Internal versus External Equity

Combined investment expenditures are predominately financed by debt issues and internally-generated funds. New stock issues play a relatively small part. This reality is what the pecking order hypothesis suggested in the first place (Myers, 1984). But it might also be explained in a static tradeoff theory by adding significant transaction costs of equity issues and noting the favorable tax treatment of capital gains relative to dividends. This would make external equity relatively

expensive. It would explain why companies keep target dividend payouts low enough to avoid having to make regular stock issues. It would also explain why a firm whose debt ratio climbs above target does not immediately issue stock, buy back debt, and re-establish a more moderate debt ratio. Thus, firms might take extended excursions above their debt targets. However, the out-of-pocket costs of repurchasing shares seem fairly small. It is thus hard to explain extended excursions below a firms' debt target by an added static tradeoff theory. The firm could quickly issue debt and buy back shares. Moreover, if personal income taxes are important in explaining firm's apparent preferences of internal equity, then it's difficult to explain why external equity is not strongly negative that is why- according to Myers - why most firms haven't gradually move to materially lower target payout ratios and used the released cash to repurchase shares.

Timing of Security Issues

Firms apparently try to time stock issues when security prices are *high*. Given that they seek external finance, they are more likely to issue stock rather than debt after stock processes have risen than after they have fallen. This fact is embarrassing to static tradeoff

advocates. If firm value rises, the debt ratio falls, and firms ought to issue debt, not equity, to rebalance their capital structures.

The fact is equally embarrassing to the pecking order hypothesis. There is no reason to believe that the manager's inside information is systematically more favorable when stock prices are high. Even if there were such a tendency, investors would have learned it by now, and would interpret the firm's issue decision accordingly. Myers confirmed "There is no way firms can systematically take advantage of purchasers of new equity in rational expectations equilibrium."

Borrowing against Intangibles and Growth Opportunities

Firms holding valuable intangible assets or growth opportunities tend to borrow less than firms holding mostly tangible assets. Myers stated that there is plenty of indirect evidence indicating that the level of borrowing is determined not just by the value and risk of the firm's assets, but also by the type of assets it holds. Without this distinction, the static tradeoff theory would specify all target debt ratios in terms of market, not book values. Since many firms have market values far in excess of book values- even if these book

values are restated in current dollars- we ought to see at least a few such firms operating comfortably at very high book debt ratios (Myers, 1984). The fact begins to make sense as soon as we realize that book values reflect assets-in-place, meaning tangible assets and working capital. Market values reflect intangibles and growth opportunities as well as assets-in-place. Thus, firms do not set target book debt ratios because accountants certify the books. Book asset values are proxies for the values of assets in place.

Exchange Offers

The offers happen when a firm offers to exchange debt for equity or equity for debt. Masulis has shown that stock prices rise on average when a firm offers to exchange debt for equity and fall when they offer to exchange equity for debt (Masulis, 1980). Myers explained this fact by various ways. For example, it might be a tax effect. If most firms' debt ratios are below their optimal ratios and if corporate interest tax shields have significant positive value, the debt for equity exchanges would tend to move firms closer to optimum capital structure. Equity-for-debt swaps would tend to move them farther away.

The evidence on exchanges hardly builds confidence in the static tradeoff theory as a description of financing behavior. If the theory were right, firms would be sometimes above and sometimes below their optimum ratios. Those above would offer to exchange equity for debt. Those below would offer debt for equity. In both cases, the firm would move closer to the optimum. Myers asked "Why should an exchange offer be good news if in one direction and bad news if in the other?"

As Masulis pointed out, the firm's willingness to exchange debt for equity might signal that the firm's debt capacity had, in the management's opinion, increased. That is, it would signal an increase in firm value or a reduction in firm risk. As a result of the fact, a debt-for-equity exchange would be good news, and the opposite exchange bad news.

The idea that an exchange offer reveals a change in the firm's target debt ratio, and thereby signals changes in firm value or risk, sounds plausible. But an equally plausible story can be told without saying anything about a target debt ratio. If the manager with superior information acts to maximize the intrinsic value of existing shares, then the announcement of a stock issue should be bad news, other things equal, because stock

issues will be more likely when the manager receives bad news. On the other hand, stock retirements should be good news. Myers points out that the news in both cases has no evident necessary connection with shifts in target debt ratios.

It may be possible, according to Myers, to build a model combining asymmetric information with the costs and benefits of borrowing emphasized in static tradeoff stories. However, it will prove difficult to do this without also introducing some elements of the pecking order theory.

Issue or Repurchase of Shares

This fact is obviously not a surprise given the previous one. On average, stock price falls when firms announce a stock issue. Stock prices rise, on average, when a stock repurchase is announced. This fact has been confirmed in several studies including Vermaelen (1981).

This fact is hard to explain by a static tradeoff model, except as an information effect in which stock issues or retirements signal changes in the firm's target debt ratio.

The simple asymmetric information model Myers used to motivate the pecking order hypothesis does predict that the announcement of a stock issue will cause stock price

to fall. It also predicts that stock price should not fall, other things equal, if default-risk debt is issued. Of course, a private company can issue debt that is absolutely protected from default, but it seems reasonable to predict that the average stock price impact of high-grade debt issues will be small relative to the average impact of stock issues (Dann & Mikkleson, 1983).

All these results pointed out in theory and researches by analysts and writers make us more comfortable with asymmetric information models of the kind sketched above, and thus a bit more comfortable with the pecking order story. Indeed, Myers points out that people feel comfortable with the static tradeoff story because it sounds plausible and yields an interior optimum debt ratio. It rationalizes *moderate* borrowing. Myers adds that the story may be moderate and plausible, but that does not make it right. We have to ask whether it explains firm's financing behavior. If eventually, it does not, then we need a better theory before offering advice to managers.

In what follows, I will present a model of optimal capital structure presented by Michael Bradley, Gregg A. Jarrell and E. Han Kim in their article entitled "On the Existence of an Optimal Capital Structure: Theory and Evidence." The model synthesizes the current state of the

art in the theory of optimal capital structure. It captures the essence of the tax-advantage-and-bankruptcy-costs trade off models of Kraus and Litzenberger (1973), Scott (1976), Kim (1978), and Titman (1984), the agency costs of debt arguments of Jensen and Meckling (1976), and Myers (1977).

To develop a model that represents the current state of the art in the theory of optimal capital structure, Bradley, Gregg, and Kim (1983) made the following assumptions:

a. Investors are risk-neutral.

b. Investors face a progressive tax rate on returns from bonds, while the firm faces a constant statutory marginal tax rate.

c. Corporate and personal taxes are based on end-of-period wealth; consequently, debt payments (interest and principle) are fully deductible in calculating the firm's end-of-period tax bill, and are fully taxable at the level of the individual bondholder.

d. Equity returns (equity and capital gains) are taxed at a constant rate.

e. There exist non-debt tax shields, such as accelerated depreciation and investment tax

credits, that reduce the firm's end-of-period tax liability.

f. Negative tax bills (unused tax credits) are not transferable (saleable) either through time or across firms.

g. The firm will incur various costs associated with financial distress should it fail to meet in full the end-of-period payment promised to its bondholders.

h. The firm's end-of-period value before taxes and debt payments is a random variable. If the firm fails to meet the debt obligation to its bondholders, the costs associated with financial distress will reduce the value of the firm by a constant fraction.

The first assumption, that of risk neutrality, eliminates the need to model the general equilibrium issue of the trade-off between the tax status and the risk/expected return characteristic of debt and equity securities. In this context, risk-neutrality is equivalent to assuming that investors form either all-equity or all-debt portfolios depending on their tax rates.

Assumptions (b) through (d) describe the tax environment of the model. Assumption (d) relaxes the

undesirable assumption of a zero tax rate on income from stocks that has been commonly used by authors.

Assumptions (e) and (f) are made to incorporate the effects of non-debt tax shields on the corporate leverage decision. Assumption (f) prohibits firms from carrying tax credits backward or forward, or from selling them via a leasing agreement or through a merger.

Finally, assumptions (g) and (h) allow for the existence of costs associated with risky debt that are incurred when the firm encounters difficulty in meeting its end-of-period obligation to its debt holders.

To show that the net tax advantage of debt is positive with a constant-positive tax rate on equity returns, the analysts considered both the demand and supply of corporate debt and equity. In a risk neutral world, affirmed the writers of the model, investors are indifferent between holding stocks and bonds as long as the expected after-tax returns are the same. On the corporate side, firms are indifferent between issuing stocks and bonds as long as the marginal expected after-tax cost of issuing debt is the same as the marginal expected cost of issuing equity.

The comparative static and the simulation of the model provide some testable implications. The debt ratio

is inversely related to the costs of financial distress, which include bankruptcy costs.

This model synthesizes the modern balancing theory of optimal capital structure. It incorporates positive personal taxes on equity and on bond income, expected costs of financial distress (bankruptcy costs and agency costs), and positive non-debt tax shields. It shows that optimal firm leverage is related inversely to expected costs of financial distress and to the amount of non-debt tax shields. A simulation analysis demonstrates that if costs of financial distress are significant, optimal firm leverage is related inversely to the variability of firm earnings.

The Use of Debt in the Capital Structure

Before boarding into the usefulness of the bringing into play of debt in the capital structure and its worth to the firm, we have to define the management's first place goal: is it the maximization of the value of equity or the value of the firm?

