INDUSTRY CHARACTERISTICS, AGENCY THEORY, AND THE INTERACTION OF CAPITAL STRUCTURE AND DIVIDEND POLICY

by

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(ABSTRACT)

The literature on agency theory has generally modelled and tested the firm's dividend and capital structure decisions separately. In this dissertation, a model is developed based on agency cost considerations and dividends as a means of controlling equity agency costs, which simultaneously determines the optimal capital structure and payout rate for firms. However, to the extent that alternative, non-dividend mechanisms exist across industries and industry groups that may either diminish or nullify the effect of dividends in controlling equity agency costs, simultaneity is not predicted to be universal but a function of industry characteristics. This central hypothesis is tested on three industry groups: industrial firms, banks and electric utilities. Banks and utilities are regulated. Industrials are not regulated but are subject to other equity agency cost controlling mechanisms like the threat of takeover and incentive-based compensation packages. As hypothesized, the results for industrials show no simultaneity in the subsample where these other mechanisms are present, and simultaneity in the subsample where dividends are the dominant mechanism. For banks and utilities no simultaneity is found since regulation, through its effect on the debt agency cost curve of firms in these industries effectively precludes its occurrence.
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Chapter 1

Introduction

Traditionally, the investment, financing and dividend decisions of the firm have been modelled as independent decisions. In fact, the dividend puzzle has been stated as: “what is the effect of a change in cash dividends paid, given the firm’s capital budgeting and borrowing decisions?”

More current theories of corporate finance, however, recognize interactive nature of these decisions. Easterbrook (1984) postulates that “Dividends exist because they influence the firms’ financing policies, because they dissipate cash and induce firms to float new securities.” In this framework, the paying of dividends induces the issuance of new securities resulting in capital market monitoring and consequent reduction in agency costs. However, the use of dividends as a mechanism to reduce equity agency costs is not itself without a cost. The cost takes the form of underwriter fees and drop in stock prices associated with new equity financing.

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2 Italics in original.
In the signalling based models of Bhattacharya (1977), Miller and Rock (1985), John and Williams (1985), and Ofer and Thakor (1987), cash disbursements in the form of dividends or stock repurchase convey positive information about the firm's prospects and are perceived as 'good news'. The predictions of these models are empirically supported in studies, among others, by Aharony and Swary (1980) and Asquith and Mullins (1983) for dividends, and Vermaelen (1981) for repurchases. These studies report a significant positive market reaction to the announcement of an unanticipated increase in dividends or stock repurchases. However, given cash flow constraints, if dividend increases result in subsequent issuance of equity or dividend reductions, these announcements are received as 'bad news' and have a negative impact on stock prices. An awareness of these results leads Asquith and Mullins (1986) to state: "It should be apparent that decisions concerning dividends, repurchases and equity issues are interrelated. These decisions must be determined jointly to avoid paying the cost inherent in violating the cash flow constraint and reducing dividends and/or issuing equity." Thus, in both the agency cost framework where monitoring benefits are traded off against issuance costs and in the signalling framework where the value of the signal is traded off against issuance costs, dividend and financing decisions are interrelated.

The information asymmetry/adverse selection model of Myers and Majluf (1984) also links the firm's dividend and financing decisions. The model predicts that firms with a high degree of information asymmetry place a higher value on financial 'slack', or internal funds, and have a preference for low dividend payout and high internal equity financing. However, while the agency and signalling theories are consistent with the notions of optimal dividend payout ratios and optimal capital structures, the adverse selection model only predicts a 'residual' dividend and an optimal 'pecking order' of financing.
Although Easterbrook (1984) links the firm's dividend and financing decisions in an agency framework, the literature on agency theory has generally modelled and tested these decisions independently. Rozeff (1982) ignores the (optimal) capital ratio constraint in arriving at a specification for the optimal payout ratio at which the marginal benefit of reduced agency costs through dividend induced capital market monitoring is equal to the marginal issuance cost. Jensen and Meckling (1977) ignore the dividend decision in arriving at the optimal capital structure at which the marginal equity agency cost is equal to the marginal debt agency cost and total agency cost is minimized. Rozeff (1982) tested his specification using proxy measures for equity agency costs and issuance costs on a cross-section of 1000 industrial firms across 64 industries and concluded that the dividend policy of industrial firms was consistent with the agency hypothesis. Crutchley and Hansen (1989) also concluded that for industrial firms both the Jensen and Meckling model and the Rozeff model were valid.

These studies, however, have not specifically examined the simultaneity of optimal dividend and capital structure decisions. Furthermore, by testing the models on a large sample of heterogeneous industries, the studies do not examine the relationship between the nature of industry-specific characteristics and the simultaneity of decisions. To the extent that the dividend mechanism for controlling equity agency costs is expensive and that other, more cost-effective mechanisms (e.g. regulation, takeover market, incentive-based compensation packages and the managerial labor market) may be available to particular industries or industry sub-groups, the dividend decision may not be primarily based on considerations of minimizing equity agency costs. If it is not, then the dividend and capital structure decisions, in an agency framework, will not be simultaneous. Thus, the existence of the simultaneity of these decisions in an agency cost framework is ex-

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4 See Jensen(1986), Fama(1980)
pected to be a function of firm characteristics, in particular, the availability and effectiveness of non-dividend mechanisms for controlling equity agency costs.

The overall approach of this study is the interactive nature of the firm's dividend and capital structure decisions in an agency theoretic framework for a cross section of industries. This objective is in keeping with Asquith and Mullins' (1986) assertion that "...future research needs to focus on the interrelated nature of major financial decisions." The specific objective of this study is verifying the existence of a relationship between industry characteristics and the degree of interaction between these decisions. The research strategy is to:

1. Integrate the models of Rozell and Jensen & Meckling and arrive at a simultaneous equations specification for the dividend payout and capital structure decisions.

2. Test the relationship between industry characteristics and simultaneity by estimating the model separately for a diverse group of industries: the manufacturing industry as a whole, subgroups within the manufacturing industry, the utility industry, and the banking industry.

Given the acknowledged problem of ascribing specific functional forms to debt and equity cost curves, the development of the model, like those of Rozell for dividend payout and Jensen and Meckling for capital structure, is graphical and descriptive in nature. Under the premise that firms have optimal capital structures they try to maintain, agency costs of equity are traded off against the transactions costs of new financing, as in Easterbrook (1984) and Rozell (1982), at various capital structures (debt levels), and the sum of these two costs minimized at all these debt levels. The locus of these minimum sums forms the equity agency cost curve of the Jensen-Meckling framework, in
which the agency costs of debt and equity are traded off and the total agency cost (the sum of debt, equity and transactions costs) minimized. The debt level at which these costs are minimized is the firm's optimal capital structure. This optimal debt level has, corresponding to it a payout rate at which the equity agency and transactions costs were minimized and is the optimal payout rate. That is, dividend policy determines the equity agency cost curve, which when traded off against the debt agency cost curve so as to minimize total costs, determines the optimal debt ratio which immediately determines the optimal payout rate. Thus, the firm's dividend and capital structure decisions are simultaneously determined in an agency-theoretic framework, based on the minimization of total agency costs.

