Small firms effect, agency costs and capital structure

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Small firms effect, agency costs and capital structure

by

Carmen Yvette Navia

A Thesis Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

Major: Economics

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Signatures have been redacted for privacy

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Iowa State University
Ames, Iowa

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I. INTRODUCTION

In this paper, we draw on recent progress in the theory of agency problems. Our analysis casts new light on, and has implications for, issues such as the differences between small and large corporations in the determination of their optimal capital structure and in the differentials in the yield of their securities.

As Barne, Haugen and Senbet (1985) said: "The role of agency problems enriches finance by making it more realistic and exciting" (p.1). In this chapter, we elaborate on what is meant by agency problems and how they are to some extent resolved by market forces or by complex contractual arrangements.

Agency costs arise from conflicting interests among parties to the corporate firm. An agency relationship can be defined as a contract under which one party, the principal(s), employs another party, the agent, to perform a service in which some decision making authority is delegated to the agent. Following the classic work by Jensen and Meckling (1976), we assume that: 1) Both parties to the relationship are utility maximizers who behave according to their own self-interest. 2) All parties involved in the corporate relationship are rational and capable of forming unbiased expectations regarding future wealth. 3) The parties have conflicting interests (which can occur among the principals
themselves). From these assumptions, it may be concluded that the agent(s) will not always act in the best interest of the principal(s).

The principal can greatly reduce the divergence from his self-interest by offering the appropriate incentives to the agent, by ex post readjustment, or by controlling the behavior of the agent through monitoring. In some cases, it will be advantageous for the agent to incur bonding costs in order to guarantee that his behavior will be in line with the interest of the principal or that the principal will be compensated if the agent deviates from his expected behavior.

According to Jensen and Meckling (1976), in most agency relationships both parties will spend resources on monitoring and bonding activities. Additionally, even if the amount of resources spent on these activities is optimal, there will be some divergence between the agent's decisions and the decisions which would maximize the principal's welfare. The dollar equivalent of the principal's welfare loss due to this divergence is a component of the agency costs. Jensen and Meckling refer to it as residual loss. The other components of the agency costs are, as would be expected, the monitoring and bonding expenditures. They reduce the value of the firm. The current value of expected future monitoring expenditures by outside security holders diminishes the value of their securities dollar for dollar, and they will take this into account when determining the maximum price they are willing
to pay for any given security in the firm.

Agency problems can be limited by the capital and labor markets. Barnea, Haugen and Senbet (1985) note the different ways by which agency conflicts can be costlessly neutralized through the capital markets. The first such mechanism deals with a uniting of the ownership interests of the firm's stockholders and debtholders. Each of the stockholders (bondholders) buys a fraction of the bonds (stocks) of the firm equivalent to their fractional interests in the stock (bonds). The second alternative involves informal reorganization. This would succeed in limiting some agency costs arising from formal reorganization or bankruptcy. The third method refers to the issuance of side securities called contingent contracts. Their purpose is to guarantee that under certain conditions the firm will undertake a predetermined investment strategy which maximizes the total value of all the securities, successfully eliminating the development of agency costs. Also, there is the possibility of a takeover process that could prevent agency problems, but this mechanism is many times frustrated by the free-rider problem (discussed by Jensen and Meckling, 1976, and by Barnea, Haugen and Senbet, 1981b).

The unresolved agency problems can be further reduced by the issuance of complex financial contracts that try to align the diverse and conflicting interests of the parties. The agency problems may well be the "raison d'être" of these
complex contractual agreements since a class of security holders requires additional protection against possible expropriation of their wealth by another class of security holders.

There are many complex contracts that are capable of realigning the diverse interests of the various classes of security holders, such as call provisions in corporate debt, executive managerial stock options, convertible debt indenture provisions, pension plans, convertible securities, maturity structures of debt, debt renegotiation, and leasing agreements. These contracts are excellent for resolving such agency problems as risk shifting, informational asymmetry, excessive managerial perquisite consumption, and forgoing growth opportunities. The belief that complex contracts originate in order to reduce agency problems can explain many real world contractual arrangements. The call provision, for example, as noted by Barnea, Haugen and Senbet (1985), can be explained as a means of resolving many agency problems like those of informational asymmetry and risk incentives and the shifting to high risk, low value investments in order to transfer wealth from bondholders to stockholders. Convertible securities are another example. They may be used to reduce agency problems associated with excessive perk consumption by an owner-manager.

There are, nevertheless, residual agency problems that still remain unresolved through either the marketplace or
complex financial contracts. Those residual agency problems are the ones that are dealt with in the following chapters. The analysis shows that the presence of agency problems or attempts to control these residual agency problems require a comparison of the costs and benefits of the different forms of required outside financing in order to obtain the optimal corporate financing and capital structure.

Miller's general equilibrium model (1977) develops a rationale for capital structure invariance, even in the presence of differential personal income taxes. This landmark article has been subjected to numerous empirical tests, with mixed results. By incorporating costly tax avoidance and unresolved agency problems into the analysis, Barnea, Haugen and Senbet (1981a) generalize Miller's equilibrium model and obtain results that appear to be consistent with empirical estimates of yield differentials between corporate and tax-exempt bonds. Furthermore, in the Barnea, Haugen and Senbet equilibrium, the firm's capital structure is relevant to valuation, and agency costs are borne by bondholders—not stockholders, as previously thought (Jensen and Meckling, 1976). These works and others have taken us some distance toward explaining capital structure, but as Stewart Myers (1984) pointed out in his 1983 AFA Presidential Address, we still know relatively little about capital structure. One aspect of our future research in this area must be to explain differences between large and small firm capital structures.
The purpose of this work is to develop a general equilibrium model similar to the one of Barnea, Haugen and Senbet but which takes firm size into account as an important determinant of supply and demand for corporate debt. The resulting equilibrium provides results that are consistent with observed differences in both bond yields and capital structures between large and small firms.

To facilitate the analysis, only two firm size categories are used: large corporations, characterized by separation of ownership and control, and small corporations, characterized ownership control, i.e., the presence of an owner-manager. Agency costs have a different impact on each of these groups. One important example of this differential impact involves the relative significance of equity agency costs. Equity agency costs, as noted by Jensen and Meckling (1976), result because owner managers of firms with outside equity have an incentive to consume excessive non-pecuniary benefits since they bear only a fraction of the cost. Outside equity makes an unbiased estimate of these costs and adjusts the offering price accordingly, resulting in agency costs. By contrast, Barnea, Haugen and Senbet assume equity agency costs to be negligible since, according to Fama (1980), the labor market disciplines managers' behavior in firms with diffuse ownership. Therefore, we assume that agency costs are insignificant for large firms but are relevant for small firms which are dominated by an owner-manager. Based on this
difference and on others related to debt agency costs, adjustments to the supply and demand curves for large and small firms are undertaken, which yield a new equilibrium in the corporate debt market.

The implications of this equilibrium are: 1) The yield on corporate debt for small firms is higher than that for large firms; 2) the typical small firm employs greater financial leverage than the typical large firm; 3) optimal capital structures exist for firms in each size group; 4) differential agency costs of large firms are borne by bondholders (consistent with Barnea, Haugen and Senbet), but for small firms, the agency costs are shared by debt and equity holders.

The remainder of this thesis is organized as follows: Chapter Two is divided into four sections. Section A discusses equity agency costs. These are mainly the result of non-pecuniary benefits or on-the-job consumption by the manager with partial ownership in the firm. Section B deals with the problems of informational asymmetry. Informational asymmetry occurs when the exact nature or the firm cannot be revealed costlessly by the manager (agent) to debt and equity financiers (principals). In this case, management sells the securities at undervalued prices, and existing security holders suffer a loss that can be viewed as an agency cost. Section C considers the different types of debt agency costs. It is divided into four parts. Part one looks at stockholders'
incentive to adopt high risk investment projects in order to expropriate wealth from the bondholders. Part two views the stockholders' incentive to forgo profitable investment opportunities when the outstanding debt is supported by the existing assets and the option to undertake these growth opportunities. Part three concentrates on the agency costs of liquidation. Part four deals with bankruptcy costs. These costs arise when insolvency occurs and different classes of security holders dispute over their respective rights. Section D summarizes the findings of this chapter.

Chapter Three is composed of two sections. Section A discusses the implications of Miller's analysis in Part one and the implications of Barnea, Haugen and Senbet's (1981a) analysis in Part two. Section B deals with the further introduction of equity agency costs into the model and effects of this factor on the aggregate supply curve of debt and on the capital structure for individual firms.

Chapter Four is divided into four sections. Section A presents some of the available empirical evidence relating to the implications of the model presented in this thesis. It is subdivided into four parts. Part one presents the empirical evidence related to the yield differential between taxable and tax-exempt securities. Part two reviews the evidence pertaining to the equity differences among large and small corporations. Part three deals with the differences in the cost of debt for large and small corporations. And Part
four looks at the available evidence on the relationship between the level of leverage and firm size. A brief summary and conclusions of the thesis are contained in Section B.
II. AGENCY COST PROBLEMS AND THE SIZE EFFECT

A. The Agency Cost of Outside Equity

In this chapter, an analysis is undertaken to show the effect of outside (non-management) equity on agency costs. This is done by comparing the utility maximizing behavior of a manager when he owns 100% of the residual claims on the firm to his behavior when he sells or issues outside equity claims which are identical to his own. It will be shown that the magnitude of agency costs depends on the fraction of outside equity to total equity in the case of an all equity financed firm, and on the fraction of outside equity to total value of the firm in the case of a firm financed by inside as well as outside equity and by debt.

Jensen and Meckling (1976) in a seminal article, have shown the effect of agency costs on firm investment, capital structure, and other financial matters. They argue that when the manager owns 100% of the residual claims, he or she consumes on the job through shirking, excessive perquisites ("perks"), or incompetence, which are non-pecuniary activities. He or she will do this to the point where the marginal utility generated by these activities equals an additional dollar of wealth after taxes usable for consumption or investment outside of the firm. In this situation, the manager pays directly for consumption on the job. In effect the manager faces full ex post settling up with himself as secu-
In the absence of some form of full ex post settling up for deviations from the contract, the sale of equity to outsiders generates agency costs. These agency costs result from the divergence of the manager's interest from the interest of outside shareholders. In this situation, the manager has an incentive to consume more non-pecuniary benefits since he will only bear a fraction of the cost.

Outside shareholders can limit, but probably cannot eliminate, these costs through monitoring activities. An alternative procedure for limiting equity agency costs which can be undertaken by the manager is to engage in bonding activities. It is in the owner-manager's interest to minimize equity agency costs since he bears the full amount of these costs as wealth reduction. If it is assumed that the capital market is efficient and that investors are rational, they will be aware of the costs associated with increased perk consumption. Investors will make unbiased estimates of these agency costs and will adjust the price they are willing to pay for the corporation's shares. The manager ends up with a combination of pecuniary and non-pecuniary benefits which place him in a lower indifference curve when compared to the situation when he is the sole owner. Thus, when a manager decides to carry out his financial operations through common stock, he suffers a welfare loss which may be called an agency cost.
If the owner-manager is simply selling his own shares, he will bear these costs as long as the welfare increment he realizes by the conversion of the shares to general purchasing power is large enough to offset the costs. If, to satisfy the financing requirements of the set of projects available to the firm, he has to seek outside financing, the value of the firm will be lower than in the case when the manager has enough financial resources to wholly finance the projects. This reduction in firm value is termed agency costs. Even if the owner-manager had enough money to invest in all profitable projects, he may decide not to do so when he seeks an optimal diversified portfolio of assets. In this case, his fraction of ownership in the firm will be in accordance with his portfolio objectives.

There is a negative relationship between the ownership fraction and the agency costs generated. The owner-manager will continue to issue equity as long as the investments are sufficiently profitable and his welfare continues to rise. By issuing outside equity, the manager decreases his ownership fraction, a fact which encourages him to change the composition and magnitude of the benefits he receives. This increases, of course, the amount of corporate resources consumed by the manager on the job. Thus, the agency costs of equity increase as the fractional ownership decreases. It is also argued by Jensen and Meckling (1976), that, as the manager's ownership decreases, his desire to dedicate signi-
significant effort to innovating activities, such as searching out new creative ventures or investment opportunities, diminishes.

It is interesting to note that any monitoring and bonding activity reduces the value of the firm dollar for dollar, and the minority stockholders will take this into account when determining the maximum price to pay for a fraction of the firm's equity.

As Jensen and Meckling have stated, the magnitude of equity agency costs will tend to vary from firm to firm and will be determined by the tastes of the managers; the ease with which they can behave according to personal preference instead of according to value maximizing behavior; the cost of monitoring and bonding activities; the cost of evaluating and measuring the manager's performance; the cost of designing and enforcing specific behavioral rules and policies; and the cost of replacing the manager when the manager has less than a controlling interest in the firm. The size of the agency costs will also be constrained by the the capital market, i.e., the market for the firm.

To analyze further the magnitude of the agency costs and their relationship to the size of the firm, we make the following assumptions:

1. All outside financing is done through equity. (This assumption is dropped later.)
2. The firm is owned and managed by the same person.
3. Outside equity is voting.
4. The firm has available to it sufficient investment opportunities to grow if it so desires.

5. Capital markets are efficient.

6. Investors are rational.

It is assumed that a firm follows the following path:
First, there is a range where the owner-manager is able to finance all the investments with his own resources. In this range, the agency costs of equity are zero. In Figure 2.1, this region is represented by OA. In the second range, AB, the manager chooses to sell some equity shares in order to increase the size of the firm through some sort of profitable investment opportunity because either his own funds are exhausted or he holds a diversified portfolio of assets and does not want to increase the fraction represented by the firm in his portfolio. (We are assuming for the moment that the firm has no debt available to it.) In this range, the manager's fractional ownership decreases but he still has decision-making power. What is meant by decision-making power is that he has the majority of the votes and his decisions can easily be enforced. He would demand compensation over and above the fair market value of his securities for this decision-making power. The owner-manager derives utility from his non-pecuniary activities but also from the dollar wealth coming from his shares of equity. The utility arising from a combination of pecuniary and non-pecuniary sources is greater than the utility he can derive from eliminating absolutely
Figure 2.1. Ownership Structure, Firm Size and Relative Equity Agency Costs
his perk consumption and maximizing the value of the firm. Consequently, he will only sell the firm for a price that exceeds the value maximizing price. The range AB starts as soon as the owner-manager begins selling outside equity and continues until he loses control of the firm. How soon he loses control depends, among other things, on how diffuse outside shareholders are. The less diffuse outside ownership is, the faster the owner-manager may lose his managerial rights.

As long as the owner-manager has managerial rights, agency costs are going to increase, since a lower ownership fraction increases the incentive to consume on the job and, therefore, increases the agency costs. When the manager has sold more claims (in order to finance investments) to the point in which his control of the firm is weakened, his consumption of perquisites will start declining because, in effect, he has entered the managerial labor market. If his performance as a manager does not satisfy the outside shareholders, the manager can readily be replaced at a lower cost than when he had control of the firm. Therefore, the risk that he faces in this range of losing his job limits his consumption of perquisites. This stage is given by BC in Figure 2.1.

The characteristics of this third stage are that the manager has relatively little ownership interest in the firm, which is typical of large corporations. According to Fama
(1980), as will be discussed below, equity agency costs for large corporations are minimal.

Reference can be made to a concept of the firm which differs from the traditional one. Fama (1980) argues that the firm can be viewed as a set of contracts among factors of production. It is viewed as a team in which the members act from self-interest but realize that their destinies depend to some extent on the survival of the team in its competition with other teams.

In this sense, the firm is disciplined by competition from other firms. This process generates ways of efficiently monitoring the performance of the entire team and its individual members. Individual members of the team, particularly the managers, are subject to the discipline within the firm and also to the discipline dictated by the market. Managers also take the opportunities provided by the market.

To understand the behavior of large corporations, Fama suggests that we view management and shareholders as separate factors of production, each faced with a market which offers alternative opportunities for its service. In the particular case of management, this market provides incentives to strive for good performance.