A good starting point for our analysis is the common misunderstanding that in order to optimize the firm's capital structure; managers should maximize the value of equity. For this sake, I used Ivo Welch's analysis and

thoughts in examining this matter as expressed in his article "A Primer on Capital Structure" (1996). Even though equity is a part of the firm's capital structure, there is also debt and many financial instruments with both debt and equity features that managers *should* take into account. Welch states in his "A Primer on Capital Structure" article (1996) that if an alternative capital structure would lead to a higher value for the overall firm (the sum of the values of all securities), the latter would be a better capital structure.

To see the difference, Welch assumes there was a way (known by everybody) in which managers could increase the value of equity by $1 if they could reduce the value of debt by $3. This would reduce the value of the firm by $2. Managers are now faced with a dilemma: should they maximize the firm value, or should they maximize the value of equity, which after all votes managers into office and allows them to stay in office? Thus, managers may find it in their interest to do this exchange-even though this lowers the value of the firm (i.e., the total value of all assets and projects, both current and future, which equals the total value of all financing instruments). Yet, note that today's (*ex-ante*) purchasers of debt will take into consideration the possible future (*ex-post*) loss in the

value of their debt, and will rationally demand compensation (an extra $3 discount) for the possibility of this transfer. If managers cannot commit *not* to undertake the 3-for-1 exchange, everyone will realize that *ex-post* managers will like to do this when the time comes. Therefore, managers today would either reduce the value of the firm (equity) by $2, or have to forego issuing debt (as we will see later, debt in the capital structure could have valuable tax benefits). Even if the firm does not need to raise debt today, if it could possibly become advantageous to raise debt in the future, the value of a firm *today* with a management team unable to commit not to do the 3-for-1 exchange would be lower. For example, if there is a 10% probability that the firm might want to raise debt next year, it would then have to reduce its debt price by $3 and lose $2 in firm value. If investors are risk-neutral, with the 10% probability, the loss in firm value today of the firm's inability to commit itself in the future is thus 20 cents.

The important insight is that the cost of *ex-post* actions is born not only by bondholders tomorrow, but also by the owners today. Indeed, *caveat emptor* ("buyer beware") applies; bond and stock purchasers can only be

hurt to the extent that future opportunistic actions by management are unforeseen surprises.

Thus, it is in management's (owners') own interest today to commit not to exploit future owners and bondholders tomorrow-especially if every one knows that when the time comes, management would like to change its mind. Another important insight is that competition can force firms towards the best capital structure. When one management team cannot commit not to do bad 3-for-1 exchanges and a firm with debt would be worth more than a firm without debt, then another management team that can commit can bid for the right to take over the firm-up to the value that the firm is losing by not having debt. Again, in general, a line emphasized throughout Welch's article is that firms that can commit to do "the right thing" tomorrow (*ex-post*) are worth more today (*ex-ante*). It is a direct consequence that firms that maximize firm value are worth more than firms that maximize equity value.

Miller's famous "Debt and Taxes" paper (1977) cut us loose from the extreme implications of the original Miller and Modigliani theory, which made interest tax shields so valuable that we cannot explain why all firms were not awash in debt (Meyers, 1983). Miller described an

equilibrium of an aggregate supply and demand for corporate debt, in which personal income taxes paid by the marginal investor in corporate debt just offset the corporate tax saving. However, according to Myers, since the equilibrium only determines aggregates, debt policy should not matter for any single tax paying firm. Thus, Miller's model allows us to explain the dispersion of actual debt policies without having to introduce non-value-maximizing managers (Meyers, 1983).

The trouble is, according to Myers, this explanation works only if we assume that all firms face approximately the same marginal tax rate, and that is an assumption we can immediately reject. The extensive trading of depreciation tax shields and investment tax credits, through financial leases and other devices, proves that plenty of firms face low marginal rates.

Myers stated that the literature on costs of financial distress supports two qualitative statements about financing behavior:

1. Risky firms ought to borrow less, other things equal. Here, "risk" would be defined as the variance rate of the market value of the firm's assets. The higher the variance rate, the greater the probability of default on any given

package of debt claims. Since costs of financial distress are caused by threatened or actual default, safe firms ought to be able to borrow more before expected costs of financial distress offset the tax advantages of borrowing.

2. Firms holding tangible assets-in-place having active second-hand markets will borrow less than firms holding specialized, intangible assets or valuable growth opportunities. The expected cost of financial distress depends not just on the probability of trouble, but the value lost if trouble comes. Specialized, intangible assets or growth opportunities are more likely to lose value in financial distress.

James H. Scott, Jr., in his article "Bankruptcy, Secured Debt, and Optimal Capital Structure," (1977) defends the issuance of secured debt and its ability to increase to total value of a firm, even in absence of corporate tax. First, according to Scott, "A debt contract is said to be secured if the borrower pledges an asset to the lender with the provision that should the borrower default on his agreement the lender has the right the seize and sell the asset in question. Should the proceeds from the sale exceed the amount owed to the lender, the

excess is returned to the borrower or his estate. If the proceeds are insufficient, the lender retains all of the proceeds and becomes an unsecured creditor to the remainder due him. In general, upon bankruptcy the proceeds are distributed in the following order: secured creditors, priority creditors (administrators of the bankruptcy proceedings, tax collectors, certain wage earners, etc.), unsecured creditors, stockholders."

Previous studies conducted by Kraus and Litzenberger (1973), Modigliani and Miller (1958) and Stiglitz (1969) have shown that in absence of tax, in frictionless markets where there is no possibility for the firm to go bankrupt, changes in its debt-equity ratio will not alter to total market value of its debt plus its equity. Stiglitz (1969) had shown that even if bankruptcy can occur, the irrelevance of debt policy will follow if the individual investor is permitted to purchase equity on margin paying the same rate of interest as would the firm and using his/her equity as collateral for the debt. The investor's loan contract must also stipulate that the firm should go bankrupt, the investor need only surrender his/her equity to settle his/her margin debt (Stiglitz, 1969).

However, in a more recent article entitled "Default Risk, Scale, and the Homemade Leverage Theorem," (1972)

Smith seems to disagree with the Stiglitz conclusion, arguing that a rational lender would demand a higher interest rate of the individual than of the firm. However, Stiglitz dealt with the effect of an increase in the amount of debt by a firm which initially had no debt and, given that situation, according to Scott, Stiglitz's reasoning is correct. On the other hand, if the firm originally has debt-the Smith situation-and, increases it, then a stronger condition is required for capital structure irrelevancy.

More generally, Fama and Miller (1972) have argued that if the capital market is what they call "perfect" then even if bankruptcy is possible, firms cannot alter the total market value of their outstanding securities by issuing or retiring any type of security. One of the conditions imposed by Fama and Miller is that securities be defined so that they are protected against financing actions by firms or by individuals, which would reduce the value of the securities without adequate compensation.

However, not all of the liabilities of a firm are protected in the Fama-Miller sense and as a result, Scott argues, that the issuance of secured debt can increase the total market value of the firm. For example, he states that one of the hazards of engaging in commercial activity

lies in the fact that a disgruntled customer, supplier, or injured party may file suit and win legal damages from the firm. Since there is always the possibility that the firm will be obliged to pay future legal damages, the present value of expected damages constitute a liability of the firm. By the issuance of secured debt, the firm can increase the value of its securities by reducing the amount available to pay legal damages in the event that the firm should go bankrupt. This follows since Baumol and Malkiel's article "The Firm's Optimal Debt Equity Combination and the Cost of Capital," (1967) upon bankruptcy the claim of a secured creditor to the assets pledged as security ranks ahead of claims for legal damages, and potential victors in legal suits are unable to protect themselves from the issuance of secured debt if, at the time of issuance, they do not yet have cause for legal action. Other future costs not protected in the Fama-Miller sense include sales taxes, property taxes, excise taxes, and the administrative costs of bankruptcy. The issuance of secured debt can increase firm value by reducing the probability that these costs will be paid.

To close up his statement, Scott proves by his model that it is possible for the firm to go bankrupt, but also to raise funds in the capital market in an attempt

(successful or not) to avoid bankruptcy. Valuation formulas were derived for equity, subordinated debt, and secured debt, and it was demonstrated that a firm following an optimal policy should issue as much secured debt as possible. The maximum amount of secured interest payments was shown to be an increasing function of the size of the firm, and of both the mean and variance of its earnings stream. On the other hand, increases in the default free rate of interest decreased the maximum amount of secured interest payments. Finally, Scott shows the effect of U.S. bankruptcy law on the ability of firms to issue the type of secured debt.

Stuart M. Turnbull, in his article "Debt Capacity," (1979) confirms the position taken by Modigliani and Miller vis-à-vis the use of debt in capital structure. Turnbull states that in a world with corporate taxation, where interest payments are tax deductible, it has long been recognized that the issuance of debt can enhance the value of the firm. The existence of various market imperfections, adds Turnbull, can off-set the advantages of debt, giving rise to the idea that there is a limit on the amount of debt a firm should use and a limit on the amount of debt the firm is allowed to use. The latter

limit, according to Turnbull, has been termed the *debt capacity* of the firm.