As discussed earlier, simultaneity of the dividend-capital structure decision in an agency framework is, in principle, a function of industry characteristics. Consequently, the characteristics of three industry groups are examined for their effects on simultaneity. In the case of industrials, some subgroups of firms operate where factors such as the threat of takeover and incentive-based managerial compensation packages might serve as alternative mechanisms to align management interests with those of shareholders. To determine whether these factors are indeed significant in diminishing the role of dividends in reducing agency costs we, test for simultaneity of the dividend and capital structure decisions first on the whole sample of industrials and then on subgroups stratified according to the availability of these alternative mechanisms. For the subgroup of firms with a high (above sample average) incentive component in the compensation package and a high takeover threat, measured by the presence of single large outside shareholdings (in excess of 5%), simultaneity is not expected. For the subgroup of firms low in these attributes, the absence of non-dividend mechanisms dictates a more impor-
tant agency rationale for dividends and simultaneity is expected. The empirical results support the hypotheses for both subgroups.

Unlike the industrial firms, electric utilities are regulated and the fact of regulation along with intrinsic differences in the industry characteristics result in equity and debt agency cost curves for utilities that are different from those of industrials. Regulators, as short-term political appointees are agents of ratepayers and are more likely to be responsive to pressure from the ratepayers than to the needs of shareholders. Thus regulation introduces a regulator-shareholder conflict in addition to the manager-shareholder conflict. At the same time, regulation takes away the threat of takeover as a mechanism for monitoring the potentially larger equity agency costs. It is also empirically observed that compensation for utility managers is associated with sales rather than with stock price. Thus compensation packages as a monitoring mechanism are not effective for utilities. Finally, the costs of issuing equity are, at least partially, passed on to ratepayers making the dividend mechanism cheaper for utilities relative to industrials. Overall, regulation increases equity agency costs, reduces the availability of non-dividend mechanisms and makes the dividend mechanism cheaper. It is therefore hypothesized that, for utilities, the dividend decision is driven primarily by considerations of minimizing equity agency costs by inducing capital market monitoring of both managers and regulators at a low cost to shareholders. With respect to debt agency costs, however, the capital investment characteristics of the industry, and the fact of regulation, are likely to render these costs insignificant. Utility managers have a very limited investment opportunity set and therefore have limited opportunity to shift wealth from bondholders to shareholders through underinvestment or through unanticipated increases in asset risk. Further, regulation reduces the potential debt agency costs of bankruptcy. If the debt agency costs are insignificant then, unlike the dividend decision, the utility's capital structure
decision is not based on agency cost considerations, and no simultaneity is expected in an agency framework. The empirical results support the absence of simultaneity and the insignificance of debt agency costs but, unexpectedly, fail to find a significant association between the dividend decision and agency cost variables.

The banking industry too is subject to regulation. A large portion of industry liabilities comprising most of its deposits, are insured by the Federal Deposit Insurance Corporation (FDIC), with the result that the FDIC has a strong interest in ensuring that banks not take undue risk. Several researchers, notably Buser, Chen, and Kane (1981), Furlong and Keeley (1987) and Arshadi (1989) investigate the propensity of banks to make high risk loans, the agency problem that such behavior represents, and the role of capital regulation in controlling it. Buser, Chen, and Kane note that: "...the need to establish regulatory disincentives to bank risk-taking is at the heart of the controversy over the adequacy of bank capital and the ability to close risky banks..." In order to limit managerial incentives to assume high risk levels, the FDIC sets capital standards that banks are obliged to maintain. Bank capital also serves to limit FDIC expected losses by limiting the probability of a bank failure. Since depositors, for the most part, consider their deposits risk-free, any wealth that is expropriated as a result of excessive risk taking by the banks' managers comes from the insurers of deposits, thereby putting the full onus of monitoring on the FDIC. This is exacerbated by the fact that the FDIC cannot directly limit the amount of liability, in the form of deposits, taken on by the bank. Further, banks do not go through a capital market monitoring process when they take deposits because there are no investment bankers or other monitoring bodies involved. The only recourse the FDIC has, then, is to demand a capital level that is some percentage of the banks assets and so limit the bank from taking on more deposits than its capital can safely support. The part played by regulators, however, is not as simple as
it appears at first glance. If we assume that regulators act to maximize their own objective functions, then a conflict can arise between regulators and shareholders when regulators attempt to impose capital levels on banks that will minimize the probability of failure so as to prevent all the externalities that result from such failure while at the same time minimizing the possible loss to the FDIC. Bankers, acting in the interests of shareholders, will not accept arbitrarily high capital levels because this will raise their cost of capital, decrease their capital budget and generally be economically inefficient. This is specifically the problem addressed by Buser, Chen, and Kane. Regulators are aware that the 'explicit' premium they charge is underpriced and raises incentives for bankers acting in the interests of shareholders to take on additional risk. However, in order to protect the depositors and its own insurance reserves, the FDIC charges a contingent 'implicit' premium that is activated in the event the bank, as perceived by the FDIC, has a level of risk unsupported by its capital base. In such an environment, it is entirely conceivable that the incentive to risk-taking by banks on the one hand and regulatory pressure from the FDIC on the other drives capital structure to the extent that the capital structure decision assumes prime importance and the dividend decision becomes secondary to it. Therefore, simultaneity between the dividend and capital structure decision is not expected. The empirical results validate the hypothesis of no simultaneity and show the dividend decision to be dependent on the capital structure decision. In addition and contrary to expectations, the results demonstrate that regulators are ineffective in controlling bankers' propensity to risk-taking.

The rest of this dissertation is structured as follows: The literature pertaining to decision making in an agency framework is reviewed in Chapter 2. A model of simultaneous dividend and capital structure decision making based on the minimization of total agency costs is developed in Chapter 3. Chapter 4 discusses the industry characteristics
of industrial firms, utilities, and banks, and the expected effect of these characteristics on simultaneity. Simultaneous equations methodology is described in Chapter 5. Chapter 6 contains a description of the data, the specific hypotheses and the empirical results. Chapter 7 concludes the dissertation.
Chapter 2

Agency Theory and Financial Decision Making

2.1: Introduction

A *sine qua non* of the modern corporation is the delegation of decision-making authority. The securityholders of the firm, who are the principals, delegate authority to professional managers, or agents. Agency problems arise when conflicts of interest between agents and principals compromise the efficient operation and subsequent value of the firm.

Underlying the analysis of agency problems are two fundamental behavioral assumptions. First, all individuals are assumed to act so as to maximize their own welfare. As a result, the delegation of decision-making authority from principals to agents leads agents to use this authority in actions that promote their own well-being even if these actions are not in the best interests of the principals. Second, individuals are assumed to be rational and capable of forming unbiased expectations of the impact of agency
problems on the future value of their wealth. This means that principals anticipate and take into account the propensity of agents to act in their own self-interest.

