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Capital Structure Theory and Flotation Costs: An Empirical Analysis of Utility Debt and Equity Decisions

by

Beverly R. Fuller

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APPROVED:

Robert S. Hansen, Chairman	Arthur J. Keown
Dana J. Johnson	Dilip K. Shome
W. Lewis Young	Bernard W. Taylor, III

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(ABSTRACT)

This research investigates which theory -- an optimal, irrelevance, or modified pecking order -- best explains a firm's capital structure. A sample of 457 debt and equity utility offerings made from 1973-1982 is used in logit regression analysis to test the predictions of the different theories and the relevance of flotation costs to the financing decision. Target leverage ratios are constructed as averages from industry and firm-specific data. These ratios change over time suggesting that leverage targets are moving in response to general economic conditions.

Miller's irrelevance and the modified pecking order theories (if utilities operate well below their debt capacity) are supported. In spite of using leading and lagging targets, no support is found for an optimal capital structure theory. Also, there is no support for flotation costs when measured as the savings from issuing debt rather than equity.

An anomalous finding that overlevered firms continue to lever with their next financing decision seems to be robust to the different measures of a target leverage ratio. This finding is inconsistent with the three capital structures theories tested.

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With so much help from many sources, I have only myself to blame for flaws that remain.

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Chapter I. Introduction

An issue of great concern to the theory and the practice of finance over the past twenty-five years has been the effect of capital structure on the market value of a firm. If capital structure is irrelevant, then the firm can choose any financing instrument for investment without regard to its impact on firm value. If, however, capital structure is relevant, then the type of financing instrument the firm chooses is important because firm value can be affected.

In spite of twenty-five years of theoretical development in the area of capital structure, there is no consensus as to which theory best explains corporate financing behavior. The list of conflicting empirical evidence concerning the various capital structure theories is growing. Lack of a unified theory concerning how firms choose among the various financing instruments is reason that researchers have little advice to offer financial managers when firms must raise funds in the capital markets.

Whether capital structure affects firm value is an empirical question. This research proposes to investigate that question and to provide insight as to which theory -- an optimal, irrelevance, or modified pecking order -- best explains a firm's capital structure. Most studies have sought to test each theory in isolation and have failed to yield conclusive results. The chief contribution of this research is to test the three major theories of capital structure simultaneously. As a consequence, the results should be more conclusive than those of prior studies.

The role of flotation costs, like other forms of transaction costs, has generally been ignored in the development of capital structure theory. It is assumed that new capital can be raised costlessly; yet, in fact, raising funds in the capital markets is expensive. This study addresses the costs of raising such funds in the external markets. In particular, this study provides an empirical assessment of the importance of flotation costs in a firm's capital structure decision.

In the following chapter, three different theories of capital structure as well as the empirical evidence supporting and refuting the different theories are presented. The general model of a firm's financing decision is developed in Chapter III which is followed by the econometric specifications used to test the model. The sample and variables used in testing the model are described in Chapter V. In the final chapter, the empirical evidence from the logit regression analyses and the conclusions drawn concerning the three capital structure theories are presented.

Chapter II. Capital Structure Theory and Evidence

2.1. Introduction

Seminal work by Modigliani and Miller (1958, 1963) opened the theoretical debate over the relevance of the capital structure decision. However, after twenty-five years, there is no consensus as to its relevance. If capital structure is irrelevant, then the firm can choose any financing instrument for investment without regard to its impact on firm value. If, however, capital structure is relevant, then the type of financing instrument the firm chooses is important because firm value can be affected. Whether capital structure affects firm value is an empirical question.

This chapter presents three different theories of capital structure as well as the empirical evidence to date supporting and refuting the different theories. Specifically, an optimal, irrelevance and modified pecking order theories are examined. This research proposes to provide empirical evidence as to which theory best explains the firm's capital structure.

2.2. Capital Structure Theory

2.2.1 Optimal Capital Structure Theory

An optimal capital structure, if it exists, can be explained by balancing the advantages and the disadvantages of debt. The possible advantages include the tax shield on corporate income from the tax deductibility of interest and the capacity to collateralize debt. The possible disadvantages include: direct bankruptcy costs from payment to third parties such as courts, law and accounting firms; indirect bankruptcy costs such as those borne by customers who purchase durable goods that require future servicing and parts that would otherwise not be supplied by the market; and corporate non-debt tax shields that reduce the advantage of the tax shield. Agency costs may also explain an optimal capital structure; however, this research does not address such costs.

Robichek and Myers (1966) were the first to suggest that the value of a firm in bankruptcy may be less than the discounted value of its cash flows from operations. If capital markets are not perfect, then when a firm goes bankrupt, there exists legal and administrative costs as well as the costs from liquidation at less than economic value. Since a sufficiently levered firm has greater probability of bankruptcy than an unlevered one, other things being equal, the value of the levered firm should be less than that of the unlevered firm. Therefore, in a world with both corporate taxation and significant bankruptcy costs, it is likely that an optimal capital structure exists. Hirshleifer suggested that "even within complete capital markets, allowing for considerations such as taxes and bankruptcy penalties would presumably permit the determination of an optimal debt-equity mix for the firm."[1]

This traditional approach to valuation assumes the value of the firm is a concave function of its leverage, l, that is,

$$V_L(l) = V_U + \tau B(l) - BC(l) \tag{2.1}$$

where:

$V_L(l)$ = the value of the levered firm;

V_U = the value of the unlevered firm;

$\tau B(l)$ = the present value of the tax shield; and

$BC(l)$ = the present value of the bankruptcy costs.

An optimal capital structure exists where the marginal tax benefit equals the marginal cost of leverage, that is,

$$\tau\frac{\partial B}{\partial l} = \frac{\partial BC}{\partial l}. \tag{2.2}$$

[1] Hirshleifer, 1970, p.264.

DeAngelo and Masulis (1980) recognize the role that corporate non-debt tax shields, such as depreciation and investment tax credits, have in potentially reducing the corporate tax advantage of debt for some future earnings states. While there is a constant expected marginal personal tax disadvantage to debt, the corporate non-debt tax shields substitute for the debt tax shield which cause the expected marginal corporate tax benefits of debt to decrease as debt is added to the capital structure. DeAngelo and Masulis demonstrate that because of these corporate non-debt tax shields, there exists a unique interior optimal capital structure for the firm, regardless of whether bankruptcy costs are introduced. At the unique optimum, the expected marginal corporate tax benefit just equals the expected marginal personal tax disadvantage of debt, that is,

$$\tau\frac{\partial B}{\partial l} = \frac{\partial \tau_{ps}}{\partial l}. \tag{2.3}$$

These models justify an optimal capital structure by balancing the tax advantages of debt against the disadvantages of debt which include the present value of bankruptcy costs or personal taxation on interest income. Although there are other approaches to arrive at an optimal capital structure, the equilibrium is always reached by equating the marginal benefits to the marginal costs of leverage.[2] As debt is added to the capital

[2] For example, Scott (1976, 1977) assumes that the probability of bankruptcy is positive, secondary markets for assets are imperfect, and investors are risk neutral, and he derives a multiperiod model of firm valuation where there exists an optimal capital structure that may be related to the collateral value of the firm's assets. If the firm is liquidated, tangible nonspecific physical assets may decline only slightly in value. Hence, other things being equal, the present value of bankruptcy costs should be less for firms with tangible nonspecific physical assets as compared with those with intangible assets. In this model, debt is issued beyond the point where it is secured until the marginal benefits of debt caused by the tax shield is exactly balanced with the marginal costs of too much debt caused by the bankruptcy costs.

structure, the value of the firm first increases because of the benefits from debt. Gradually, however, the costs of debt become more important. As more and more debt is added, the costs outweigh the benefits causing firm value to decline. This approach to valuation, as seen in Figure 1, assumes the value of the firm is a concave function of its leverage, l, that is,

$$V_L(l) = V_U + B(l) - C(l) \tag{2.4}$$

where

$B(l)$ = the benefits of debt, and

$C(l)$ = the costs of debt

and where

$$V'_L(\, l\,) > 0 \text{ and}$$

$$V''_L(\, l\,) > 0.$$

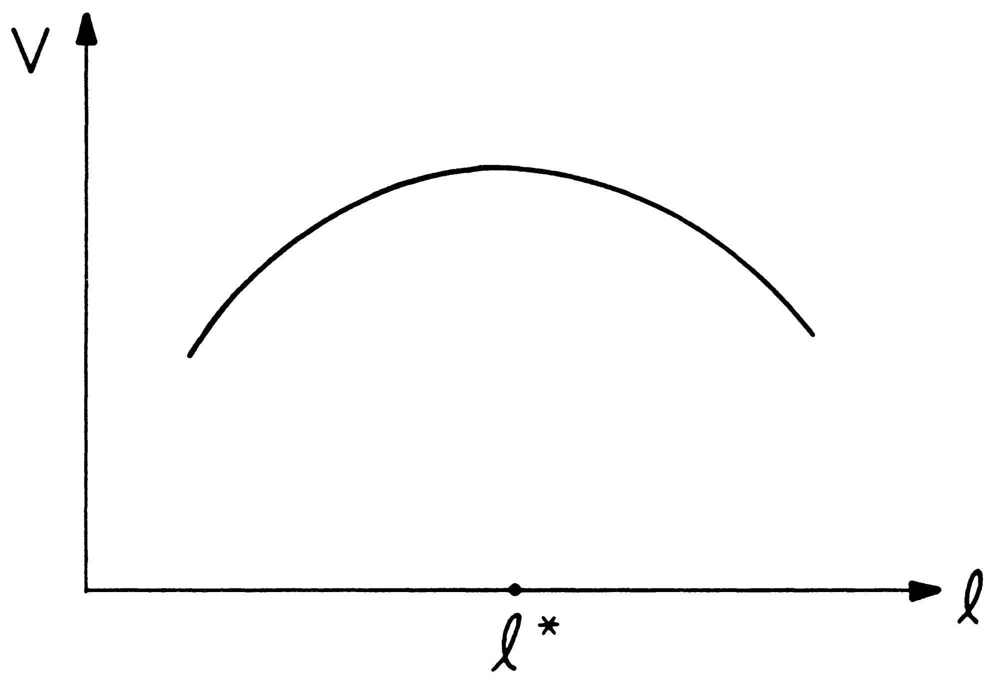


Figure 1. Optimal Capital Structure Theory

2.2.2. Irrelevance Theory

Miller (1977) offers a different perspective on the capital structure problem by further relaxing the perfect market assumption. Personal taxation is introduced when the tax on equity income is less than the tax on bond income. Given there are tax-free bonds that pay a certain rate, the corporate bond rate must include compensation for the personal taxes that investors pay on interest income. Since personal taxation is progressive in the model, the corporate bond rate must increase as more corporate bonds are issued to attract investors in progressively higher tax brackets to purchase the bonds. Firms will supply bonds if the tax advantage to leverage exceeds the rate they must pay. Therefore, the aggregate demand curve is initially perfectly elastic until the demand for tax-exempt bonds is satisfied. The demand curve becomes less than perfectly elastic as investors are offered before-tax returns that offset the personal tax disadvantage. Miller finds that once capital markets are in equilibrium, the after-tax cost of debt to the firm is equal to the after-tax rate of return on equity. Although there is an optimal amount of aggregate corporate debt for the economy, the firm-specific capital structure decision is irrelevant, as seen in Figure 2.

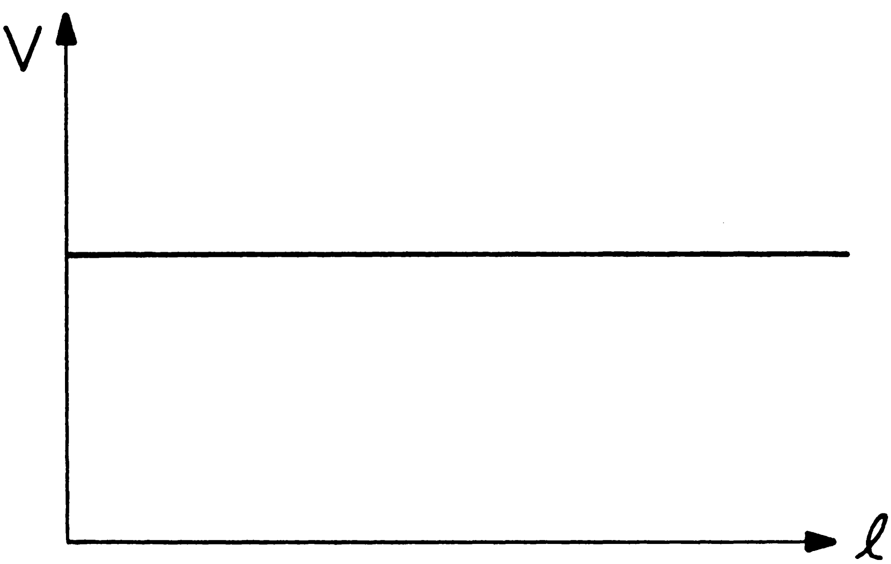


Figure 2. Irrelevance Theory of Capital Structure

2.2.3. Pecking Order Theory

An early pecking order theory developed by Lintner (1956) states that a downward-sloping demand curve for a firm's debt and equity should result in a low dividend payout ratio to permit firms to build up retained earnings for future investments. Durand (1959) and Vickers (1968) show that institutional restrictions and imperfect substitutes for a firm's debt and equity explain why demand curves for these instruments are not perfectly elastic. Firms cannot sell new debt and equity at current market prices so they have a preference for internal financing. Schloes (1972) offers another explanation of the early pecking order theory: he adds flotation costs along with a downward-sloping demand curve for a firm's debt and equity to suggest a preference for internal financing. Given the flotation cost advantage of debt, external financing needs are first met by debt and then by equity, once the presumed price-pressure flotation cost tradeoff becomes favorable. These early pecking order theories rely on price pressure and flotation costs arguments not consistent with efficient and perfect capital markets.