Finally, all this corporate finance literature over the past several decades shows in general the imperative usefulness of the employ of debt in capital structure. The expression for the value of the levered firm can be used to determine to optimal method of financing an investment project, given the firm's capital structure. An interesting result proved by Thomas E. Conine, Jr. in his article "Corporate Debt and Corporate Taxes: An Extension," (1980) was that the correlation between the return of a levered firm and the market portfolio, a primary input to the measurement of diversification relative to the market, can be influenced by the financing decision of the firm. That is, pure capital structure rearrangements directly affect the relative amount of diversifiable risk which investors are not compensated for an efficient market characterized by risk aversion.

CHAPTER THREE

NECESSITY AND ADVANTAGE OF THE USE OF DEBT IN THE CAPITAL STRUCTURE

Inside versus Outside Debt

Eugene Fama, in the article "What's Different About Banks?," (1985) presents a distinction between *inside* and *outside* debt. Inside debt, according to this article, is defined as a loan for which the lender has access to information about the borrower that is not otherwise publicly available. The lender, for example, may contribute in the firm's decision-making process as a member of the board of directors. Outside debt, on the contrary, is a publicly-traded claim, for which the debt holder relies on publicly available information generated by bond rating agencies, independent audits, or analyst reports. Bank loans and privately places loans are examples of inside debt, and publicly traded bonds and commercial paper are examples of outside debt.

Inside Debt, in addition, seems to be a chief source of financing for smaller public corporations as well as privately held firms. As stated by Donald H. Chew, Jr. in "The New Corporate Finance: Where Theory Meets Practice,"

(2001) bank loans represented some 46 percent of debt financing by U.S. (non financial) corporations between 1977 and 1986. Private placements of bonds, which are essentially loan sales to a limited number of investors accounted for about 30 percent of all bond issues over the same period.

Using inside debt has several advantages as pointed out by Chew. First, inside debt may provide a possible solution to the information asymmetry problem that attends all public securities offerings. For example, to the extent banks have better information about, and thus greater confidence in, a given firm's future than outsiders, they would price their loans to reflect this information advantage. For firms with strong relationships with local bankers, but no chance of gaining an investment grade bond rating- maybe just for a matter of size- the cost of a bank loan or private placement can be significantly lower than the cost of borrowing through a public securities offering.

Second, added Chew, inside debt holders are in a better position to monitor the firm after the debt is issued. Private placements and bank loans typically contain detailed restrictive covenants, often custom-tailored to the specific problems and opportunities

of the borrower. Renegotiating the credit in response to unexpected developments is much easier when there is only one or several lenders then when there are several hundreds or even thousands of anonymous investors. Also, in the case of bank loans, firms may be able to lower their debt costs by borrowing from banks with which they maintain a deposit relationship, because these banks already have information useful for evaluating and monitoring credit quality.

Third, Chew adds that there may be a benefit to maintaining confidentiality about the firm's investment opportunities. Companies may not wish to reveal to the public the information that lenders require. For example, if a firm is raising capital for some investment the value of which goes down if competitors learn about it prior to its introduction, borrowing from private parties or from insiders allows the firm to keep the investment secret until introduction in the right time.

Finally, the use of inside debt allows borrowers to avoid the costly and time-consuming process of registering issues with the Securities and Exchange Commission. It should be noted, however, that according to Chew, there are also costs to negotiating inside debt and while the fixed cost of public issues are relatively large, variable

costs are small. For this reason, inside debt is more likely to be used for smaller borrowings- that is, when the size of the issues are not large enough to benefit from the considerable economies of scale in floating new public issues.

Chew mentioned also about the testable insinuation of the hypothesis that bank loans and other types of private debt keep away from the negative signal associated with the public offerings is that announcements of such inside debt transactions will have a positive consequence on the stock prices of the borrowing firms. The loan approval process itself may convey positive information to market participants about the financial strength of the firm, especially in the case of smaller firms without access to public capital markets. Loan renewals and new extensions may provide a credible seal of approval to equity investors and further claimants of the firm, who consequently need not undertake similar costly evaluations of the firm's financial situation.

How Big is the Advantage of Debt

Tax Advantage

This section of the thesis explains the tax advantage of debt in the capital puzzle of corporations in US

economy. The relationship between the tax advantage of a debt and annual rate of return advantage offered by optimal leverage may be too small to make a difference about the debt policy of the firms. In other words, the range of debt to firm value ratios is indifferent about the debt policy of the firms. However, the debt policy of the firms is the important determinant of the bankruptcy costs.

According to Ross Stephen, the experimental range of debt-to-firm value ratios in the U.S. economy is from zero to 60 percent (Ross, 1977). There are financial models to investigate the capital structure of the firms. Some of the those models pioneered by Turnbull in his article entitled "Debt Capacity," (1979) focused on the tradeoff between the tax shield and bankruptcy costs arising due to the cost of debt and other models such as Ross (1977) focused on information agency costs.

The issue of tax benefits of debt versus bankruptcy cost is controversial. According to Miller in the article "Debt and Taxes," (1977) the costs of bankruptcy are small relatively to the tax benefits of the debt. Miller argues this theory to explain the existence of unlevered firms. On the other hand, DeAngelo and Masulis argue that the bankruptcy costs and the net tax advantage to debt should

be in equilibrium in order to offset the marginal bankruptcy. DeAngelo and Masulis defend every firm's need to structure its debt policy according to tax advantage versus bankruptcy costs even if the bankruptcy costs are relatively small if compared to the tax advantage.

The United States taxes corporate income, but interest is a tax-deductible expense. A taxpaying firm that pays an extra dollar of interest receives a partially offsetting "interest tax shield" in the form of lower taxes paid. Financing with debt instead of equity increases the total after-tax dollar return to debt and equity investors, and should increase firm value.

This present value of interest tax shields could be a very big number. Suppose debt is fixed and permanent, as Modigliani and Miller (1963) assumed, and that corporate income is taxed at a current 35 percent statutory rate. The firm borrows $1 million and repurchases and retires $1 million of equity. It commits itself to maintain this debt level and to make annual interest payments for the indefinite future. Absent taxes, this new debt does not increase or decrease firm value: the firm is borrowing on fair terms, so the money raised is exactly offset by the present value of the future interest payments. But for a taxpaying firm the net liability created by the $1 million

debt issue is only $650,000, because the Internal Revenue Service effectively pays 35 percent of the interest payments. The after-tax net present value of this transaction would be NPV = + 1 - 0.65 = $0.35 million. The gains from borrowing $10 million or $500 million scale up proportionally (Myers, 2001).

Myers points out that such calculations are now understood as remote upper bounds. First, the firm may not always be profitable, so the average effective future tax rate is less than the statutory rate. Second, debt is not permanent and fixed. Investors today cannot know the size and duration of future interest tax shields. "Debt capacity" depends on the future profitability and value of the firm. It may be able to increase borrowing if it does well, or be forced to pay down debt if it does poorly. The future interest tax shields flowing to investors are therefore risky (Myers, 2001).

Third, according to Myers, the corporate-level tax advantages of debt could be partly offset by the tax advantage of equity to individual investors, namely, the ability to defer capital gains and then to pay taxes at a lower capital gains rate. The tax rate on investors' interest and dividend income is higher than the effective tax rate on equity income, which comes as a mixture of

dividends and capital gains. Corporations should see this relatively low effective rate as a reduction in the cost of equity relative to the cost of debt.

The tax advantages of equity to investors could, in some cases, offset the value of interest tax shields to the corporation. For example, suppose Firm X's shareholders are in the top individual tax bracket, paying about 40 percent on a marginal dollar of interest or dividends received. However, the firm pays no dividends, so equity income comes entirely as capital gains. Suppose the effective rate on capital gains is about 8 percent. (The top-bracket capital gains rate is now 20 percent, and payment can be deferred until shares are sold and the gains realized). Then the total taxes paid on $100,000 of Firm X's income are: 1) $35,000 in corporate taxes, plus 2) about $5,000 of (deferred) capital gains taxes (about 8 percent of the after-tax corporate income of $65,000).

Now Firm X borrows $1 million at 10 percent and repurchases and retires $1 million of equity. It pays out $100,000 per year in interest but saves $35,000 in taxes. But investors receive $100,000 *more* in interest income and $65,000 *less* in capital gains. Their taxes go up by $40,000 - 5,000 = $35,000. There is no net gain once both corporate and individual taxes are considered.

Myers states that if these effective tax rates applied generally to the marginal investors in debt and equity securities, we would predict the equilibrium described by Miller (1977).

The equilibrium is reached in the following way. As the supply of debt from all corporations expands, investors with higher and higher tax brackets have to be enticed to hold corporate debt, and to receive more of their income in the form of interest rather than capital gains. Interest rates rise as more and more debt is issued. So corporations face rising costs of debt relative to their costs of equity.

Eventually the after-tax cost of debt becomes so high that there is no gain from further borrowing. The supply of debt increases until there is no further net tax advantage. At that point, the effects of personal and corporate taxes cancel out, and Modigliani and Miller's Proposition 1 holds despite the tax-deductibility of interest (Myers, 2001).

But actual tax rates do not appear to support this equilibrium. Graham (2000) examines the interest rate spread between corporate bonds and tax-exempt municipal bonds to estimate the tax rate paid by marginal investors in corporate debt.