The resolution of the agency problem involves aligning the interests of agents with those of the principals. The principals may achieve this by establishing incentives for the agents and by monitoring the actions of the agents so as to limit their aberrant activities. The monitoring process is costly and commensurately reduces the value of the firm. In some situations, the agents may find it worthwhile to expend resources to guarantee that they will not take certain actions that would harm the principals or to ensure that the principals will be compensated if they do take such actions. This expenditure that the agents undertake is called a bonding cost and also serves to diminish firm value. Despite the expenditure by the principals to monitor the agents and that by the agents to bond themselves to actions in the principals' interests, there exists the possibility that the agents' actions may yet diverge from those that would maximize the welfare of the principals. The welfare loss experienced by the principals as a result of this divergence is called a residual loss. Total agency costs may then be defined as the sum of the monitoring expenditure incurred by the principals, the bonding costs incurred by the agents, and the residual loss.

Thus far, the discussion has focused on the agency problem as being one between principals, or securityholders, and agents, or managers, without any distinction being made with regard to differences between securityholders. Securityholders differ in terms of risk sharing depending upon their mode of ownership. In general, the equityholders of a given firm bear more risk than the debtholders of the same firm. Managers are presumed to be delegated authority by equityholders, who bear the residual risk, and are accountable to them. Managers acting in the interests of equityholders have incentives
to make decisions that increase shareholder wealth at the expense of bondholder wealth. Bondholders, in turn, protect their interests through costly financial contracting such as the inclusion of restrictive covenants in bond indentures. The associated monitoring costs give rise to debt agency costs. Thus, in the corporate form of organization, agency relations exist between managers and shareholders and between shareholders and bondholders. One of the foci of the financial theory of agency is this relationship between managers, equityholders and debtholders, particularly in the context of how this relationship affects the optimal financing of the firm. Conceivably, the firm can sell debt and equity in such proportions that the total of all costs arising from the agency problem is minimized. This proportion of debt and equity would then be the firm's optimal capital structure.

2.2: Optimal Capital Structure in an Agency Framework

In their seminal paper on the financial theory of agency, Jensen and Meckling (1976), argue that, agency costs are associated with equity and debt financing and increase with the proportion of equity and debt, respectively. An optimal financial structure for the firm may be arrived at by minimizing the sum of debt and equity agency costs.

2.2.1: Agency Costs of Equity

Under the assumption that the agent behaves so as to maximize his utility from money wages (which are assumed fixed), the market value of the firm, and perquisites or non-pecuniary benefits (which are assumed to be inseparable from the firm), a conflict can arise between the agent and the principal to the extent that the agent, in seeking to
maximize his own utility, no longer maximizes that of the principal (in this case, the equityholders). That is, the agent does not act so as to maximize firm value. If the principal is the sole owner and operator, there is no problem because the costs and benefits are borne by the same person. A problem arises, however, when the owner-operator sells off a part of his shares to outsiders but continues as sole operator (becomes the agent of the outside shareholders). The agent then continues to enjoy the full benefit of additional perquisite consumption but bears only his proportional ownership fraction of the associated reduction in firm value. Rational investors are aware of the incentive of the partial owner to increase perquisite consumption and, upon making unbiased estimates of the cost to them of such an increase, will pass back to the agent, or partial owner, the full burden of these costs in the form of a commensurate reduction in the price they pay for the securities of the firm. The resultant loss in firm value, (a residual loss), is one aspect of the agency cost associated with raising new equity. This loss may be less if either the outside shareholders can monitor the operator, or the operator bonds against malfeasance, as long as the present value of future bonding or monitoring expenses is less than the amount of the original loss. Any consequent loss reduction then accrues to the partial owner-operator.

Another agency cost of equity is the agency cost of free cash-flow proposed by Jensen (1986). Free cash-flow is defined as the funds in excess of those which the firm needs to invest in all positive net present value projects. Conflicts of interest may arise between managers and shareholders regarding the disposition of free cash. Shareholders may prefer the free cash to be paid out in the form of dividends or repurchases, or be used for debt restructuring. However, managers seeking to protect or build their empires to increase perquisites and salaries may invest in negative net present value projects even if these projects diminish stockholder wealth. Managers attempting to convince share-
holders that they will not misuse excess cash can bond themselves by increasing debt financing and raising the debt ratio. This subjects the firm to the discipline of increased fixed debt service costs and forces the paying out of free cash.

Easterbrook (1984) suggests that managers who are not well diversified and have a significant portion of their personal wealth invested in the firm may seek to lower the firm's asset risk or financial risk. In the process, a transfer of wealth will occur from shareholders to existing bondholders who "receive their contracted-for interest, but escape the contracted-for risk." Once again, shareholders perceiving such non-value-maximizing behavior will discount the firm's securities and this loss is an agency cost.

2.2.2: Agency Costs of Debt

The agency problem associated with risky debt financing mainly results from the opportunities of stockholders to expropriate wealth from bondholders. Additionally, the bankruptcy cost associated with debt financing may be viewed as a debt agency cost. Wealth expropriation from bondholders to shareholders may be effected through several mechanisms:

Asset Substitution: Stockholders can expropriate wealth from bondholders by taking on high-risk projects as may best be seen by considering equity to be a call option on the value of the firm with exercise price equal to the face value of debt and maturing when the debt matures. The bondholders may be viewed as buying the assets of the firm and issuing a call option (equity) on these assets. Since, in the framework of an option pricing model, the value of a call option increases with the variance of the cash flows of the underlying assets, stockholders can increase the value of equity, at the expense of
bondholders, by selecting high-risk projects. If two projects have the same systematic risk and, hence, the same market value in a CAPM framework, but different levels of total cash flow variability, rational bondholders will price debt to reflect the cash flow distributions of the riskier project. In this scenario, firm value will remain unaltered regardless of the final choice of project and there is no redistribution of wealth or welfare loss. When the riskier project has a lower market value, however, real (agency) costs are incurred. Bondholders, assuming that stockholders will take the riskier project since this results in a higher stock price, will price debt accordingly, and stockholders, having received a commensurately lower value for the debt issued, will necessarily have to take the lower valued, riskier project since to do otherwise would result in wealth being transferred from stockholders to bondholders with a consequent decline in stock price. The difference in value between the superior project and the inferior one is an agency cost of debt.

Even though wealth expropriation is the final result, the asset substitution discussed above is not the only means whereby stockholders can achieve expropriation. Smith and Warner (1979) mention three additional sources of conflict:

**Dividend Payment:** If bondholders buy a firm's bonds believing that the firm will maintain its current dividend and investment policy, the value of the bonds is reduced if the firm increases the payout rate when the increase is financed by reducing investment in positive net present value projects. In the limit, the firm can sell all its assets and pay a liquidating dividend, leaving the bondholders with worthless claims.