Myers and Majluf (1984) propose a modified pecking order theory of corporate financing behavior that predicts a preference for internal financing; but when external financing is required, risky debt is preferred to equity. The prediction is the same as the earlier pecking order models but the rationale for the corporate financing behavior is different. The Myers and Majluf model is based on asymmetric information: management has information that investors do not have about future earnings from existing assets and from new investment opportunities. In addition, they assume that managers act to maximize wealth of existing shareholders who do not readjust their portfolios when financing decisions are announced.

Because of potential redistribution of wealth, the market perceives raising funds in the external capital markets negatively. Investors realize that when risky debt or equity capital is raised, a wealth redistribution takes place. Consequently, the market price adjusts ex-ante. However, since debt is a safer financing instrument than equity, Myers and Majluf argue issuing debt results in a smaller wealth transfer from existing shareholders than if the same amount of capital were raised through an equity issue. Therefore, when the market price adjusts ex-ante, the price decline is greater for equity than for debt issues. Sometimes, firms find themselves in a financing trap and simply forego investing in new projects to avoid the ex-ante price adjustment. Firms can avoid the financing trap by having sufficient internal funds or the capacity to issue safe debt to make the investment without resorting to the external capital markets.

In the modified pecking order theory of capital structure, the firm makes financing decisions according to a pecking order. First, internal funds are used until exhausted; next, riskless debt is issued; then risky debt is issued until capacity is reached; finally, equity is issued. To depict the modified pecking order theory of capital structure, firm value is specified as a function of leverage. At low leverage levels, firm value is non-increasing in leverage since the firm reduces its debt capacity as bonds are issued and moves up the pecking order towards the financing trap. However, as the leverage ratio approaches and exceeds debt capacity, according to the modified pecking order theory, the firm should be issuing equity. Therefore, firm value must decline further with a debt than with an equity issue. Thus, firm value is depicted as a function of leverage where

$$V = V(l),$$

$$V' \leq 0 \text{ for } l < l_c,$$

$$V' < 0 \text{ for } l > l_c \text{, and}$$

$$V'' < 0 \text{ for all } l.$$

Figure 3 illustrates the value of the firm as a function of leverage according to the modified pecking order theory of capital structure.

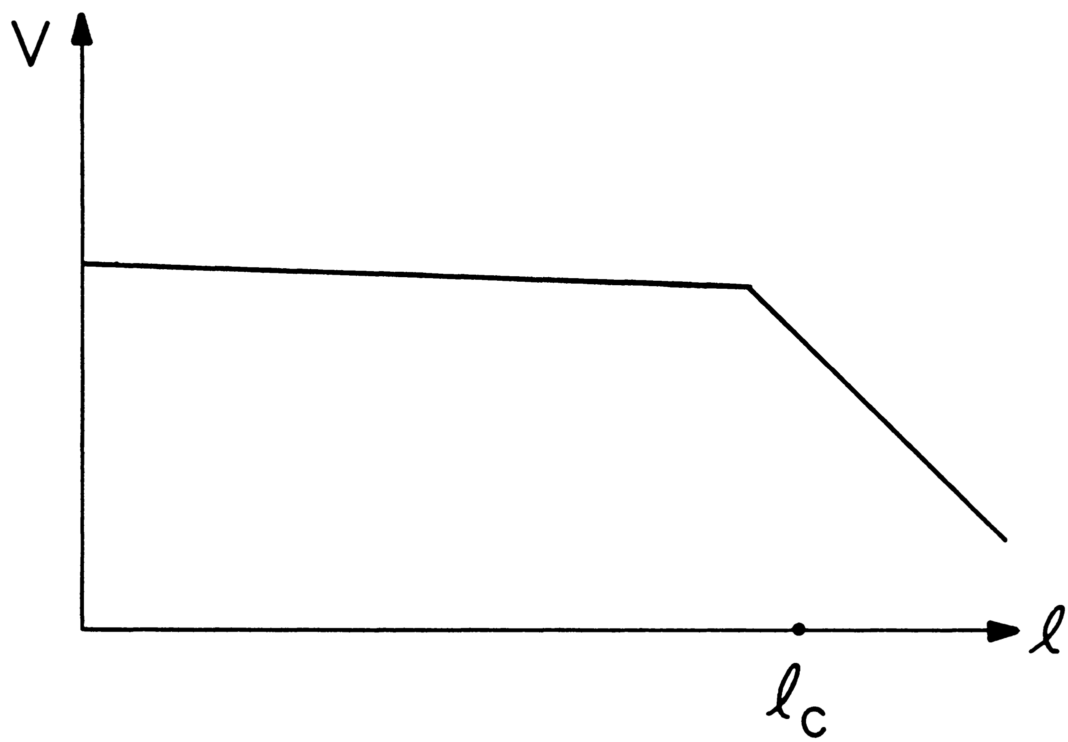


Figure 3. Modified Pecking Order Theory of Capital Structure

2.3. The Empirical Evidence

2.3.1. Industry and Bankruptcy Cost Studies

Early empirical literature on capital structure focuses on the theories of optimal capital structure and irrelevance. If irrelevance theory is correct, there should be few differences among inter-industry debt ratios. However, a cursory glance at the debt ratios for industries reveals major differences; for example, utilities and services have rather high debt ratios, while mining and chemicals have rather low debt ratios. Schwartz and Aronson (1967), Baxter and Cragg (1970), Scott (1972), Scott and Martin (1975), and Bowen, et al. (1982) provide evidence of industry's influence on capital structure. Such industry influence is consistent with an optimal capital structure. Ferri and Jones (1979) find industry class and leverage related, but in a less pronounced and direct manner than previously thought, while Chaplinsky (1984) found no evidence of industry influence once regulated industries were accounted for.

While some researchers analyze industry effects, others investigate bankruptcy costs. Warner (1977a, 1977b) and Ang, et al. (1982) find that direct bankruptcy costs are substantially less than the expected tax savings from debt and conclude that capital structure is invariant with respect to these costs. However, Castanias (1982), whose sample contains a large percentage of small firms, finds that bankruptcy costs are sufficient in magnitude to affect capital structure decisions. Altman (1984) offers a similar conclusion when he examines total bankruptcy costs -- both direct and indirect.

2.3.2. Event Studies

When leverage is changed, often the asset structure changes too, which then induces a risk change. To control for this problem, exchange offers are used to study the effects of capital structure changes on security prices and firm value.[3] The following table summarizes common stock price effects associated with various exchange offers, repurchases, and new issues; it also identifies the researcher and the predicted sign of the capital structure change. The consensus seems to be that unanticipated leverage-increasing decisions are followed by common stock price appreciation; unanticipated leverage-decreasing decisions are followed by common stock price depreciation. It also appears that price effects are more pronounced for leverage increases than for leverage decreases and are more pronounced for industrials than for utilities. Although different studies find similar results, there appears to be little consensus as to the cause of the price changes. Some feel capital structure changes are valid explanations for the announcements period price effects, while others do not. There are alternative explanations, such as price pressure, signalling, and redistribution of wealth.

[3] In an exchange offer, one class of securities is traded for another. Therefore, there is no simultaneous change in the asset structure of the firm.

Table 1
Average Announcement Period Return by Type of Capital Structure Change

Author and Type of Capital Structure Change	Predicted Sign of Leverage Change	Two-day Announcement Period Return
Masulis (1980a)		
Exchange Offers:		
Common for Debt	-	-7.44%
Debt for Common	+	+10.52
Common for Preferred	-	-2.29
Preferred for Common	+	+5.78
Preferred for Debt	-	-14.29
Debt for Preferred	+	+2.13
McConnell and Schlarbaum (1981)		
Exchange Offers:		
Income Bonds for Preferred	+	+2.18
Mikkelson (1981)		
Conversions:		
Debt to Common	-	-2.13
Preferred to Common	-	-0.36
Dann (1981)		
Repurchase of Common	+	+15.41
Masulis (1980b)		
Repurchase of Common	+	+16.35
Vermaelen (1981)		
Repurchase of Common	+	+14.14
Korwar (1982)		
Issuance of Common	-	-2.48
Hess and Bhagat (1984)		
Issuance of Common:		
Industrial Firms	-	-3.95
Public Utilities	-	-1.00
Masulis and Korwar (1986)		
Issuance of Common:		
Industrial Firms	-	-3.22
Public Utilities	-	-0.74

Table 1 Continued

Author and Type of Capital Structure Change	Predicted Sign of Leverage Change	Two-day Announcement Period Return
Asquith and Mullins (1986)		
Issuance of Common:		
Industrial Firms	-	-3.0%
Public Utilities	-	-0.9
Mikkelson and Partch (1985b)		
Issuance of:		
Common	-	-4.46
Straight Debt	+	+0.06
Convertible Debt	+	-1.39
Preferred	+	+1.53
Eckbo (1986)		
Issuance of:		
Convertible Debt	+	-1.25
Straight Debt	+	-0.06
Dann and Mikkelson (1984)		
Issuance of:		
Convertible Debt	+	-0.37
Straight debt	+	-0.37
Officier and Smith (1985)		
Issuance of Common that was cancelled	-	-2.33
Pettway and Radcliff (1985)		
Issuance of Public Utility Common:		
Market Return Index	-	-2.3
Utility Return Index	-	-1.4
Janjigian (1987)		
Issuance of Convertible Debt:		
Industrials	?	-2.40
Financials	?	-2.40
Transportations	?	-2.23
Utilities	?	-0.19
Campbell (1987)		
Calling Convertible Debt	-	-4.21
Equity for Debt Swaps	-	-8.11

Increasing (decreasing) leverage decisions cause the value of equity to increase (decrease) because of the tax benefit (loss) from the change in the amount of outstanding debt. Those who argue that the announcement period price effect is caused by a change in capital structure, believe that a firm can regard the price of its shares, given its investment policy, as independent of the number of shares it or any of its shareholders sell. Shares are rights to an uncertain income stream. Shares are not unique, but have many close substitutes either directly or indirectly through combinations of securities. If proponents of the capital structure change hypothesis did not subscribe to independence of financing and investment decisions, then other explanations for the price effects than tax effects are needed.

In opposition to the capital structure change proponents, the proponents of the price-pressure hypothesis argue that a firm's shares are unique. When the number of shares is large, they believe that the stock price must fall to attract new buyers. If the excess demand curve for the shares slopes downward, the new shares would clear at prices below the prevailing market price. Buying at a discount gives the investor an extra return or "sweetener" to induce purchase. The magnitude of the discount is a direct function of the size of the new offering, according to the price pressure hypothesis.

Proponents of the signalling hypothesis argue that a firm's decision acts as a signal to the market conveying management's superior assessment of future earnings prospects independent of capital structure. In a world of asymmetric information, managers and insiders have superior information than outside investors. When a financing decision is announced, it carries with it management's assessment about the intrinsic value of the firm. When the announcement is perceived as good news about the firm, the market price increases; when the announcement is perceived as bad news, the market price declines.

Proponents of the wealth redistribution hypothesis argue that redistribution of wealth may motivate managers to make some financing decisions. If debt is used to retire equity, existing bondholders may suffer a loss if the new debt is not subordinated; the existing debt becomes riskier with a smaller equity base. In such a situation, the market value of debt should fall, but the market value of equity should rise because of a potential wealth transfer. The redistribution effect may explain the observed stock price behavior when unanticipated leverage changing decisions are announced.

Although these potential explanations for the announcement period price effects are difficult to research because they are not mutually exclusive, there has been much research in this area recently. Some investigators such as Asquith and Mullins (1984) and Pettway and Radcliff (1985) find evidence consistent with the price-pressure and signalling hypotheses. Others, such as Officier and Smith (1985), find support for the redistribution effects. At this time, there is no consensus whether capital structure changes, price-pressure, signalling, or redistribution of wealth cause announcement period price effects.

2.3.3. Debt/Equity Choice Studies

Although the evidence for an optimal capital structure theory is mixed, empirical evidence suggests that firms behave as if they determined an optimal structure and made adjustments towards it.

Taggart (1977) believes that there is a consensus for the existence of an optimal capital structure determined in part by corporate taxes, financial distress, and rationing by lenders. He argues that although a rigorous theory of optimal term structure did not exist, firms hedge against changes in interest rates by financing permanent assets with long term sources of funds. Based on this hedging principle and on the notion that firms adjust to their target ratios when they finance, Taggart develops a test of these hypotheses that permits interrelationships among balance sheet assets using aggregated flow of funds data from the Federal Reserve. He concludes that adjustment to a long-term debt target is a significant explanatory variable for explaining long-term debt issues, stock issues, and stock retirement decisions. When the permanent capital is below target, firms issue more of both bonds and stock. Taggart also find some evidence that timing strategies speed up or delay the firms adjusting to target.