The rate is about 30 percent, well below the top bracket. He also estimates the effective tax rate on equity income at about 12 percent. Assume again that Firm X borrows $1 million and pays out $100,000 of interest yearly. It saves $35,000 in taxes. The marginal investor in debt pays an extra $30,000 on interest income but saves about $8,000 on equity income (about 12 percent of $65,000). The net tax saving is $35,000 - (30,000 - 8,000) = $13,000. Thus the extra tax paid by investors offsets more than half of the corporate interest tax shield. Nevertheless, interest tax shields should still be extremely valuable.

Graham's (2000) estimates are not definitive. We are not sure who the relevant marginal investors are; much less their effective tax rates (Myers, 2001). Yet, there is a near consensus, among both practitioners and economists, that there is a significant tax incentive for corporate borrowing. Therefore, we should observe corporations borrowing to exploit interest tax shields. If there were no offsetting costs, they would attempt to shield as much taxable income as possible, and in equilibrium there would be no corporations paying taxes! According to Myers, "This prediction is clearly wrong."

There must be some costs attached to aggressive borrowing. This leads to the tradeoff theory of capital structure.

Taxes and the Tradeoff Theory. The tradeoff theory justifies moderate debt ratios. It says that the firm will borrow up to the point where the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible costs of financial distress (Myers, 2001). Financial distress refers to the costs of bankruptcy or reorganization, and also to the agency costs that arise when the firm's creditworthiness is in doubt. For now, just assume that costs of financial distress exist, and that the prospect of financial distress can drag down the current market value of the firm.

The tradeoff theory is in immediate trouble on the tax front because it seems to rule out conservative debt ratios by taxpaying firms. If the theory is right, a value-maximizing firm should never pass up interest tax shields when the probability of financial distress is remotely low. Yet there are many established profitable companies with superior credit ratings operating for years at low debt ratios, including Microsoft and the major pharmaceutical companies (Myers, 2001).

These examples are not unusual. About half the firms in Graham's (2000) sample were paying taxes at the full statutory rate; the average firm in this sub sample could have doubled its interest payments in confident expectation of doubled interest tax shields. Graham (1996) estimates that these companies could have added 7.5 percent on average to firm value by "levering up" to still-conservative debt ratios. This is not small change. A 7.5 percent deviation from Modigliani and Miller's (1958) leverage-irrelevance proposition should prompt a vigorous supply response from security issuers. One cannot accept Modigliani and Miller's proposition and at the same time ignore many mature corporations' evident lack of interest in the tax advantages of debt (Myers, 2001).

Studies of the determinants of actual debt ratios consistently find that the most profitable companies in a given industry tend to borrow the least. For example, Wald (1999) found that profitability was "the single largest determinant of debt/asset ratios" in cross-sectional tests for the United States, United Kingdom, Germany, France and Japan.

High profits mean low debt, and vice versa. But if managers can exploit valuable interest tax shields, as the tradeoff theory predicts, we should observe exactly the

opposite relationship. High profitability means that the firm has more taxable income to shield, and that the firm can service more debt without risking financial distress.

The tradeoff theory cannot account for the correlation between high profitability and low debt ratios. It does no good to say (without further explanation) that managers are "excessively conservative" or "not value-maximizing." That amounts to blaming managers, rather than economists, for the failure of the economists' theory. Also, Myers adds that an examination of financing tactics quickly dismisses the idea that managers don't pay attention to taxes.

Floating-rate preferred shares are creatures of the tax code, and a clear illustration of the importance of taxes in financing tactics (Myers, 2001). These preferred dividend payments are tied to short-term interest rates. This stabilizes the preferred dividends' prices. They are purchased by other corporations with excess cash available for short-term investment. The key tax advantage is that only 30 percent of inter-corporate dividends are taxed (Myers, 2001). The effective corporate tax rate for preferred dividends is therefore 0.3 x 0.35 = 0.105 or 10.5 percent. The financial innovators who first created floating-rate preferred shares thus created a partially

tax-exempt security that acted like a safe, short-term, money-market instrument.

Financial leases are also largely tax-driven. When the lessor's tax rate is higher than the lessee's, there is a net gain because the lessor's interest and depreciation tax shields are front-loaded. That is, they are mostly realized earlier than the taxes paid on the lease payments. The tax advantage is due to the time value of money, and therefore increases in periods of high inflation and high nominal interest rates (Myers, Dill, & Bautista, 1977).

There are many further examples of tax-driven financing tactics. Finding clear evidence that taxes have a systematic effect on financing *strategy*, as reflected in actual or target debt ratios, is much more difficult. In Myers (1984, p. 588), after a review of the then-available empirical work, the writer concluded that there was "no study clearly demonstrating that a firm's tax status has a predictable, material effect on its debt policy. I think that the wait for such a study will be protracted."

A few such studies have since appeared although some relate in part to financing tactics and none gives conclusive support for the tradeoff theory. For example, MacKie-Mason (1990) estimated a probity model for

companies issuing debt or equity securities. He predicted that companies with low marginal tax rates—for example companies with tax loss carry-forwards—would be more likely to issue equity, compared to more profitable companies facing the full statutory tax rate. This was clearly true in his sample.

MacKie-Mason's (1990) result is consistent with the tradeoff theory, because it shows that taxpaying firms favor debt. But it is also consistent with Miller's (1977) equilibrium in which the value of corporate interest tax shields is entirely offset by the low effective tax rate on capital gains. In this case, a firm facing a low enough tax rate would also use equity, because investors pay more taxes on debt interest than on equity income. Thus, we cannot conclude from MacKie-Mason's results that interest tax shields make a significant contribution to the market value of the firm or that debt ratios are determined by the tradeoff theory (Myers, 2001).

Graham (1996) also finds evidence that changes in long-term debt are positively and significantly related to the firm's effective marginal tax rate. Again this shows that taxes affect financing decisions, at least at the tactical level. It does not show that the present value of interest tax shields is materially positive. Myers states

that Fama and French (1998), despite an extensive statistical search, could find no evidence that interest tax shields contributed to the market value of the firm.

The tradeoff theory of optimal capital structure has strong commonsense appeal. It rationalizes moderate debt ratios. It is consistent with certain obvious facts, for example, companies with relatively safe tangible assets tend to borrow more than companies with risky intangible assets (high business risk increases the odds of financial distress, and intangible assets are more likely to sustain damage if financial distress is encountered.) However, as Myers affirms, "the words "consistent with" are particularly dangerous in this branch of empirical financial economics." He adds that a fact or statistical finding is often consistent with two or more competing capital structure theories. It is too easy to interpret results as supporting the theory that one is used to.

The Evidence on Taxes. Theoretical models of optimal capital structure predict that firms with more taxable income and fewer non-debt tax shields should have higher leverage ratios (Barclay & Smith, 1999). But the evidence on the relation between leverage ratios and tax-related variables is mixed at best. For example, studies that examine the effect of non-debt tax shields on companies'

leverage ratios find that this effect is either insignificant, or that it enters with the wrong sign (Barclay & Smith, 1999). That is, in contrast to the prediction of the tax hypothesis, these studies suggest that firms with more non debt tax shields such as depreciation, net operating loss carry forwards and investment tax credits have, if anything, more, not less debt in their capital structures.

Barclay and Smith (1999) stressed out that before we conclude that taxes are unimportant in the capital structure decision, it is critical to recognize that the findings of these studies are hard to interpret because the tax variables are crude proxies for a company's effective marginal tax rate. In fact, these proxies are often correlated with other variables that influence the capital structure choice. For example, companies with investment tax credits, high levels of depreciation, and other non-debt tax shields also tend to have mainly tangible fixed assets. And, since fixed assets provide good collateral, the non-debt tax shields may in fact be a proxy not for limited tax benefits, but rather for low contracting costs associated with debt financing (Barclay & Smith, 1999). The evidence from the studies just cited is generally consistent with this interpretation.

Similarly, firms with net operating loss carry forwards are often in financial distress; and, since equity values typically decline in such circumstances, financial distress itself causes leverage ratios to increase. Thus, again, it is not clear whether net operating losses proxy for low tax benefits of debt or for financial distress.

More recently, several authors have succeeded in detecting tax effects in financing decisions by focusing on incremental financing choices (that is, changes in the amount of debt or equity) rather than on the levels of debt and equity. For example, the 1990 study by Jeffery Mackie-Mason examined registered security offerings by public U.S. corporations and found that firms were more likely to issue debt if they had a high marginal tax rate and to issue equity if they had a low tax rate. In another attempt to avoid the difficulties with crude proxy variables, the 1996 study by John Graham used a sophisticated simulation method to provide a more accurate measure of companies' marginal tax rates. Using such tax rates, Graham also found a positive association between changes in debt ratios and the firm's marginal tax rate.

On balance, then, the evidence appears to suggest that taxes play at least a modest role in corporate

financing and capital structure decisions. Moreover, as will be mentioned in the coming section of other advantages of the use of debt in capital structure, the results of the tests of contracting costs reported above can also be interpreted as evidence in support of tax explanation.

Other Advantages

Myers (1984), based in part on the argument in Myers and Majluf (1984), introduces the pecking order theory of capital structure. The major prediction of the model is that firms will not have a target or optimal capital structure, but will instead follow a pecking order of incremental financing choices that places internally generated funds at the top of the order, followed by debt issues, and finally, only when the firm reaches its "debt capacity," it will use new equity financing. This theory is based upon costs derived from asymmetric information between managers and the market and the idea that tradeoff theory costs and benefits to debt financing are of second order importance when compared to the costs of issuing new securities. The development of a pecking order based upon costs of adverse selection requires an ad hoc specification of the manager's incentive and a limitation on the types of financing strategies that may be pursued.