**Claim Dilution:** If the firm sells bonds and the bondholders believe that no additional debt will be issued, the bondholders' claims are reduced if the firm issues additional debt of the same or higher priority.
**Underinvestment:** Myers (1977) proposes that an agency problem with risky debt can arise when managers, acting in the interests of shareholders, forego positive net present value projects. If, based on future opportunities to invest, a firm issues debt now which is entirely supported by the current value of the future investment opportunity, the firm will fail to invest and will default on the debt in all states where the revealed value of the investment is less than the sum of debt and the shareholder’s investment, the project’s positive net present value notwithstanding. To see this, suppose that the firm issues debt at time 0 which matures at time 2, after the market value of investments is revealed at time 1. At time 1 the firm must decide on whether to invest or not. In the absence of debt financing, the firm will accept any project for which the market value net of the investment outlay is positive. But with debt outstanding, stockholders maximize their wealth by investing only if the market value of the investment is greater than the sum of their investment outlay and the debt obligation. Otherwise, it is in their best interests to forego the investment opportunity and default on the debt. Again, bondholders, being rational, will discount the debt to reflect the probability of default on their claims.

Debt does not have to be supported by future investment opportunities for underinvestment to take place. Suboptimal future investment can occur even when debt is issued against currently held assets. To the extent that benefits from future positive net present value investments partly accrue to bondholders in the form of a lowered probability of default, such investments may be foregone despite the fact that they increase firm value. This argument follows from the option pricing framework mentioned earlier. It is in the interests of the stockholders to increase, rather than reduce, the risk of default because this increases the value of the equity at the bondholders’ cost. As before, bondholders will buy debt only at a lower price.
Agency Costs of Bankruptcy: In case of default by the stockholders, if the transfer of ownership to bondholders is costless, the actual possibility of bankruptcy should have no impact on the capital structure decision since it has already been factored into the price bondholders are willing to pay for debt. That is, bondholders, aware of the risk of wealth being expropriated from them to the extent of default and bankruptcy, price debt accordingly. What they do expect, however, is that once the firm is bankrupt, their claims, or the residue thereof, be settled. But it is costly, even impossible, to write contracts that will clearly delineate the rights of all claimants in all contingencies. Thus, bankruptcy costs are a concomitant of the threat of wealth expropriation that results from the stockholder-bondholder or agent-bondholder relationship. The expected value of these costs too will be considered by rational investors in pricing debt, and is an agency cost of debt.

2.2.3: Optimal Capital Structure

From the foregoing discussion, it is clear that agency costs are associated with equity financing and with debt financing and that these costs increase as the proportions of equity and debt, respectively, increase in the financing mix. In this agency cost framework, the firm’s optimal capital structure is one that minimizes total agency costs, these being the sum of the debt and equity agency costs.

In the original Jensen and Meckling (1976) framework, the optimal scale of the firm is determined before the optimal capital structure is obtained. If the owner-manager has insufficient funds to establish the firm on his own, the deficiency determines the amount of external funding needed. However, the owner-manager, being risk-averse, may also not want to tie up all his wealth in the firm. Thus, in seeking to access the benefits of
risk diversification in financial markets, he raises units of external capital until the marginal benefits from diversification equal the marginal costs associated with the agency costs of external capital. At this point, the optimal scale of external financing is reached. Given an optimal amount of external financing, there exists an optimal capital structure (as shown in Figure 1) where the marginal debt agency cost is equal to the marginal equity agency cost and the total agency cost is minimized.

2.2.4: Empirical Evidence

Bradley, Jarrell, and Kim (1984) develop and test a generalized model of capital structure that incorporates both the tax and agency cost arguments. They regress firm leverage on the variability of the firm's operating income, the level of non-debt tax shields, and the firm's advertising and R&D expenditure. The higher the variability of operating income, the riskier the firm, the higher the expected bankruptcy related agency costs of debt financing and, consequently, the lower the firm's debt ratio. Myers (1977) argues that expenses on advertising and R&D are more subject to managerial discretion than others since they create assets that may be viewed as options, which will be exercised or not depending on the firm's well-being. In other words, investors will view firms with high advertising and R&D expenses as being more subject to the debt agency costs of underinvestment. Consequently, the higher the advertising and R&D expenses, the lower the firm's leverage. Non-debt tax shields may be viewed in two ways. DeAngelo and Masulis (1980) propose that, in non-default states, non-debt tax shields substitute for

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5 The interior optimum capital structure depicted in Figure 1 need not exist, however. The implicit assumption in Figure 1 is that the cost functions for debt and equity have positive first and second derivatives, which is a sufficient condition for the interior optimum. If the first derivatives are positive but the second derivatives are either constant or negative, only corner solutions will obtain. A necessary condition for the interior optimum is that at least one of the cost functions is increasing at the margin.
Figure 1. Optimal Capital Structure

AT = TOTAL COSTS
AE = AGENCY COSTS OF EQUITY
AD = AGENCY COSTS OF DEBT
debt tax shields and hence the higher the non-debt tax shield, the lower should be the debt ratio. On the other hand, following Scott (1976) firms with large investments in tangible assets will have large depreciation and investment tax credits (the components of the non-debt tax shield). If debt is secured by these assets, the firm’s borrowing costs will be lower and, consequently, the firm can have a higher debt ratio. Bradley, Jarrell, and Kim’s results validate the agency hypotheses and Scott’s secured debt hypothesis. That is, they find that leverage is negatively related to variability in firm value and to advertising and R&D expenses and positively related to non-debt tax shields.

In a similar study, Long and Malitz (1985) regress leverage on advertising, R&D and capital expenditures. Advertising and R&D each proxy for investment in intangible assets, or discretionary investment, while capital expenditures measure investment in tangible assets. As before, the debt agency costs of tangible asset investment is expected to be lower and those of discretionary investment higher. Long and Malitz’s results validate this hypothesis. They find that R&D and advertising are each negatively related to leverage while capital expenditure is positively related.

2.3: The Agency Rationale for Paying Dividends

Dividends have long puzzled financial economists. Miller and Modigliani (1961) proved dividends irrelevant in a perfect market. In the presence of imperfections such as taxes and issuance costs, reasons against the paying of dividends are more obvious than those in favor. The payment of dividends imposes a tax cost on shareholders, who pay a higher effective tax rate on dividends than on capital gains. Further, given a level of investment capital needed, higher dividend payment induces the issuance of external equity and the
incurrence of the associated issuance costs. The payment of dividends is rational only if it is associated with benefits that offset these known costs imposed on shareholders. Easterbrook (1984) provides an agency cost rationale for paying dividends according to which the issuance of new securities induced by dividend payout results in efficient capital market monitoring which reduces equity agency costs.

Easterbrook proposes two agency-theoretic explanations for dividends. Since, in the agency framework, managers are not perfect agents for principals, the monitoring of managers is one means whereby principals can control managerial propensity to act in ways contrary to the principals' interests. However, monitoring is costly and the question arises of who will undertake the monitoring. In view of the free-rider or collective choice problem, any principal who monitors would bear the full cost of monitoring, but reap gains only in proportion to his holdings. Principals would benefit if there were some entity who monitored managers on the behalf of all the principals. A second problem arises because of the risk-aversion of managers. Managers, with substantial personal wealth invested in the firm are concerned about the total risk of the firm, rather than just systematic risk as investors are, and will therefore choose projects with lower risk and commensurately lower return than shareholders would prefer. In this sense, managers act in the interests of bondholders rather than shareholders. However, the choice of projects is not the only means whereby managers can reduce firm risk. They can also do so by reducing the debt-equity ratio, or financial risk, by financing projects out of retained earnings, which, if unanticipated by bondholders, results in a wealth transfer from the stockholders to the bondholders.