Marsh (1982) develops a descriptive model of the choice between debt and equity. Using logit analysis, he analyzes a sample of 750 issues of debt and equity by U.K. companies[4] between 1959 and 1974. Marsh models the choice of financing instrument as a function of

[4] The type of company used is not identified, that is, it is not known whether the companies are industrials, manufacturing, financial, and/or utilities.

1. the difference between the firm's target and current leverage ratio,

2. the determinants of the target ratio which includes company size, business risk, asset composition, and

3. short term timing considerations such as market conditions affecting debt and equity issues.

Like Taggart (1977) and Scott (1972), Marsh also provides evidence that companies appear to make their choice of financing instrument as though they had target leverage ratios and were making adjustments to them. It appears that these targets are functions of size, risk, and asset composition. Again, it seems that firms are influenced by market conditions when choosing between debt and equity. Firms appear to issue stock after a long period of stock price appreciation.

Jalilvand and Harris (1984) develop a partial adjustment model and find evidence that manufacturing firms (SIC 2000-3999) make financing decisions by partially adjusting to target ratios. However, adjustments to targets are not accomplished with a single issue. Instead, firms appear to use long- and short-term debt, draw upon the stock of liquid assets, or issue equity to meet their immediate financing needs. Large firms appear to adjust to targets more quickly than small firms. Large firms also tend to use more long-term debt. There is evidence of attempts by firms to time long-term debt and equity issues.

2.4. Conclusions

While some of the empirical work support an optimal capital structure theory and some support the irrelevance theory, there is a growing list of conceptual problems and empirical anomalies which challenge the ability of these models to explain fully capital structure decisions. Conceptually, the following problems exist with these two theories.

1. If capital structure adjustment costs are small, it is hard to explain why firms do not remain at their target leverage ratios and why there is such variation in leverage ratios for otherwise similar firms.

2. The valuation effects of both debt and equity issues are not fully consistent with an optimal capital structure theory. One disturbing part of these valuation findings is that if firms are indeed moving towards an optimal capital structure, why should only increases in leverage cause stock price appreciation? Should not all movement towards the optimal -- whether debt or equity issues -- lead to valuation increases?

3. An optimal capital structure theory does not explain why firms with growth opportunities and intangible assets borrow less than those with tangible assets and no growth opportunities. Long and Malitz (1983) find a significant negative relationship between debt and growth opportunities. They use investment in advertisement and research and development as surrogates for growth opportunities. Williamson (1981) finds negative relationships between the amount of intangible assets and growth opportunities as well as the debt ratio. The theories that equate the marginal benefits and the marginal costs of debt do not make a distinction between book and

market value. Since many firms with growth opportunities and intangible assets have market values far in excess of book values, an optimal capital structure theory should predict very high book debt ratios that are not observed.

Empirically, the following findings are inconsistent with an optimal capital structure theory and the irrelevance theory.

1. Marsh, Taggart, and Asquith and Mullins find that firms are more likely to issue equity rather than debt when stock prices have increased over a long time period. However, with general stock price appreciation, absent any impending bankruptcy effects, the leverage ratio is falling, so debt and not equity should be issued if the firm is to return to its capital structure target.

2. Donaldson (1961) finds that internal financing is preferred to external, but when external funds are required, the evidence presented by Brealey and Myers (1984) suggest, debt is preferred to equity.

3. Eckbo examines a sample of firms that increased leverage, but finds no valuation effect -- suggesting, consistent with Miller's hypothesis, there is no net advantage to issuing debt.

4. There are large differences between inter-industry debt ratios, inconsistent with an irrelevance proposition.

Thus, in spite of twenty-five years of theoretical development in the area of capital structure, there is no consensus as to which theory best explains corporate financing behavior. The list of conflicting empirical evidence concerning the various capital structure theories is growing. Lack of a unified theory concerning how firms choose among the various financing instruments are reasons that researchers have little advice to offer financial managers when firms must raise funds in the capital markets.

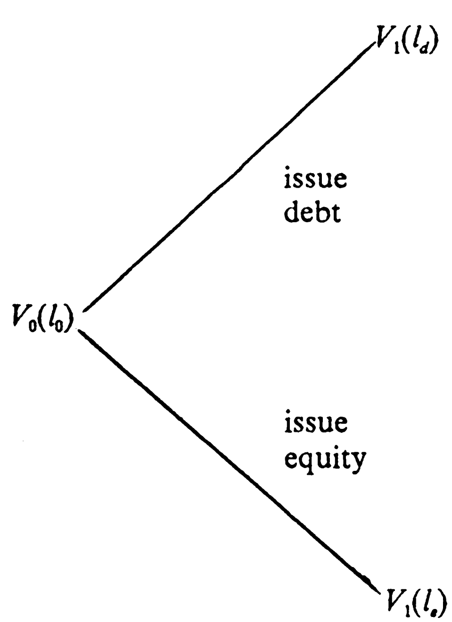
Chapter III. A Model

3.1. Introduction

The purpose of this chapter is to examine and draw empirical implications from an optimal, irrelevance, and modified pecking order theories of capital structure. It is shown that these theories make different predictions about which financing instrument is best. Therefore, it is possible to design tests that empirically distinguish among these three capital structure theories.

3.2. Framework for Analysis

Consider a two-period world. At the present time, $t = 0$, the manager has determined the firm's investment decision and must select the financing instrument that maximizes the future value of the firm at time t = 1. The time period is presumed to be so short that problems associated with the time value of money can be ignored. Firm value is specified as a function of leverage. The leverage decision may be described by the static theory where an optimal capital structure exists, by the irrelevance theory where a wide range of capital structures are equally suitable, or by the modified pecking order theory where internal financing is preferred to external and risky debt is preferred to equity. Denote the value of the firm at t = 0 by $V_0(l_0)$ which is a function of its existing leverage ratio, l_0. At t = 1, the firm needs external financing for publicly known investment purposes and has only two choices: issuing debt or issuing equity. If the time t = 1 firm value is greater with a debt issue, $V_1(l_d)$, then debt will be issued; if t = 1 firm value is greater with an equity issue, $V_1(l_e)$, then equity is issued. The financing choice is thus described by the following decision tree:



3.2.1. Assumptions

Three assumptions underlie this model of financing choice:

1. Capital markets are efficient;

2. Managers maximize firm value when making financing decisions; and

3. Firms raise funds in the capital markets by either issuing debt or issuing equity. Preferred stock offerings, convertible debt offerings, exchanges or joint offerings are not examined in this model.

3.3. Three Specific Valuation Models

From a theoretical perspective, the valuation consequences of the capital structure decisions vary according to the capital structure theory assumed to prevail. Three capital structure theories -- an optimal, irrelevance, and modified pecking order -- are relevant to the present study.

3.3.1. Optimal Capital Structure Theory

According to an optimal capital structure theory, firm value is a concave function of its leverage decisions, so the firm can increase its value by adjusting its current leverage ratio towards an optimal or target leverage ratio. Therefore, this decision can be viewed in terms of a leverage loss function. The loss due to the leverage ratio, l, not being at target, l^*, is denoted by $L(l)$, where

$$L(\, l \,) = L(l^*) - L(l_0)\,.$$

Because firm value is a concave function of leverage, the loss function is a convex function of leverage where

$$L' < 0 \text{ for } l < l^*$$

$$L' > 0 \text{ for } l > l^* \text{ and}$$

$$L'' > 0 \text{ for all } l.$$

The expected ex-post benefits from issuing debt are defined as the change in the leverage loss function resulting from a debt issue:

$$B_d = L(l^*) - L(l_0). \tag{3.1}$$

In the ex-ante financing decision, managers will issue debt when the benefits are positive; otherwise equity is issued.

3.3.2. Irrelevance Theory

According to the irrelevance theory of capital structure, firm value is independent of its leverage decision. Therefore, the firm cannot increase its value by levering. In this case, the leverage loss function is such that

$$L' = 0 \quad \text{and}$$

$$L'' = 0 \quad \text{for all} \quad l\,.$$

Therefore, there are no benefits to issuing debt, that is,

$$B_d = 0\,.$$

Hence, the irrelevance model predicts that a debt or an equity issue is equally likely.

3.3.3. Modified Pecking Order Theory

To depict the modified pecking order theory of capital structure, firm value is specified as a function of pecking order costs. These costs increase as the firm moves up the financing pecking order. Pecking order costs cannot decrease as leverage increases because the firm is reducing its future ability to issue riskless debt. Therefore, at low leverage levels, pecking order costs are non-decreasing in leverage. As leverage is further increased and the firm approaches and exceeds debt capacity, pecking order costs are increasing in leverage.

Denote debt capacity as l_c and denote pecking order costs as $P(l)$ where

$$P' \geq 0 \text{ for } l < l_c,$$

$$P' > 0 \text{ for } l > l_c, \text{ and}$$

$$P'' \geq 0 \text{ for all } l.$$

In this situation, firm value is depicted as a function of pecking order costs which are themselves a function of leverage where

$$V(l) = V - P(l),$$

$$V' \leq 0 \text{ for } l < l_c,$$

$$V' < 0 \text{ for } l > l_c, \text{ and}$$

$$V'' \leq 0 \text{ for all } l.$$

According to the modified pecking order model, the firm can increase its value by adjusting it current leverage ratio below debt capacity. Therefore, this decision can be viewed in terms of a leverage loss function. The loss from the leverage ratio, l, being beyond capacity, l_c, is denoted by

$$L(l) = L(l_c) - L(l_0)$$

and where

$$L' \leq 0 \text{ for } l \leq l_c,$$

$$L' > 0 \text{ for } l > l_c, \text{ and}$$

$$L'' \geq 0 \text{ for all}.$$

The expected ex-post benefits from issuing debt are defined as the changed in the leverage loss function resulting from a debt issues:

$$B_d = L(l_c) - L(l_0). \tag{3.4}$$

In the ex-ante financing decision, managers will issue debt when the benefits are positive; otherwise, equity is issued.

3.4. Implications of the Three Capital Structure Theories

The three capital structure theories predict different valuation effects from levering depending upon the firm's current leverage ratio. This can be seen by partitioning the leverage valuation function into two distinct regions. For the sake of discussion, assume that the optimal or target leverage ratio is equal to the debt capacity.

According to an optimal capital structure theory, when the firm is below its target leverage ratio, l^* , the leverage valuation effect is positive. Similarly, when the firm is above target, the leverage valuation effect is negative so there is gain from reductions in leverage. The leverage valuation effect from leverage can be positive or negative. This defines two regions:

$$l_0 < l^* \text{ for Region I, and}$$

$$l_0 > l^* \text{ for Region II.}$$

Since firm value is a function of leverage according to an optimal capital structure theory, these leverage valuation effects can be associated with derivatives of the leverage valuation function by region as follows:

$$\frac{\partial V}{\partial l} > 0 \text{ for Region I, and}$$

$$\frac{\partial V}{\partial l} < 0 \text{ for Region II.}$$

According to the irrelevance theory, firm value is invariant with respect to leverage; hence, the derivative would be zero throughout the leverage valuation function.

In the modified pecking order theory, pecking order costs are non-decreasing at low leverage levels or in Region I. When leverage exceeds debt capacity, pecking order costs increase at an increasing rate which occurs in Region II. Then, according to the modified pecking order theory of capital structure, when the firm is below its debt capacity, l_c, the leverage valuation effect from further levering is negative or zero. However, when the firm is above its debt capacity and issues debt, the leverage valuation effect is negative.

The leverage regions according to the pecking order theory are characterized as follows:

$$l_0 \leq l_c \text{ for Region I, and}$$

$$l_0 > l_c \text{ for Region II.}$$

Therefore, the derivatives of the leverage valuation function with respect to leverage are:

$$\frac{\partial V}{\partial l} \leq 0 \text{ for Region I, and}$$

$$\frac{\partial V}{\partial l} < 0 \text{ for Region II.}$$

The three capital structure theories lead to unique predictions in Region I and II. In particular, for firms in Region I, debt issues should dominate if an optimal capital structure theory is correct, while debt or equity issues are equally likely with the modified pecking order or irrelevance theories of capital structure. For firms in Region II, equity issues should dominate according to optimal capital structure or modified pecking order theories, while debt or equity issues are equally likely according to the irrelevance theory. Thus, the sign of the derivative of the leverage valuation function with respect to leverage permits distinguishing among the three theories. The derivatives for each theory by leverage region are found in Table 2.

Table 2

Derivatives of Leverage Valuation Function by Region

	Derivatives	
Theory	Region I	Region II
Optimal	+	-
Irrelevance	0	0
Modified Pecking Order	0/-	-

Chapter IV. Econometric Specification

4.1. Introduction

The purpose of this chapter is to develop for each type of theory an econometric specification of the firm's financing decision that permits simultaneous testing of the three capital structure theories and also permits testing the role of flotation costs to the financing decision. In Section 2 of this chapter, the logit regression methodology is introduced. In Section 3, flotation costs are introduced. In the last section, the econometric specifications are developed.

4.2. The Logit Methodology

The purpose of this research is to test capital structure theory by using a model that predicts whether the firm will issue debt or equity when it goes to the capital markets for funds. Therefore, in building the prediction model, the dependent variable is dichotomous -- equalling one if debt is issued and zero if equity is issued.