Despite these theoretical criticisms, the pecking order theory remains one of the predominant theories of the incremental financing choice (Myers, 1984).

Contracting Costs. Conventional capital structure analysis holds the financial managers set leverage targets by balancing the tax benefits of higher leverage against the grater probability, and thus higher expected costs, of financial distress. In this view, the optimal capital structure is the one in which the next dollar in debt is expected to provide an additional tax subsidy that just offsets the resulting increase in expected costs of financial distress.

Costs of Financial Distress. Although the direct expenses associated with the administration and the bankruptcy processes appear to be quite small relative to the market values of companies, the indirect costs can be substantial (Barclay & Smith, 1999). In thinking about optimal capital structure, the most important indirect costs are likely to be the reductions in firm value that result from cutbacks in promising investment that tend to be made when companies get into financial difficulty.

When a company files for bankruptcy, the bankruptcy judge effectively assumes control of corporate investment policy-and it is not hard to imagine the circumstances in

which judges do not maximize firm value. But even in conditions less extreme than bankruptcy, highly leveraged companies are more likely that their low-debt counterparts to pass up valuable investment opportunities, especially when faced with the prospect of default. In such cases, corporate managers are likely not only to postpone major capital projects, but to make cutbacks in R & D, maintenance, advertising, or training that end up reducing future profits.

This tendency of companies to under-invest when facing financial difficulty is attenuated by conflicts that can arise among the firm's different claimholders. To illustrate this conflict, Barclay and Smith (1999) considered what might happen to a high-growth company that had trouble servicing its debt. Since the value of such a firm will depend heavily on its ability to carry out its long-term investment plan, what the company needs is an infusion of equity. But there is a problem. As Stewart Myers points out in his classic 1977 article entitled "Determinants of Corporate Borrowing," the investors who would be asked to provide the new equity in such cases recognize that much of the value created (or preserved) by their investment would go to restoring the creditors' position. In this situation, the cost of the new equity

could be so high that managers acting on their shareholders' behalf might rationally forgo both the capital and the investment opportunities.

Myers refers to this as "the underinvestment problem." And as he still argues, companies whose value consists primarily of intangible investment opportunities- or "growth opting," as he called them- will choose low debt capital structures because such firms are likely to suffer the greatest loss in value from this underinvestment problem. By contrast, mature companies with few profitable investment opportunities where most of their value reflects the cash flows from tangible "assets in place" incur lower expected costs associated with financial distress. Such mature companies, all else equal, should have significantly higher leverage ratios than high-growth firms.

The Benefits of Debt in Controlling Overinvestment. If too much debt financing can create an underinvestment problem for growth companies, too little debt can lead to an over-investment problem in the case of mature companies. As Michael Jensen has argued, large, mature public companies generate substantial free cash flow- that is, operating cash flow that cannot be profitably reinvested inside the firm. The natural inclination of

corporate managers is to use such free cash flow to sustain growth at the expense of profitability, either by over investing in their core businesses or, perhaps worse, by diversifying through acquisition into unfamiliar ones.

Because both of these strategies tend to reduce value, companies that aim to maximize firm value must distribute their free cash flow to investors. Raising the dividend is one way of promising to distribute excess capital. But major substitutions of debt to equity offer a more reliable solution because contractually obligated payments of interest and principal are more effective than discretionary dividend payments in squeezing our excess capital. Thus, in industries generating substantial cash flow but facing few growth opportunities, debt financing can add value simply by forcing managers to be more critical in evaluating capital spending plans (Barclay & Smith, 1999).

Evidence on Contracting Costs. Much of the evidence on capital structure supports the conclusion that there is an optimal capital structure and that firms make financing decisions and adjust their capital structures to move closer to the optimum (Barclay & Smith, 1999).

For example, some studies have used cross-sectional regression techniques to test whether the theoretical

determinants of an optimal capital structure actually affect financing decisions. For example, in their 1984 study, Michael Bradley, Gregg Jarrell, and Han Kim found that the debt to (book) asset ratio was negatively related to both the volatility of annual operating earnings and to advertising and R&D expenses. Both of these findings are consistent with high costs of financial distress for growth companies which tend to have more volatile earnings as well as higher spending on R&D.

According to Barclay and Smith (1999), when firms get into financial difficulty, complicated capital structures with claims of different priorities can generate serious conflicts among creditors, thus exacerbating the underinvestment problem described earlier. And because such conflicts and the resulting underinvestment have the greatest potential to destroy value in growth firms, those growth firms that do issue fixed claims are likely to choose mainly high-priority fixed claims.

Information Costs. Corporate executives often have better information about the real value of their companies than outside investors. Recognition of this information disparity between managers and investors has led to two distinct but related theories of financing decisions- one known as *signaling*, the other as the *pecking order.*

Signaling. With better information about the value of their companies than outside investors, managers of undervalued firms would like to raise their share prices by communicating this information to the market. Unfortunately, according to Barclay and Smith (1999), this task is not as easy as it sounds; simply announcing that the companies are undervalued is generally not enough. The challenge for managers is to find a credible signaling mechanism.

Economic theory suggests that information disclosed by an obviously biased source (like management, in this case) will be credible only if the costs of communicating falsely are large enough to constrain managers to reveal the truth. Increasing leverage has been suggested as one potentially effective signaling device (Barclay & Smith, 1999). Debt contracts oblige the firm to make a fixed set of cash payments over the life of the loan; if these payments are missed, there are potentially serious consequences, including bankruptcy. Equity is more forgiving (Barclay & Smith, 1999). Although stockholders also expect cash payouts, managers have more discretion over these payments and can cut or omit them in times of financial distress.

For this reason, adding more debt to the firm's capital structure can serve as a credible signal of higher future cash flows. By committing the firm to make future interest payments to bondholders, managers communicate their confidence that the firm will have sufficient cash flows to meet these obligations.

Debt and equity also differ with respect to their sensitivity to changes in firm value. Since the promised payments to bondholders are fixed, and stockholders are entitled to the residual (or what's left over after the fixed payments), stock prices are much more sensitive than bond prices to any proprietary information about future prospects (Barclay & Smith, 1999). If management is in possession of good news that has yet to be reflected in market prices, the release of such news will cause a larger increase in stock prices than in bond prices; and hence current stock prices (prior to the release of the new information) will appear more undervalued to managers than current bond prices. For this reason, signaling theory suggests that managers of companies that believe their assets are undervalued will generally choose to issue debt- and to use equity only as a last resort.

To illustrate this with a simple example, let's suppose that the market price of a stock is $10.00.

Investors understand that its real value-that is, the value they would assign if they had access to the same information as the firm's managers- might be as high as $12.00 or as low as $8.00; but given the investors' available information, $10.00 is a fair price. Now let's suppose that the managers want to raise external funds and they could either sell equity or debt. If the managers think the stock is really worth only $8.00, selling shares for $10.00 will be attractive- especially if their compensation is tied to stock appreciation. But if the managers think the stock is really worth $12.00, equity would be expensive at $10.00 and debt would be more attractive.

The investors understand this and so if the company announces an equity offer, investors reassess the current price in the light of this new information. Since it is more likely that the stock is worth $8.00 than $12.00, the market price declines. Such a rapid adjustment in valuation associated with the announcement thus eliminates much of any potential gain from attempting to exploit the manager's superior information.

Consistent with this example, many economists have documented that the market responds in systematically negative fashion to announcements of equity offerings,

marking down the share prices of issuing firms to a new equilibrium price. By contrast, the average market reaction to new debt offerings is not significantly different from zero. The important thing to recognize is that most companies issuing new equity - those that are undervalued as well as those that are overvalued - can expect a drop in stock prices when they announce the offering (Barclay & Smith, 1999). For those firms that are fairly valued or undervalued prior to the announcement of the offering, this expected drop in value represents an economic strength of the existing shareholders' interest.

The Pecking Order. The signaling theory, then, says that the financing decisions are based, at least in part, on management's perception of the *fairness* of the market's current valuation of the stock. Stated as simply as possible, the theory suggests that in order to minimize the information costs of issuing securities, a company is more likely to issue debt than equity if the firm appears undervalued, and to issue equity stock rather than debt if the firm seems overvalued.

The pecking order theory takes this argument one step further. According to Barclay and Smith (1999), this theory suggests that the information costs associated with issuing securities are so large that they dominate all

other considerations. According to this theory, the companies maximize value by systematically choosing to finance new investments with the *cheapest available* source of funds. Specifically, they prefer debt to equity because of the lower information costs associated with debt issues. Companies issue equity only as a last resort, when their debt capacity has been exhausted.

Barclay and Smith (1999) stressed out that the pecking order theory would thus suggest that companies with few investment opportunities and substantial free cash flow will have low debt ratio and that high-growth firms with lower operating cash flows will have high debt ratios. Consequently, the theory suggests that interest tax shields and the cost of financial distress are at most a second-order concern; in addition, the logic of the pecking order actually leads to a set of forecasts that are accurately the opposite of those offered by the tax and contracting cost arguments obtainable above.