Holders of securities have the capital market available to them, and this allows them to exchange securities at a relatively low cost in their aim to diversify their portfolios among many firms. This is consistent with rational
behavior according to portfolio theory. Therefore, an individual security holder of a large corporation does not have any interest in personally monitoring the activities of any firm. Efficient allocation of resources leads to a large degree of separation of security ownership from control of the firm.

The managers rent their human capital, which is many times the main source of their wealth, and have a special interest in the survival of the firm. The success or failure of the firm affects the manager's future wage signaled by the managerial labor market. According to Fama, the value of the firm is an important variable for the managerial market when evaluating the firm's management. Fama argues that when the firm's reward system is not responsive to performance, given a competitive managerial market, it will lose its managers.

To address the question of why equity agency costs are minimized under diversified ownership, reference can be made to the internal monitoring of managers by managers from both above and below. Managers usually control the board of directors, which may be efficient because positions in it are highly sensitive to performance. Inclusion of outside directors, who are also disciplined by the market for their service, prevents management from collusion and expropriation of wealth from the owners of claims on the firm. According to Fama (1980), the board can be looked at as a low cost mechanism to replace or reorder top management.
Fama analyzes situations in which costs arising from the managerial incentive problem could be resolved. If the managerial labor market were efficient, it would impose a wage reevaluation which would permit a full ex post settling up for deviations from the contract. This solution is desirable because managers' abilities and tastes for perquisites are not known with certainty and are only imputed by past performance. Efficient managerial markets imply correct use of past information to revise future wages and to assign a weight in the wage revision large enough to take care of any potential problem generated by managerial incentives. Therefore, efficient managerial labor markets guarantee a full ex post settling up, and related agency costs would be reduced. With full ex post settling up, the manager's current marginal product is absorbed by the stream of his future wages.

Alternatively, if security holders are risk averse, they could set a fixed discount on the wage to prevent incomplete settling up due to a manager switching firms. The manager can also contract to accept his ex post measured marginal product at the end of each period in order to maintain his freedom to switch firms. In his article, Fama provides examples of ex post settling up through the wage revision process making specific assumptions about the stochastic evolution of a manager's measured marginal product and how the managerial market uses information from the process to adjust the manager's future wages to reach full ex post
settling up.

Thus, in Fama’s view,

The viability of the large corporation with diffuse security ownership is better explained in terms of a model where the primary disciplining of the manager comes through managerial labor markets, both within and outside of the firm, with assistance of the panoply of internal and external monitoring devices that evolve to stimulate the ongoing efficiency of the corporate form, and with the market of outside takeovers providing discipline of last resource (1980, p.542).

The above discussion is intended to establish a sound basis to bring out the differences between small and large corporations with respect to equity agency costs. The main arguments used are those of Jensen and Meckling (1976) and Fama (1980). The point of view taken here is that Jensen and Meckling’s analysis applies to small corporations, while Fama’s arguments apply primarily to large ones.

If we relax the assumption that all outside financing is done by equity and we allow debt into the picture, then the owner-manager has the opportunity of financing his investments with debt instead of equity. Agency costs of equity will be eliminated as long as the manager does not have any outside equity. But agency costs of debt will be generated as debt is employed in the capital structure. These agency costs will be analyzed in Section C of this chapter. The manager’s decision on how to finance his projects will depend primarily on the relative magnitude of debt and equity agency costs, the size of tax subsidies generated by debt, and the magnitude of the flotation costs. In this analysis, flota-
tion costs are incorporated by adding them to the equity agency costs and assuming that flotation costs arise only when outside equity is issued. (Alternatively, we could add the difference in equity and debt flotation costs to the agency costs of equity.) Flotation costs decrease as the size of the issue increases. If we assume that the size of the issue is directly proportional to the size of the firm, we can say that as the size of the firm increases, flotation costs decrease.

Graphically, this is shown in Figure 2.2. In this figure, the perpendicular distance from the X axis to the line MT represents the flotation costs. The assumption that all outside financing is done through equity is maintained. If debt is incorporated in the graph, as in Figure 2.3, agency costs of equity will decrease as outside equity is replaced by debt. Figure 2.4 shows how the owner-manager can postpone the generation of equity agency costs and flotation costs by issuing debt instead of equity.

Summarizing: A) for a wholly equity financed firm, going back to Figure 2.1

\[ \Delta = \text{equity agency costs} \]

\[ \Delta = 0 \]

from 0 to A (no outside equity)

\[ \frac{\partial \Delta}{\partial \text{Size}} > 0 \]

from A to B (as the manager's fractional ownership of the firm decreases)

\[ \frac{\partial \Delta}{\partial \text{Size}} < 0 \]

from B to C (as the manager loses control power over the firm)
Figure 2.2. Agency Costs and Flotation Costs

Figure 2.3. Equity Agency Costs

Figure 2.4. Equity Agency Costs
considering flotation costs:

\[ \frac{\partial \text{Flotation Costs}}{\partial \text{Size}} < 0 \]

B) when debt is brought into the picture,

\[ \frac{\partial \Delta}{\partial (\text{Debt/Total Value})} < 0 \]

Therefore,

\[ \Delta = f(\text{size, fractional ownership, flotation costs, debt}) \]

The fractional ownership in this analysis assumes that we are dealing with an owner-manager that has decision making power. The inverse relationship between equity agency costs and fractional ownership means that as the firm grows and the financing is done through outside equity, fractional ownership decreases and agency costs increase. What has to be kept in mind is that as the firm grows, following this path, agency costs of equity increase thus determining the upward sloping portion of the curve. The downward sloping portion of the curve is explained by diversified ownership and the manager being disciplined by the labor market within and outside the firm.

Other equity agency cost analyses which are found in the literature should also be mentioned. Easterbrook (1984), for example, tries to give an agency cost explanation to dividends. He analyzes how dividends can set up a mechanism that reduces the agency costs of management and that prevents one group of investors from taking advantage of the others. He refers to the agency costs arising from the divergence of
interests between investors and managers. He also points out another source of agency costs, which is risk aversion by the managers. Managers generally invest a large portion of their wealth, their human capital, in the firm. The other investors in the firm, on the other hand, usually hold a well diversified portfolio. The performance of the firm will affect the manager to a greater extent, and, therefore, his personal risk aversion will go against the shareholders' preference for risk. He would tend to select projects with both low risk and low expected returns. Of course creditors do not like risk and they adjust their demanded return in accordance with their perception of the riskiness of a particular firm.

Managers, Easterbrook observes, are able to alter the risk status of the firm not only by changing the mix of the projects but also by changing the firm's debt-equity ratio. The lower the debt-equity ratio, the lower the risk.

If a manager first issues debt and then finances new projects out of retained earnings, the debt-equity ratio falls and so does the risk of the firm transferring wealth from shareholders to bondholders because the riskiness of the outstanding debt falls. Easterbrook considers that a way out of the transfer of wealth is through dividends. Of course, bondholders do not like dividends. They feel that they also could be taken advantage of by shareholders given that a rate of interest has been set already.
Easterbrook believes that the monitoring problem and the risk aversion problem can be lessened. Managers would be more likely to behave in the investors' interest if the firm were constantly in the market for new capital. This activity allows the revision of the state of the firm because investment bankers act as monitors of the collective interest of the shareholders and disclose information relevant to the security holders. This process allows the firm to adjust debt-equity ratios so that neither group of investors takes advantage of the other. Another advantage is that contributors of capital are very good monitors of managers. New investors are better than old ones at being able to reduce agency costs. Thus, managers have incentives to reduce these agency costs in order to collect the highest possible price for new securities.

Underwriters of stock and large lenders are able to supply information to investors at low cost, since by providing their services, the underwriters are undertaking risk and the more information they are able to obtain, the lower the risk.

The relationship between dividends, agency problems, and the frequent visit to the capital markets should be easily seen. As Easterbrook notes, expected continuing dividends force the firm to raise new money in order to pay dividends, investment, and capital requirements. Dividends by themselves, even without the use of capital markets, may adjust
the debt-equity ratio in such a way as to prevent transfers of wealth from stockholders to bondholders. Dividends serve as ex post adjustments for many types of contracts. Even though dividends are not the only way of disclosing information and the agency costs explanation of dividends is not unique, it is an alternative that in many cases is cheaper. For example, it may be cheaper than accommodation through ex post negotiations of controls.

The agency cost explanation for dividends focuses on constant and regular payout policies rather than on changes in dividends. This approach implies that dividends are worthless in themselves. If the firm needs to go to the capital market for motives other than dividends, then it would pay out less in dividends than a firm whose sole purpose was to minimize the agency costs of equity. The implication would be that growing firms do not need dividends as a method to reduce agency costs. According to Easterbrook, old firms would use dividends as a device from the capital market to control agency costs. He also argues that if the manager holds substantial residual claims in the firm, dividends would be less valuable and would decrease.

The question addressed here is how this dividend method would affect small and large corporations. Small firms do not need to use dividends as a way of controlling agency costs because they are in a growing state and, therefore, visit the market anyway. At the first stage of our model,
there is an owner-manager and no outside equity, so the type of agency cost discussed in the dividend approach does not even exist. As we move into the second stage of the model, where the owner-manager issues outside equity, the firm is at a growing state but the owner-manager still has control power. We have to be careful, for agency costs of equity do exist but are not identical to the agency costs faced by large corporations. Both managers will tend to consume more perquisites than is optimal according to the stockholders. But the situation of the owner-manager is different from that of the manager of a large corporation because the owner manager has wealth invested in the firm. His behavior with respect to the risk of investments involves both risk preference, for he is an owner, and risk aversion, for he is also a manager. It is, therefore, not possible to say that the manager is unambiguously risk averse, so the role of the dividends as a corrector of risk aversion would not apply. Also, the decision of dividend policy is mainly in the owner-manager’s hands. Large firms have more alternative available to them. They may consider dividends as a way of minimizing agency costs. This argument is in accordance with the decreasing function of equity agency costs for large corporations with diversified ownership and managers who do not own shares in the firm. In Easterbrook’s view, the payment of excessive dividends offers a procedure by which agency costs can be minimized.
B. Informational Asymmetry Agency Costs

Barnea, Haugen and Senbet (1981b) and Jensen and Meckling (1976), among others, consider informational asymmetries as an agency problem. Informational asymmetry arises when management seeks to finance a project by selling securities, and the true nature of the return distribution of the project is unknown to the outside market. In this case, it is not possible for the market, without the information possessed by management, to identify the true nature of the project a priori. Because it is impossible for management to disclose this information costlessly to the market, the price that investors are willing to offer for the securities reflects this informational asymmetry. This price is less than the fair value reflected in the true nature of the project. The difference between the fair value and the actual price is the agency cost generated by informational asymmetry. Barnea, Haugen and Senbet (1981b) emphasize the fact that these costs cannot be resolved costlessly through arbitrage in the financial market. In this sense, the costs become significant by inducing yield differentials between securities and, consequently, affecting capital structure determination.

This particular agency cost affects fixed as well as residual type of claims. It can be resolved at a cost through various signaling mechanisms. But the problem of informational asymmetry does not only consist of trying to unambiguously identify the nature of the project; it also
involves the costs and efforts of trying to identify the nature of the current distribution of returns to the entire firm whenever additional financing is needed.

Stewart Myers (1984), in his 1983 Presidential Address to the American Finance Association, examines the importance of the informational asymmetry problem. His analysis further extends the scope of the problem. He assumes that aside from information asymmetry, capital markets are perfect and semi-strong efficient. In another article that treats this subject more in detail, Myers and Majluf (1984) find the most probable objective that managers pursue in the presence of informational asymmetry to be the maximization of the true or intrinsic value of the firm's existing shares. New investors who purchase any stock issue will assume that the manager is trying to maximize the old shareholders' wealth, so they will adjust the price they are willing to pay. Myers' innovation in approaching the problem is that he acknowledges the fact that because of informational asymmetry, the price of stock may be not only be undervalued but also overvalued. That is, the manager's inside information can be either favorable or unfavorable.

In the case of having unfavorable information, Myers assumes that the manager has an incentive to issue securities (equity) even if NPV = 0 because he behaves according to the interest of the old shareholders, and in this case the securities will be overvalued, therefore, allowing old security
holders to take advantage of new security holders. On the other hand, if information is favorable, the firm may rather not undertake positive NPV investment opportunities than issue undervalued shares. This latter possibility implies a cost of external financing that is different from administrative and underwriting costs or the underpricing of new securities.

Firms will issue and invest if the NPV of their projects is greater than or equal to \( X \), the amount by which new shares are undervalued or overvalued. \( X \) is endogenous in this model, meaning that it is not under the control of the manager. The way to reduce \( X \) and thereby increase the possibility of having more positive NPV investments is by issuing the safest possible securities. These securities are described by Myers as those for which future value changes least when the manager's inside information is revealed to the market. Myers notes that even though \( X \) is endogenous, there are cases in which the absolute value of \( X \) is always less for debt than for equity. \( X \) would be zero for debt which is free of default risk. This model, therefore, suggests that if the manager has favorable information, firms are forced by investors to issue debt, unless they have already exhausted their debt capacity and would incur substantial additional costs by issuing any more debt. On the other hand, if the information is unfavorable, it is in the interest of the old security holders to maximize \( X \) in order to take advantage of
new security holders. Managers will, therefore, issue equity in this situation. In Myers' words, the best path to follow seems to be to "issue debt when investors undervalue the firm and equity when they overvalue it" (1984, p. 585). This model predicts that the announcement of a stock issue will cause stock prices to fall. It also predicts that stock prices should not fall, all else being equal, if risk free debt is issued instead. By the same token, a high grade debt issue should have an average stock price impact smaller than the one of a stock issue. This implies that investors would effectively force the firm to issue debt initially since equity issues carry unfavorable information.

When a firm decides to carry out its external financing through debt, it faces asymmetric information problems and other debt related agency problems which are an increasing function of debt. As debt increases, the firm faces higher probability of entering a situation of financial distress and also a higher probability that future positive-NPV projects are not undertaken because management will be reluctant to finance them by issuing equity due to the informational asymmetry problem. A possible way of evading this situation is to issue equity now. Equity would thus not be used to finance a real investment; it would be used to reduce the possibility of financial distress and of passing positive NPV projects. Issuing stock in this way is a way of buying debt capacity. The problem that arises is that the equity issued
for obtaining debt capacity faces the same asymmetry of information problems as the equity issued to finance real investment. The decision on which form of financing to use would have to compare the magnitude of the agency costs arising from increasing debt against the cost of losing some positive NPV projects due to asymmetry of information and the corresponding equity agency costs of issuing common stock (while, of course, taking into account such factors as underwriting and administrative costs). In conclusion, asymmetry of information affects the prices of both risky debt and equity, but according to Myers, it seems to affect the latter to a greater extent.

We address next the question of how problems of asymmetrical information affect small and large corporations differently. First, recall that agency costs of equity are more relevant to the capital structure decision of small corporations because they are an increasing function of size for the small firm but that they are negligible for the large firm. Note also that flotation costs are a decreasing function of size and thereby affect small corporations to a greater extent than they affect large corporations. Furthermore, it has been shown empirically that economies of scale exist in the administrative handling of equity issues (Miller, 1961). Here, once again, small corporations are at a disadvantage. If we sum all these factors, we can conclude that it is rational for small corporations to postpone the issuance of
equity as long as possible. But this has its disadvantages, too. Among these are the increase of the debt to total value ratio, which generates debt related agency costs and which increases the asymmetry of information costs since the debt becomes riskier. This places the firm in a vulnerable position because in the event of issuing new securities, the asymmetry of information problems will involve risky debt or equity and the costs arising from the difference between the fair value of the securities and the actual value obtained can be considerable. Eventually, the small firm will issue equity when the sum of the informational asymmetry costs generated by risky debt plus the debt agency costs outweigh the informational asymmetry costs associated with the issuance of equity. Large corporations do not face all the above mentioned cost disadvantages. They can maintain, if they desire, a debt capacity by issuing equity. It is true that they will face the corresponding asymmetry of information problems, but they are able to decrease the asymmetry of information of the existing and future debt issues. They have at their disposal high grade debt issues, and they do not worry too much about administrative, flotation, or equity agency costs generated by the issuance of common stock. In other words, they have a greater financial flexibility than their small counterparts and, therefore, more control power over their capital structure, which in turn allows them to keep both agency costs and asymmetry of information problems
at a low level. Small corporations, like large ones, pursue cost minimization, but, due to their lack of flexibility, small firms face relatively larger costs from informational asymmetry problems.