Both the monitoring problem and the risk-aversion problem can be addressed if the firm is constantly in the market for new capital. Easterbrook suggests that paying out divi-
dividends forces the firm to the market to issue new securities. When the firm enters the market for capital, its affairs are reviewed by investment bankers, the SEC and the capital market. Easterbrook points out, however, that dividends need not be the only means whereby the monitoring function is achieved. The repurchase of stock through a tender offer also subjects the firm to monitoring and effectively reduces equity agency costs. As Booth and Smith (1986) point out, financial intermediaries such as investment bankers have a high level of reputational capital invested in their undertaking and, by carefully examining the affairs of the issuing firm, resolve the problem of any informational asymmetry that may exist between existing and new securityholders without fear of moral hazard. In the process they also monitor managerial performance. Investors accept the assessments of investment bankers because the cost of misrepresentation and subsequent loss of reputational capital is too high a cost for the intermediary to bear. In essence, issuing firms are viewed as leasing the name and reputation of the investment banker to certify that the issue price reflects all relevant information on the firm’s affairs.

With regard to the risk-aversion problem and wealth-expropriation, managers can choose which securities to issue, debt or equity, so that the debt-equity ratio is adjusted to the extent that neither bondholders nor shareholders are taking advantage of the other. For example, if stockholders feel that managers are lowering firm risk by accepting less risky projects and transferring wealth to bondholders, managers can pay out dividends and finance investment by issuing more debt so as to increase firm risk, thereby relieving the fears of stockholders.
2.3.1: Optimal Dividend Payout in an Agency Framework

Rozeff (1982) empirically anticipates Easterbrook's agency-based rationale for dividend payout. He proposes that firms pay out dividends in order to reduce the agency costs of equity. However, the paying out of dividends is expensive because the firm then has to go to the capital markets to obtain funds for investment. The firm, therefore, will balance the reduction in equity agency costs with the costs of raising new capital and will arrive at an optimal dividend payout policy such that the marginal reduction in equity agency costs achieved by capital market monitoring is equal to the marginal cost of issuing new securities, and the total equity agency cost is minimized. (Figure 2)

The cost of issuing equity should include, in addition to out-of-pocket expenses and underwriting fees, the negative market response to the announcement of the issue. Myers and Majluf (1984), argue that given asymmetric information between managers and the market, managers acting in the best interests of existing shareholders will issue and invest if, based on their superior information, they perceive the firm to be overvalued. If, on the other hand, managers perceive the firm to be undervalued, they may pass up positive net present value projects rather than issue and invest, so as to prevent windfall gains to new securityholders at the expense of existing shareholders when the information asymmetry is eventually resolved. Rational suppliers of capital will, therefore, always perceive an issue announcement as signalling bad news and will, accordingly, discount the price of the security. This negative announcement effect has been well documented in the literature (see Masulis and Korwar (1986), among others), and constitutes a cost of issuance.
Figure 2. Optimal Dividend Payout Rate

AT = TOTAL COSTS
AE = AGENCY COSTS OF EQUITY
TC = TRANSACTIONS COSTS
Rozell tests his theory by regressing dividend payout on proxy measures of equity agency costs and issuance costs. His equity agency cost variables include insider holding and the number of shareholders. He argues that the larger the insider ownership, the lower the level of monitoring required to align manager and stockholder interests and the lower the consequent payout. However, the more diffuse the stock ownership, the larger the number of stockholders, the greater the collective choice problems in monitoring and so the higher the payout needed to induce monitoring through the investment banking process. This argument follows because if there were a few large outside shareholders, they might more easily influence insider behavior, thereby reducing equity agency costs and leading to a lower optimal payout. Growth and beta are employed as proxies in the regression for the firm's issuance costs. If the firm is growing, it needs financing anyway and does not need dividends as a reason to visit the capital markets, so the higher the growth, the lower the payout. The higher a firm's beta, the greater its risk and the higher its cost of raising external funds. A risky firm will, therefore, conserve internal funds and pay low dividends. Rozell's results validate his hypothesized relationships and support the agency explanations for the paying of dividends.

Rozell's analysis has a couple of flaws. First, in examining the impact of increasing payout rate on equity agency costs and issuance costs he ignores the constraint that the firm may have a preferred capital structure. An increase in payout will, ceteris paribus, affect the capital structure through earnings retention. Second, the proxy measures for issuance costs are unnecessarily 'crude'. Determinants of issuance costs have been directly examined by Booth and Smith (1986) and Bhagat and Frost (1986) and could be used as instruments. These include issue size, reflecting economies of scale, and variance

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6 This is another area where repurchases may have an advantage over dividends. Repurchases not only disburse cash and lead to firm monitoring at possibly lower costs than do dividends, but also possibly lower equity agency costs by reducing the dispersion of outside equity.
of market returns, reflecting information asymmetry and, hence, the announcement effect cost of issuance.

2.4: The Interaction of Dividend and Financing Decisions in an Agency Framework

If the agency rationale for paying out dividends is valid, then firms pay out dividends because they influence financing decisions. In such a framework, capital structure and dividend decisions are jointly made. However, while proposing a theory of optimal capital structure, Jensen and Meckling ignore the dividend decision. Similarly, in arriving at an optimal dividend payout, Rozell ignores capital structure. In Chapter 3 of this dissertation, a model is developed that not only links dividends and capital structure in an agency-theoretic framework, but also shows that these decisions are simultaneously made. The simultaneity is contingent upon the firm's using the (costly) dividend mechanism to control equity agency costs. If, however, alternative and more cost-effective mechanisms exist, reducing or eliminating the need for using the dividend mechanism, then the decisions need not be simultaneous in a pure agency framework. Whether or not the decisions are jointly made is, therefore, an empirical question which will be addressed in this dissertation.

2.5: Alternative Mechanisms that Control Equity Agency Costs

Theoretically, mechanisms exist in the capital and labor markets whereby agency conflicts (from both debt and equity) may be resolved. One method is to unite the interests
of stockholders and bondholders by having each securityholder own debt and equity securities in equal proportions. Thus, any wealth transfer leaves the total wealth of the securityholder unaffected. In such a framework, complete separation of financing and investment obtains and capital structure is irrelevant. Haugen and Senbet (1978) argue that informal reorganization may be effective in costlessly controlling certain debt agency costs. They propose that if bankruptcy is imminent, managers can avoid bankruptcy costs by continually adjusting the capital structure by issuing stock at market prices and using the funds to repurchase outstanding bonds also at market prices. If managers fail to reorganize informally to achieve the new optimal capital structure, outsiders can take over the firm, informally reorganize and capture an arbitrage profit. In this way management is disciplined to reduce agency costs through informal reorganization or face the threat of takeover.