If the probability that the firm chooses a debt issue is a linear function of expected leverage effects, the usual technique would be the estimation of the linear regression model using ordinary least squares. Although the parameter estimators for the linear probability model are unbiased and consistent, there are serious problems with ordinary least squares estimation.[5] First, since the distribution of the errors is not normal, the ratio of the estimated coefficient to its standard error does not follow an approximate normal distribution, and this implies that hypothesis testing and confidence intervals are invalid. Second, the estimated probability of a debt issue can be outside the (0,1) range, which is not reasonable. Third, there is heteroscedasticity of the error terms and if weighted least squares regression is used to correct the heteroscedasticity, there is a loss of efficiency.

A logit specification transforms the linear probability model in such a way that guarantees that the predicted probability of a debt issue is within the (0,1) range. After transformation, the model is nonlinear so a nonlinear estimation technique is required.

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[5] Robert S. Pindyck and Daniel L. Rubinfeld, Econometric Models and Economic Forecast, McGraw Hill, New York, 1981, pp. 287-300.

Although the estimatores are consistent and asymptotically efficient for large samples, there is no guarantee that the estimators are unbiased after transformation. However, the biased estimator problem is mitigated with maximum likelihood estimation. Because the ratio of the estimated coefficient to its estimated standard error approximately follows a normal distribution, parameter estimators are asymptotically normal, which permits the use of t-tests to determine the significance of the regressors. For these reasons, the logit regression equation is estimated with a maximum likelihood technique.

Logit regression is based on a cumulative logistic function and is specified in the following manner:

$$Pr(Debt = 1) = \frac{1}{[1 + e^{(\beta X)}]} \tag{4.1}$$

where:

$Pr(Debt = 1)$	=	the probability of a debt issue;
β	=	the vector of regression coefficients, and
X	=	the vector of exogenous variables.

4.3. Flotation Costs

The role of flotation costs, like other forms of transaction costs, has generally been ignored in the development of capital structure theory. For example, in the tax models from Modigliani and Miller (1963) to DeAngelo and Masulis (1980), it is assumed that new capital can be raised costlessly. Myers (1984a, 1984b) essentially dismisses the idea that flotation costs can contribute to explaining corporate financing behavior. However, Marsh suggests flotation costs should enter into the decision making for firms when going to the capital markets:

> In principle, companies needing new finance should issue equity if they are above their target debt levels and debt if they are below. With no flotation costs, such adjustments could be made instantaneously and continuously. In practice however, the existence of significant flotation costs means that companies should plan issues to minimize both flotation costs and the costs of deviating from their target ratios.[6]

Masulis (1987) also suggests that flotation costs may represent an important element in the capital structure decision. He suggest that since there are substantial scale economies in flotation costs for security sales, the effect should be to encourage less frequent but larger security offerings.

Although some argue flotation costs matter and others argue they do not, flotation costs have not been incorporated into tests of capital structure theory. This research proposes to remedy that situation and test the role of flotation costs in the financing decision.

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[6] Marsh (1982) p.122.

4.4. Econometric Specification

Three different econometric specifications are used to test capital structure theory and the relevance of flotation costs to the financing decision. They are:

1. The probability of a debt offering is a function of the distance of the current leverage ratio from target and the savings in flotation costs from issuing debt rather than equity;

2. The probability of a debt offering is a function not of the distance from target, but whether the firm is currently underlevered or overlevered, and the savings in flotation costs from issuing debt rather than equity; and

3. If the leverage valuation function is rather flat around the optimal target leverage ratio, then the test measuring the deviations from target may not identify firms moving towards target. Therefore, offerings of firms that are extremely underlevered or extremely overlevered are analyzed as a function of the leverage region and the savings in flotation costs from issuing debt rather than equity.

4.4.1. Specification 1

After evaluating the benefits from levering and the savings in flotation costs from issuing debt rather than equity, managers issue debt when the benefits are positive. Then, the logit regression equation predicts a debt issue when the benefits from issuing debt are positive:

$$Pr(Debt = 1) = Pr(B_d = \Delta L + \Delta FC > 0) \tag{4.2}$$

where:

ΔL = the difference in the target and current leverage ratios, and

ΔFC = savings in flotation costs from issuing debt rather than equity.

Econometrically, the specification is:

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \Delta L + \beta_2 \Delta FC + \varepsilon > 0) \tag{4.3}$$

where:

ΔL = gain from levering;

ΔFC = flotation cost savings from issuing debt rather than equity;

β_0 = parameter for the intercept term;

β_1 = parameter which indicates the significance of the leverage effect to the financing decision;

β_2 = parameter which indicates the significance of the flotation cost savings to the financing decision; and

ε = the model error.

The model error term captures errors because of misspecification of the model and/or in the measurement in the benefits from debt from the leverage effect and the savings in flotation costs.

This econometric specification is first analyzed for the entire sample (pooled). Also, the sample of issuing firms are partitioned into leverage regions as discussed in Chapter III and their security offerings are analyzed separately (unpooled).

This logit estimation procedure permits assessing the significance of the potential role that flotation costs may play in the financing decision. Recall that the earlier pecking order theories rely upon the flotation cost differences. The estimated coefficient, β_2, measures the significance of flotation costs. A positive β_2 for all regions is predicted by the flotation cost relevance hypothesis.

The test of the alternate capital structure theories is the result of the analysis of the sign of the estimated regression coefficient, β_1. According to optimal capital structure theory, the greater (smaller) the difference in the target and current leverage ratios, the greater the probability of a debt (equity) issue. Therefore, the probability of a debt issue is directly related to the leverage difference, $l^* - l_0$. This implies the sign of β_1 should be positive for Regions I and II. According to the pecking order theory, since pecking order costs are non-decreasing in Region I, the firm is indifferent to issuing debt or equity. Then the sign of β_1 is zero for Region I. However, when the firm exceeds debt capacity as it does in Region II, pecking order costs increase and the probability of a debt issue declines. In Region II, the probability of a debt issue is directly related to the leverage difference; hence, the expected sign of β_1 is positive for Region II according to the modified pecking order theory. For the irrelevance theory of capital structure, the expected sign of β_1 is zero throughout Regions I and II. Table 3 summarizes the predicted sign of β_1 by region for each of the theories.

Table 3

Predicted Sign of Coefficient β_1 in
$Pr(Debt = 1) = Pr(\beta_0 + \beta_1 \Delta L + \beta_2 \Delta FC + \varepsilon > 0)$

Theory	Predicted Sign: Region I	Predicted Sign: Region II
Optimal	+	+
Irrelevance	0	0
Modified Pecking Order	0	+

4.4.2. Specification 2

The probability of a debt issues is also predicted based not on the distance of its current leverage ratio from target, but whether the current leverage ratio falls above or below target. The specification that is used is:

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{Region II} + \beta_2 \Delta \text{FC} + \varepsilon > 0) \ . \qquad (4.5)$$

The expected sign of the leverage effect by region for the three different capital structure theories is found in Table 4.

4.4.3. Specification 3

If the leverage function is rather flat around the target, by investigating the types of issues firms are making that are in the extremes of the leverage distribution, perhaps some additional light may be gained from this research. Therefore, the following specifications are used:

$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{ Region } 2 + \beta_2 \text{ Region } 3 + \beta_3 \text{ Region } 4 + \varepsilon > 0)$ and

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{ Region 2 } + \beta_2 \text{ Region 3 } + \beta_3 \text{ Region 4 } + \beta_4 \text{ Region 5 } + \beta_5 \text{ Region 6 } + \beta_6 \text{ Region 7 } + \beta_7 \text{ Region 8 } + \varepsilon > 0).$$

For these analyses, firms are sorted into equal regions based on the distance of its current leverage ratio from target. This means that 50% of the underlevered firm offerings are contained in Regions 1 and 2, while 50% of the overlevered firm offerings are contained in Regions 3 and 4. The regression is rerun with seven dummy regressors when underlevered firms offerings are sorted into four equal regions and overlevered firms offerings are sorted into four equal regions as well. The predicted signs of the logit regression coefficients are similar to Table 4. For example, for an optimal capital structure theory, underlevered firm offerings should have a positive regression coefficient indicating an higher probability of a debt issue while overlevered firm offerings should have a negative regression coefficient indicating a lower probability of a debt issue.

Table 4

Predicted Sign of Coefficient β_1 in
$Pr(Debt = 1) = Pr(\beta_0 + \beta_1 \text{ Region II } + \varepsilon > 0)$

	Predicted Sign	
Theory	Region I	Region II
Optimal	+	-
Irrelevance	0	0
Modified Pecking Order	0	-

Chapter V. Sample Construction and Variable Measurement

5.1. Introduction

The purpose of this chapter is to discuss the data used to test the three capital structure theories presented in Chapter II and specified in Chapter IV. In Section 2, sample construction is discussed. The dependent variable is presented in Section 3 while the final section describes the measurement and estimation of the independent variables.

5.2. The Sample

The Securities and Exchange Commission's (SEC) Registered Offering Statistics tape as of March 1983 is read to obtain an initial sample of 3137 debt and equity offerings[7] occurring during the period from January 1973 through December 1982 subject to the following restrictions:

1. The offering is not an initial public offering;

2. The offering is not part of an exchange or joint offer;

3. The offering is less than 10% secondary;

4. The offering is one of a primary cash nature made to the public; and

5. The underwriter contract is negotiated.

Because of the need to predict flotation costs, the sample is further restricted to the 2098 offerings by firms whose common stock returns are contained on the Center on Research on Security Prices (CRSP) daily returns tapes around the offering period. Current leverage ratios for firms as well as leverage ratios for the industry are required to test capital structure theory. Therefore, the sample is further restricted to the 1900 offerings by firms whose financial statements, for the entire ten years before the security offerings, are contained on the annual Standard and Poor's Compustat tapes as of 1983 and 1986.

Since flotation costs are analyzed as savings from issuing debt rather than equity, it is necessary to estimate flotation costs for both types of issues. Thus, current bond ratings are required to predict flotation costs for debt issues even though the firm actually issued

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[7] The offerings are verified from the Investment Dealers' Digests.

equity.[8] The firm's bond rating at the time of an equity issue is obtained from an actual debt offering closest in time to the equity offering. Therefore, it is necessary to restrict the sample to offerings by firms making both debt and equity issues to predict savings in flotation costs.

It is also necessary to restrict the sample to offerings by firms making both debt and equity issues to avoid a selection bias. Table 5 illustrates the extent of the selection bias if the sample includes firms issuing either debt or equity exclusively. This table contains the frequency of offering type by industrials. It is apparent from the first row and first column in the table that most firms remain in either the debt or the equity capital markets; rarely are they in both.

Of the 771 industrial offerings, only 48 firms make both debt and equity issues for a total of 168 offerings. Since leverage valuation differs by risk, firms typically are classified and analyzed according to homogeneous risk classes. However, when firms are sorted into classes based on two-digit SIC codes, there are too few industrial firms to be analyzed. Consequently, industrial firms are dropped from the analysis. The paucity of industial firms in both debt and equity capital markets can also be seen in Table 6.

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[8] When the firm issues debt, there are no special problems with predicting flotation costs for an equity issue because the variables are known for the firm. However, when rhw firm issued equity, there are problems with predicting flotation costs for a debt issue. The problem arises because the firm's bond rating is required.

Table 5

Frequency of Industrial Offerings by Security Type

	Number of Debt Offerings							
	Freq	0	1	2	3	4	>4	
Number of Equity Offerings	0	0	116	56	9	11	9	
	1	123	18	6	5	4	2	
	2	22	4	3	2	0	0	
	3	3	2	1	0	0	0	
	4	1	2	0	0	0	0	
	>4	0	0	0	0	0	0	n = 771

Table 6

Frequency of Industrial Firms and Security Issues

	Frequency		
Sic Code	Firms	Debt Issues	Equity Issues
13	6	15	9
16	1	4	1
20	3	4	7
26	4	6	4
28	5	15	5
32	2	2	2
35	9	21	15
36	3	7	4
38	2	2	2
53	3	9	3
54	2	1	2
59	2	1	2
75	3	4	3
80	3	6	9

Because of the problem of analyzing leverage effects with too few industrials, the sample is restricted to the 596 offerings made by utilities. It is possible to analyze these because utilities are generally considered homogeneous with respect to risk. Issues for the purpose of refunding debt, as identified from EBASCO Services, Inc., are also eliminated from the sample leaving 550 offerings. Furthermore, because the sample contains only 23 straight debt offerings which are too few to predict flotation costs, these issues are dropped from the sample. Therefore, the sample is restricted to the remaining 527 issues of mortgage bonds and equity offerings. Finally, the sample is restricted to the 457 issues that have complete Compustat, CRSP, and ROS data. In the final sample of 457 offerings, 145 are debt and 312 are equity. Table 7 reports the frequency of firm offerings by type of security issue.