C. The Agency Costs of Debt

This section contains an analysis of four debt related agency costs: Part 1 deals with the incentive effect associated with levered firms and discusses the monitoring costs these incentive effects engender; Part 2 focuses on the incentive of stockholders to forgo a profitable investment; Part 3 discusses liquidation agency costs; and Part 4 looks at the agency costs of bankruptcy. It is important to mention that some of these agency costs are interrelated and some help minimize others.

1. Risk incentive effects associated with levered firms

Certain incentive effects arise in the presence of debt. They are one of the primary reasons for which one does not see corporations financed entirely or almost entirely by debt. The incentive effect refers to the behavior of the manager of a heavily levered firm. Here, we assume that the manager acts to maximize the value of the firm. He will engage in activities that if successful would have very high payoffs, even if the probability of success is very low. This would be perfectly rational behavior because in the case of success the shareholder receives the gain while in the case
of failure it is the debtholder who bears the cost.

Jensen and Meckling (1976) and others have analyzed this problem using the analogy of equity claims as European call options in the context of the Black and Scholes (1973) option pricing model. In this framework, a share of equity is viewed as a European call option on the total value of the firm and the face value of debt is viewed as the exercise price. The equity holders would buy back the firm from creditors at an exercise value equal to the face value of the debt. The Black and Scholes model establishes a positive relationship between the variance of the cash flows underlying the assets and the value of the call option. The manager would increase the value of the call or, in this case, of the equity shares by choosing high risk projects at the expense of the debtholders.

To illustrate how these risk incentives can generate agency costs, Barnea, Haugen and Senbet (1981b) use the following situations: If two projects are available to the firm and they have the same expected value but different variances, the distribution of the value of the firm between stockholders and bondholders would be affected but not the total value of the firm. The problem arises when the two projects have, in addition to different variances, different values. In this situation, bondholders would either monitor the stockholders to make sure they do not undertake the low value, high risk project or else, as rational bondholders,
they would pay a lower price for these bonds. This lower price reflects the inferiority of the value of the project and the higher risk, which benefits the equity holders.

In the absence of monitoring costs, the stockholders are forced to adopt the low value project. This follows from the fact that the initial price of the bonds is low. If after the bonds have been sold, management decides to finance the superior project, the bond price would increase, but, due to the lower risk, the stock price would decrease, which is not an attractive alternative for the stockholders. The agency cost, in this case, is the difference in the values of the projects. If the stockholders continue to bear unwarranted risks, the total value of the firm will be low.

Monitoring and bonding activities, as noted in chapter I, help eliminate or at least minimize the risk incentive agency cost. These activities involve, for example, the inclusion of convenants in monitoring activities to the point where their marginal cost equals the marginal benefit of engaging in them. In this analysis, at the firm level, the stockholder bears the entire wealth effect of these agency costs. It is in the stockholder’s interest to see that agency costs are minimized and bonding activities are undertaken, when beneficial. In conclusion, these agency costs tend to discourage the use of corporate debt.

The differential impact of debt-risk-incentive agency costs on small and large firms is examined next. We can
relax the assumption made at the beginning of Part one that the manager acts to maximize the value of the firm and assume, as before, that owner-managers behave differently from managers with no ownership interest in the firm, that small firms are characterized by such owner-managers, and that, in general, owner-managers are willing to undertake more risk than large corporation managers because they see their shares as options, with a value that increases as risk increases. Managers of large corporations are risk averse because they do not own any residual claims and they generally have all their wealth (in the form of managerial services) invested in the firm and are highly concerned about the security of their jobs. They consequently favor low risk projects. The behavior of large corporation managers benefits debtholders and decreases the debt agency costs related to risk incentive problems. Small corporations, either wholly owned or partially owned by a manager with control power, tend to choose riskier projects than large corporations, when financing through debt, thereby generating higher debt-risk-incentive agency costs.

2. Costs associated with stockholders' incentive to forgo profitable investment opportunities

Myers (1977) has analyzed the problem of the stockholders' incentive to forgo profitable investment. He attempts to explain why it may be rational for firms to limit borrow-
ing. In his analysis, he assumes that capital markets are strictly perfect, efficient, and complete. He argues that most firms are valued as going concerns with the value of the firm reflecting an expectation of continuing future investments in the firm.

One of the components of the value of the firm is, thus, the present value of options to undertake future investments. The value of this component depends on whether or not the firm decides it will exercise these options. Myers' paper shows how a firm with risky debt outstanding and which acts in the stockholders' interest will act differently from a purely equity financed firm or a firm financed with risk free debt. Myers concludes that in some instances a firm that has risky debt outstanding will not undertake valuable investment opportunities which would increase the market value of the firm. The sub-optimal investment policy constitutes an agency cost induced by risky debt.

Myers makes a distinction between assets that can be regarded as call options in the sense that their ultimate values depend, at least in part, on further discretionary investment by the firm and assets whose ultimate value does not depend on further discretionary investment. He distinguishes between assets already in place and assets not yet in place, i.e., the present value of the future investment options. He shows that the amount of debt supported by the present value of future growth opportunities, everything else
held equal, would be less than the amount of debt supported by assets already in place because some of the investment opportunities may not be undertaken.

The fact that there might be some states where these investment options are not exercised implies, for example, that a firm possessing only future growth opportunities can issue only risky debt to reduce the required initial equity investment. Another important factor is the maturity of debt. Consider a firm with only future growth opportunities and with a debt that matures before the investment decision is made but after the true state of nature is known. The investment will be undertaken by stockholders if the present value of the return on the investment is greater than the value of the debt, or by debt holders if the value of the firm after the investment is greater than the investment capital required. In this case, borrowing is a matter of indifference.

The firm's investment decisions will be different if the debt matures after the firm's investment option expires. In this case, the outstanding debt will determine the investment decisions of the firm. The shareholders will exercise only if the revenues from the project are greater than the investment outlay plus the outstanding debt. The greater the level of debt, the larger the probability of the investment options not being exercised by the shareholders. In the event the investment option is not exercised, the creditors will not
receive anything. If debt is set high enough, the present value of the returns of the investment can be less than the sum of the capital requirements of the investment plus the debt in all states. The firm is worthless since the investment options are unexercised. Myers uses these extreme situations to show how the existence of corporate debt can reduce the present market value of the firm by weakening the corporation's incentive to undertake profitable future investments.

Monitoring might solve the problem posed by Myers, but monitoring is in general very costly. An alternative solution to monitoring is to use covenants. Covenants can decrease the number of investments that from the point of view of the shareholders are not worthwhile but that might be beneficial from the point of view of the debtholders. However, some of these covenants have the shortcoming of having the firm undertake a negative NPV investment, and thereby opening the door to a potentially extremely inefficient way of allocating resources.

Myers observes that a plausible but still costly solution would be that of permanent debt capital through a policy of rolling over short term maturity claims. He favors this type of debt because it is very flexible. As mentioned before, debt that matures before an investment option is to be exercised does not induce sub-optimal investment decisions. Borrowing short term does not eliminate monitoring costs, but
does provide the flexibility to modify the capital structure of the firm.

The main purpose here is to highlight the differences between small and large firms and to show how these differences affect the decision making process with respect to capital structure. With respect to growth opportunities, analyzed by Myers, it can be said that the small corporations that are most relevant to this particular problem are the ones with high growth rates. They play an important role in determining the equilibrium interest rate for the group of small firms since they are, in general, far more likely to enter the public capital market for debt as well as equity and, therefore, must face the associated agency costs.

To enter the public capital market, small firms must have reasonable growth opportunities. According to Miller (1961), for example, the main characteristic that an underwriter looks for when deciding whether or not to undertake a public equity or debt issue is the outlook and trend for future earnings. For our purposes, we assume that the small corporations which have high growth rates and which have a large component of their value represented by their growth opportunities are at the margin the ones that determine the equilibrium rate for the small firm sector. For large corporations, on the other hand, even in the case when a substantial package of growth opportunities is still available, the component of growth opportunities tends to be outweighed by
assets in place whose value does not depend on further discretionary investment.

Myers' approach regarding the incentive problem to forgo profitable investments, therefore, leads us to conclude that, in order to decrease the risk of their securities and increase their price, small firms with growth opportunities should have less debt in their capital structure than large firms. This result, however, is a partial conclusion and does not consider other important factors, such as tax subsidy and equity agency costs, which should be weighed against the debt agency costs in the financing decision.

Next consider the monitoring costs incurred by the debt holders to prevent shareholders from letting profitable opportunities pass by. These costs are directly proportional to the percentage of the value of the firm represented by growth opportunities. Monitoring activities are aimed at limiting the possibilities of transferring capital to the firm owners. Monitoring is less successful in the case of the firm with an owner-manager because the owner-manager can take advantage of the possibility of consuming non-pecuniary benefits. This factor places small firms in a position of disadvantage with respect to large, widely diversified firms. Monitoring costs, which are agency costs, would be relatively higher for small firms than for large ones. This aspect of the monitoring cost reinforces the agency costs associated with growth opportunities, that is, small firms face higher
debt agency costs arising from the forgoing of profitable investment opportunities and should, therefore, issue less debt, everything else being equal.

We can conclude from the above arguments that if we have a large and a small firm with the same capital structure, everything else being equal, the small firm would have relatively higher agency costs of debt associated with the stockholders' incentive to forgo profitable investment opportunities.

3. Liquidation agency costs

Liquidation of a firm occurs whenever the liquidation value of the firm is greater than its operating value. Titman (1983) analyzes an important agency relationship between security holders (as agents) and other associates of the firm (as principals). The principals face certain costs in the event of the liquidation of the firm. The costs that Titman refers to are, for example, those that workers and suppliers have to incur when they have job specific capital, or the increased expenses of customers. In his paper, Titman demonstrates that these liquidation costs, along with all the other agency costs, have important implications that are relevant to the theory of optimal capital structure.

In particular, Titman analyzes the agency relationship between security holders and customers. If customers and other associates rationally evaluate the probability of li-
quidation of the firm, the firm will bear the imposed liqui-
dation cost ex-ante. This happens because, for example, the
customers adjust the prices they are willing to pay for a
durable good, taking into account the probability of liquida-
tion of the firm. There is, of course, an inverse relation-
ship between the probability of liquidation and the price the
customer is willing to pay because of the increase in expec-
ted maintenance costs.

According to Titman, if a firm wants to insure the
implementation of its value maximizing liquidation policy, it
has to bond itself so that it will not undertake actions that
would be rational under some circumstances in the future, but
whose probability of occurrence affects the value of the firm
negatively at the present time.

Titman (1983) shows that the capital structure of a firm
can affect its decision to liquidate, and that it is a deter-
minant factor of the states of nature in which bondholders
control liquidation policy. He suggests that the firm can
choose an appropriate capital structure that bonds it to
implement an optimal liquidation policy. When a firm con-
trols its liquidation decisions it can effectively affect the
terms of trade at which it does business with its customers,
workers and suppliers.

He constructs a simple model where before the product is
sold, a value maximizing firm should implement a liquidation
policy that liquidates only when the value of its assets
exceeds their operating value by an amount larger than the costs imposed on the customers due to liquidation. Since consumers will rationally forecast the liquidation policy and will adjust the prices they are willing to pay for the product, it is in the interest of the firm to prespecify its liquidation policy. One way in which the firm can accomplish this is through its capital structure, which may be cheaper than the writing and enforcement of state contingent contracts. In this mode, stockholders have a stronger preference for continuing to operate the firm because they have the lowest priority claims to the liquidation proceeds. On the other hand, bondholders have the highest priority to the proceeds and therefore have the strongest preference for liquidating the firm.

Based on his model, Titman concludes that an appropriate selection of capital structure assures that equity holders will operate the firm in those states where the firm is not bankrupt, but that in those states where bankruptcy is imminent, control is transferred to the bondholders, who will liquidate the firm when liquidation is consistent with optimal liquidation policy. Any deviation from that policy will be reflected in the prices of the products and debt claims of the firms. These deviations are the agency costs, and these costs are borne by the equity holders. Of course liquidation policy is not the only thing that has to be taken into account when deciding on an optimal capital structure; other
factors that favor an increase in the level of debt should be weighed against the negative effect that this would have on product prices and the price of the debt claims.

In many instances, small corporations have to undersell in the market in order to compete with well-known products from larger corporations. This lack of confidence on the part of the customers may reflect the fact that in general they place a higher probability of liquidation on the smaller corporation, everything else being equal.

Titman's theory predicts that, in general, firms which can potentially impose costs on their associates if they liquidate, select capital structures with relatively low debt to equity ratios, while firms that produce relatively short-lived products choose a high debt to equity ratio.

Due to all the higher costs that a small firm has to face, it is reasonable to suppose the small firm has fewer choices than its large counterpart if it decides to issue equity publicly. For some states, the equity markets are for all intents and purposes inaccessible to the small firm. This reality implies that the small firm will tend to be more levered, and as debt increases, so does the probability of bankruptcy. According to Titman, as the probability of bankruptcy increases, bondholders will take over and might decide to liquidate the firm, even if this is not optimal policy for the stockholders.

Based on Titman’s model, one could argue that small
corporations in a durable goods industry have a tougher time than small corporations in a short-lived product or a consumer industry. As mentioned before, the fact that small corporations charge lower prices might be partially explained by a sub-optimal liquidation policy.

Liquidation can occur even if the liquidation value of the firm is less than the operating value. If control passes to the bondholders because the firm is bankrupt and highly levered, it is in the bondholders' interest to liquidate in order to maximize their wealth, even if it is not optimal to liquidate at that moment. Because of the lower flexibility which small firms have in choosing debt versus equity claims, they probably face this problem more often than large corporations.

4. Bankruptcy agency costs

Bankruptcy occurs when a firm is unable to meet current payment obligations or when it violates one or more of the indenture provisions which allow bankruptcy. In the event of bankruptcy, the control passes to the bondholders or creditors. The stockholder loses all claims on the firm, and the negative difference (if one exists) between the market value of the firm and the value of debt is borne by the debt-holders.

Jensen and Meckling (1976) have mentioned that it is very difficult for the firm to write and enforce state con-
tingent contracts. In the event of financial distress, the problem of setting the priorities of the claims arises and many times causes bankruptcy.

The probability of bankruptcy is a determinant of the price of the fixed claims of the firm because, in the event of bankruptcy, the value of the firm would be reduced due to the fact that payments have to be made to third parties other than bondholders and stockholders. Rational bondholders will adjust their price according to their perceived probability of bankruptcy for the given firm, and equity holders will bear these costs. Bankruptcy costs, in Barnea, Haugen and Senbet's view (1981b), are identical to other agency costs in this respect.

It has been argued by Kim (1982) and Kraus and Litzenberger (1973) that bankruptcy costs are a determinant of the choice of corporate capital structure. The relevance of these costs, however, has been challenged by Warner (1977). Warner, in a study of eleven railroad bankruptcies, found that the magnitude of the direct bankruptcy cost was insignificant. His estimate of bankruptcy costs as a fraction of the value of the firm three years prior to bankruptcy was 2.5%. Immediately prior to the petition date this fraction was estimated to be 5.3% of the firm's value. Warner thus concluded that bankruptcy agency costs are not among the major determinants of capital structure. It is possible that these empirical findings have been overemphasized in the
literature because there were, at the time, practically no other empirical investigations of this matter.

Altman (1984) has added to the empirical evidence in this area by estimating both direct and indirect costs of bankruptcy. His contribution is an improvement over Warner's study. This improvement results from using for the first time a proxy methodology for measuring indirect costs and from using a larger and less restricted sample.