The Evidence on Information Costs. The signaling theory says that companies are more likely to issue debt then equity when they are undervalued because of the large information costs (in the form of dilution) associated with the equity offering. The pecking order model goes even further, suggesting that the information costs

associated with riskier securities are so large that most companies will not issue equity until they have completely exhausted their debt capacity. Neither the signaling theory nor the pecking order offers any clear prediction about what optional capital structure would be for a given firm (Barclay & Smith, 1999). The signaling theory seems to suggest that a firm's actual capital structure will be influenced by whether the company is perceived by management to be undervalued or overvalued. Barclay and Smith affirmed that the pecking order is even more extreme: it implies that a company will not have a target capital structure, and that its leverage ratio will be determined by the gap between its operating cash flow and its investment requirements over time. Thus, the pecking order predicts that companies with consistently high profits or modest financing requirements are likely to have low debt ratios-mainly because they do not need outside capital. Less profitable companies, on the other hand, and those with large financing requirements, will end up with high leverage ratios because of the managers' reluctance to issue equity.

A number of studies provide support to the pecking order theory in the form of evidence of a strong negative correlation coefficient between past probability and

leverage. That is, the lower a company's profits and operating cash flows in a given year are, the higher its leverage ratio is (Barclay & Smith, 1999). Moreover, in an article published in 1998, Myers and Lakshmi added to this series of studies by showing that this relation explains more of the time-series variance of debt ratios than a simple target-adjustment model of capital structure that is consistent with the contracting cost hypothesis.

Such findings have generally been interpreted as confirmation that managers do not set target leverage ratios-or at least do not work very hard to achieve them (Barclay & Smith, 1999). But this is not the only interpretation that fits this data. Even if companies have target leverage ratios, there will be an optimal deviation from those targets: one that will depend on the transactions costs associated with adjusting back to the target relative to the costs of deviating from the target. To the extent there are fixed costs and scale economies in issuing securities, companies with capital structure targets-particularly smaller firms- will make infrequent adjustments and often will deliberately overshoot their targets.

Maturity and Priority

The signaling theory implies that undervalued firms have more short-term debt and more senior debt than undervalued firms because such instruments are less sensitive to the market's assessment of firm value and thus will be less undervalued when issued. The findings of Barclay and Smith's (1999) study are inconsistent with the predictions of the signaling hypothesis with respect to debt maturity. In fact, companies whose earnings were about to increase the following year issued less short-term debt and more long-term debt than firms whose earnings were about to decrease. And, whereas the theory predicts more senior debt for firms about to experience earnings increases, the ratio of senior debt to total debt is lower for overvalued than for undervalued firms.

In the sum, the results of Barclay and Smith's (1999) tests of managers' use of financing choices to signal their superior information to the market are not robust, and the economic effect of any such signaling on corporate decision making seems minimal.

According to the pecking order theory, the firm should issue as much of the security with the lowest information costs as it can. Only after this capacity is exhausted should it move on the issue of security with

higher information costs. Thus, for example, firms should issue as much secured debt or capitalized leases as possible before issuing any unsecured debt, and they should exhaust their capacity for issuing short-term debt before issuing any long-term debt. But these predictions are clearly rejected by the data. For example, Barclay and Smith (1999) examined the capital structures of over 7,000 companies between 1980 and 1977 (representing almost 57,000 firm-year observations), they found that 23% of these observations had no secured debt, 54% had no capital leases, and 50% had no debt that was originally issued with less than one year to maturity.

To explain these more detailed aspects of capital structure, proponents of the pecking order theory must go outside their theory and argue that other costs and benefits determine their choices. But according to Barclay and Smith (1999), once you allow for these other costs and benefits to have a material impact on corporate financing choices, you are back in the more "traditional domain" of optimal capital structure theories.

The Role of Bank Loans Raising Capital and Optimizing Capital Structure

In a frictionless capital market, firms are always able to secure funding for positive NPV projects. In the

presence of information asymmetry in which the firm's quality and the quality of its investment projects cannot be easily evaluated by the outside capital markets, firms may be unable to raise sufficient capital to fund all of their good projects. Such market frictions create the possibility for differentiated markets or institutions to arise (Faulkender & Petersen, 2002). Financial intermediaries are lenders that specialize in collecting information about borrowers, a collection which is then used in the credit approval decision. By interacting with borrowers over time and across different products, the banker may be able to partially alleviate the information asymmetry which is the cause of the market's failure (Faulkender & Petersen, 2002).

Financial intermediaries such as banks may also have an advantage over arms length lenders (such as bond markets) after the capital is provided. If ex-post monitoring raises the probability of success (either through enforcing efficient project choice or enforcing the expenditure of the owner's effort), then they may be a preferred source of capital. Financial intermediaries may also be better at efficient restructuring of firms which are in financial distress (Faulkender & Petersen, 2002).

The literature has often described banks (or private lenders) as being particularly good at investigating informational opaque firms and deciding which are viable borrowers. This suggests that the source of the capital may be intimately related to the firms' ability to access debt markets. Firms which are opaque (and thus difficult to investigate ex-ante) or which have more discretion in their investment opportunities (and thus difficult for lenders to constrain contractually) are more likely to borrow from active lenders and are also the type of firms which theory predicts may be constrained. In this paper, I am concerned about investigating the link between where firms obtain their capital (the private versus the public debt markets) and the contribution of the debt in the capital. I am going to briefly describe the tradeoff between financial intermediaries (the private debt markets) which have an advantage at collecting information and restructuring firms, but are a potentially more expensive source of capital, and arm's length lenders (the public debt markets). The higher cost of capital may be due to the expenditure on monitoring or because of the tax disadvantage of the lender's organizational form. Additionally, not all firms may be able to choose the source of their debt capital. If firms which do not have

access to the public debt markets are constrained by lenders in the amount of debt capital they may raise, we should see this in their lower debt ratios.

Debt ratios should depend upon firm characteristics as well. Thus a difference in leverage does not imply that firms are constrained by the debt markets. This difference could be the product of firms with different characteristics optimally making different decisions about leverage. This, however, does not appear to be the case. Even after controlling the firm characteristics which, as theory and previous empirical work argue, determine a firm's choice of leverage, we still find that firms with access to the public debt market have higher leverage that is both economically and statistically significant (Faulkender & Petersen, 2002). Finally, we consider the possibility that the choice of whether to gain access to the public debt markets (obtain a debt rating) is endogenous. Even after controlling the endogeneity of a debt rating, we find that firms with access to the public debt markets have significantly higher leverage ratios (Faulkender & Petersen, 2002).

This intuition is the basis of the empirical literature which has examined the firm's choice of lender. Firms that are riskier, smaller and about which less is

known are the firms most likely to borrow from financial intermediaries. Larger firms about which much is known will be more likely to borrow from public capital markets (Faulkender & Petersen, 2002).

The monitoring done by financial intermediaries and the resources spent on restructuring firms, however, is costly (Faulkender & Petersen, 2002). Its cost must therefore be passed back to the firm and this means that the cost of the capital for firms in this imperfect market depends not only on the risk of their projects but also on the resources needed to verify the viability of their projects. If monitoring is costly and imperfect, and if we compare two firms with identical projects, we will find that the one which needs to be monitored (for example if the owner does not have a track record), will have a different cost of (debt) capital. The cost of monitoring will be passed on to the borrower in the form of higher interest rates. This will cause the firm to reduce its use of debt capital. In addition, if the monitoring and additional information collection performed by the financial intermediary cannot eliminate the information asymmetry completely, credit may still be allowed.

To sum up the role and necessity of the use of debt in the capital structure, I developed a numerical example

explaining the different processes in capital structure puzzle. I got inspired from class notes in corporate finance and summarized all the steps I already mentioned through the literature I presented above.

The question I am going to answer is: does capital structure matter?

A firm consists of assets which produce a stream of cash flows. The *capital structure* decision determines how those assets will be paid for, and thus how the cash flows will be allocated among different claims (debt, equity, etc.). From this point, an important question derives: Can the firm *increase the value of its assets* by issuing a particular set of securities?

We first isolate the capital structure decision by holding investment and dividend policy fixed; Modigliani and Miller's (MM's) Proposition I states that in perfect markets, the value of a firm's assets is unaffected by the mix of securities used to finance the purchase of the assets.

The proof relies on the fact that investors can do (or undo) any actions that firms can take.

Suppose that two firms have the same assets (that generate the same operating earnings), and differ only in how the assets are financed:

Firm U is unlevered (no debt) and so its assets and equity are both worth the same amount ($V_U = S_U = \$100,000$)

Firm L is levered (uses debt - say $25,000) and so the value of the equity is equal to: $S_L = V_L - B_L = V_L - \$25,000$.

Consider two different investments:

1. buy 15% of firm U's stock
2. buy 15% of firm L's debt and stock

For investment 1:

Dollar Investment	Dollar Return

For investment 2:

	Dollar Investment	Dollar Return
Debt		
Equity		
Total		

Figure 1. Investment/Return Chart for Investments 1 and 2

Both investments offer the same return (and have the same risk), and so *must sell for the same price today*. Thus $0.15\ V_U = 0.15\ V_L$, or $V_U = V_L = \$100,000$. The levered and unlevered firms are worth the same.