Table 7

Frequency of Firm Offerings by Security Type

		Number of Debt Offerings						
	Freq	1	2	3	4	5	> 5	
Number of Equity Offerings	1	7	1	0	0	0	0	
	2	5	1	0	0	0	1	
	3	4	0	3	0	0	0	
	4	3	0	0	0	0	0	
	5	1	0	0	2	0	0	
	> 5	4	6	5	9	1	6	n = 457

5.3. The Dependent Variable

The main purpose of this research is to test three different theories of capital structure by examining how well the theories predict whether the firm will issue debt or equity when it goes to the capital markets for funds. Therefore, in the econometric model, the dependent variable is dichotomous, equalling one for a debt issue and zero for an equity issue. When logit regression analysis is employed, the dependent variable becomes the probability of a debt issue. Since the dependent variable is dichotomous, the probability of an equity issue is one minus the probability of a debt issue. Table 8 contains the frequency of debt and equity offerings by year. There are fewer offerings in the early years than the later years of the study period. Also, there are more equity offerings than debt offerings for every year in the time period except for 1974, when the number of equity offerings equals the number of debt offerings.

Table 8

Offerings by Year

Year	Number of Offerings: Debt	Number of Offerings: Equity
1973	2	19
1974	26	26
1975	19	23
1976	11	26
1977	7	25
1978	8	37
1979	8	34
1980	21	40
1981	21	38
1982	22	44
Total	145	312

5.4. Independent Variable Definition and Measurement

5.4.1. Leverage Related Variables

This research is concerned with long-term debt issues, so it seems reasonable to use targets based on the ratio of long-term debt to total capital.[9] However, because other studies use total debt measures, total debt ratios are also included in the analysis.

5.4.1.1. Ex-ante Leverage Ratios

The firm's leverage ratio prior to issuance is measured by the ratio of debt to debt and equity, denoted as:

$$l_0 = \frac{D}{D + E}. \tag{5.1}$$

Theoretically, leverage ratios should be measured in market values. Yet, in practice, rarely do empirical tests use market values for debt and total asset measures. Some textbooks in finance and accounting suggest book values be used and some even argue

[9] Scott and Johnson (1982) survey chief financial officers of the Fortune 1000 Corporations and find they use long-term debt to total capitalization to guide their firm's debt/equity choice.

financial managers think in terms of book values. In fact, Myers (1977) suggests that book values are theoretically justified because book values capture the value of assets in place, while market values capture the value of growth opportunities. Bowman (1980) provides direct empirical evidence on the comparability of book value and market value measures of leverage in tests of systematic risk. He finds book value measures for debt to be statistically indistinguishable from market value measures in predicting risk. Taggart (1977) finds similar results in his analysis of corporate financing decisions. Thus, book value for debt is used in calculating the leverage ratio. However, equity is measured in market value. The book value of debt is measured as of the year preceding the security issue. The market value of equity is calculated as the product of the number of shares outstanding at the end of the fiscal year before the issue and the year end market price of common stock.

When the firm made more than one offering during the fiscal year, the ex-ante leverage ratio is calculated so that the financing raised in the previous offerings are included. For example, when a firm issues debt in the same year prior to the issue under investigation, the current leverage ratio is calculated as

$$l_0 = \frac{D + K}{D + E + K} \tag{5.2}$$

where K is the dollar amount of capital raised by the firm in the previous offering. If, instead, equity was issued, then the current leverage ratio is calculated as

$$l_0 = \frac{D}{D + E + K}. \tag{5.3}$$

The variables extracted from the Compustat tapes that are used in the creation of the leverage ratios are found in Appendix A. The mean and the standard deviation for the current leverage ratios are found in Table 9.

Table 9

Descriptive Statistics for Current Leverage Ratios

	Current Leverage Ratios
Long-term Debt	
Mean	0.63410
Standard Deviation	0.06559
Total Debt	
Mean	0.70353
Standard Deviation	0.05862

5.4.1.2. Target Leverage Ratios

According to an optimal capital structure theory, the firm's choice of financing instrument will depend on the difference between its target and current leverage ratios. A problem arises because the firm's target leverage ratio is unobservable. One method for dealing with this problem of an unobservable target is to build a partial adjustment model in which the target is replaced by a function containing variables that specify the target. However, since the purpose, here, is to test capital structure theory, it would be tautological to specify exogenous variables to explain the target (not knowing which theory is correct), and then use this target to test the theories. The procedure used here is to assume that the actual leverage decisions made by managers are made with their perceptions as to the correct target. Thus, observed leverage ratios become predictors of targets. If, over time, the target leverage ratios are changing, reflecting changes in underlying economic conditions, problems with this method of proxying for target leverage ratios arise. To control for this latter possibility, several different cross sectional and intertemporal measures of target leverage ratios are examined in the subsequent analysis.

Many argue that managers have firm-specific target leverage ratios in mind when their firms go to the capital markets. These researchers then conduct tests using proxies for leverage targets that are calculated as historical averages of firm-specific leverage ratios. However, others argue that optimal leverage ratios are industry determined. To accommodate both of these possibilities, target leverage ratios are estimated as averages for the firm and also as averages for the industry. The target leverage ratio for the electrical utility industry is calculated from the current leverage ratios for all firms in the industry whose financial statements are contained on the Compustat tapes.

Typically, in calculating leverage ratios, 10- or 20-years of historical data are used.[10] However, this research varies the time frame used in calculating the target leverage ratio to control for movement of the target over time. Given the limitation of the data on the Compustat tapes, a ten-year time period prior to the offering is the longest time period used in calculating the target leverage ratios. Other time periods that are used in calculating the averages are five and three years prior to the offering. In addition, this research examines leading measures of the target leverage ratio. This approaches captures the possibility that current and historical measures only tell where the firm "is" , and not where it is going, with respect to its leverage decisions. Thus, a leading target leverage ratio is constructed based on an average of three years of leverage data after the offering. Also, a spot measure of the target, based on the third year after the offering, is constructed. For both long-term and total debt, five industry and five firm-specific targets are constructed. Therefore, 20 different proxies for the target leverage ratios are examined. Table 10 identifies the name of each target leverage ratio and indicates how it is calculated. Table 11 presents the yearly average leverage ratio for the utility industry and Table 12 presents the industry and the firm-specific targets at the time of the offering.

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[10] See for example, Kim (1978), Bradley, Jarrell and Kim (1984), or Marsh (1984) .

Table 10

Definitions of Target Leverage Ratios

	Definitions of Targets
Debt Targets	
$l^*_{SIC(3)}$	= target based on the industry average debt ratio at year three after an offering;
$l^*_{SIC(+3)}$	= target based on the industry average debt ratio for three years after an offering;
$l^*_{SIC(-3)}$	= target based on the industry average debt ratio for three years prior to an offering;
$l^*_{SIC(-5)}$	= target based on the industry average debt ratio for five years prior to an offering;
$l^*_{SIC(-10)}$	= target based on the industry average debt ratio for ten years prior to an offering;
$l^*_{FIRM(3)}$	= target based on the average debt ratio for the firm at year three after an offering;
$l^*_{FIRM(+3)}$	= target based on the average debt ratio for the firm for three years after an offering;
$l^*_{FIRM(-3)}$	= target based on the average debt ratio for the firm for three years prior to an offering;
$l^*_{FIRM(-5)}$	= target based on the average debt ratio for the firm for five years prior to an offering;
$l^*_{FIRM(-10)}$	= target based on the average debt ratio for the firm for ten years prior to an offering;

These ratios are either measures of long-term or total debt.

Table 11

Annual Industry Leverage Ratios

Fiscal Year	Long-Term Debt	Total Debt
1963	0.374685	0.438998
1964	0.359749	0.424277
1965	0.374904	0.440586
1966	0.421679	0.493611
1967	0.446629	0.519597
1968	0.445969	0.521245
1969	0.514867	0.594168
1970	0.512985	0.586832
1971	0.523037	0.593700
1972	0.521500	0.595530
1973	0.589344	0.671452
1974	0.674577	0.758062
1975	0.615556	0.704799
1976	0.563406	0.658197
1977	0.556038	0.662428
1978	0.580263	0.692931
1979	0.568679	0.693061
1980	0.556142	0.687384
1981	0.566198	0.702050
1982	0.534091	0.677713
1983	0.508334	0.656919
1984	0.485382	0.646395
1985	0.447437	0.611936
1986	0.410638	0.572683

Table 12

Target Leverage Ratios

TARGETS	LONG-TERM	TOTAL
$l^*_{SIC(3)}$	0.52736	0.66440
$l^*_{SIC(+3)}$	0.54496	0.67437
$l^*_{SIC(-3)}$	0.57416	0.67571
$l^*_{SIC(-5)}$	0.57004	0.66594
$l^*_{SIC(-10)}$	0.54124	0.62730
$l^*_{FIRM(3)}$	0.59651	0.68391
$l^*_{FIRM(+3)}$	0.60423	0.68911
$l^*_{FIRM(-3)}$	0.60969	0.68329
$l^*_{FIRM(-5)}$	0.59854	0.66911
$l^*_{FIRM(-10)}$	0.56120	0.62792

If the target debt ratio is changing over time, capital structure analyses should control for the changes. In order to ascertain whether the targets are changing, statistical tests are performed. First, an analysis of variance test is performed to determine whether there are differences among the annual industry leverage ratios. Since the test reveals a difference, multiple range tests are used to determine which means are different. After ranking targets by magnitude, pairwise t-tests are performed to determine which means are statistically different. Results from Duncan's multiple range tests are presented below in Table 13.[11] Means connected by lines are not significantly different. Although the tests reveal significant differences, a causal examination of the annual industry leverage ratios in Table 11 suggests that both long-term and total debt ratios change over time. However, the change is not monotonic. In the 1960s, leverage ratios were low compared to the 1970s and 1980s, but they seem to increase and decrease during this period with no clear pattern.

[11] Tukey's multiple range tests are performed with similar results.

Table 13
Duncan's Multiple Range Tests for Utility Industry Debt Ratios

Fiscal Year	Long-Term
1974	.67458
1975	.61556
1973	.58934
1978	.58026
1979	.56868
1981	.56620
1976	.56341
1980	.55614
1977	.55604
1982	.53409
1971	.52304
1972	.52150
1983	.51526
1969	.51487
1970	.51298
1984	.49926
1985	.45958
1967	.44663
1968	.44597
1986	.43035
1966	.42168
1965	.37490
1963	.37469
1964	.35927

Table 13 Continued

Fiscal Year	Total
1974	.75806
1975	.70480
1981	.70205
1979	.69306
1978	.69293
1980	.68738
1982	.67771
1973	.67145
1977	.66243
1983	.65869
1976	.65820
1984	.64804
1985	.61328
1976	.59553
1969	.59417
1971	.59370
1970	.58683
1986	.58079
1968	.52124
1967	.51960
1966	.49361
1965	.44059
1963	.43900
1964	.42428

Means connected by line are not significantly different.

5.4.1.3. Debt Capacity

Just as the target leverage ratios is unobservable so too is the debt capacity. Therefore, debt capacity is estimated in the same manner as the target leverage ratio. Thus, it is assumed that the target leverage ratio is equal to the debt capacity. In actuality, this may be a rather restrictive assumption, particularly, if firms reserve slack by maintaining leverage ratios well below debt capacity. As discussed below, this possibility is also accounted for the analyses.

5.4.1.4. Leverage Regions

Given the target leverage ratio, most firms will invariably be either above or below their target. This information is useful in the logit regression analysis. Thus, for some tests, firms are sorted into two leverage regions based on the difference between the target and current leverage ratios, $l^* - l_0$. When the difference is positive, firms are classified into Region I; when the difference is negative, they are classified into Region II. Further refinement of this classification scheme is examined below.

5.4.2. Flotation Costs

Flotation costs consist of the underwriter spread, reported firm costs, unreported costs, and underpricing. In general, it is impossible to estimate unreported costs because no data exists concerning these costs; hence, they are called unreported costs. In this analysis, underpricing costs are ignored because of the difficulty in predicting the offering price. Therefore, only underwriter spread and firm reported costs are estimated.[12]

The first step is to estimate flotation costs for debt and equity issues. The second step uses these flotation costs estimates to predict what the flotation costs would have been if the firm issued debt rather than equity and vice versa. Finally, the third step uses the predicted cost differences to estimate flotation costs advantage of debt versus equity financing.

5.4.2.1. Flotation Costs for a Debt Issue

The specification for the debt spread equation is similar to that generally used in the literature.[13] The independent variables include the rating of the bond issue,[14] issue size to capture any economies of scale, and a measure of interest rate uncertainty in the bond market.

Underwriter spread for debt is estimated by

$$\text{Spread}_d = \beta_0 + \beta_1 \ln \text{Size} + \beta_2 \text{A} + \beta_3 \text{BAA} + \beta_4 \text{BA} + \beta_5 \text{Uncertainty} + \varepsilon \quad (5.4)$$

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[12] To the extent that underpricing and unreported expenses differ for debt and equity issues, a bias is introduced into the analysis.

[13] Sorensen (1979), Ederington (1975), Logue and Jarrow (1978), and West (1967).

[14] Ederington (1975) and West (1967) argue that potential price movements and demand estimation are greater for low rated issues since a large portion of lower-rated issues are sold to the non-institutionalized sector, so rating is included not as a measure of default risk but rather as a measure of potential price volatility that the underwriter is exposed to during the brief selling period.

where:

ln Size	= natural logarithm of the dollar amount raised by issuing debt;
A	= variable equalling 1 for A rated bonds by Moody's Investor Service rating and zero otherwise;
BAA	= variable equalling 1 for BAA rated bonds by Moody's Investor Service rating and zero otherwise;
BA	= variable equalling 1 for BA rated bonds by Moody's Investor Service rating and zero otherwise; and
Uncertainty	= Variance in interest rates computed as the previous ten days (from issue date) in the 10-year constant maturity U.S. Treasury bond index.[15]

Other debt expenses that are fixed and are subject to economies of scale are estimated by

$$\text{Reported}_d = \beta_0 + \beta_1 \ln \text{Size} + \varepsilon\,. \qquad (5.5)$$

Therefore, the expected flotation cost for a debt issue[16] is calculated by the sum of the estimated underwriter's spread and the estimated reported costs of the firm:

[15] Source: Federal Reserve Statistical Release H.15: Selected Interest Rates.