The usual argument for the significance of bankruptcy, as stated by Altman, is as follows: If in fact bankruptcy costs are significant, then the expected value of these costs must at some point be greater than the tax benefit derived from increasing leverage; therefore, bankruptcy would be relevant in finding the optimal capital structure mix. Altman provides evidence consistent with this proposition.

Altman assumes that markets are not perfect. He identifies as direct bankruptcy costs such things as legal, accounting, filing, and other administrative costs and as indirect cost the loss of profits due to significant risk of bankruptcy. He specifies a methodology for estimating expected profits for the period up to three years prior to the bankruptcy and then compares expected profits with actual profits (or losses) to determine the magnitude of the bankruptcy cost.

He also clearly observes the difference between liquidation and bankruptcy costs and refers to the direct and indirect bankruptcy costs already mentioned. He also emphasizes
the fact that public awareness of a firm's financial distress situation and bankruptcy possibilities will have a negative impact on its subsequent performance. Moreover, an unexpectedly poor showing by a company would add to its financial vulnerability and could lead to bankruptcy. Altman argues that both series of events can and in most cases will be occurring at the same time.

The measure of total value used by Altman was obtained by adding the market value of equity (preferred and common), the market value of debt (where available), the book value of other debt, and the capitalized value of financial leases.

The average direct bankruptcy costs (BCD) for the retailer sample of his study are similar to the figures obtained by Warner. Altman found a BCD to total value ratio of 2.8% five years prior to filing for bankruptcy and of 4% in the year of bankruptcy, compared to Warner's respective figures of 1.4% and 5.3%. Altman's result for the industrial sample is somewhat larger. The average BCD to total value ratio was fairly stable for the entire five year period. It ranged from 6.2% to 11.1%. The overall ratio, including both groups, was 6% just prior to bankruptcy. But this figure does not include indirect costs. If these costs are considered, the overall average percentage relative to firm value is 12.19% (retailers 8.7%, industrial 17.4%) five years prior to bankruptcy and 16.7% (retailers 12.2%, industrial 23.7%) just prior to bankruptcy. These figures, if accurate, are
Indeed of considerable relevance for capital structure policy.

In a second attempt to measure indirect costs of bankruptcy, Altman uses experts' expectations of firms' profits for the years prior to bankruptcy and compared them with actual results. The sample used was composed of seven large bankruptcies filed between 1980 and 1982. This analysis is limited to indirect bankruptcy costs, mainly due to the availability of data constraints. The average ratio of the cost to value estimated for the three annual statement dates prior to petition filing is close to 20%. Bankruptcy was found to be even more significant on average for this sample of large, recently bankrupt firms than for the initial retailer and industrial samples.

Altman checks for a possible selection bias in the sampling of bankrupt firms, and he observed that firms with extreme bankruptcy probability tended to underperform what was expected of them, regardless of whether they went bankrupt or not. He emphasizes that the difference between actual and estimated earnings is not an unambiguous measure of indirect bankruptcy cost. Lower than expected earnings could have contributed to the filing for bankruptcy.

Altman attempts to find some important implications for the continuing debate on whether there exists an optimal capital structure for corporations. He measured the present value of expected bankruptcy costs and compared it to the
present value of the expected benefits from interest payments on leverage. Altman concludes that if bankruptcy costs exceed tax benefits, the firm has too much leverage in its capital structure and its optimum mix of claims with respect to bankruptcy cost vs. tax benefits is at a lower debt to equity ratio. His results were that eight out of the fourteen firms had a present value of expected bankruptcy costs that exceeded the present value of tax benefits from debt. It appears that most firms are over levered in the financial statement one year prior to their bankruptcy petition, regardless of how the leverage factor was measured. This seems to be strong evidence in favor of the relevance of bankruptcy costs in the capital structure.

When bankruptcy probability increases, the chances of reorganization rise and the managers face greater risk of unemployment. In this scenario, equity holders would have to offer the managers greater salaries to compensate for the greater risk they are facing. In the case of bankruptcy, consumers do not know how they are going to be affected by the reorganization, even if the firm continues as a going concern. The firm's sales and profits are likely to decrease, and new financing for profitable investment would become harder to obtain because debt agency costs would be very high at this point.

The proportion of debt in the capital structure directly affects the probability of bankruptcy. By looking at the
conditions under which bankruptcy occurs, i.e., when the firm fails to meet current payments of debt obligations, one can see that bankruptcy will be to some extent affected by the availability of funds to fulfill the firm's fixed claims requirements and by the firm's liquidity position. In a recent empirical study, Walker and Petty (1978) show that small firms have less liquidity, as reflected by the current ratios. Furthermore, a problem frequently encountered by small firms is their shortage of working capital. Walker and Petty suggest that small firms need to economize on the use of capital because of their limited access to the capital markets. This conclusion is consistent with Gupta's study (1969), which shows that the current and quick ratios were seen to increase with the size of the firm.

Gupta observed that smaller sized, growing corporations economize in the use of available resources. They have a high inventory turnover, high cash velocity, low average collection period, and high total asset turnover. They are motivated to economize in investment in fixed and current assets because often, especially if they are growing, the investment fund requirement exceeds the available supply. The fact that small firms generally exhaust all their possible sources of liquidity financing increases their probability of running out of liquid assets to cover fixed claims requirements and thus increases their risk of bankruptcy.

Gupta finds evidence that growing corporations have less
liquidity than non-growing ones. In our study, it is the growing corporations which are relevant, and the fact that they are small and growing makes them especially inclined towards having a low liquidity. In a situation of financial distress, the probability of bankruptcy could be high for these firms. In the case of an unpredictable event in which they did not have enough liquid assets to pay their fixed claims, the chance of finding new sources of liquidity are lower for the small corporation than for the large one. For example, sometimes the government is willing to assist large corporations in the event of bankruptcy due to the impact that such a bankruptcy would have on the economy. The troubles of a single small corporation, on the other hand, cannot worry the federal government.

Grossman and Hart (1980) have studied the incentive effect of the threat of bankruptcy on the quality of management of a widely held corporation. They argue that management can use debt as a bonding activity to precommit itself in such a way that managers can avoid losing their jobs only by being more productive. They also maintain that managers of firms that are mainly or solely equity financed do not have a strong interest to maximize profits, assuming that they have no ownership interest in the firm, because they do not feel the threat of debt. Such a firm's low profits would be reflected in its low value on the stock market. Bankruptcy is seen by Grossman and Hart as a factor encouraging
managers to behave as profit maximizers. If managers do not seek high profits, the probability that the corporation will go bankrupt increases. Managers prefer to pursue profit rather than risking sacrificing the perquisites and benefits they obtain from the firm.

For our analysis, the difference between the owner-manager of a small firm and the manager of a widely diversified corporation is important. One can assume that the owner-manager has control power which decreases as the firm grows and as his or her ownership fraction decreases. With this in mind it would seem that Grossman and Hart’s analysis would not apply for a manager that is the sole owner of an all equity financed firm nor would it apply for an owner-manager that still has control power. Even though he also enjoys perk consumption, the owner-manager will seek to maximize the value of the shares. Due to his ownership interest, he and other shareholders will receive full benefit from any increase in profits, except in bankruptcy states. This analysis is in agreement with Jensen and Meckling’s (1976) view.

It follows that Grossman and Hart’s theory will only apply to large corporations whose managers have no ownership interest in the firm. In this case, the manager would not directly benefit from an increase in profits. A switch from equity financing to debt financing involves an incentive strategy because managers feel an incentive to avoid bankruptcy. This bonding on the part of the managers helps mini-
mimize the equity agency costs of large corporations. It sup-
ports Barnea, Haugen and Senbet's (1981a) assessment that
for large corporations equity agency costs are negligible.

Bonding on the part of the managers is a particular case
in which management reduces the agency costs related to
equity by favoring a capital structure with debt. It is
interesting to note that this happens because of the fear of
bankruptcy on the part of the manager. This potential loss
of his benefits is one of many possible incentive schemes
which can lead to a good managerial behavior. The control
over information possessed by management is endangered by the
probability of bankruptcy. This positive characteristic of
this particular incentive scheme is not a component of the
salary incentive schemes analyzed by Fama, but it would be
present in a corporate charter which permits and to some
extent encouraged takeover bids. Then, if the corporation is
poorly managed, an investor can make profits by buying the
compány at a low price, reorganizing it, and selling it at a
higher price. This again can only happen in large corpora-
tions and is another method of minimizing the agency costs of
large corporations.

In the Grossman and Hart (1980) model, the agency rela-
tionship exists because the shareholders are not able to
observe the investment decisions of the management. The
problem can be solved, benefitting both managers and share-
holders, if the manager makes his reward conditioned on the
future value of the firm. For him to have a positive reward, the value of the firm has to be greater than the debt payments. He will, therefore, act in a profit maximizing manner, and this, in turn, would have a counter effect on the increased probability of bankruptcy due to an increase in the level of debt.

To explain the debt to equity ratio, Ross (1977) develops a signaling model which is also related to managerial incentives and the probability of bankruptcy. His analysis assumes that the firms have some exogenous qualities known by the management but not by the market. The purpose of his paper is to see the capital structure of the firm as a signaling mechanism. His theory predicts that there is a direct relationship between a firm's debt to equity ratio and its market value. This is because increasing leverage increases the market's perception of value. Ross proves that a low quality firm will not try to signal that it is of high quality through the issuance of debt because the risk and cost of a high probability of bankruptcy is too high.

The difference between Ross' and Hart and Grossman's approach is that one is a bonding scheme and the other is a signaling scheme. Ross tries to explain how the level of debt in a firm is used by the market as a signal of the value of the firm, where high levels of debt imply high value. Hart and Grossman analyze how managers and stockholders benefit from having debt in their capital structure. Both analy-
ses look at the probability of bankruptcy as the key incentive for managers to act in the interest of the shareholders. In this sense, debt reduces equity agency costs for large corporations.

Both arguments also suggest that the behavior of management in the presence of debt and the probability of bankruptcy that comes with the debt minimizes bankruptcy agency costs. It is in the interest of managers of large corporations to try to avoid bankruptcy, so it is in their interest to keep debt under control and at an optimal level.

Owner-managers will have other incentives underlying their behavior. It is rational for them to issue large amounts of debt. They prefer high risk, and they have less fear of bankruptcy because they have the possibility of being rewarded by high return.

The tax shelter bankruptcy cost (TS-BC) theory of optimal capital structure determines a firm’s optimal leverage as a function of the distribution of future earnings, business risk, default costs, and taxes. Castanias (1983) analyzes a cross sectional prediction of the tax shelter bankruptcy cost hypothesis. He argues that a shift in the distribution of earnings that increases the probability of bankruptcy will induce a firm to decrease the debt to equity ratio in its capital structure. Castanias tries to prove that there is an inverse cross sectional relationship between probability of bankruptcy and leverage rather than between business risk and
leverage, as has been assumed in previous studies. He estimates this relationship and he uses the results to test the Miller irrelevance hypothesis and the TS-BC hypothesis.

Castanias favors his method of cross sectional tests of the TS-BC over the direct market value test because cross sectional tests are not confounded by ambiguous announcements and wealth transfer effects and because cross sectional tests usually focus on the risk-leverage relationship implied by the TS-BC model. The data used by Castanias represent a large sample of firms, including many small firms and firms that are not publicly traded.

He finds that tests based on samples of very large firms are less likely to find a negative relationship between the probability of bankruptcy and leverage since the marginal bankruptcy costs for large firms increase less rapidly than those for smaller firms. Myers has suggested that marginal bankruptcy costs will be lower for large firms than for small firms due to the lower managerial related agency costs and to fewer growth opportunities.

Castanias believes that past relative failure rates would be a good indicator of which lines of business have relatively high expected future failure rates, assuming that relative failure rates are stationary over time and that line of business failure rates are good predictors of the probability of failure of individual firms in that line of business. He applied the Kendall coefficient of concordance to
each pair of years of his sample (1940-70; 1972-77) and found that in fact, relative failure rates are rank stationary by business line for the period covered by the sample. He tested the hypothesis that business-line historical failure rates provide information about the risk of individual firms if failure rates differ significantly across business lines. The hypothesis was not rejected at the 0.01 significance level. He, therefore, concluded that failure rates contain information concerning expected future probability of default and can be used as surrogates for them.

Total assets as a measure of firm size may be related indirectly to the business risk or bankruptcy cost of the firm. Castanias argues that given the TS-BC hypothesis, the average firm size of a line of business is directly related to line of business failure rates for the following reasons:

1) Larger firms have less business risk per dollar of assets invested or per dollar of expected earnings because they might be more diversified and have a lower variance of earnings. 2) Larger firms have borrowing markets more acceptable to them. 3) Larger firms may have a greater marginal tax rate and thereby more tax offset per dollar of assets. 4) Large firms have lower costs of default per dollar of assets, debt, or expected returns.

According to Castanias:

To the extent that firm size is a surrogate for cross sectional variation in business risk or default costs, its correlation with historical failure rates
should be negative. However, firm size might also be a surrogate for difference in tax offsets or in access to debt markets across industries, in which case its correlation with business failure rate series is ambiguous (1983, p.1625).

He found that the correlation coefficient between total assets and failure rates is negative and significant. The probability of failure is, therefore, higher for those lines of business in which firms are smaller on the average. The TS-BC model suggests that this may lead to higher debt to equity ratios for larger firms. It follows that to the extent that larger firm size is a surrogate for lower business risk or lower bankruptcy costs, the significant negative correlation between firm size and failure rates refutes the Miller irrelevance hypothesis and is consistent with the TS-BC hypothesis.

The empirical results of Castanias' study are consistent with a variant of the TS-BC model in which firms in lines of business that tend to have high failure rates also tend to have less debt in their capital structure. They are not, however, consistent with Miller's irrelevance hypothesis. The results are consistent with the theory that ex-ante default costs are large enough to induce the typical firm to hold an optimum mix of debt and equity. Further research may well corroborate the hypothesis that for smaller firms default costs and business risk are important factors affecting optimal leverage levels.
D. Summary of Chapter Two

A brief summary of this chapter will be helpful to emphasize the most important findings of how agency costs affect large and small firms differently.

With respect to equity agency costs, they arise when the prices of the shares are negatively affected by the behavior of the manager. It was observed that small corporations characterized by an owner-manager face equity agency costs of considerable magnitude. These agency costs arise mainly from the incentive of this owner-manager, who has control power, to maximize his utility at the expenses of outside security holders. Large corporations with diversified ownership, on the other hand, are characterized by managers who are disciplined by the labor market to behave in a manner that will maximize the security holders' wealth. These managers will keep the consumption of "perks" and incompetent behavior to a minimum in order to maintain their job and reputation.

Another equity agency problem is the one related to risk incentives. If the manager's attitude is one of risk aversion this will have a negative effect on the price of the stock, since according to the option pricing view of equity, the higher the risk, the higher the value of the stock. For small firms we assumed that the manager is also an owner and, therefore, will have an incentive to undertake risky projects. But managers of large corporations tend to be risk
averse since the majority of their wealth is represented by the service rendered to the firm, and their wealth would be at stake if the corporation enters a troubled situation. This equity agency cost is neutralized to a great extent by the labor market, monitoring and bonding activities and by other agency costs.

Asymmetry of information arises when the manager cannot disclose the value of a particular project or investment costlessly to investors. This asymmetry of information has a negative effect on the price of the security issued for financing, whether the issue is debt or equity. But according to Myers (1984) the firm would face higher agency costs, in general, if it decides to finance with equity as opposed to debt. Moreover, the higher the risk of existing debt, i.e., the higher the probability of default, the greater the information of asymmetry agency cost of issuing debt. If, for example, we believe that small firms have greater risk than large firms, then this particular agency cost would also be greater for small firms.

The debt agency costs related to the incentive to undertake high risk, low value projects, refers to the behavior of the manager of a levered firm. If the manager undertakes risky projects, he will benefit shareholders at the expense of bondholders. An owner-manager of a small corporation is less risk averse than the one of large corporation and, therefore, small firms will face relatively higher agency
costs of debt of this particular type.