Now consider the following investments:

3. Buy 15% of firm L's stock
4. Borrow $\$0.15\ B_L = \$3,750$, and buy 15% of firm U's stock for $15,000.

For investment 3:

Dollar Investment	Dollar Return

For investment 4:

	Dollar Investment	Dollar Return
Debt		
Equity		
Total		

Figure 2. Investment/Return Chart for Investments 3 and 4

Again, both investments offer the same payoff, and therefore *must sell for the same price today.* This says that $0.15\ (V_L - B_L) = 0.15\ (V_U - B_L)$, or $V_L = V_U$. The value of the levered firm is the same as the unlevered firm.

In both cases, the irrelevance of capital structure depended on investors' ability to *undo* any effects of the differences in capital structure. In particular, investors must be able to borrow or lend on the same terms as the firm.

Some Restatements of Modigliani and Miller Proposition I

1. If shares of levered firms are priced too high, investors will borrow by themselves and use the money to buy shares in unlevered firms. This is sometimes called *homemade leverage.*

2. If shares of unlevered firms are too high, investors will buy shares in levered firms and put money in bonds.
3. In order for capital structure to matter, there must be some market imperfections that allow the firm to do something that investors cannot do for themselves.

A counter-argument to Modigliani and Miller I?

Individuals *cannot* borrow as easily and cheaply as firms. Wouldn't investors be willing to pay a premium for investment 3 (firm L's equity?).

Answer. Market imperfections are a *necessary*, but not a *sufficient*, condition for capital structure to matter. There must be an *unsatisfied clientele* for shares in levered firms. There are a zillion levered firms available to invest in. How could a firm increase its value by becoming the zillion-and-first?

Another Restatement of Modigliani and Miller I

Capital structure matters when firms find an untapped demand among investors and satisfy it with a new security. In a competitive market for securities your firm is unlikely to be *consistently* first to the market with a new security.

Leverage and Returns

The expected return on a portfolio is the weighted average of the expected returns of its component securities (*weighted average cost of capital*):

$$r_0 = (B/V)\ r_B + (S/V)\ r_S \Rightarrow r_S = r_0 + (B/S)\ (r_0 - r_B)$$

$$r_{WACC} = r_0$$

Since portfolio betas are also weighted averages of component betas we can also write:

$$\beta_S = \beta_0 + (B/S)\ (\beta_0 - \beta_B)$$

An aside: with taxes we write MM Proposition II as:

$$r_S = r_0 + (B/S)\ (1-T_C)\ (r_0 - r_B)$$

The Bottom Line

In perfect capital markets, capital structure is irrelevant. However, even market imperfections per se are not enough to make debt policy matter.

In the next section, we will examine two market imperfections that *do* make capital structure matter: taxes and the costs of financial distress.

What can explain firms' financing choices? We focus on two market imperfections that we ignored in the last chapter: taxes and the costs of financial distress.

Taxes

If we assume constant cash flows; and EBIT is the total cash flow of the firm before interest and taxes,

ignoring depreciation and other such items as taxes, then the taxable income of a 100%-equity financed firm equals

EBIT

For a 100%-equity financed firm, total taxes are

EBIT×Tc

and earnings after taxes are

EBIT×(1-Tc)

taxable income for a levered firm

EBIT - rBB

total taxes in a levered firm are

(EBIT - rBB) ×Tc

cash flow going to stockholders

EBIT - rBB - Tc×(EBIT - rBB) = (EBIT - rBB) ×(1-Tc)

cash flow going to stockholders and bondholders

EBIT×(1-Tc) + TcrBB

	Firm U	Firm L
EBIT	1000	1000
Interest	0	80
Taxable Income	1000	920
Tax @ 34%	340	321.80
Net Income	660	607.20
Payments to stockholders and bondholders	660	687.20
Interest tax shield (34% × interest)	0	27.20

Figure 3. Firm U/Firm L Tax Shields Chart

NB: Assume that the tax rate for the firms is T = 34% and that the interest rate for the loan is 8%.

Firm L has borrowed $1000 at 8%. The government pays 34% of L's interest bill, increasing the total income available for payout to both stockholders and bondholders.

If L's debt is "permanent," the firm can enjoy a perpetual $27.20 tax break from using debt. If we discount this cash flow at the rate of return on the debt, we have:

$$\text{PV tax shield} = 27.20/0.08 = 340 = T_c D.$$

Note that the PV of tax shields may be less if the debt is not permanent, or if there is uncertainty about realizing the tax shields.

This leads to MM's "corrected" Proposition I:

Value of firm = value if all-equity financed + PV of tax shield

$$V_L = V_U + T_c D$$

Implication

Unfortunately, MM's corrected Proposition I implies that 100% debt financing is optimal. Aside from the logical impossibility of this prescription, we don't observe firms with *market value* debt ratios anything close to 100% (unless they're about to go bankrupt).

There are 2 possible omissions from the theory which could explain why "corrected Proposition I" doesn't

describe reality (Schlingemann, 1996). The first is *personal taxes*; the second is *financial distress and agency costs*.

Personal Taxes

In the prior example, the firm can deduct interest from its corporate tax bill. *But*, that interest may be taxable to the bondholder. In contrast, if the firm pays no interest but retains all its earnings, shareholders may pay no taxes (if they don't realize the capital gain).

What does this imply for the relevance of corporate financing?

	EBIT = \$1	
	If paid as interest	If paid as equity income
Corporate tax	0	T_C
Income after tax	\$1	$\$1-T_C$
Personal tax	T_B	$(1-T_C)T_S$
Income after all taxes	$1-T_B$	$(1-T_S)(1-T_C)$

Figure 4. Firm U/Firm L Income After Tax

Borrowing is better if $1-T_B$ exceeds $(1-T_S)(1-T_C)$; otherwise equity financing is better.

Suppose all equity income comes from dividends (or all capital gains are realized immediately). Then the relative advantage is $1/(1-T_C)$, since T_B and T_S are equal.

Since this is greater than 1.0, MM are right - use as much debt as you can.

For debt policy to be irrelevant again, we need $1-T_B = (1-T_S)\ (1-T_C)$. This essentially requires the corporate rate to be less than the personal rate, and for T_S to be very small.

Costs of Financial Distress

Value of firm = Value if all equity financed + PV of tax shield - PV of costs of financial distress If the costs of financial distress are positive, this implies that 100% debt financing is NOT optimal.

What are the Costs of Financial Distress?

Bankruptcy Costs. Bankruptcy is a legal mechanism that allows firms to renegotiate the terms of their debt contracts. *Direct bankruptcy costs* are the costs of using this legal framework (Schlingemann, 1996).

Indirect bankruptcy costs measure the loss in value realized when customers and suppliers abandon a bankrupt firm. These are hard to measure because it's hard to disentangle cause and effect, but reasonable estimates are between 8 and 15% of firm value. NB: It is not the *probability* of bankruptcy per se that reduces firm value, but rather the *costs* of bankruptcy (Schlingemann, 1996).

CHAPTER FOUR

CONCLUSION

In addition to explaining the basic leverage (debt vs. equity) decision, a functional theory of capital structure should also help explain other capital structure choices, such as debt maturity, priority, the use of callability and convertibility provisions, and the choice between public and private financing. As discussed above, the contracting-cost theory provides a unified framework for analyzing the entire range of capital structure choices while most other theories, such as signaling and pecking order theories, are at best silent about-and more often inconsistent with- the empirical evidence on these issues.

We can also take this argument a little further to say that a productive capital structure theory should also help explain an even broader array of corporate financial policy choices, including dividend, compensation, hedging and leasing policies. The empirical evidence suggests that companies choose coherent packages of these financial policies (Barclay & Smith, 1999). For example, Barclay and Smith (1999) add that small high-growth firms tend to have not only low leverage ratios and simple capital structures

(with predominately short-maturity, senior bank debt), but also low dividend payouts as well as considerable stock-based incentive compensation for senior executives. By contrast, large mature companies tend to have high leverage, more long-term debt, more complicated capital structures with a broader range of debt priorities, higher dividends, and less incentive compensation (with higher reliance on earnings-based bonuses rather than stock-based compensation plans). Thus, corporate financing, dividend and compensation policies, besides being highly correlated with each other, all appear to be driven by the same fundamental firm characteristics: investment opportunities and (to a lesser extent) firm size (Chew, 2001). This consistent pattern of corporate decision-making suggests that we now have the rudiments of a unified framework for explaining most, if not all, financing policy choices.

As mentioned earlier, proponents of the pecking order theory argue that the information costs associated with issuing new securities dominate all other costs in determining capital structure. But, the logic and predictions of the pecking order theory are at odds with, and thus incapable of explaining, most other financial policy choices. For example, in suggesting that firms will always use the cheapest source of funds, the model implies

that companies will not simultaneously pay dividends and access external capital markets. But this prediction can, of course, be rejected simply by glancing at the business section of most daily newspapers. With the exception of a few extraordinary high tech companies like Microsoft and Amgen, most large, publicly traded companies pay dividends while at the same time regularly rolling over existing debt with new public issues. As already discussed, although the pecking order theory predicts that mature firms that generate lots of free cash flow should eventually become all equity financed, they are among the most highly levered firms in Barclay and Smith's (1999) sample. Conversely, the pecking order theory implies that high-tech startup firms will have high leverage ratios because they often have negative free cash flow and incur the largest information costs when issuing equity. But, in fact, such firms are financed almost entirely with equity (Barclay & Smith, 1999).