[16] In the case of predicting what flotation costs would be for a debt issue when in fact the firm issued equity, it is necessary to make the following assumptions: (i) underwriter contracts are negotiated; (ii) debt is issued at par; (iii) maturity, callability and sinking fund features of the debt do not significantly affect underwriter spread; and (iv) bond rating of the debt issue is similar to other outstanding debt issues for the firm.

$$F_d = \hat{\text{Spread}}_d + \hat{\text{Reported}}_d \ . \qquad (5.6)$$

5.4.2.2. Flotation Costs for an Equity Issue

The specification for the equity spread equation includes as regressors the systematic risk of the firm, the unsystematic risk, and a measure of uncertainty in the overall equity market. The risk measures are not measures of default risk but rather measures of volatility that the underwriter is exposed to during the brief selling period. The systematic risk is included to control for the firm's market risk on the marketability of the equity issue. It is calculated with a market model using Ordinary Least Squares to regress the firm's returns on the market returns for the period from 200 to 25 trading days prior to the offering. The unsystematic risk is included in the specification to control for effects other than the market effects and equals the variance of the error terms for the market model where returns from 200 to 25 tarding days prior to the offering are again used.[17]

Therefore, spread for equity is estimated as

$$\text{Spread}_e = \beta_0 + \beta_1 \ln \text{Size} + \beta_2 \beta_i + \beta_3 \text{Var } \varepsilon_i + \beta_4 \text{Var } R_m + \varepsilon \qquad (5.7)$$

where:

β_i = systematic risk of returns of the common stock,

[17] The CRSP tapes are used to calculate the systematic and unsystematic risk of the firm using a value weighted market index.

Var ε_i = unsystematic risk of the return of common stock, and

Var R_m = the variance of the market return for the 10 days before the issue.

Other reported costs that the firm incurs when floating an equity issue are a function of economies of scale. Therefore, the reported costs for an equity issue are estimated by

$$\text{Reported}_e = \beta_0 + \beta_1 \ln \text{Size} + \varepsilon. \tag{5.8}$$

The flotation cost for an equity issue[18] is calculated by the sum of the estimated underwriter's spread and the estimated reported costs of the firm:

$$F_e = \widehat{\text{Spread}}_e + \widehat{\text{Reported}}_e \ . \tag{5.9}$$

5.4.2.3. Savings in Flotation Costs

The flotation costs variable used in this research is a measure of the savings to the firm from issuing debt rather than equity. Alternatively, it is the opportunity cost of issuing equity. The savings in flotation costs is calculated as a difference in the flotation costs between equity and debt, that is,

$$\Delta FC = F_e - F_d. \tag{5.10}$$

[18] In contrast with debt issues, there are no special problems predicting flotation costs for an equity issue when in fact the firm actually issued debt. The variables required for predicting are known at the time of the issue: the issue size, systematic and unsystematic risk of the firm, and the variability in the return of the market.

In general, the savings in flotation costs from issuing debt rather than equity averages about 2.728%.[19]

The mean size for debt and equity issues are found in Table 14. Tables 15 and 16 present the parameter estimates for the debt and equity flotation cost equations. The Ordinary Least Squares Regression for both debt and equity spread and other reported expenses are statistically significant at the .0001 level. The adjusted R-squares for spread and other expenses of debt issues are 71.06% and 22.41%, respectively. The adjusted R-squares for spread and other expenses of equity issues are 32.64% and 58.02%, respectively. All the variables, except systematic risk in the equity spread equation, are statistically significant at the .05 level or better.[20] Also, all the signs of the estimated parameters are as predicted except for market uncertainty in the debt spread equation.

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[19] There are some problems with this measure. Flotation costs for debt are deductible and should be multiplied by the corporate tax rate which reduces the costs. However, debt has to be reissued which increases the costs. To the extent that these effects tend not to cancel, there is a bias introduced into the analysis.

[20] See Hansen and Torregrosa (1987) for a similar finding and the references cited therein.

Table 14

Descriptive Statistics for Issue Size

Debt	
Mean	$67,333,000
Standard Deviation	$39,985,000
Equity	
Mean	$52,334,000
Standard Deviation	$38,339,000

Table 15

Estimates for Flotation Costs for Debt Issues

Variables	Parameter Estimates	Standard Error	Prob > $\|t\|$
	Spread		
Intercept	1.528	0.218	.0001
A	0.056	0.268	.0393
BAA	0.131	0.027	.0001
BA	1.365	0.077	.0001
Ln Size	-0.063	0.020	.0018
Uncert.	-0.537	0.168	.0017
	Other Expenses		
Intercept	2.066	0.265	.0001
Ln Size	-0.158	0.024	.0001

F statistics for spread and other expenses are significant at the .0001 level. For spread and for other expenses, the adjusted R^2s are 71.06% and 22.41%, respectively.

Table 16

Estimates for Flotation Costs for Equity Issues

Variables	Parameter Estimates	Standard Error	Prob > $\|t\|$
		Spread	
Intercept	7.541	0.837	.0001
Beta	0.245	0.221	.2691
Var (ε)	1354.654	267.117	.0001
Ln Size	-0.439	0.078	.0001
Var R(m)	5307.982	688.677	.0001
		Other Expenses	
Intercept	2.946	0.125	.0001
Ln Size	-0.243	0.012	.0001

F statistics for both spread and other expenses are significant at the .0001 level. For spread and other expenses, the adjusted R^2 s are 32.64% and 58.02%, respectively.

Chapter VI. Empirical Results and Conclusions

6.1. Introduction

This chapter presents the results of the logit regression analyses developed in Chapter IV. A sample of 457 debt and equity offerings made between 1973 and 1982 is used to test the predictions of the three capital structure theories and the relevance of flotation costs to the financing decision. The following econometric specifications are used:

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \Delta L + \beta_2 \Delta FC + \varepsilon > 0), \text{ and}$$

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{Region II} + \varepsilon > 0) ,$$

where:

ΔL = the difference in the target and current leverage ratios, and

ΔFC = savings in flotation costs from issuing debt rather than equity.

Region II = dummy regressor equalling one if the firm is overlevered and zero if underlevered,

β_0 = parameter for the intercept term;

β_1 = parameter which indicates the significance of the leverage effect to the financing decision;

β_2 = parameter which indicates the significance of the flotation cost savings to the financing decision; and

ε = the model error.

Two additional dummy logit regression specifications are used. The purpose of these latter analyses is to investigate the leverage decisions of firms that are in the extremes of the leverage valuation functions, relative to the rest of the sample. If the leverage valuation is rather flat around the target, then by partitioning the function, first, into four regions, and then into eight, further insight into financing behavoir may be gained. Firms are sorted into equal regions based on the deviation from target. This means that 50% of the underlevered firm offerings are contained in Regions 1 and 2, while 50% of the overlevered firm offerings are contained in Regions 3 and 4. Similar regression analysis is performed when firms offerings are sorted into eight regions.

6.2. Logit Regression Results

6.3.1. Pooled Data and Flotation Costs

Consider first, the logit regression results for the general model in which the benefits of issuing debt are a function of a leverage effect and the savings in flotation costs from issuing debt rather than equity. The regression form is

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \Delta L + \beta_2 \Delta FC + \varepsilon > 0) \ .$$

Note underlevered and overlevered firms are pooled in this regression. The leverage effect is measured as the distance the current leverage ratio is from target, $\Delta L = l^* - l_0$. Thus, β_1 is the estimate of the response of the probability of issuing debt to the distance the current leverage ratio is from target. The savings in flotation costs from issuing debt rather than equity is measured as $\Delta FC = F_e - F_d$. The estimated coefficient, β_2, is the estimate of the the response of the probability of issuing debt to the savings in flotation costs.

Table 17 contains the regression results. In general, the leverage effect is statistically non-significant. Curiously, although it is non-significant, the leverage effect is typically negatively related to the probability of a debt issue. This means that the more underlevered the firm, the less likely it will issue debt or the more overlevered the firm, the more likely it will issue debt. Thus, in those cases in which the estimated coefficients, β_1, are statistically significant, the results are fully contrary to the capital structure theories being tested in this research. Although this may be due to pure randomness because the data is pooled in the analysis, the possibility is explored that there may be a leverage region effect which accounts for the anomaly. This possibility is explored subsequently.

The coefficient for savings in flotation costs is statistically non-significant in all 20 regression models which differ only in the method of creating the target leverage ratios. This suggests that flotation costs are not important to a manager when deciding whether to issue debt or equity. Because the savings from flotation costs are statistically non-significant, the remainder of the logit regression analyses examines only the leverage effect.

Table 17
Logit Regression Results for Model
$Pr(Debt = 1) = Pr(\beta_0 + \beta_1 \Delta L + \beta_2 \Delta FC + \varepsilon > 0)$

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	Model p-value	% Debt
Long-Term Debt					
$l^*_{SIC(3)}$	-1.09 (.0070)	-0.90 (.4671)	0.08 (.5287)	(.6400)	144/456
$l^*_{SIC(+3)}$	-1.09 (.0061)	-1.10 (.3871)	0.09 (.5242)	(.5721)	144/46
$l^*_{SIC(-3)}$	-1.01 (.0084)	-0.75 (.6120)	0.07 (.5993)	(.7336)	144/456
$l^*_{SIC(-5)}$	-1.00 (.0088)	-1.5 (.3056)	0.05 (.7027)	(.4886)	144/456
$l^*_{SIC(-10)}$	-1.00 (.0085)	-1.17 (.3988)	0.05 (.7282)	(.5820)	144/456
$l^*_{FIRM(3)}$	-1.00 (.0118)	-0.63 (.6159)	0.06 (.6693)	(.7474)	128/418
$l^*_{FIRM(+3)}$	-.097 (.0136)	-1.34 (.3413)	0.06 (.6929)	(.5178)	138/441
$l^*_{FIRM(-3)}$	-.071 (.0790)	**-5.21 (.0184)**	-0.05 (.7135)	**(.0488)**	144/456
$l^*_{FIRM(-5)}$	-0.76 (.0580)	**-4.22 (.0224)**	-0.05 (.7397)	**(.0578)**	144/456
$l^*_{FIRM(-10)}$	-0.93 (.0162)	-1.83 (.1984)	0.01 (.9249)	(.3635)	144/456
Total Debt					
$l^*_{SIC(3)}$	-1.04 (.0069)	-1.46 (.3186)	0.08 (.5726)	(.5059)	144/456
$l^*_{SIC(+3)}$	-1.03 (.0071)	-1.81 (.2244)	0.07 (.5827)	(.3955)	144/456
$l^*_{SIC(-3)}$	-0.97 (.0113)	-1.16 (.5001)	0.06 (.6645)	(.6641)	144/456

Table 17 Continued

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	Model p-value	% Debt
$l^*_{SIC(-5)}$	-0.95 (.0135)	-2.07 (.2165)	0.03 (.8055)	(.3850)	144/456
$l^*_{SIC(-10)}$	-0.99 (.0095)	-1.55 (.3168)	0.04 (.8017)	(.5041)	144/456
$l^*_{FIRM(3)}$	-1.00 (.1023)	-0.67 (.6342)	0.06 (.6614)	(.7570)	128/418
$l^*_{FIRM(+3)}$	-0.96 (.0152)	-1.49 (.3288)	0.05 (.7023)	(.5056)	138/441
$l^*_{FIRM(-3)}$	-0.70 (.0882)	**-6.25** **(.0083)**	-0.08 (.5897)	**(.0231)**	144/456
$l^*_{FIRM(-5)}$	-0.75 (.0593)	**-5.38** **(.0094)**	-0.08 (.5960)	**(.0264)**	144/456
$l^*_{FIRM(-10)}$	-0.94 (.0144)	-2.51 (.1219)	-0.01 (.9538)	(.2510)	144/456

Values in parentheses are p-values.

6.3.2. The Unpooled Data

For this analysis, the logit regressions are run by leverage region and without the savings in flotation costs. Thus, the regression,

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \Delta L + \varepsilon > 0),$$

is run for underlevered firms ($l_0 < l^*$) and for overlevered firms ($l_0 > l^*$). Table 18 reports the regression results. For underlevered firms, of the 20 models two are statistically significant: the models using the total debt ratios $l^*_{SIC}(3)$ and $l^*_{SIC}(-5)$. Since all other models are non-significant, unless other evidence supports these significant findings, the conclusion is drawn that these significant results are due to chance rather than a statistically significant leverage effect.

For overlevered firms, the situation is different. Of the 20 logit regressions, ten models are statistically significant. The models that are significant use the following targets:

long-term debt: $l^*_{SIC}(3)$, $l^*_{SIC}(-5)$, $l^*_{SIC}(-10)$, $l^*_{FIRM}(3)$, and $l^*_{FIRM}(-3)$, and
total debt: $l^*_{SIC}(-3)$, $l^*_{SIC}(-5)$, $l^*_{SIC}(-10)$, $l^*_{FIRM}(-3)$, and $l^*_{FIRM}(-5)$.