The agency costs associated with stockholders' incentive to forgo profitable investments arise with the issuance of debt. These costs as Myers (1977) noted, are affected by the growth opportunity component of the total value of the firm. The probability of these investment options not being exercised by the shareholders, depends mainly on the maturity structure of the debt. We found that in general the relative magnitude of these agency costs is indeterminate. That is, without knowing the particular situation we cannot tell a priori the relative magnitude (small firm versus large firm) of these costs.

Liquidation agency costs may be viewed as a debt-agency cost that appears to have an adverse effect on small firms producing consumer durables. Liquidation agency costs would probably produce a weak effect in the small firm debt market. This weak effect, however, would still be greater than the effect of these agency costs in the large firm debt market.

Finally, bankruptcy agency costs clearly affect small firms to a greater extent than large firms. Thus, the debt agency costs arising from bankruptcy are higher for small firms, relative to the value of the firm.
III. YIELD AND CAPITAL STRUCTURE DIFFERENTIALS BETWEEN LARGE AND SMALL FIRMS: A PARTIAL GENERAL EQUILIBRIUM MODEL

The purpose of this chapter is to show that the size of the corporation is an important determinant of the supply and demand curves of corporate debt. This analysis will be made using the framework used by Barnea, Haugen and Senbet (1981a), modified to take firm size into account. In their work, Barnea, Haugen and Senbet generalize the analysis made by Miller (1977), which can be summarized as follows: Miller analyzes the notion of tax-induced differential returns on securities in a general equilibrium framework. This differential return arises because an investor in a higher tax bracket will demand a higher rate of return on investment in order to compensate for the greater tax burden incurred. On the other hand, firms will supply debt so long as the personal tax-induced compensation is less than the tax saving from interest payment deductions at the corporate level. As a consequence, the corporate tax subsidy disappears and corporate leverage is irrelevant to the value of any particular firm. In equilibrium, there is only an optimal debt level for the corporate sector as a whole.

The generalization of this argument made by Barnea, Haugen and Senbet (1981a) consists of: 1) modification of the demand curve for corporate debt by introducing costs associated with tax avoidance and 2) modification of the supply
curve to take into account agency costs associated with corporate debt financing. This generalization leads the authors to conclude that an equilibrium will be reached where the capital structure of any firm is consequential to its market value and, in addition, that agency costs of debt are shifted to bondholders in the form of lower interest rates.

Miller's work, as well as the generalization by Barnea, Haugen and Senbet, are based on the following assumptions: 1) progressive personal tax rates; 2) no tax arbitrage by individuals and firms (relaxed by Barnea, Haugen and Senbet); 3) a personal tax rate differential in favor of income from stocks; 4) the opportunity for riskless borrowing and lending (also relaxed by Barnea, Haugen and Senbet).

To extend the analysis to include the size of the corporation, it is necessary to subdivide the market into different groups with respect to size. We will analyze only two extreme groups, one composed of small corporations and the other composed of large corporations.

To be consistent with previous chapters, we emphasize that the most important characteristic which differentiates small and large corporations is the ownership structure. Small corporations are identifiable as having a manager who owns enough shares to maintain control of the company while large corporations are characterized by diversified ownership and a separation of ownership and control.

Note also that throughout the analysis in previous chap-
ters we were concerned with relative agency costs instead of absolute agency costs and with debt to value ratios instead of total levels of debt. Since Barnea, Haugen and Senbet develop their equilibrium model based on total levels of debt, some adjustments are called for in order to convert the analysis to relative and not absolute terms so that agency costs of small and large corporations can be compared in a meaningful way. What is important for the corporation when choosing its optimal capital structure is the percentage by which the value of the firm is reduced due to agency costs and not the absolute value of these costs.

Section A, Part 1 of this chapter considers the implications of Miller's analysis. Part 2 focuses on the implications of Barnea, Haugen and Senbet's introduction of a tax avoidance function and an agency cost function. Section B extends the earlier analyses by introducing equity agency costs, and analyzing effects of these on equilibrium interest rates and the capital structure of large and small firms.

A. Miller's Model and Generalization

1. Implications of Miller's model

Miller (1977) differentiates between personal taxation on investment income from stock and from bonds. Tps and Tpb denote personal tax rates on income from stock and bonds respectively. In Miller's model with personal taxes, the after-tax returns to the investor of a levered firm with a
given investment strategy are:

\[ XL = X (1-Tc)(1-Tps) + rD[1- Tpb - (1-Tc)(1-Tps)] \]  

(1)

where:  
- \( X \) = random earnings before interest and taxes  
- \( r \) = interest rate on taxable but riskless corporate bonds sold at par  
- \( D \) = par value of consol bonds (since the analysis is carried out in a perpetual framework)  
- \( Tc \) = corporate income tax rate

The valuation equation is obtained by invoking the value additivity principle to discount the earnings in (1). The modified tax-adjusted valuation model may be written as:

\[ VL = Vu + D \left[1- (1-Tc)(1-Tps)/(1-Tpb)\right] \]  

(2)

Where: \( Vu \) = value of the unlevered but otherwise identical firm.

The second term represents what Miller calls the gain from leverage. Miller, in his analysis, assumes progressive taxation which is exogenously determined. He shows why the gain from leverage must be zero in equilibrium, as shown in Figure 3.1. This equilibrium is obtained when \( Tc = Tpb \) at the margin, with the assumption that \( Tps = 0 \). Since Miller does not allow tax arbitrage in his framework, he obtains an upward sloping demand curve \( rd(D) \). The intercept of the demand curve represents the tax exempt equivalent of the pure rate of interest. All tax exempt securities yield certainty equivalent returns equal to \( r^* \) in Miller's world. These securities include equity, which is assumed to be tax exempt.
Figure 3.1. The Miller Bond Market Equilibrium
The horizontal part of the demand curve represents the demand for tax exempt securities.

On the demand side, an investor with the marginal tax rate Tpb will buy a taxable security, as opposed to a tax exempt one, only if bonds offer at least \( r = r^*/(1-Tpb) \). Therefore, to issue additional debt the corporation must pay higher interest rates. On the supply side, firms will only issue bonds as long as the marginal tax saving \( rTc \) is more than \( r-r^* \). The supply curve is horizontal at \( r = r^*/(1-Tc) \) because corporations are assumed to be wealth maximizers and because Miller assumes a corporate tax rate which is uniform across all corporations. This implies that interest rates below \( r = r^*/(1-Tc) \) will induce firms to seek debt financing, whereas interest rates greater than \( r^*/(1-Tc) \) will eliminate debt as an alternative way of corporate financing. Equilibrium in the corporate debt market occurs where the supply curve intersects the demand curve and the equilibrium yield is given by \( r = r^*/(1-Tc) \). The most striking implication of this equilibrium is that at this yield individual firms are indifferent between issuing debt or equity to finance their investments, even though an optimal aggregate level of corporate debt \( D^* \) is determined.

2. Implications of Barnea, Haugen and Senbet's generalization

Barnea, Haugen and Senbet (1981a) include costly tax arbitrage in their analysis. If arbitrage were costless,
investors would be able to completely eliminate the disadvantage of taxable investment income. In Figure 3.2, costless tax arbitrage is reflected by a perfectly elastic demand curve for corporate debt at the rate r*. As a result of its lower cost, debt becomes a dominant financial instrument. Barnea, Haugen and Senbet, therefore, assume that investment strategies which save taxes exist but are costly to investors.

These tax-avoidance costs are taken into account in investors' portfolio optimization and are assumed to be an increasing function of the amount of tax sheltered income utilized by the investor. Barnea, Haugen and Senbet justify this assumption by arguing that the utilization of tax shelters results in investors deviating from their utility-maximizing consumption and portfolio decisions. The loss in pre-tax utility obtained by comparing investor portfolio choices without taxes to investor choices with personal taxes measures the implicit cost of tax avoidance. The explicit costs include the costs of financial intermediation and short selling. Additionally, the tax code may prohibit the excessive use of a particular tax shelter. As a result of these factors, the authors argue that the marginal cost of tax avoidance is an increasing function of the amount of income sheltered.

Barnea, Haugen and Senbet note that increasing costs of tax avoidance at the margin are sufficient to generate the
Figure 3.2. Barnea, Haugen and Senbet's Extension of Miller's Equilibrium
upward sloping demand curve UYV in Fig. 3.2. This demand curve is more elastic than the upward portion of Miller's demand curve. In their analysis, however, the demand curve represents increasing aggregate demand by all investors in different tax brackets induced by the increasing differential in yield on corporate bonds over tax exempt securities. The major effect of introducing costly tax avoidance is to introduce equilibrium differential returns on securities of different tax status, which is consistent with empirical observation.

The existence of agency problems presupposes that debt instruments are risk bearing. Therefore, the bond yield is adjusted to its certainty equivalent value using the unique market price of risk. This adjustment of bond yields allows the comparison of perfect substitutes in Figure 3.2.

It is necessary, before continuing, to mention that the authors assume that agency costs of equity are negligible. They, therefore, deal only with debt agency costs. The implications of this assumption are dealt with in detail in section B, "Large and Small Firm Differences in the Barnea, Haugen and Senbet Equilibrium."

Using the debt agency cost arguments outlined in Chapter Two, Barnea, Haugen and Senbet (1981a) establish that agency costs of debt are an increasing function of the amount of debt employed by a firm. (They assume the agency cost function to be linear.) Thus, given an investment opportunity
set of the firm, any increase in the amount of debt will increase the size of the agency costs incurred by the corporation. They incorporate the agency costs of debt by modifying the supply curve of corporate debt. With agency costs, the supply curve is no longer horizontal. Rather the supply curve must fall with higher levels of debt to compensate firms for the additional agency costs incurred. The downward sloping supply curve XYZ in figure 3.2 reflects this adjustment for agency costs.

Corporations will be encouraged to use debt if the sum of the rate of interest on corporate bonds and the differential agency costs as a percent of marginal debt financed is at most equal to \( r^*/(1-Tc) \). Otherwise, debt financing is dominated by equity financing. The individual firm will have an incentive to issue debt to the point where the differential agency costs of debt financing, \( \Theta_k(D) \) are equal to \( \Theta^* \) for the marginal unit of debt. \( r \) is associated with a finite aggregate supply of debt across all firms. As the interest rate falls, firms will increase the optimal amount of debt in their capital structure.

Equilibrium will be reached where the demand and supply curves intersect. Barnea, Haugen and Senbet conclude that there is an equilibrium quantity of bonds outstanding in the corporate sector D***, that the agency costs of debt are shifted to bondholders, and that there is an optimal capital structure such that individual firms supply debt until
\[ r^*/(1-Tc) - r (D^{**}) = \Theta_w(D_k) = \Theta D^{**} = \Theta^*. \]

The final incidence of agency costs in their framework will be determined by the elasticities and cross-elasticities of the demand and supply curves of corporate debt, tax exempt debt and corporate equity. They assert, though, that the equilibrium rate on corporate bonds will always be between \( r^* \) and \( r^*/(1-Tc) \).

As noted above, Barnea, Haugen and Senbet (1981a) assume the agency costs of equity to be negligible. They cite Fama's work (1980) as a justification for this assumption. Fama argues that under widely diversified ownership the labor market disciplines managers' behavior. But to say that the market is composed solely of large corporations with diversified ownership is to overlook the large number of small corporations that help make up the economic system.

Based on our previous discussion of debt and equity agency costs, we now graph the agency cost function for a representative small and large firm. In Fig. 3.3, size is treated as a parameter, i.e., size is constant for a given set of curves, with small firms denoted by "s" and large firms denoted by "l". For each size group, the agency cost of debt (ACD) and the agency cost of outside equity (ACE) are summed for each leverage ratio to obtain the total agency cost function (TAC).

We provisionally assume that the purpose of the firm, given its investment opportunity set, is to minimize the agency costs arising from their financing decisions. We also
Figure 3.3. The Component of Total Agency Cost for Small and Large Firms
assume that both the large and small corporation represented in Figure 3.3 have the same fraction of internal equity (which is held constant and is not shown in the graph).

For a given size, the following relationships are obtained:

a) \( \frac{a \cdot ACE}{a \cdot D/Total \ Value} < 0 \)
   As equity is replaced by debt, ACE decreases (since the incentive to consume excessive perquisites decreases).

b) \( \frac{a \cdot ACD}{a \cdot D/Total \ Value} > 0 \)
   As the ratio of debt to total value increases ACD increases (due to bankruptcy, asymmetry of information, etc.)

This graph shows that size is an important determining parameter of capital structure when the objective of a firm is to minimize agency costs. The graph implies that the debt to total value ratio is larger for small corporations than for large ones.

It is important to emphasize that the difference in relative agency costs of equity between small corporations and large corporations is of considerable magnitude. The ACE are considered negligible for large corporations but very relevant in the financial decisions of small corporations. Relative agency costs of debt are also considered to be smaller for large corporations than for small ones, but it is not possible to infer how large the difference between ACD for large and small corporations is. Regardless of the mag-
nitude of this difference, however, the difference in equity agency costs is large enough so that the minimum point in the TAC curve, i.e., the optimal ratio of debt to total value, for small corporations lies to the right of the minimum point of the TAC for large corporations. Based on agency cost relationships, small firms have an incentive to increase leverage beyond the leverage chosen by their large firm counterparts. The fact that small firms do indeed have a debt to total value ratio greater than that for large corporations will be discussed in Chapter Four.

If the assumption of negligible agency costs of equity is indeed justified for large corporations, then we would expect to find large corporations with the objective of minimizing agency costs to be financed almost entirely by equity. At the extreme when $ACE = 0$, the graph representing agency costs would be depicted as in Figure 3.4. Here, the TAC curve is upward sloping and does not have a minimum that would determine an optimal debt to total value ratio exclusively from an agency cost analysis. This is the type of graph used by Barnea, Haugen and Senbet in their analysis.

Of course firms do not simply try to minimize agency costs, but rather, given an investment opportunity set, they try to minimize the total financing related costs including agency costs, flotation costs, and the like, while also taking into account tax subsidies and tax deductions. Still, this preliminary analysis has allowed us to see some isolated
Relative Agency Costs of Debt Financing

Marginal Debt Agency Costs

Average Debt Agency Costs

Figure 3.4. Agency Costs for a Large Firm
implications of agency costs on the capital structure.

B. Large and Small Firm Differences in the Barnea, Haugen and Senbet Equilibrium

To incorporate these factors into the partial equilibrium framework used by Miller (1977) and by Barnea, Haugen and Senbet (1981a), we first separate the market into a group composed of small corporations and a group composed of large corporations. Therefore, we will be dealing with an aggregate supply and demand for small and large corporations respectively. To do this, we take a particular small corporation as representative of the group and then we aggregate over this part of the market. The same process is applied to large corporations. We will deal only with these two groups in order to emphasize the major differences but, we are, of course, aware that there is a continuum of firm sizes.

Next we introduce the agency costs of equity in the partial equilibrium framework of Miller and Barnea, Haugen and Senbet. Recall that Miller as well as Barnea, Haugen and Senbet, take $r^*$ to be the yield of tax exempt securities, including equity. In fact, $r^*$ is the only parameter in the graph that is directly related to equity. $r^*$ may be thought of as the risk adjusted return on equity for large corporations. No adjustment is needed for equity agency costs (ACE(l)), since they have been assumed to be negligible. To incorporate the equity agency costs for small corporations,
we note that investors require a higher rate of return on equity from small corporations to compensate for the higher ACE(s). If so, then \( r^*s \) will be greater than \( r^*l \) by a certain premium denoted \( \Delta \). The size of \( \Delta \) is a function of the size of the corporation, the debt to total value ratio, and the flotation costs, i.e.,

\[
\Delta = f(S, \frac{D}{V}, F)
\]

The sign of \( \Delta / S \) depends on the size range, as discussed in Chapter Two. This derivative is greater than zero when the owner of the majority of shares is also the manager and, therefore, possesses control. But as the percentage of his shares decreases, the manager is subject to the competition in the labor market and \( \Delta / S \) becomes less than zero.