Problems exist, however, that preclude the costless resolution of agency problems by the capital market. One of these is the free rider problem. Some security holders may not tender their shares in an informal reorganization in the hope that others will. The remaining security holders then reap part of the increase in firm value. Since it is in the interests of all security holders to free ride so long as the expected value of their securities is higher subsequent to the reorganization, this method does not work in practice. Another problem hindering costless resolution of agency problems is the value of managerial rights. If a manager owns a part of the firm but retains full operating control (as in the Jensen-Meckling framework), he may be unwilling to give up his share in the firm at the market price because in doing so he also gives up his right to consume on-the-job perquisites. This follows because, if he sells a part of his holding he could lose operating control and be ousted, thereby losing both his position and his perquisites. Other meth-
ods are available that may serve to align the interests of principals and agents and are described below.

*The Managerial Labor Market:* Fama (1980) argues that the managerial labor market can serve to discipline managers if they fail to act in the interests of stockholders. Under the more realistic assumption that managers actually own very small proportions of the firms they manage, monitoring of managers can take place at several levels. From above, the board of directors can scrutinize decision making at the highest level. From below, junior managers can reap rewards by stepping over less competent managers at higher levels. Monitoring also takes place by competing firms. If the managerial labor market functions well, managers will face ex post settling up in the form of adjustments to their future wages and perquisites, and will consequently act in accordance with shareholder wishes. However, as Hirschey (1986) points out, the presence of information asymmetry concerning managerial performance impedes the efficient functioning of the managerial labor market which is not likely to be strong-form efficient.

*Incentive-Based Compensation:* Aligning the interests of agents and principals may also be achieved via incentive based compensation where a part of the agent’s compensation is tied to the value of the firm. Murphy (1985) documents that managerial compensation is significantly positively related to firm stock price performance and growth in firm sales. He contends that past studies that tried to verify this relationship were unsuccessful mainly because of the focus of these studies on non-performance or incentive based measures, as well as econometric problems with missing variables in the cross-sectional analysis. That is, past studies ignored incentive-based compensation such as stock options and deferred compensation and focused only on salary and bonus. Also, by running time series analyses of individual executives and assuming that any omitted
variables remain invariant over time for these individual executives, Murphy finesse the
problem of missing variable bias encountered in cross-sectional analyses by previous
studies. His conclusion is that incontrovertible evidence exists that “corporate perform-
ance, as measured by the rate of return realized by shareholders, is strongly and posi-
tively related to managerial remuneration.” One area of study that conflicts with
Murphy’s findings is the utility industry. As Hansen, Kumar, and Shome (1990), argue,
due to the cost-plus determination of utility cash flows, and the fact that managerial
compensation is tied to sales, an incentive arises for managers to increase sales by in-
creasing costs, even though stockholder income is diminished in the process. For utilities,
studies by Carroll and Ciscel (1982) and Hirschey and Pappas (1981) find a positive re-
lationship between compensation and sales but a negative one between compensation
and stockholder income.

Finally, and in support of Fama’s thesis, Coughlan and Schmidt (1985) report that stock
price performance and subsequent executive turnover are negatively correlated. This
evidence is consistent with the hypothesis that poor performance increases the proba-
bility that top level managers lose their jobs.

The Threat of Takeover: The threat of takeover is another means whereby agents may
be forced to work towards maximization of firm value. Under certain circumstances,
takeovers can occur despite management acting in the best interests of securityholders.
However, how the acquiring firm deals with the management of the acquired firm sub-
sequent to the takeover is dependent upon their performance, and so managers always
have the incentive to act so as to maximize firm value or lose their jobs following a
takeover. Several theories have been advanced to explain takeovers. The differential ef-
iciency theory says that more efficient firms will acquire less efficient firms and realize
gains by improving the efficiency of the acquired firm. Linked to this theory, and to agency theory, is the theory of inefficient management. Inefficient management may be broadly classified as that which, for whatever reason, fails to maximize the value of the firm. Almost anyone taking over such a firm and getting rid of existing management could improve its performance. Theories of operating and financial synergy as reasons for takeovers are motivated by economies of scale or of scope and could lead to takeovers irrespective of the efficiency of the incumbent management. Similarly, market power theories lead to gains from collusion and monopoly effects rather than from any improvement in performance. Although all the above theories are valid reasons for takeover, only managerial inefficiencies and agency problem effects are the focus of this dissertation.

Jensen (1986) proposes that managers of firms with large free cash flows may be reluctant to pay out the excess cash in the form of dividends and instead use it to increase firm size through acquiring other firms regardless of whether they have any expertise in the operation of those firms. Consequently, inefficient operation may bring stock prices down. On the other hand, the knowledge that a firm with free cash flows has the potential to misallocate resources and thus be undervalued will make it a target for takeover by other firms. One way to control the free cash problem is to issue debt. Debt has a fixed cost, interest charges, and will force managers to pay out any free cash flow or face bankruptcy. In the absence of high interest charges, the existence of high free cash flow signifies a lack of discipline imposed by the potential for a takeover.

As mentioned earlier, due to the free-rider problem, in a diffusely-held corporation no one small shareholder has the incentive to monitor the actions of managers. However, Shleifer and Vishny (1986) suggest that the presence of a large minority (outsider or
non-management) shareholder may provide a solution to the problem. In their model, large shareholders could initiate a takeover and gain, after the costs of the takeover, from the increase in share price resulting from the changes in corporate policy brought about by the takeover. Alternatively, third-party takeovers could be facilitated by the large shareholder who is willing to split gains with the bidder. The larger the shareholding of the outsider, the greater the threat of takeover. Also, the larger the holding, the more incentive there is to incur the costs of monitoring that may be compensated by an increase in the value of the individual's holding. That is, the smaller is the free rider problem.

*Regulation:* Regulatory oversight can serve to lower agency costs. However, due to the differing nature of regulation in various industries, the effects of regulation are not uniform, nor do they uniformly lower agency costs. For example, in the banking industry, capital regulation is intended to limit the incentives of management to risk-taking, and so should help primarily to lower the agency costs of debt. In the utility industry, on the other hand, regulation serves to lower equity agency costs by monitoring managers, but, as just discussed in the section on compensation, raises them by giving managers the incentive to raise costs even at the risk of lowering stock price. Both these issues are discussed in greater detail in Chapter 4.

2.6: Industry Characteristics and the Interaction between Dividend and Financing Policies in an Agency Framework

As discussed in the previous section, other mechanisms exist besides dividends that may be used to control the agency costs of equity. A value-maximizing firm will employ all
mechanisms up to the point where the marginal cost of each mechanism used equals its marginal benefit. Consequently, firms will use dividends together with alternative mechanisms to control equity agency costs. However, the availability and efficacy of these alternative, non-dividend mechanisms are likely to vary across industries and industry groups. The simultaneity of the dividend policy-capital structure decision will vary accordingly. This is the central premise of the dissertation, empirically tested by examining the existence of simultaneity in three disparate industry groups: Industrials, Banks, and Utilities. Of these, banks and utilities are regulated while industrials are not. However, some industrial firms may have available other mechanisms such as compensation packages and takeover threats that may serve to align manager-shareholder interests while being more cost-effective than dividends. For a subsample of such industrial firms, simultaneity may not be observed. On the other hand, for firms with low availability or effectiveness of such alternative mechanisms, the dividend mechanism is expected to be predominant in the monitoring of equity agency costs resulting in the simultaneity of the dividend-capital structure decision.