Thus, comparing the two debt measures, only $l^*_{SIC}(-5)$, $l^*_{SIC}(-10)$, and $l^*_{FIRM}(-3)$ targets are statistically significant in both analyses. More importantly, the signs of the significant regression coefficients indicate that the leverage effect is negative. This implies that firms are levering even further beyond their targets when going to the capital market. Obviously, this is contrary to the capital structure theories examined here.

Table 18
Logit Regression Results for Model
$Pr(Debt = 1) = Pr(\beta_0 + \beta_1 \Delta L + \varepsilon > 0)$
by Leverage Region

	Underlevered				Overlevered			
TARGETS	β_0	β_1	Model p-value	% Debt	β_0	β_1	Model p-value	% Debt
Long-Term Debt								
$l^*_{SIC(3)}$	0.45	-0.19	(.9682)	19/49	-1.16	**-2.99**	**(.0741)**	126/408
	(.2454)	(.9682)			(.0000)	**(.0741)**		
$l^*_{SIC(+3)}$	-0.76	0.71	(.8648)	21/64	-1.05	-2.67	(.1582)	124/393
	(.0384)	(.8641)			(.0000)	(.1583)		
$l^*_{SIC(-3)}$	-0.85	-1.88	(.5937)	28/87	-1.07	-3.85	(.1389)	117/370
	(.0052)	(.5904)			(.0000)	(.1391)		
$l^*_{SIC(-5)}$	-0.90	2.10	(.5764)	26/83	-1.12	**-4.43**	**(.0493)**	119/374
	(.0039)	(.5725)			(.0000)	**(.0496)**		
$l^*_{SIC(-10)}$	-0.23	-4.03	(.4013)	19/48	-1.15	**-3.45**	**(.0496)**	126/409
	(.5497)	(.4507)			(.0000)	**(.0490)**		
$l^*_{FIRM(3)}$	-0.99	2.31	(.4215)	45/149	-1.11	**-3.93**	**(.1053)**	38/270
	(.0002)	(.4179)			(.0000)	**(.1051)**		
$l^*_{FIRM(+3)}$	-0.92	0.91	(.8014)	49/166	-0.96	-3.41	(.2242)	90/276
	(.0007)	(.8007)			(.0000)	(.2236)		
$l^*_{FIRM(-3)}$	-0.84	-3.05	(.6456)	48/172	-1.03	**-7.91**	**(.0244)**	97/285
	(.0029)	(.6472)			(.0000)	**(.0247)**		

Table 18 Continued

	Underlevered				Overlevered			
TARGETS	β_0	β_1	Model p-value	% Debt	β_0	β_1	Model p-value	% Debt
$l^*_{FIRM(-5)}$	-1.15 (.0000)	1.77 (.7496)	(.7518)	41/163	-0.82 (.0000)	-3.67 (.1572)	(.1581)	104/294
$l^*_{FIRM(-10)}$	-0.63 (.0605)	-6.18 (.4145)	(.3911)	25/82	-0.97 (.0000)	-2.50 (.1368)	(.1385)	120/375
Total Debt								
$l^*_{SIC(3)}$	-1.46 (.0000)	**8.68 (.0547)**	**(.0527)**	36/139	-0.70 (.0028)	-0.69 (.7966)	(.7966)	109/318
$l^*_{SIC(+3)}$	-1.09 (.0001)	3.26 (.4125)	(.4170)	42/148	-0.92 (.0001)	-3.33 (.2486)	(.2489)	103/309
$l^*_{SIC(-3)}$	-0.96 (.0005)	-4.98 (.3899)	(.3899)	40/128	-1.09 (.0000)	**-5.74 (.0665)**	**(.0666)**	105/329
$l^*_{SIC(-5)}$	-1.32 (.0000)	**9.25 (.0817)**	**(.0678)**	34/121	-1.03 (.0000)	**-4.85 (.0610)**	**(.0612)**	111/336
$l^*_{SIC(-10)}$	-0.34 (.3631)	-1.04 (.8769)	(.8759)	20/49	-1.21 (.0000)	**-4.28 (.0181)**	**(.0184)**	125/408
$l^*_{FIRM(+3)}$	-0.80 (.0020)	-1.39 (.7274)	(.7258)	55/187	-0.83 (.0006)	-1.93 (.5497)	(.5503)	84/255

Table 18 Continued

	Underlevered				Overlevered			
TARGETS	β_0	β_1	Model p-value	% Debt	β_0	β_1	Model p-value	% Debt
$l^*_{FIRM(-3)}$	-1.27 (.0001)	6.85 (.3878)	(.3909)	39/151	-1.04 (.0000)	**-8.53** **(.0145)**	**(.0104)**	106/306
$l^*_{FIRM(-5)}$	-1.29 (.0001)	7.10 (.3963)	(.4026)	28/110	-1.08 (.0000)	**-6.11** **(.0148)**	**(.0147)**	117/347
$l^*_{FIRM(-10)}$	-1.73 (.0106)	17.33 (.2500)	(.2479)	9/37	-0.96 (.0000)	-2.54 (.1273)	(.1289)	136/420

Values in parenthesis are p-values.

6.3.3. Pooled Data Using Leverage Region Dummies

As an alternative to unpooled data, the pooled data can be analyzed using a dummy regressor. In this case, the logit regression takes the form:

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{Region II} + \varepsilon > 0) \ .$$

The variable, Region II, equals one for an overlevered firm and zero for an underlevered firm. Now the probability of a debt offering is simply a function of whether the offering is made by an overlevered firm. According to an optimal and modified pecking order theories, the estimated coefficient, β_1, should be negative; overlevered firms should issue debt less frequently. Of the 20 regressions, five are statistically positively significant indicating that overlevered firms are indeed continuing to lever with their next issue. The leverage ratios for models that are significant are:

long-term targets: $l^*_{FIRM}(-5)$ and
total debt targets: $l^*_{SIC}(3)$, $l^*_{FIRM}(3)$, $l^*_{FIRM}(-3)$, and $l^*_{FIRM}(-5)$.

When comparing the alternate debt measures (long-term versus total), under the leverage region dummy specification, only $l^*_{FIRM}(-5)$ is statistically significant. In comparing the results from the dummy variable method to the results of the overlevered firm in the unpooled method, no target is statistically significant in both sets of analyses for both long-term and total debt targets. Table 19 contains the results of this dummy regression specification.

Table 19
Logit Regression Results for Model
$Pr(Debt = 1) = Pr(\beta_0 + \beta_1 \text{ Region II } + \varepsilon > 0)$

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	Model p-value	% Debt
Long-Term Debt				
$l^*_{SIC(3)}$	-0.46 (.1193)	-0.35 (.2638)	(.2692)	145/457
$l^*_{SIC(+3)}$	-0.72 (.0071)	-0.06 (.8408)	(.8412)	145/457
$l^*_{SIC(-3)}$	-0.75 (.0012)	-0.03 (.9192)	(.9193)	145/457
$l^*_{SIC(-5)}$	-0.78 (.0009)	0.02 (.9305)	(.9304)	145/457
$l^*_{SIC(-10)}$	-0.42 (.1519)	-0.39 (.2186)	(.2242)	145/457
$l^*_{FIRM(3)}$	-0.84 (.0000)	0.11 (.6257)	(.6248)	145/457
$l^*_{FIRM(+3)}$	-0.87 (.0000)	0.16 (.4434)	(.4418)	145/457
$l^*_{FIRM(-3)}$	-0.95 (.0000)	0.29 (.1733)	(.1705)	145/457
$l^*_{FIRM(-5)}$	-1.09 (.0000)	**0.49** **(.0252)**	**(.0231)**	145/457
$l^*_{FIRM(-10)}$	-0.82 (.0006)	0.07 (.7899)	(.7893)	145/457
Total Debt				
$l^*_{SIC(3)}$	-1.05 (.0000)	**0.40** **(.0776)**	**(.0735)**	145/457
$l^*_{SIC(+3)}$	-0.93 (.0000)	0.23 (.2874)	(.2843)	145/457
$l^*_{SIC(-3)}$	-0.79 (.0000)	0.03 (.8909)	(.8908)	145/457

Table 19 Continued

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	Model p-value	% Debt
$l^*_{SIC(-5)}$	-0.94 (.0000)	0.23 (.3177)	(.3136)	145/457
$l^*_{SIC(-10)}$	-0.37 (.2011)	-0.45 (.1504)	(.1557)	145/457
$l^*_{FIRM(3)}$	-1.03 (.0000)	**0.41** **(.0553)**	**(.0527)**	145/457
$l^*_{FIRM(+3)}$	-0.88 (.0000)	0.18 (.3761)	(.3747)	145/457
$l^*_{FIRM(-3)}$	-1.05 (.0000)	**0.42** **(.0578)**	**(.0545)**	145/457
$l^*_{FIRM(-5)}$	-1.07 (.0000)	**0.40** **(.1060)**	**(.0999)**	145/457
$l^*_{FIRM(-10)}$	-1.13 (.0031)	0.40 (.3154)	(.3021)	145/457

Values in parenthesis are p-values.

6.3.4. Analysis of Extreme Leverage with Dummy Regressors

The above findings generally are not consistent with an optimal or the modified pecking order theories of capital structure which predict equity offerings in the overlevered tails of the leverage function. Moreover, an optimal capital structure theory predicts increased probability of debt issuance for underlevered firms which is not found. To investigate further the predictions of the three capital structure models, this section examines financing decisions of firms that are located in the extreme underlevered and overlevered ranges of the leverage function, relative to the remaining firms in the sample. The logit regression specification used in this analysis is

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{ Region 2 } + \beta_2 \text{ Region 3 } + \beta_3 \text{ Region 4 } + \varepsilon > 0)\,.$$

The offerings of the underlevered firms are sorted into Regions 1 and 2 and the offerings of the overlevered firms are sorted into Regions 3 and 4. Firms are sorted into these equal regions based on the distance the current leverage ratio is from target. This means that 50% of the underlevered firm offerings are contained in Regions 1 and 2, while 50% of the overlevered firms offerings are contained in Regions 3 and 4.

The regression is rerun with seven dummy regressors when underlevered firms offerings are sorted into four equal regions and overlevered firms offerings are sorted into four equal regions as well. The logit regression specification used in this analysis is

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{ Region 2 } + \beta_2 \text{ Region 3 } + \beta_3 \text{ Region 4 } + \beta_4 \text{ Region 5 } + \beta_5 \text{ Region 6 } + \beta_6 \text{ Region 7 } + \beta_7 \text{ Region 8 } + \varepsilon > 0)\,.$$

Tables 20 and 21 contain the results of these analyses. The dummy regressors for the overlevered firms are of interest. Of the 20 logit regressions in Table 20, five models are statistically significant. The models that are significant use the following targets:

long-term debt: $l^*_{FIRM}(-3)$, and $l^*_{FIRM}(-5)$, and
total debt: $l^*_{FIRM}(-3)$, $l^*_{FIRM}(-5)$, and $l^*_{FIRM}(-10)$,

Thus, comparing the two debt measures, only $l^*_{FIRM}(-3)$, and $l^*_{FIRM}(-5)$ targets are statistically significant in both analyses. However, more importantly, the signs of the significant regression coefficients indicate that the leverage effect is positive. This implies that firms are levering even further beyond their targets when going to the capital market. Obviously, this is contrary to the capital structure theories examined here, if the firm is underlevered at the time of an offering. The significant model using $l^*_{FIRM}(-10)$ lends supoort to an optimal capital structure theory, but since this finding is not supported elsewhere, it is assumed to be due to chance rather than due to a true statistically significant relationship between the probability of issuing debt and the extremely underlevered region.

Of the 20 logit regressions in Table 21, eight are statistically significant. The pattern of overlevered firms continuing to lever in their next financing decision is not supported. There appears to be no pattern for the financing decision among the significant models in this analysis.