Since we are dealing with the aggregation of small and large corporations of a particular given size, respectively, size is again a parameter. With the size given, flotation costs are determined, assuming debt issues are proportional to firm size. Therefore, the only factor that can affect the magnitude of \( \Delta \), given firm size, is the debt to total value ratio \( (D/V) \).

Figure 3.5 presents a graph which shows the risk adjusted required equity-equivalent rate, \( r \), for a representative small firm. Here, \( \Delta \) is the sum of a fixed component which depends on size and flotation costs and a variable component which depends on the debt to total value ratio. \( \Delta \) is at a maximum when the small corporation's outside financing con-
Figure 3.5. The Equity Agency Cost Effect on the Certainty Equivalent Cost of Capital for a Small Firm

\[
\Delta = \gamma - \lambda (D)
\]

Interest Rate

\[\Delta = 0\]

\[r^*\]

\[\lambda\]
sists solely of equity and declines continuously as the proportion of debt increases, reaching a minimum when D/V = 1.0.

\[ \Delta = \gamma - (\lambda(D)) \]

To move from the representative firm to the market, we aggregate over all firms in the group. That is, we sum horizontally across debt levels at each interest rate \( r \). The results of this effort are shown in Figure 3.6.

In Figure 3.6, \( D* \) represents the level of the debt if all small corporations are 100% levered. The advantage of incorporating equity agency costs in this way is that we have a corresponding point of reference of the debt to total value ratio in the general partial equilibrium framework, which is necessary for this analysis.

The distance between \( r*/(1-Tc) \)-\( r* \) is determined by \( Tc \). We assume here that all corporations are subject to the same corporate tax rate. After taking into account equity agency costs, the relevant equity equivalent rate is \( r* + \Delta \) and the debt rate is \( (r* + \Delta)/(1-Tc) \).

As the firm starts replacing outside equity for debt, the alternative costs of equity and debt are:

\[ (r* + \Delta) \text{ vs.} \frac{(r* + \Delta)}{1 - Tc} \]

The supply curve for corporate debt is not infinitely elastic for small corporations while it is for large ones. The supply curve is negatively sloped for small firms, and its slope depends on how responsive equity agency costs are when
Figure 3.6. Aggregate Agency cost of Equity for Small Firms
outside equity is replaced by debt.

Debt agency costs are assumed to be an increasing function of debt. As Barnea, Haugen and Senbet have noted, the supply curve must reflect these additional costs, and therefore, the supply curve is downward sloping. Figure 3.7 shows the supply curve as well as the demand curve for debt of small corporations. In Figure 3.7 we take as valid Barnea, Haugen and Senbet's argument that costly tax arbitrage is one of the primary determinants of the slope of the demand curve.

Due to the segmentation of the market into small and large corporations, it is necessary to make some modifications of this tax arbitrage argument. Barnea, Haugen and Senbet argue that the demand curve for corporate debt is upward sloping because of the increasing cost of tax avoidance. In their analysis, they consider the total level of corporate debt. In this analysis, however, we have considered small and large corporations separately, so it would be incorrect to use the same, or even two upward sloping curves, for small and large corporations. As previously noted, small corporations have a smaller share of the market than large ones, and thus the costly tax arbitrage function could affect the demand curve for small corporations less than the demand curve for large corporations. To avoid this potential problem, it will be the assumed that the marginal tax avoidance cost is determined solely by the demand curve for corporate debt for large firms when the market is in equilibrium. The
Figure 3.7. The Effect of Costly Tax Arbitrage on the Equilibrium Model
rate determined at equilibrium can then be used for the small firm's demand as a proxy for the costs of tax arbitrage. The justification for this treatment is that the debt issued by large firms dominates the total debt market, and there is no special reason why the costs of tax arbitrage should be different for small and large firms.

In Fig. 3.7, AB would be the costly tax arbitrage for the marginal unit of debt, determined by the intersection of the demand and supply of corporate debt for large firms. The demand curve for debt of small corporations is shifted upward by the distance AB to reflect the effect of costly tax arbitrage on small firm demand.

For large corporations, the same aggregative process is applied so we have a finite amount of debt, $D_{\text{max}}$, corresponding to the situation where all large corporations are financed by debt (also in Figure 3.7).

To emphasize the interest rate differential between large and small firms, we can think how a lender or supplier of capital (demand side of this graph) reacts when faced with two different alternatives. For example, he can buy a bond from a large corporation with 80% debt to total value ratio or he can buy one from a comparable small corporation with the same ratio. All previous analyses lead us to conclude that relative agency cost for small corporations are larger than those for large corporations. This would mean that if large and small corporations have the same financial lever-
age, the supply curve, which has debt agency costs incorporated, would be always lower for large corporations than for small corporations, i.e., $\Theta_{dL} > \Theta_{dS}$, as shown in Figure 3.8. Therefore, the marginal agency costs of debt for small and large corporations are different at all points, assuming the same debt to total value ratio. Recall that the demand curve for small firms, but not for large ones, is affected by equity agency costs. Total demand is the sum of the curve $r^* + \Delta$ plus the cost of tax arbitrage. This demand curve for small corporations lies above the demand curve for large corporations throughout the range. In Figure 3.8, the equilibrium for each group occurs where the demand crosses the supply for corporate debt.

The implication of these equilibria is that the equilibrium interest rate for corporate debt for small corporations is higher than equilibrium corporate debt for large corporations. This conclusion is supported empirically, as will be documented in Chapter Four. Moreover, an equilibrium agency cost as a percentage of marginal debt financed and an equilibrium level of corporate debt for each size group are determined.

Figure 3.8 illustrates the composition of agency costs in the small firm sector. $\Theta_d$ represents debt agency costs, $\Theta_e$ represents equity agency costs, and $\Theta_t$ is the sum of $\Theta_d$ and $\Theta_e$. This equilibrium analysis for the aggregate market takes into account not only agency costs but also flotation
Figure 3.8. The Small and Large Firm Equilibrium
costs and tax subsidies, which were considered in this analysis to be the major factors affecting the financial decisions. (The availability of tax deductions, among other things, can also affect this decision, but it is not considered here.)

To link the results of the aggregate market and individual firm decisions, assume for a moment that we have all the agency costs on the demand side. This will have an impact on the equilibrium interest rate, but we are interested in the net equilibrium interest rate, after agency costs are subtracted. The net interest rate is the same regardless of whether agency costs are accounted for in the supply or demand curve. If all agency costs are accounted for in the demand side, Figure 3.9 allows us to obtain some additional implications concerning capital structure.

Fig. 3.10 isolates the agency costs and flotation costs which are included in $\Delta$ from all other factors. As drawn, the aggregate demand curve which has all agency costs incorporated does have a minimum point. This minimum point corresponds to the minimum point for an individual firm whose goal is to minimize the agency costs. But as shown in Figure 3.9, this point, $D^*$, does not correspond to the equilibrium point. The tax advantage of debt implies a rate differential of $r^* + \Delta - (r^* + \Delta)/(1-Tc)$, which determines the intercept of the supply curve. The supply curve has a negative slope, since decreases as debt increases. The equilibrium interest
Figure 3.9. Equilibrium With All Agency Costs and Tax Arbitrage Costs in the Demand Curve
Figure 3.10. Equilibrium With Total Agency Costs in the Demand Curve
rate occurs where the demand and the supply curve intersect. This equilibrium occurs to the right of the minimum point of the demand curve, implying a high level of aggregate debt. When this result is carried over to individual firms, it implies a level of debt to the right of the minimum point of total agency costs, as shown in Fig. 3.11. This occurs because firms will adjust their capital structures, replacing equity for debt or debt for equity until their $\theta_k = \theta^*$. At this point firms are able to take maximum advantage of the tax subsidy of leverage, while taking into account the aggregate agency costs.

This implication that small firms are more highly levered is, as mentioned earlier, in agreement with the results of empirical research. When the factor of costly tax arbitrage is taken into account, the equilibrium level of debt decreases, as shown in Figure 3.9. However, this equilibrium is still larger than the one implied by the minimization of agency costs.

For large corporations, assuming that equity agency costs are zero and given that $\theta_k$ is less than $\theta^*_s$, the graphical representation would be as shown in Figure 3.12. This graph implies that comparing marginal agency costs, large firms would be less levered than small firms.

The issue of agency incidence, i.e., who bears these agency costs, will be considered next. In the general equilibrium one could say, as Barnea, Haugen and Senbet have
Figure 3.11. Relative Agency Costs for the Small Firm
Figure 3.12. Relative Agency Costs for the Large Firm
argued, that for large firms, bondholders bear the differential agency costs. Firms with fewer agency costs could extract rent and would be able to employ higher leverage. However, this goes against the micro analysis carried out, for example, by Jensen and Meckling (1976), who suggest that rational bondholders are aware of the agency cost problems associated with debt financing and will demand a higher rate of return. Barnea, Haugen and Senbet found that in the same way as tax subsidy 'grosses up' interest rates, agency costs 'gross them down'... and corporations are enticed to increase their supply of debt only if they are compensated for the associated agency cost disadvantage (1981a, p. 579).

For any given firm, a reduction in the average agency cost function for a given $\Theta$ is beneficial because it increases its "financier surplus", as it is called by Barnea, Haugen and Senbet. This can be seen in Figure 3.12. If A'ACD shifts to A'AC'D', the financier surplus is increased from PQRS to PTUV.

The adoption of any solution to agency problems, if learned by all firms quickly, will reduce the interest rate. As Barnea, Haugen and Senbet argue, the decision whether to adopt it or not will depend on how rapidly the other firms will be able to do the same.

Since total agency costs for small firms are composed of debt as well as equity, and since in our analysis we incorporated the equity costs on the demand side, we can say that the burden of the agency costs is shared by both parties.
i.e., equity, and bondholders.

Another implication of the preceding analysis is that due to high agency costs and high flotation costs, small firms face higher costs for debt and equity than large firms. This might lead them to forego projects that would have a negative NPV calculated with their cost of capital rates, but which would have a positive NPV for large corporations.

In summary, Barnea, Haugen and Senbet specified an equilibrium in which, among other things, capital structure affects market value, and where the observable spread between yields on taxable and non-taxable bonds is explained. Our analysis takes as a point of departure the research by these authors. In addition, we have a demand curve that is determined, not only by tax avoidance factors, but also by the effects of equity agency costs on the demand for debt. By separating the market according to size, this analysis succeeds in being able to explain the differences in the yield on securities of corporations of different sizes. The modifications of the analysis also show that the differential agency cost for the marginal unit of debt, which is determined in equilibrium \( \Theta^* \), is different for large corporations and small corporations.

This analysis is also an extension of Miller's analysis. In Miller's analysis, the interest rate differential between taxable and tax-exempt bonds in the final equilibrium reflects exactly the tax advantage of debt financing at the
corporate level with personal tax burden. But obviously there are other factors that have to be taken into account by value maximizing firms when they are optimizing their capital structures. Moreover, it is likely that these factors affect the aggregate debt market and the equilibrium interest rates. The incorporation of the most significant of these factors was the purpose of the preceding analysis.
IV. EMPIRICAL EVIDENCE AND CONCLUSIONS

A. Empirical Evidence

1. Yield differential: taxable vs. tax-exempt securities

The empirical evidence presented in this part deals with the testing of the different theories that try to explain the differential rate between taxable and tax-exempt debt securities. The purpose of this literature review is to find out if, in fact, there is empirical evidence that supports our theoretical conclusion that the equilibrium marginal tax rate is less than the corporate tax rate. This result is implied in the model analyzed in the previous chapters, where debt agency costs are positive and significant. There are mainly three theories that analyze this phenomenon.

The Miller Model (1977) assumes complete markets and no taxes on income from equity and concludes that the marginal tax rate at work in the relative pricing of taxable and tax-exempt debt or equity is likely to be the corporate tax rate because equilibrium must be achieved across all securities. The equality of the marginal tax rate with the corporate tax rate only holds when leverage related costs are zero, as shown by Kim (1982) and Barnea, Haugen and Senbet (1981a).

In the second theory, an extension of Miller's model, it is argued that the various leverage related costs are significant enough to influence the costs of corporate borrowing. That is, if the leverage related costs such as bankruptcy costs, loss of non-debt tax shields, and agency costs of debt
are taken into account and if it is assumed that there are no taxes on income from equity, it is possible to conclude that the marginal bondholders' tax rate is less than the corporate rate and that there is a positive net tax advantage to corporate debt financing. Under these circumstances the firm's optimal capital structure involves the tradeoff between the tax advantages of debt and the leverage related costs.

The third theory is the institutional demand theory. It takes the taxable rate as exogenously determined and determines the tax-exempt rate, which responds to the supply and demand. It is assumed that the supply of municipal debt is inelastic with respect to interest and that the marginal tax rate is determined by the demand. The major participants are banks, property insurance, and individuals to a lesser extent since few individuals are trying to shield income taxed at the corporate rate. Banks are the only investors who may deduct interest payments in debt obligations, and at the same time invest in tax-exempt. Property insurance can also arbitrage if they discount premiums and invest in tax-exempt. The arbitrage, of course, will depend on the magnitude of the leverage related costs and on the existing legal regulations. The implication of this theory is that the marginal tax bracket depends on the demand for tax-exempt securities on the part of banks and property insurance institutions. If they demand 100% of the issuance, the tax bracket would be the corporate one. If they demand less than 100%, the rate
on tax-exempt has to increase to induce lower tax bracket individuals to buy these securities and, consequently, the marginal tax rate will decrease.

It is worth noting that most of the articles that will be mentioned in this section deal directly or indirectly with the importance of the leverage related costs and the determination of the marginal tax rate. None of them, however, deals with how these leverage related costs affect differently small and large corporations. Nevertheless, it is very relevant for this paper to have evidence supporting the fact that agency costs are significant as a first step towards empirical support for our findings. It would be very interesting, of course, to carry out an empirical study that concentrates on tracking down the firm size effect on the differential rates between large and small corporations' debt securities, but this is left to future research.

As is often the case with empirical research, there are mixed results in the testing of the above mentioned theories. Among the selected time series studies which search for evidence on the existence of leverage related costs, there is one article by Trzcinka (1982) that rejects the significance of these costs. Based on his evidence, Trzcinka cannot reject the original Miller hypothesis that the marginal bondholders tax rate is equal to the corporate tax rate. He emphasizes, however, that assuming that income from equity is not taxed has important implications for his results and
that if this assumption is dropped, his results may be significantly altered. Kamma and Trzcinka (1984), on the other hand, find different results when they include more recent data for the old sample (Trzcinka, 1982) and when they take into account the structural changes that took place in those years. Kamma and Trzcinka found that Miller's equilibrium model was altered by the Economic Recovery Tax Act of 1981 and the recession that began that year.

The Economic Recovery Tax Act of 1981 eliminated personal tax rates above fifty percent and lowered taxes by increasing the number and timing of tax shields. This act undermines the incentive of investors in high tax brackets to demand equity of unlevered firms and diminishes the incentive of corporations to issue debt with the consequent tax advantages, since they can use non-debt tax shields as a substitute. These events, together with the economic recession of 1981-82, would have some effect on Miller's framework by affecting Miller's equilibrium. Inflation is a third factor considered by Kamma and Trzcinka that may affect the equilibrium because it alters investors' portfolio decisions by affecting real after-tax rates.

Kamma and Trzcinka developed a model which is an extension of Miller's. They argue that marginal costs of leverage appear to have increased during the recession and that this would cause the supply furve to shift down (since they use the same framework, it is possible to refer to Figure 3.1),
lowering the marginal tax rates. If leverage related tax costs are large enough so as to affect marginal tax rate, the tax reform that lowered the maximum tax rate (lowered marginal tax rates at every income level) also affected the equilibrium marginal tax rate because it increased the amount of taxable bonds demanded at each taxable interest rate. The increase in tax shield will have as an effect the increase in the substitutes for tax exempt debt and, consequently, would increase the elasticity of demand for corporate debt. If debt related costs are negligible, neither the tax reform nor inflation would affect the marginal tax rate.