For electric utilities, regulation causes a conflict between regulators and shareholders while simultaneously eliminating the threat of takeover as an alternative non-dividend monitoring mechanism. Compensation packages for utilities are linked to sales rather than stock price performance and prove equally ineffective as monitoring mechanisms. Also, issuance costs are partially passed to ratepayers. Thus, for utilities, dividends have high marginal benefits and low marginal costs and are likely to be the dominant mechanism for controlling equity agency costs. However, the fact that dividends are used to control equity agency costs is not a sufficient condition for simultaneity. The debt agency cost curve must also be considered. Because the fixed nature of asset portfolios eliminates the agency cost of underinvestment and wealth transfer, and regulation mini-
mizes the potential cost of bankruptcy, the capital structure decision of utilities is unlikely to be driven by agency cost considerations and simultaneity between the dividend and capital structure decisions may not be observed.\footnote{For an optimal capital structure to be determined in an agency cost framework, the shapes of either the debt or equity agency cost curve must be such that they permit a trade-off so that an optimum obtains. However, if, for example, the debt agency curve is flat, or not a function of the debt ratio, there will be no trade-off and the capital structure may be a function of the payout rate (i.e., a one way relationship). A similar situation arises if the equity agency curve is dependent on the debt ratio but not on dividend policy. Consequently, there will be no simultaneity (i.e., no two way relationship.)}

Bank regulation, may effectively reduce or eliminate equity agency costs and, through insurance and capital adequacy requirements, affect the debt agency cost curve in such a way as to make the capital structure decision the primary decision. Under such a scenario the dividend decision, in an agency context, becomes secondary and, consequently, no simultaneity is expected for banks.

Detailed descriptions and analyses of the industry characteristics and the related hypotheses regarding simultaneity are provided in Chapter 4. Before these hypotheses are empirically tested, however, a model of simultaneous dividend and financing decisions in an agency-theoretic framework is developed in Chapter 3.
Chapter 3

A Model of Simultaneous Dividend and Financing Decisions

3.1: Introduction

Easterbrook (1984) hypothesized that firms pay dividends in order to induce external financing despite the associated issuance costs. They do so to reduce equity agency costs through the capital market monitoring process that accompanies the issuance of new securities. In such a framework, the dividend and financing decisions are necessarily interactive. Rozell (1982) developed the notion of an optimal dividend payout rate at which the marginal increase in issuance costs equals the marginal reduction in equity agency costs and total costs are minimized. The Rozell analysis, though intuitively appealing, does have certain drawbacks. It fails to incorporate the interactive aspect of the dividend and financing decisions and thus ignores the impact of a choice of dividend payout rate on the firm’s capital structure. Specifically, Rozell ignores the balance sheet
constraint, with the result that he overlooks both, the existence of a preferred capital structure and the effects of capital market monitoring due to the possible repurchase of stock that may be necessary to preserve such a capital structure.

Jensen and Meckling (1976) arrived at an optimal capital structure at which the marginal cost of equity equals the marginal cost of debt and total agency costs are minimized. However, to the extent that the agency rationale for dividends is valid, the equity agency cost curve in the Jensen and Meckling framework is affected by the firm's dividend policy. Thus, in the Rozeff framework, the capital structure constraint affects the firm's dividend policy and in the Jensen and Meckling framework, dividend policy, through its impact on the firm's equity agency cost curve, affects the capital structure decision. The simultaneity in the firm's capital structure and dividend policy is, thus, clearly implied an agency-theoretic framework.

In this chapter, a model of simultaneous dividend and capital structure decisions is developed. Given the acknowledged problems in ascribing specific functional forms to agency cost curves, the model is necessarily qualitative and descriptive in nature. The essential structure is as follows: With the firm's capital structure as a constraint (that is, at a given debt ratio), issuance costs are traded off against reductions in equity agency costs until total costs, which are the sum of equity agency and issuance costs, are minimized. This procedure is repeated for all debt ratios, and a curve is generated which is the locus of all points of minimum sums of equity agency and issuance costs at all levels of debt. This curve, the equity agency cost curve, is then input to the Jensen and Meckling framework from which an optimal capital structure is obtained which minimizes the global total agency cost (that is, the sum of issuance, equity and debt agency
costs). From the equity agency cost curve corresponding to the optimal capital structure, or debt ratio, the corresponding optimal payout rate may then be obtained.

3.2: Total Equity Agency Costs in the Presence of Dividend Induced Monitoring and Capital Structure Constraints

To begin with, this study assumes the existence of both, an optimal payout as well as an optimal capital structure. In the general case, if asset size changes, so will debt and equity to preserve the preferred capital structure. An increase in debt necessitates a visit to the debt market and the incurrence of transactions costs. An increase in equity, however, does not necessarily mean that the firm has to visit the equity market. Whether it does or not depends on its net income (return on assets) and its payout rate. Further, these two variables also contribute to the decision of whether the firm issues or repurchases stock. Consider the following:

At time $t = 0$, let the firm's beginning balance sheet be given by

$$ A = D + E \quad (1) $$

If the firm has a preferred capital structure it wishes to maintain, then at time $t = 1$,

$$ A(1 + g) = D(1 + g) + E(1 + g) \quad (2a) $$

or,

$$ A(1 + g) = D(1 + g) + E + rA - P + N \quad (2b) $$

where,

$A$ = asset size in $S$

$D$ = debt size in $S$

$E$ = equity size in $S$

$g$ = asset growth rate

$P$ = payout in $S$

$r$ = rate of return on assets (i.e. Net Income/Total Assets)
\( N = \text{net new stock in $ (negative in the case of a repurchase)} \)

That is, if the firm strives to keep its capital structure constant at the optimal, in light of asset growth, it becomes necessary that both debt and equity grow at the same rate as the assets. The growth in equity is calculated as the return on assets in dollars, or net income, less the dollar dividend payout plus the proceeds from the issue of net new stock (which may be negative in the case of a net repurchase). Therefore, \( rA = \text{return on assets in $, and } P = prA \) is the payout in $, where \( p \) is the payout rate. Simplifying (2b),

\[
gA = gD + rA(1 - p) + N
\]
i.e.
\[
gE = rA(1 - p) + N
\]  
(3)

3.2.1: The Transactions Cost Curve

Transactions costs are a minimum when \( N = 0 \), and thus

\[
gE = rA(1 - p_0),
\]  
(4)

where \( p_0 \) is the payout rate corresponding to zero net equity financing or minimum transactions cost. Rearranging,

\[
p_0 = 1 - \left( \frac{g}{r} \right) \left( \frac{E}{A} \right).
\]  
(5)

Alternatively, \( rA/E \) may be replaced by \( r' \), the rate of return on the firm's equity and equation (5) becomes:

\[
p_0 = 1 - \left( \frac{g}{r'} \right).
\]  
(6)

In the special case where \( r = g \), transactions costs are minimized when the equity ratio, \( E/A \), equals the retention rate, \( (1 - p_0) \), or, equivalently, when the debt ratio equals the payout rate. At the minimum point, the firm issues only debt, if anything. As the payout rate increases, the firm issues both debt and equity. As the payout rate drops the firm
issues debt but repurchases stock in order to maintain its preferred capital ratio. The issuance costs of equity are likely to be greater than the costs incurred through repurchase because of the negative market response to the issuance of equity and the positive response to repurchases. Accordingly, the transactions cost curve rises more rapidly to the right of the minimum and to a lesser extent to the left of it. The transactions cost curve then looks as drawn in Figure 3. Some transactions costs are incurred even at the cost minimizing payout rate because the firm issues debt in order to maintain its chosen capital structure.