Table 20
Logit Regression Results for Model

$$Pr(Debt = 1) = Pr(\beta_0 + \beta_1 \text{ Region 2 } + \beta_2 \text{ Region 3 } + \beta_3 \text{ Region 4 } + \varepsilon > 0)$$

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	Model p-value
Long-Term Debt					
$l^*_{SIC(3)}$	0.00 (.9999)	-0.94 (.1180)	-0.92 (.0345)	-0.69 (.1106)	(.1801)
$l^*_{SIC(+3)}$	-0.46 (.2127)	-0.52 (.3320)	-0.43 (.2513)	-0.20 (.6097)	(.5527)
$l^*_{SIC(-3)}$	-0.52 (.0972)	-0.46 (.3227)	-0.39 (.2728)	-0.11 (.7463)	(.4734)
$l^*_{SIC(-5)}$	-0.55 (.0898)	-0.48 (.3090)	-0.37 (.3076)	-0.06 (.8576)	(.4010)
$l^*_{SIC(-10)}$	-0.26 (.5328)	-0.31 (.5970)	-0.77 (.0884)	-0.34 (.4402)	(.1321)
$l^*_{FIRM(3)}$	-0.34 (.1469)	-0.72 (.0406)	-0.52 (.0729)	-0.42 (.1459)	(.1811)
$l^*_{FIRM(+3)}$	-0.61 (.0080)	-0.48 (.1616)	-0.33 (.2659)	0.06 (.8205)	(.2017)
$l^*_{FIRM(-3)}$	-1.23 (.0000)	0.55 (.1063)	0.32 (.3061)	**0.77 (.0113)**	**(.0563)**
$l^*_{FIRM(-5)}$	-0.92 (.0002)	-0.41 (.2622)	0.16 (.5976)	**0.48 (.1056)**	**(.0334)**
$l^*_{FIRM(-10)}$	-1.13 (.0019)	0.54 (.2613)	0.26 (.5074)	0.49 (.2111)	(.4810)
Total Debt					
$l^*_{SIC(3)}$	-0.85 (.0012)	-0.43 (.2679)	0.13 (.6859)	0.27 (.3902)	(.1877)
$l^*_{SIC(+3)}$	-0.84 (.0009)	-0.28 (.4535)	-0.23 (.9103)	0.34 (.2569)	(.1943)

Table 20 Continued

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	Model p-value
$l^*_{SIC(-3)}$	-0.74 (.0053)	-0.12 (.7477)	-0.17 (.5860)	0.14 (.6608)	(.6054)
$l^*_{SIC(-5)}$	-0.67 (.0152)	-0.56 (.1682)	-0.07 (.8260)	-0.01 (.9810)	(.3898)
$l^*_{SIC(-10)}$	-0.17 (.6834)	-0.41 (.4847)	-0.83 (.0888)	-0.48 (.2680)	(.1642)
$l^*_{FIRM(3)}$	-0.55 (.0138)	-0.51 (.1252)	-0.22 (.4388)	-0.16 (.5793)	(.4734)
$l^*_{FIRM(+3)}$	-1.11 (.0000)	0.55 (.0908)	0.21 (.4884)	0.55 (.0662)	(.1857)
$l^*_{FIRM(-3)}$	-1.19 (.0000)	0.29 (.4279)	0.34 (.2871)	**0.74** **(.0190)**	**(.0813)**
$l^*_{FIRM(-5)}$	-0.97 (.0011)	-0.18 (.6807)	0.00 (.9974)	**0.55** **(.0985)**	**(.0398)**
$l^*_{FIRM(-10)}$	-0.45 (.3499)	**1.69** **(.0579)**	-0.44 (.3841)	-0.14 (.7878)	**(.0599)**

Values in parentheses are p-values.

Table 21
Logit Regression Analysis for Model:

$$Pr(Debt = 1) = Pr(B_d = \beta_0 + \beta_1 \text{ Region 2 } + \beta_2 \text{ Region 3 } + \beta_3 \text{ Region 4 } + \beta_4 \text{ Region 5 } + \beta_5 \text{ Region 6 } + \beta_6 \text{ Region 7 } + \beta_7 \text{ Region 8 } + \varepsilon > 0)$$

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$	$\hat{\beta}_5$	$\hat{\beta}_6$	$\hat{\beta}_7$	Model p-value
Long-Term Debt									
$l^*_{SIC(3)}$	-1.05	**2.15**	0.71	-0.73	-0.24	0.44	0.22	0.43	**(.0078)**
	(.1045)	**(.0207)**	(.4147)	(.4547)	(.7279)	(.5152)	(.7482)	(.4751)	
$l^*_{SIC(+3)}$	-0.50	-0.01	0.50	-2.24	-0.67	-0.15	-0.21	-0.10	(.0561)
	(.3283)	(.9907)	(.4835)	(.0503)	(.2376)	(.7932)	(.7112)	(.8552)	
$l^*_{SIC(-3)}$	-0.16	-0.82	-0.60	-1.04	-0.67	-0.77	-0.83	-0.21	(.3284)
	(.7091)	(.1979)	(.3326)	(.1119)	(.1575)	(.1089)	(.0872)	(.6544)	
$l^*_{SIC(-5)}$	0.11	-1.56	-1.03	-1.24	-1.12	-0.92	-0.82	-0.65	(.2614)
	(.7933)	(.0268)	(.1126)	(.0631)	(.0226)	(.0591)	(.0913)	(.1766)	
$l^*_{SIC(-10)}$	-0.65	0.98	0.98	-1.04	-0.24	-0. 53	-0.09	0.12	**(.0496)**
	(.2790)	(.2399)	(.2399)	(.2725)	(.7091)	(.4054)	(.8846)	(.8436)	
$l^*_{FIRM(3)}$	-0.38	0.06	-0.94	-0.44	-0.72	-0.25	-0.73	-0.06	(.1453)
	(.2527)	(.8906)	(.0711)	(.3743)	(.0937)	(.5380)	(.0858)	(.8717)	
$l^*_{FIRM(+3)}$	-0.80	0.32	-0.47	-0.08	-0.05	0.07	-0.05	0.40	(.6706)
	(.0162)	(.4917)	(.3540)	(.8672)	(.9023)	(.8655)	(.9023)	(.3507)	
$l^*_{FIRM(-3)}$	-1.04	0.31	-0.06	-0.54	0.36	0.20	0.50	0.65	(.2046)
	(.0032)	(.5308)	(.9018)	(.3166)	(.3967)	(.6526)	(.2380)	(.1229)	

Table 21 Continued

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$	$\hat{\beta}_5$	$\hat{\beta}_6$	$\hat{\beta}_7$	Model p-value
$l^*_{FIRM(-5)}$	-1.03	0.31	0.06	-0.54	0.36	0.19	0.50	0.65	(.2036)
	(.0032)	(.5308)	(.9018)	(.3166)	(.3967)	(.6526)	(.2380)	(.1229)	
$l^*_{FIRM(-10)}$	-1.04	-0.13	0.12	0.73	0.32	-0.04	0.28	0.54	(.5860)
	(.0319)	(.8557)	(.8617)	(.2503)	(.5453)	(.9472)	(.6050)	(.3043)	
Total Debt									
$l^*_{SIC(3)}$	-0.31	-1.48	-0.77	-0.89	-0.41	-0.41	-0.18	-0.36	(.1367)
	(.3600)	(.0124)	(.1337)	(.0910)	(.3174)	(.6674)	(.6660)	(.3834)	
$l^*_{SIC(+3)}$	-0.25	**-1.32**	**-1.16**	-0.63	-0.43	-0.77	-0.20	-0.33	**(.0767)**
	(.4393)	**(.0169)**	**(.0290)**	(.1985)	(.2836)	(.0576)	(.6180)	(.4147)	
$l^*_{SIC(-3)}$	-0.47	-0.67	-0.67	-0.13	-0.37	-0.54	-0.38	0.15	(.3720)
	(.1925)	(.2141)	(.2141)	(.8005)	(.3841)	(.2188)	(.3777)	(.7255)	
$l^*_{SIC(-5)}$	-0.26	-0.80	-0.59	**-1.63**	-0.65	-0.33	**-0.84**	-0.03	**(.0278)**
	(.4810)	(.1472)	(.2766)	**(.0113)**	(.1406)	(.4452)	**(.0589)**	(.9453)	
$l^*_{SIC(-10)}$	-1.38	2.07	1.05	0.42	0.59	0.20	0.64	0.82	(.1024)
	(.0431)	(.0237)	(.2453)	(.6274)	(.4017)	(.7785)	(.3677)	(.2513)	
$l^*_{FIRM(3)}$	-0.21	-0.62	-1.08	-0.64	-0.51	-0.65	-0.74	-0.30	(.3968)
	(.4811)	(.1676)	(.0250)	(.1486)	(.1927)	(.1030)	(.0656)	(.4473)	
$l^*_{FIRM(+3)}$	-0.54	-0.87	-6.85	-0.06	-0.40	-0.29	-0.13	0.00	(.3527)
	(.0700)	(.0610)	(.)*	(.8688)	(.3144)	(.4716)	(.7461)	(.9978)	

Table 21 Continued

TARGETS	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$	$\hat{\beta}_5$	$\hat{\beta}_6$	$\hat{\beta}_7$	Model p-value
$l^*_{FIRM(-3)}$	-0.59 (.0846)	**-1.49** **(.0177)**	-0.74 (.1593)	-0.02 (.9655)	-0.58 (.1746)	0.03 (.9500)	-0.03 (.7607)	0.38 (.3530)	(.0051)
$l^*_{FIRM(-5)}$	-0.66 (.1011)	-0.64 (.2922)	-0.64 (.2922)	-0.39 (.5100)	-0.21 (.6423)	-0.48 (.3328)	-0.02 (.9666)	0.48 (.2860)	(.0589)
$l^*_{FIRM(-10)}$	-0.74 (.2370)	0.51 (.5747)	-0.52 (.6114)	-7.66 (.7158)	-0.05 (.9333)	-0.27 (.6734)	-0.01 (.9826)	0.32 (.6263)	(.0745)

* Variable has limited dispersion.

6.3. Summary of the Empirical Results and Conclusions

The predominant findings of the logit regression analyses are that the estimated coefficients for the leverage effect are statistically non-significant. This is consistent with Miller's irrelevance theory of capital structure.

When the logit regressions are run separately by leverage region, the estimated coefficients for the leverage coefficient are statistically non-significant for the underlevered region. This is consistent with both Miller's irrelevance and Myers and Majluf modified pecking order theories of capital structure. For some targets, the estimated coefficients for the leverage effect are statistically significant for the overlevered region. However, the probability of a debt issue is negatively related to the distance of the current leverage ratio from target. This implies that the overlevered firms are issuing debt rather than reducing their leverage with an equity offering. No capital structure theory examined in this study explains this finding. The findings are robust for measures of the target leverage ratio.

Flotation costs do not appear to be statistically significantly related to the firm's financing decision. It may be that flotations costs may be important to other samples, but they are not significant for the sample of utilities frequently entering the capital markets.

Comparisons of this study's findings with other findings that support an optimal capital structure theory is difficult. Taggart (1977) finds that adjustment to a long-term debt target is a significant explanatory variable for debt and equity issues. One way to reconcile the difference is that rather than using micro firm data, Taggart uses aggregate flow of funds data from the Federal Reserve in his testing. Therefore, it is difficult to make direct comparisons between the two studies.

Marsh (1982), too, has an unusual sample. He uses logit regression to analyze 750 debt and equity issues made by U.K. companies and he finds that the difference between the firm's long-term target and current leverage ratio is a statistically significant positive regressor. However, several variables that are used to proxy for target are more highly significant than the deviation from target variable. It should not be suprising that Marsh finds support for an optimal capital structure because he uses variables that determine an optimal capital structure according to that theory to test the theory. See Section 5.4.1.2. for a discussion of problems arising from such a practice. Also, Marsh provides no detailed information concerning the type of firms making the issues. They may be industrials, manufacturing, financials, and/or utilities. Therefore, it is difficult to compare the results of this research to Marsh.

In the third relevant study, Jalilvand and Harris (1984) build a model that permits firms to partially adjust to long-term targets when entering the capital markets. They use individual manufacturing firm data whose standard industrial classification is between 2000 and 3999. Jalilvand and Harris look at the determinants of period by period adjustment to financial targets and on interdependencies between different financial decisions as this adjustment takes place. Targets are obtained by multiplying a constant target ratio times an appropriate exogenous variable. For example, the target level of long-term debt of firm i at time t is calculated as a constant debt ratio for firm i times firm i's cumulated funding need at time i. So in this model, targets are given. The empirical results suggest that the firm's target is a significant factor in the firm's financial behavior. It may not be surprising that support is found for adjustment to targets when targets are determined in such a fashion and firms are analyzed as partially adjusting to these targets. Although Jalilvand and Harris analyze 150 U.S. manufacturing firms, there is no overlap between their sample and the one used is this research. However, more importantly, because of manner in which the target debt ratios were calculated, these studies are not compariable.

Finally, a statement should be made concerning the type of sample used in this analysis. A sample of utility offerings is unusual to test capital structure theory. However, most of the determinants of leverage research as well as the research supporting an optimal capital structure, generally, find support for capital structure because of the utility data. This research, however, does not find support for an optimal capital structure in spite of using utility data.

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Appendix A. Compustat Data Items

Long-term and total debt ratios are calculated, respectively, as follows:

$$LTDEBT = LTDEBT^{*}\left(\frac{PRICE}{CAF11}\right)*\frac{NUMSHRS}{1000}*CAF1$$

$$TODEBT = \frac{TOTASS - COMEQU - PFDSTK}{(TOTASS - COMEQU - PFDSTK) + \left(\frac{PRICE}{CAF11}\right)*\frac{NUMSHRS}{1000}*CAF1}$$

where

LTDEBT	= Debt obligations due more than one year. Annual data item 9.
PRICE	= Closing calendar year end price. Annual data item 24.
CAFI, CAFII	= Ratio to adjust per-share and share data for all stock splits and stock dividends that occur subsequently to the end of a given fiscal year. Annual data item 27.
NUMSHR	= Number of common shares outstanding. Annual data item 25.

TOTASS = Current assets plus net plant plus other non-current assests (including deferred items, investments, advances, and intangible assets). Annual data item 6.

COMEQU = Common shareholders' interest in the company including common stock outstanding, capital surplus, and retained earning. Annual data item 60.

PFDSTK = Carring value of the preferred stock. Annual data item 130.

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