Thus, as in the case of debt maturity and priority, proponents of the pecking order must go outside of their theory to explain corporate behavior at both ends of the corporate growth spectrum. In so doing, they implicitly limit the size and importance of information costs; they concede that, at least for the most mature and

highest-growth sectors, information costs are less important than other considerations in corporate financing decisions.

After opposing the above schools of thoughts and theories all the way since more than half a century, I would like to ask the same question that Myers asked in his 1984 article entitled "The Capital Structure Puzzle": "How do firms choose their capital structure?" Well, after going through the different theories, I am aligning myself to Myers' answer "We don't know."

It is very lucid that the capital structure theories have explained a good part of the capital structure decision-making actions, but I still believe that they do not explain with certitude all the managers' behaviors in constructing their firms' capital structures. On the one hand, the pecking order theory fails to explain some firms' financial structure as described in the high-tech industries example above; and in such a manner, we feel we cannot totally rely on this theory. On the other hand, the tradeoff theory is not perfect either. For example, as I mentioned earlier, the tradeoff theory cannot account for the correlation between high profitability and low debt ratios. It does no good to say that managers are "excessively conservative" or "not-value-maximizing." I

strongly think that none of the existing theories in capital structure is a perfect model explaining managers' behaviors and that we can recommend as sculpt to be followed by business leaders.

To sum up, let's ask ourselves: why should the firm's managers be concerned today about the firm's future ability to expropriate its bondholders or potential other equity investors, or to pursue suboptimal real investment strategies? After all, it could benefit their clientele, current equity. Yet, upon reflection, it becomes clear that when investors can be expropriated in the future, they will demand a higher compensation upfront. This reduces the firm's financing flexibility, and thus typically forces firms to offer a higher expected rate of return today to issue their preferred capital structure, or to make compromises and forego some positive NPV projects. By the same token, a firm that is more likely to take only the best projects in the future is worth more today. A firm that has both debt and equity, rather than equity only, may not be able to commit itself to the best future actions, resulting in a loss of value and competitive advantage today.

The real world is considerably more complex in that firms typically do not face each of the above problems in

isolation, but all at the same time. The presence of one problem may worsen another. For example, there can be significant costs to move from a suboptimal to an optimal capital structure. If a firm is close to bankruptcy, issuing equity could avoid or reduce bankruptcy costs, which increase firm value. But the infusion of more equity may mostly benefit bondholders, so equity holders may not be inclined to issue more equity. So, although capital structure reorganization could install a new capital structure to increase firm value, there are problems to be resolved to get there, given the current capital structure.

Ultimately, the trick in being a good manager is to weigh costs and benefits of projects, debts, and equity, and to have sound judgment in deciding on a good combination thereof. Although we have seen a multitude of theories explaining the crowds of forces interacting to get a better capital structure, choosing a good capital structure remains as much an *art* as it is a *science*.

In addition, I think that the tradeoff theory is more of the model I would recommend for use with coordination with the pecking order theory. The tradeoff model suggests keeping a target debt ratio that rationalizes the firm capital structure and financing behavior. This is a

coherent model that keeps the financial managers' forecasts and analysis safe to some extent. If we add to this model some use of the pecking order, this will lead the capital structure to a conservative and safe pavement protecting the firm's value. This might push the research to a tradeoff between the existing tradeoff theory and the pecking order model.

The question I am going to answer is "How should we proceed to get such a swapping model out of the existing theories?"

If we can find a balanced model trading between these two theories, it will possibly be the new alternative for managers to scientifically set up their firms' capital structures. A good line of attack I would recommend this balanced theory to come into view is to choose a bucket of optimal firms (that we assume they should be our target from a performance perspective) and elaborate an empirical study on the mixture of their capital structures to extract the common features of the structures of their capitals. If we start from the point where we assume the tradeoff theory concentrates on the ratios analysis, and the pecking order theory focuses on the costs analysis, then a correlation coefficient study between these two variables (debt-ratios and costs) would explain the

behaviors and orientations of an eventual model for the sake of an optimal capital structure. The tradeoff-pecking-order new theory will present a potential starting point for future researches and investigations looking for the scientific answers concerning the existence of an optimal capital structure that the existing theories do not solve.

REFERENCES

Barclay, M. J., & Smith, C. W. (1999). The capital structure puzzle: Another look at the evidence. Journal of Applied Corporate Finance, 12, 8-20.

Baumol, W. J., & Malkiel, B. G. (1967, November). The firm's optimal debt-equity combination and the cost of capital. Quarterly Journal of Economics, 81, 547-578.

Bautista, A. J., Dill, D. A., & Myers, S. C. (1976, June). Valuation of financial lease contracts. Journal of Finance, 31, 799-819.

Bradley, M., Jarrell, G. A., & Kim, E. H. (1984, July). On the existence of an optimal capital structure: Theory and evidence. Journal of Finance, 39, 857-876.

Chen, L., & Roumasset, J. (2002. October 9). Modigliani and Miller irrelevance with positive profit and default risk: An operational approach. Hawaii: Department of Economics, University of Hawaii at Manoa, 1-16.

Chew, D. H., Jr. (2001). The new corporate finance: Where theory meets practice (3rd ed.). Irwin, NY: McGraw Hill Higher Education.

Conine, T. E., Jr. (1980, September). Corporate debt and corporate taxes: An extension. The Journal of Finance, 35, 1033-1037.

Dann, L. Y., & Mikkleson , W. H. (1983). Convertible debt issuance, capital structure change and financing-related information: Some new evidence. Hanover, NH: Amos Tuck School of Business Administration.

DeAngelo, H., & Masulis, R. (1980). Optimal capital structure under corporate and personal taxation. Journal of Financial Economics, 8, 3-29.

Fama, E. (1985). What's different about banks? Journal of Monetary Economics, 15, 29-39.

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

Faulkender, M., & Petersen, M. A. (2002, November). Does the source of capital affect capital structure?. Washington: Olin School of Business, Washington University, and Kellogg School of Management, Northwestern University and NBER, 1-18.

Graham, J. R. (1996, May). Debt and the marginal tax rate. Journal of Financial Economics, 41, 41-73.

Graham, J. R. (2000, October). How big are the tax benefits of debt?, Journal of Finance, 55, 1901-1940.

Jensen, M. C., & Meckling, W. H. (1976, October). Theory of the firm managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3, 305-360.

Kim, E. H. (1978, March). A mean-variance theory of optimal capital structure and corporate debt capacity. Journal of Finance, 33, 45-64.

Kraus, A., & Litzenberger, R. (1973, September). A state-preference model of optimal financial leverage. Journal of Finance, 28, 911-927.

Lakshmi, S. S., & Myers, S. C. (1998). Testing static tradeoff against pecking order models of capital structure. Journal of Financial Economics, 51, 219-244.

Mackie-Mason, J. K. (1990, December). Do taxes affect corporate financing decisions? Journal of Finance, 45, 1471-1493.

Majluf, N. S., & Myers, S. C. (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics, 13, 187-221.

Masulis, R. W. (1980, June). The effects of capital structure change on security prices: A study of exchange offers. Journal of Financial Economics, 8, 139-177.

Masulis, R. W. (1983, March). The impact of capital structure change on firm value. Journal of Finance, 38, 107-126.

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

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

Miller, M., & Modigliani, F. (1961, October). Dividend policy, growth and the valuation of shares. Journal of Business, 34, 411-433.

Miller, M., & Modigliani, F. (1966, June). Some estimates of the cost of capital to the electric utility industry, 1954-1957. American Economic Review, 56, 333-391.

Myers, S. C. (1977, November). Determinants of corporate borrowing. Journal of Financial Economics, 5, 147-175.

Myers, S. C. (1984, December). The capital structure puzzle. Journal of Finance, 39, 575-590.

Myers, S. C. (2001, Spring). Capital structure. Journal of Economic Perspectives, 15, 81-102.

Ross, S. A. (1977, Spring). The determination of financial structure: The incentive signaling approach. Bell Journal of Economics, 8, 23-40.

Schlingemann, F. P. (1996, Autumn). Capital structure policy: Does capital structure matter? Columbus, OH: The Ohio State University, Max M. Fisher College of Business, Department of Finance.

Scott, J. H., Jr. (1976, Spring). A theory of optimal capital structure. Bell Journal of Economics, 7, 33-54.

Scott, J. H., Jr. (1977, March). Bankruptcy, secured debt, and optimal capital structure. The Journal of Finance, 32, 1-19.

Sengupta, S. (2002, January-June). Company financing, capital structure, and ownership: A literature survey. Indian Institute of Management Calcutta, Decision, 29, 153-182.

Smith, V. L. (1972, March). Default risk, scale, and the homemade leverage theorem. American Economic Review, 62, 66-76.

Stiglitz, J. E. (1972, March). A re-Examination of the Modigliani-Miller theorem. American Economic Review, 62, 66-76.

Titman, S. (1984). The effect of capital structure of a firm's liquidation decision. Journal of Financial Economics, 13, 137-151.

Turnbull, S. M. (1979, September). Debt capacity. Journal of Finance, 34, 931-940.

Vermaelen, T. (1981, June). Common stock repurchases and market signaling: An empirical study. Journal of Financial Economics, 9, 139-183.

Wald, J. K. (1999, Summer). How firm characteristics affect capital structure: An international comparison. Journal of Financial Research, 22, 161-187.