Implications of their model are that if leverage related costs are positive, the tax rate will decrease with the recession and with a tax fall but will increase with inflation. Inflation will magnify any change resulting from leverage related costs, but its net effect is unclear.

Evidence supporting the negative relationship between tax law changes and the marginal tax rate, as stated by Kamma and Trzcinka, would provide evidence in favor of the relevance of leverage related costs being positive.

For the empirical tests, Kamma and Trzcinka use the same data used by Trzcinka in 1982. They employ new issues monthly averages of yields with various ratings and maturities collected from Salomon Brothers.

In this study, the marginal tax rate has fallen from Trzcinka's previous estimate. For example, when utility bond
yields are used as independent variables in this random slope model, the implied marginal tax rate is about 36%.

Buser and Hess (1983) and Skelton (1983) have independently found results similar to the ones in the Kamma and Trzcinka study by using very different methods on the same data. Kamma and Trzcinka have found mixed evidence as to whether the structural changes in the marginal tax rate were temporary or permanent.

With respect to the evidence supporting a particular theory of the marginal tax rate, Kamma and Trzcinka favor the Miller analysis with positive leverage related costs and reject the institutional demand theory. The results showed that at least for 1980 to 1981 the leverage related costs were significant and were an important determining factor of the supply of corporate debt.

Were it not for these costs, our results imply that there should have been a dramatic increase in the supply of corporate debt in the year 1981 to 1982. The absence of any such increase lends further credence to the extended version of the Miller model (Kamma and Trzcinka, 1984, p.21).

The aforementioned study by Buser and Hess (1983) uses a longer time series of data and different and highly sophisticated econometric techniques. Their results are evidence in favor of the existence of significant leverage related costs in the economy. Furthermore, they found that the average effective personal tax rate on equity is statistically significant and positive. They argue that this equity tax rate,
together with the leverage related costs have important impacts on the relation between taxable and tax-exempt bonds. This research casts some doubts on Trzinka's 1982 results.

Skelton (1983) tries to confront Miller's (1977) theory with the institutional theory by using the institution of regulation Q. He does not consider debt related costs to be relevant. He believes that if banks behave as tax arbitrageurs, any outside or legal restriction on the banking system would offset the municipal bond market. His results lead him to support this hypothesis, so he finds that banks do have a very strong influence on the yield differential between taxable and tax-exempt bonds and, therefore, on the marginal tax bracket at work across the short term bonds. When banks can easily arbitrage, taxable rates are lower than regulation Q. Skelton finds that the point estimate of the mean marginal tax bracket is very close to the corporate or bank tax rate. On the other hand, when banks find it difficult to arbitrage, taxable interest rates exceed regulation Q and the point of estimate of the marginal tax bracket is significantly lower. Thus, he supports the institutional demand and rejects a strong interpretation of Miller's model.

Another study that discusses the importance of leverage related costs but at the firm level and also has some implications with the determination of the marginal tax bracket is the one by Bradley, Jarrell and Kim (1984). Bradley, Jarrell and Kim use a cross sectional firm specific data to test for
the existence of an optimal capital structure. They develop a theoretical model that takes into account all the advances in the theory of optimal capital structure. Then, they present the testable implications of the theory by using comparative statistics and simulations of the model. They examine the cross sectional variations in firms' leverage ratios to detect their relation with 1) the through time volatility of a firm's earnings, 2) the relative amount of non-debt tax shields, and 3) the intensity of research and development and advertising expenditures.

In their analysis, Bradley, Jarrell and Kim use a twenty years average debt to total value measure for 851 firms covering 25 two digit SIC industries. With this sample, the authors seek to minimize the effect of transient variations through time due to business cycles or lagged adjustments by firms towards their target leverage ratios. They found that the average firm's leverage ratio was very much related to industry classification.

If the tax shields are fully utilized at the end of the period or if the costs of financial distress per dollar of end of period value of the firm are positive, the difference between the corporate tax rate and the personal tax rate \((T_c - T_{pb})\) is unambiguously positive, and therefore \(T_c\) is greater than \(T_{pb}\). This implies that firms will stop issuing debt while the marginal bondholders' \(T_{pb}\) is less than \(T_c\), and the net tax advantage of debt is positive. If they additionally
assume that the personal tax rate on income from stock ($T_{ps}$) is positive, the optimal leverage involves balancing the net tax advantage of debt against the leverage related costs.

The comparative statics and the simulation of the model provide the following testable implications: 1) The debt ratio is inversely related to the costs of financial distress, which include banking costs and the agency costs of debt. 2) The debt ratio is negatively related to the levels of non-debt tax shields. 3) The debt ratio is inversely related to the variability of firm value if the costs of financial distress are significant.

The empirical results, which aim, among other things, at throwing some light on the economic sources of these strong industry influences on firm leverage ratios, show that the volatility of firm earnings is an important inverse determinant of firm leverage. It helps explain both inter and intra-industry variations in firm leverage ratio. The intensity of research and development and of advertising expenditures is also related inversely to leverage. Both of these results are consistent with the formal balancing model of optimal leverage, in that the costs of financial distress are relevant. They also find a direct relation between firm leverage and the relative amount of non-debt tax shields. This supports the idea that non-debt tax shields serve for the security of the firms assets, with more securable assets leading to higher leverage ratios. But these results
reject the theory that focuses on the substitutability between non-debt and debt tax shields.

Wayne H. Mikkelson (1984) has some criticisms, particularly to the way in which Bradley, Jarrell and Kim try to group all debt agency costs into the cost of financial distress, which arise in their model only when the firm defaults on the senior (debt) claims. Mikkelson argues that even though a positive probability of default is a necessary condition for the existing security holders of the firm to incur agency costs of debt financing, it is unclear whether agency costs of debt depend on variability of firm value, as predicted by the model. The model and simulations capture only costs that are directly related to default, but do not necessarily capture all the costs that generally are classified as agency costs of debt financing, and this fact is inconsistent with some of the testable implications of the model. Mikkelson also criticizes the fact that many studies take leverage ratios as the only characteristic that differentiates firms' claims structures. By doing this, they may miss the relevant variation in actual claims structures that is due to taxes, default related costs, incentive related and contracting costs, and informational asymmetry costs. These studies, which focus on leverage ratios, should study alternative and more detailed characteristics of firms' claims structures.

In summary, the articles discussed in this section
generally support the conclusion that debt related costs are relevant and affect the marginal tax bracket inversely.

2. Equity differences between large and small corporations

In this part, empirical evidence dealing with the relationship between the return and the total market value of common stock is reviewed. Banz (1981) found that, on the average, smaller firms have higher risk adjusted returns than larger firms, even though this difference has not been very stable through time. According to his findings, this size effect has been in existence for at least forty years. He argues that it is not known whether size itself is responsible for this phenomenon or whether size is just a proxy for one or more true unknown factors correlated with size.

As Reinganum and Smith (1983) have said:

The findings suggest that even if there were no advantage of large size in the product market (equal rates of operating profits), large firms would still have a substantial capital-raising advantage over small firms. This advantage is unrelated to the widely recognized flotation cost economies. Even after controlling for nondiversifiable risk using the Capital Asset Pricing Model (CAPM), investors still demonstrate a statistically significant and economically important preference for the securities of large firms. Investors apparently place a premium on large firms which is not attributable to large firms’ observed lower risk as captured by widely used measures of nondiversifiable risk (beta risk) (p. 213).

Many studies stimulated by Banz’ (1981) findings have been published. They either try to examine the empirical evidence using different methods and techniques or they try
to give explanations to this empirical phenomenon.

Among the studies that try to explain the results there are the ones that find high correlation between E/P effect and firm size effect. Their goal is to control for one of the effects and test for the significance of the other one. Different authors have arrived at different conclusions by this method. Basu (1977), for example, finds that portfolios characterized by high E/P ratios show higher absolute and risk adjusted rates of return than portfolios formed of randomly selected securities. Basu (1983) reexamines his earlier study and finds that the size effect virtually disappears when returns are controlled for differences in risk and E/P ratios. He detects a high interaction between the two effects since the magnitude of risk adjusted returns is largest for small firms with high E/P ratios. This result contradicts Reinganum (1981). Reinganum found that a strong firm size effect exists, even after controlling returns for any E/P effect, and found no E/P effect when the control variables were reversed. It follows from Reinganum's study that firm size effect largely subsumes the E/P effect. Ho and Stoll (1981) support Reinganum's conclusions. Their evidence indicates that the set of factors that cause the abnormal returns is much more closely associated with firm size than with E/P ratios. Even with these mixed results, it has been widely recognized that there is a small size effect independent of the earnings to price ratio. This recognition has
lead to the search for factors such as measurement or statistical errors that would explain this size effect. There are a variety of plausible hypotheses that try to explain this anomaly.

Some authors have tried to test for the measurement and statistical testing problems by analyzing the effect of an alternative method that takes into account the differences in trading frequency between large and small firms' stock. Others analyze the impact of a change in the portfolio holding strategy on the return of small firms. Finally, there are articles that scrutinize the sensitivity of the differential returns to the length of the holding period.

Roll (1981) for example, analyzes the effect that the trading frequency would have on the differential returns between small and large corporations. He concludes that because small firms' stock is traded less frequently, risk measures obtained from short interval returns data understate the actual risk from holding a small firm portfolio. The reason for this is that the low trading frequency causes this portfolio to have a higher autocorrelation of returns, which is completely spurious. The larger the average time between trades the higher the induced autocorrelation in the given portfolio. This autocorrelation results in a downward biased measure of portfolio risk, and with it a corresponding overestimate of "risk adjusted" average returns. Reinganum (1982) investigates this aspect, constructing portfolios grouped by
size and estimating the betas using OLS and the aggregate coefficient method proposed by Dimson (1979). He finds that the average returns for small firms exceed those for large firms by more than thirty percent on an annual basis. Using Dimson's estimator, the difference in the estimated betas of large and small firms is about 0.7. This corrected measurement of risk cannot explain the more than 30% difference in returns. This misassessment of risk analyzed by Roll (1981) and Reinganum (1982) cannot explain the magnitude of the differential between small and large firms.

Roll (1983b) and Blume and Stanbaugh (1983) try to demonstrate the sensitivity of security returns to the portfolio strategy used. Researchers often use arithmetic or rebalanced portfolio returns, mainly because they are easy to compute. But the buy and hold strategy is the one that best reflects investment experience. The sensitivity of the returns to the portfolio strategy arises because common stock data have serial dependence. Using the buy and hold strategy for the American and New York Stock Exchange listed stock, Roll found that small firm premium was 7.5% per annum from 1963 to 1981. With the same data, rebalanced and arithmetic methods produce an annual return difference of 14%. The annual difference in returns between the smallest and largest size quintiles (deciles) is about 34% (49.1%) using the rebalanced and arithmetic methods but only about 17% (22.8%) using the buy and hold method.
Roll (1983b) argues that using the buy and hold method, the small firm effect is marginally significant. The results show how different portfolio strategies affect the magnitude of the size effect. Based on this evidence, both Roll and Blume and Stambaugh question the empirical relevance of this anomaly.

Stoll and Whaley (1983) are among the researchers who analyze how the length of the investment horizon seems to be also relevant in terms of arriving at different results. They argue that whether investors can earn abnormal returns net of transaction costs by choosing small firms' stock, depends on the length of the investment horizon. They found that for a length as short as one month, the mean abnormal returns net of transaction costs for small firms are negative. As the length of the investment horizon increases (to a year or so) these abnormal returns become positive.

Keim (1983) and Brown, Kleidon and Marsh (1983) contributed to the investigation of the size effect by providing new evidence on its time series behavior. They found that the magnitude and size of that relation are not constant between 1967 and 1969. They report a reversal of the size anomalies for certain years. Their most striking finding, however was that the size effect is seasonal. Keim finds that almost fifty percent of the average magnitude of the size effect over the period from 1963 to 1979 is attributable to January abnormal returns. He further discovers that fifty
percent of the January premium is due to returns during the first week of trading in the year. When this January effect was detected, another wave of articles (e.g., Roll, 1983a; Reinganum and Smith, 1983; Constantinides, 1984) was written attempting to explain it. The following hypothesis was formulated: Some investors sell stock at the end of the calendar year to obtain short term capital losses for income tax purposes, and this behavior will put a downward pressure on the price of securities prior to the end of the year. It follows that this event will superficially increase the price of stocks during the first week of the following year. This hypothesis has been tested and, in most cases, rejected. Constantinides (1984), for example, builds a theoretical model using the existing distinction in the tax system between short term and long term tax rates, and he finds that the hypothesis would be accepted only if an assumption is made where the investors are irrational or ignorant. He argues that the optimal tax trading on medium and high variance stock, typical of small firms has benefits that outweigh even high transaction costs. He concludes that tax trading is not able to explain the small firm effect but predicts a seasonal pattern in trading volume which should cause a seasonal pattern in the stock prices, but not the January anomaly.

As can be expected, many researchers have tried to explain the size effect through transaction costs differentials. Schultz (1983) tried unsuccessfully to track down any
possibility of seasonality in these transaction costs that would explain the January effect. Stoll and Whaley (1983), Schultz (1983) and Roll (1983a) all agree that transaction cost differences for small and large corporations are significant. They note that small firms' stock tends to have lower prices and higher bid-ask spreads but that they cannot fully explain the abnormal average risk-adjusted returns of small corporations.

Schultz (1983) finds that the portfolio of small firms earns risk adjusted excess returns after transaction costs of almost 31% for holding periods of twelve months. This portfolio earns statistically significant excess returns after transaction costs for holding periods as short as one month, January included.

Reinganum and Smith (1983) believe, nevertheless, that for individual traders arbitraging away the gains to small firms' portfolios involves significant losses. They argue that transaction costs to maintain a well-diversified small firms portfolio as compared to a well diversified large firm portfolio, are much larger due to the frequency of delisting among small firms.

Non-stationarity in the risk measure was another attempt by Christie and Hertzel (1981) to explain the size effect. If the estimates assume that risk is constant over time, this understates the risk of levered stock whose value has decreased, since the risk of stock of a levered firm increases
as the stock value decreases. But this alternative hypothesis does not take care of the size effect either.

Klein and Bawa (1977) try to explain the difference in returns of large and small corporations by arguing that lack of information about small firms leads to the higher returns demanded by investors, due to the uncertainty about the true parameters of the return distribution. Of course, this is just a conjecture that happens to be consistent with empirical evidence.

Other potential sources of the divergences in required returns are the various regulatory and institutional constraints on the capital market. As Reinganum and Smith (1983) have said, the "prudent man" rule and related state and federal legislation prevent or inhibit the formation of small firms mutual fund shares and trustees investments in small firms. The effect of this regulation is to eliminate a large group of potential investors in small firm securities and it enhances discrimination against small firms.

Summarizing, the search for an explanation of the fact that small firms earn on average higher risk adjusted returns than large firms has been unsuccessful. Many authors interpret these results as a rejection of the capital asset pricing model as a well-specified model but not as evidence of an inefficient capital market. There have been some attempts to modify the CAPM to account for taxation, transaction costs, skewness preference and so forth, but they have failed
to unveil the missing factor for which size might be a proxy. One article dealing strictly with CAPM related problems is Ho and Stoll’s (1981).

It is clear that an intense search for the economic and statistical causes of the high average returns to small firms have been, and will continue to be a phenomenon that stimulates empirical and theoretical research. The results of this thesis indicate additional factors that might be considered in explaining the small firm anomaly. Even though the model discussed in the paper offers a plausible hypothesis that tries to explain the difference in returns for small and large corporations taking into account differences in transaction costs and equity related agency costs, it too fails to explain the January effect.

As mentioned in Chapter Three, the economic implications of higher cost of equity capital for small corporations are important. It implies that small firms might be forced to reject some risky project because of a negative NPV, while the same project has a positive NPV for a large corporation. By the same token, as noted by Reinganum and Smith (1983), a small firm could raise less capital per unit of productive capacity than an equally risky large firm. Another implication is that mergers with this cost differential are an attractive economic venture for small firms since it will reduce its equity cost of capital as a larger firm.
3. Cost of debt: differences for large and small firms

The purpose of this section is to present the existing empirical evidence related to the yield differential in bonds and the differential cost of debt funds other than bonds, i.e., bank loans, between large and small firms.

Research that is directly applicable is scarce. In part this is due to the fact that our analysis is carried out in risk adjusted (or certainty equivalent) yields.

Most of the literature that analyzes yield differentials takes into account bond rating as one of the factors and this treatment might subsume the size effect. For example, Herschman (1979) referred to small companies as B rated companies (a B rated bond is considered to be speculative). The high yield bonds of small companies are also labeled junk bonds (also because of the speculative ratings on the bonds). In 1978, these high yield bonds brought returns of between 10% and 13.5% at various times, compared to 8% to 9% for AAA bonds (not risk adjusted).

Among the determinants of systematic volatility of corporate bonds, McEnally and Ferri (1982) mention duration, coupon maturity, agency rating, call prospect, quantity outstanding, and sinking fund intensity. Some of their conclusions about the explanatory variables are: first, that except when volatility is defined with respect to the price changes of the long term default-free assets of corporate bonds, the betas are inversely related to the quality of the issue; and
second that bond outstanding in larger quantities and issues with strong sinking funds tend to have lower betas.

In a separate study, Ferri (1978) empirically examined the determinants of bond yield. He mentions, in addition to the factors noted above, the risk of default and the outstanding supply of each type of bond. If two bonds differ in risk of default the riskier bond would have a higher yield since the bond loses earning power and marketability.

The point is that the bonds of small corporations, which generally are rated B and where the quantity issue is directly related to the size of the corporation, usually have a higher beta, and therefore a higher return. The problem here is to detect what fraction of rate differential is accounted for by beta and if there is a fraction of this rate differential accounted for by agency costs. Another possibility is that agency costs might be confused with risk and are accounted for in the beta. Furthermore, part of risk of default, which is highly related to bankruptcy agency costs, is not accounted for in beta, which is systematic risk. Therefore, this risk of default is helpful in explaining the rate differential between certainty equivalent returns of large and small corporations.

Fischer (1959) asserts:

Economists have long agreed that the rate of interest on a loan depends on the risks the lender incurs. But how lenders estimate these risks has been left largely to conjecture (p. 217).
He believes that the risk premium depends on the risk of default and on the marketability of the bond. The risk of default in Fischer’s study is a function of the coefficient of variation of the firm’s net income over the last 9 years (after all charges and taxes), the period of time the firm has been functioning without defaulting to the creditors, and the ratio of the market value of the firm’s equity to the par value of the firm’s debt. The marketability was measured by one variable, i.e., the market value of all publically traded bonds the firm had outstanding. This measure of marketability was chosen because it seems to lead to better predictions of risk premiums, which was the independent variable of the regression. Fischer found that large corporations are able to borrow at a lower cost than small corporations. This is the article that most precisely studies the characteristics with which we are concerned and Fischer’s results are consistent with our theoretical conclusions, namely, that after adjusting for risk, the rate on small corporations is higher than the rate for large corporations.

Dreman (1981) undertook a research program on the subject of why securities of small firms did so well, to find out how sound Banz’ (1981) study is, which concludes that the lowest 20% of stock by market value on the New York stock exchange has done better than other groups over an extended period of time. He found that small capitalization companies did well not because they prospered, as Banz had con-
cluded, but because of precisely the opposite reason. They were in financial difficulties when they were part of the smallest capitalization group. Later on, a good number survived, accompanied by a dramatic increase in price. The main point he makes is that their findings show clearly that investors react more sharply to the financial difficulties of small companies than to the financial difficulties of large ones. The fear of bankruptcy of severe operating problems drastically reduces their price. This is in agreement with the fact that, in general, agency costs of bankruptcy or liquidation are higher for small firms than for large ones.

Cooley and Pullen (1979) have noted that most small businesses use commercial banks as their primary source of borrowed funds. They found that, in general, size of the credit line closely correlates to size of the firm. Their study reveals small businesses as being closely tied to their commercial bankers.

The banking system is subjected to continuous changes by technology, regulations, and competition. Much (1976) argues that "Banks facing rising costs are moving to recover more of the expenses involved in services they offer to commercial customers" (p.57). She states that in some cases smaller firms may be the first to be hit.

Banks are raising fees on some services and have downplayed those which are less profitable. Much cites the Chase Manhattan Bank as an example. It recently moved out of the
venture capital business, which provides the seed money for new businesses, because it was not profitable enough.

At the moment, some bank analysts contend that smaller companies would be squeezed the most by this practice since they do not have the bargaining power of the larger firms. It is the smaller firm that usually deals with only one bank which runs the risk of being declassified as prime borrower.

Although we believe that there is a yield differential after adjusting for risk, Levenson (1962) does not support this idea. Levenson tries to analyze the 1946 business loan surveys of the Board of Governors, which showed that when the size of the borrower is held constant, the interest rate declines steadily with increasing size of the loan. He notes that this might be because of some costs which are fixed and do not vary with the size of the loan. This implies that the cost per dollar of loan decreases as the size of the loan increases, and should be reflected in higher interest charges for smaller loans. The 1946 survey also shows that when the size of the loan is held constant, interest rates declined with increased size of borrower. The alternative explanation offered by Levenson to these empirical observations is that this might be due to greater cost of investigation and administration or to greater risk associated with lending to small borrowers. Also, it may be due to price discrimination by size of borrower. He argues that these observations in the rate differential have lead people to infer that since
large borrowers pay lower rates than small ones, small bor-
rowers are discriminated against in the business loan market.
His study is concerned with a statistical estimate of the
different expense rates incurred by banks in making small and
large business loans.

Levenson calculated the variation in current operation
expenses among a group of banks associated with making loans
to small and large businesses. He tried to hold other sig-
nificant factors constant through statistical procedures. He
found that if interest rates are adjusted for risk, the
remaining differential is justified by cost differences. He
concludes from his results that discrimination against small
borrowers was not being practiced. He believes that cost
differences are an important explanation of the rate differ-
ences charged at commercial banks in loans to small as op-
posed to large businesses.

For a proper comparison with our results, it would be
necessary to analyze what the composition of these adminis-
trative costs is because monitoring, informational asymmetry,
and other debt related agency costs might be included in
them. In that case, the results would still be consistent
with the existence of a rate differential between small and
large corporations, even after adjusting for risk.
4. The relationship between leverage and firm size

The empirical evidence pertaining to the relationship between firm size and the degree of leverage employed by the firm, would be more meaningful if we investigated intra-industry comparisons, since there are definite differences among industries. Among manufacturing firms, for instance, Federal Trade Commision data indicate a tendency for smaller firms to utilize larger proportions of debt, as noted by Brigham and Smith (1967). Table 4.1 is reproduced from Walker and Petty (1978) and updated to include the years 1973-1980. As noted by Brigham and Smith, the data provided by the FTC reveal that long term debt increased with firm size, and that this increase is greatly offset by a decrease in the use of trade credit.

Gupta (1969), in a study where he seeks to analyze the financial ratios with respect to three exogenous variables, industry, size and growth, also finds that the debt to total assets ratio is negatively related to size of the corporation. He further found that the bank loans to total assets ratio is invariably higher in the smaller sized corporations. With respect to the maturity of the debt structure, he notes that it is likely to be shorter for the small corporations than for the large ones. In terms of financial ratios, he finds that, for small firms, the current liabilities turnover is low and the current liabilities to total debt ratio is high.
TABLE 4.1

Leverage Position of Small and Large Companies--Percentage 1967-1980

<table>
<thead>
<tr>
<th>Year</th>
<th>Small Firms</th>
<th></th>
<th>Large Firms</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Debt</td>
<td>Equity</td>
<td>Debt</td>
<td>Equity</td>
<td>Debt</td>
</tr>
<tr>
<td>1967</td>
<td>45.5</td>
<td>54.5</td>
<td>40.2</td>
<td>59.8</td>
<td>46.3</td>
</tr>
<tr>
<td>1968</td>
<td>46.2</td>
<td>53.8</td>
<td>43.0</td>
<td>57.0</td>
<td>46.3</td>
</tr>
<tr>
<td>1969</td>
<td>47.0</td>
<td>53.0</td>
<td>44.5</td>
<td>55.5</td>
<td>46.3</td>
</tr>
<tr>
<td>1970</td>
<td>48.0</td>
<td>52.0</td>
<td>46.0</td>
<td>54.0</td>
<td>46.3</td>
</tr>
<tr>
<td>1971</td>
<td>49.0</td>
<td>51.0</td>
<td>46.0</td>
<td>54.0</td>
<td>46.3</td>
</tr>
<tr>
<td>1972</td>
<td>50.4</td>
<td>49.6</td>
<td>46.8</td>
<td>53.2</td>
<td>46.3</td>
</tr>
<tr>
<td>1973</td>
<td>52.0</td>
<td>48.0</td>
<td>47.6</td>
<td>52.4</td>
<td>46.3</td>
</tr>
<tr>
<td>1974</td>
<td>52.9</td>
<td>47.1</td>
<td>46.0</td>
<td>54.0</td>
<td>46.3</td>
</tr>
<tr>
<td>1975</td>
<td>52.0</td>
<td>48.0</td>
<td>46.3</td>
<td>53.8</td>
<td>46.3</td>
</tr>
<tr>
<td>1976</td>
<td>52.0</td>
<td>48.0</td>
<td>45.8</td>
<td>54.2</td>
<td>46.3</td>
</tr>
<tr>
<td>1977</td>
<td>53.6</td>
<td>46.4</td>
<td>46.3</td>
<td>53.7</td>
<td>46.3</td>
</tr>
<tr>
<td>1978</td>
<td>55.2</td>
<td>44.8</td>
<td>47.0</td>
<td>53.0</td>
<td>46.3</td>
</tr>
<tr>
<td>1979</td>
<td>55.5</td>
<td>44.5</td>
<td>48.6</td>
<td>51.4</td>
<td>46.3</td>
</tr>
<tr>
<td>1980</td>
<td>54.8</td>
<td>45.2</td>
<td>50.0</td>
<td>50.0</td>
<td>46.3</td>
</tr>
</tbody>
</table>

In this analysis, he revealed the following pattern in summarizing the relationship of the various financial variables with respect to corporate size and growth rate. Activity ratios and leverage ratios were found to be inversely related to the size of the firm but are directly related to its growth rate.

This implies that when all small sized corporations are also characterized by a high growth rate, the positive effect of the small size of the activity and leverage ratios is reinforced by the positive effect of a high growth rate on these two ratios. Consequently, small sized corporations with a very high growth rate tend to have very high activity and leverage ratios. Second, when we have the case of large corporations characterized by a high growth rate, the negative effect of large size of activity and leverage ratios will tend to be offset by the positive effect of a high growth rate with the result that the large sized corporations experiencing high growth tend to have moderate activity and leverage ratios. Third, when the large corporations are associated with a low growth rate, the negative effect of size in their activity and leverage ratios is reinforced by the negative effect of the low growth rate and they may have low activity and leverage ratios. These results also support our findings of the relationship between leverage and the rate of growth with size.

In a separate study, Walker and Petty (1978) gathered
random samples of both small and large manufacturing businesses. For their study, Walker and Petty classified firms as small if they had less than $5 million in total assets. They used the compustat data base for sampling large companies. The only constraint on the random selection process was to have similarity of industries for large and small firms. They found that the capital structure for small firms is more debt oriented with a greater tendency for using short term credit. They remark that their sample may have a bias in the sense that the companies analyzed were typically small firms with significant growth potential.

The empirical evidence presented above seems to support our results with respect to the level of debt of small corporations versus large ones. The fact that small corporations tend to use short term debt more than their large counterparts is consistent with small, growing corporations trying to minimize the agency costs related to the possibility of forgoing a profitable investment. These firms have a large percentage of their value represented by growth opportunities. If the debt matures before the investment decision is made, debtholders can undertake the investment if the revenue is greater than the outlay. In this sense, the agency costs arising from forgoing profitable investment opportunities would be zero.
B. Summary and Conclusions

This thesis has contributed to the insights from previous research on capital structure and yield differentials. By analyzing the different effects of agency costs on large and small debt markets, the thesis extends the earlier work of Barnea, Haugen and Senbet (1981a) and Miller (1977).

According to our analysis, the rate differential between the equity of large and small corporations is explained using equity agency costs, flotation costs and the asymmetry of information costs related to equity. For the small firm sector, the debt related asymmetry of information costs together with all the debt agency costs were incorporated in the supply curve following Barnea, Haugen and Senbet's approach.

The analysis carried out in Chapter Two lead us to conclude that when taking all the debt-related agency costs together, the relative agency costs would be greater for small than for large firms at a given capital structure.

In this modified framework, equilibrium occurs for each sector where their respective demand and supply curves intersect. The resulting equilibrium interest rate is higher for the small firm sector. When each individual firm takes the market premia for agency costs based on the aggregate equilibrium into account, several interesting results emerge. The first is that an optimal capital structure exists for each firm. The second is that because of the differences in
equilibrium agency cost premia for large and small firms, small firms are more highly levered than large firms. The third is that in the partial general equilibrium framework, the debt agency costs are borne by the bondholders (this applies to both large and small firm sectors) and the equity agency costs (which are only relevant for small firms) are borne by the outside equity holders as well as the bondholders.

The empirical evidence presented in Section A of this Chapter seems to support most of the results of Chapter Three. The empirical evidence with respect to debt related agency costs appears to bear most directly on the issues raised in this thesis. Among the available evidence supporting the relevance of debt related agency costs in general, one can mention among others Kamma and Trzcinka (1984), Buser and Hess (1983) and Bradley, Jarrell and Kim (1984). In particular, Altman (1984) has added to the empirical support of the relevance of bankruptcy agency costs by estimating both direct and indirect costs of bankruptcy. Furthermore, Castanias (1983) has found that the correlation coefficient between total assets and failure rate is negative and significant. He found that the probability of failure is higher for those lines of business in which firms are smaller on the average, supporting the contention that bankruptcy agency costs are higher for small firms than for large ones.

There have been more theoretical than empirical studies
concerning the relevance of the other debt agency costs, i.e., the incentive to forego profitable investments, the risk incentive associated with leverage and the liquidation agency costs. Further empirical evidence directly concerning the relevance of these agency costs and in particular the differential effect that they have in small and large firms would be a valuable contribution in this area of capital structure and rate differential among different securities which is the primary focus of the present analysis.

There have been very few attempts to empirically test the relevance of the equity agency costs analyzed in Chapter Two. Nevertheless, the attitude of investors towards small corporations with an owner-manager can best be described by Rader, a Wall Street analyst who is a recognized specialist in small companies. Herschman (1977) quotes Rader as saying:

I shy away from companies in which the entrepreneur-founder is still the sole decision-maker with his finger on the trigger. I now insist on companies in which the baton for managing the business has passed from the entrepreneur to a professional management team, because I have found that the bulk of entrepreneurs are not able to cope when their business gets large (p.95).

Further empirical research in this area should focus on the relevance of these agency costs and on the testing of whether they will be able to explain the existing yield differential between stock of large and small corporations.

Another study that has indirectly provided some empirical support to the equity agency costs is the one by Cooley and Edwards (1982). They examined empirically whether mana-
Greater compensation of small firm executives depends on the degree of executive ownership. Their results supported the hypothesis that small business chief executive officers who are sole or majority owners receive larger compensation than those with minority or no ownership. They also found that management salaries are a larger percentage of total assets for smaller firms than for larger firms. The ownership related salary increments appeared financially significant in all the models they used. He gave a tax-reduction explanation to this empirical results but this is just a conjecture, and it might as well be a component of the equity agency cost in the form of excessive pecuniary benefits or a combination of these two conjectures.

In conclusion, further research is called for in order to test directly some of the theoretical implications presented in this thesis. More empirical support would increase the credibility of the hypotheses presented in the analysis, even though our results appear to be consistent with the existing empirical evidence.
V. Bibliography