Also, from equation (5), it may be seen that the minimum point moves to the right as the preferred debt ratio rises or equity ratio falls. That is, the payout rate is directly proportional to the debt ratio when costs are minimized. If, at the same time, \( r > g \) then the movement to the right is accelerated. The opposite takes place when \( D/A \) is low or when \( g > r \).\(^6\)

### 3.2.2: Equity Agency Costs

We now turn to the shape of the equity agency cost curve. We know from the shape of the transactions cost curve that transactions costs are minimum when the firm has no equity-related transactions in the financial markets. Consequently, at this point equity agency costs are maximum since capital market monitoring of the firm is at a minimum. As the payout ratio increases for a given debt ratio, the firm is forced into the market to issue new stock and hence undergoes monitoring. Alternatively, as the payout rate

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\(^6\) Note that the foregoing only states what the effects of the levels of \( r \) and \( g \) will be on \( p_0 \). For any given investment policy (i.e., \( g \) constant), \( r \) will fall as debt increases due to the higher interest payments required. Due to the tax subsidy, however, the fall in \( r \) will be slower than the rise in \( D/A \). Consequently, \( p_0 \) moves to the right with increasing debt level.
Figure 3. Transactions Costs and Payout Rate
decreases, again for a given debt ratio, the firm goes to market to repurchase stock\textsuperscript{9} and once again faces monitoring.\textsuperscript{10} We now assume that there are diminishing marginal benefits to monitoring. Thus, as the firm either issues increasing quantities of equity as a consequence of maintaining a high payout rate or repurchases large quantities of equity in keeping with a low payout rate policy, the reduction in equity agency costs derived from more frequent visits to the market falls off. That is, the equity agency curve falls sharply to both sides of its maximum point, but then levels off. Figure 4 shows the relationship between equity agency cost and payout rate for a given debt ratio.

3.2.3: Total Equity Agency Costs

If the equity agency cost curve shown in Figure 4 is superimposed on the transactions cost curve shown in Figure 3 and the two curves summed, we arrive at the total equity agency cost curve in Figure 5. Note that, at a given debt ratio, the vertical location of the curves in cost-payout ratio space is immaterial, since the concern in this study is for the horizontal location of the minimum rather than the actual level of costs incurred by the firm. To the left of $p_0$, as the payout rate decreases and earnings retention increases, the firm repurchases shares to preserve its desired capital structure and, in the process, is subject to transactions costs and capital market monitoring. To the right of $p_0$, as the payout rate increases and earnings retention decreases, the firm issues new shares to maintain its optimal capital structure incurring transactions costs and receiving the benefits of capital market monitoring. The transactions costs associated with repurchases are expected to be lower than with issuance because, as discussed earlier, the

\textsuperscript{9} The implicit assumption here is that repurchase takes place via tender offer so that investment bankers are involved, rather than through the open market, private negotiation or targeted repurchase.

\textsuperscript{10} See Easterbrook, 1984.
Figure 4. Equity Agency Costs and Payout Rate
latter is subject to a negative announcement effect which is an additional cost component. Therefore, the transactions cost curve on the repurchase side should have a lower absolute slope than that on the issuance side. The reduction in equity agency costs are expected to be more effective with repurchases than with issuance because, in addition to the capital monitoring benefits common to both, repurchases reduce the dispersion of outside equity ownership, further reducing equity agency costs. Accordingly, the absolute slope of the equity agency cost curve should be steeper on the repurchase side, to the left of p_o. With these relative shapes of the equity agency cost curve and transaction cost curve, the total equity agency cost curve obtained by summing these curves will have dual minima, with a lower minimum on the repurchase side as shown in Figure 5.

From the preceding argument one might conclude that a repurchase cum dividend policy is optimal strategy. However, the IRS does not permit regular repurchases. The 1986 tax changes have taken away benefits that capital gains hitherto enjoyed over regular income, but there is no indication that the IRS has changed its policy of either disapproving frequent stock repurchases or treating them as dividends. In the face of this restriction on regular repurchases a value-maximizing firm would move to the next best alternative - that of a higher payout rate and stock issuance.\[11\] A comparison of the relative merits of repurchases and stock issuances as monitoring tools would make for an interesting study in its own right but since we are concerned with the simultaneous

\[11\] The recent literature on repurchases is extensive. Most of it favors the information hypothesis as a raison d'être for repurchases. Notably, Vermaelen (1981) and Dann (1981) find that both tender-offer as well as open market repurchases result in significantly positive stock price reactions. Vermaelen (1984) formalizes repurchases into a signaling framework and concludes that adverse managerial incentives, such as takeover prevention, are taken into account by the market when it prices securities after the repurchase announcement. Asquith and Mullins (1986), in comparing dividends and repurchases as signalling mechanisms, conclude that dividends are a means of conveying regular periodic information while repurchases serve as an "extra" bulletin to signal management's belief that the firm's stock is substantially undervalued. Ofer and Thakor (1987), considering only tender offer repurchases, concur with Asquith and Mullins but find that neither dividends nor repurchases dominate the other in all circumstances. Finally, Barclay and Smith (1988) compare dividends and open market repurchases and conclude that, in the presence of information asymmetry, dividends may be a less expensive means of cash disbursement than repurchases.
Figure 5. Transactions, Equity Agency, and Total Costs with Payout Rate
determination of capital structure and dividend policy using agency theory, there is a need for the regular monitoring mechanism of stock issuance rather than the infrequent one represented by repurchases. Therefore, in the remainder of the dissertation we restrict ourselves to the cost curves to the right of the minimum transactions cost point.\footnote{We do not wish to ignore the fact that firms sometimes repurchase stock, issue new stock and even pay dividends, all at the same time. Depending on the firm’s needs at the time, such a move can be accomplished by operating at a point that is a linear combination of the two minima for any given debt ratio. However, such a policy is, at best, infrequently implemented and so we do not pursue its implications further here but leave it for future research.}

3.2.4: The Effect of Debt on Total Equity Agency Costs

In the above analysis, the capital structure was taken as given. The effect of different debt ratios on the shape of the total equity agency cost curve is now considered. As the debt ratio rises (or as the equity ratio falls), we presume that debt financing is employed to purchase the claims of outside equity holders. Thus the diffusion of outside equity ownership falls so that the marginal monitoring benefits of new equity issuance or repurchase become less pronounced, resulting in a less peaked or flatter equity agency cost curve as shown in Figure 6. Furthermore, the level of the total equity agency cost curve falls because of the lower equity agency costs associated with higher debt ratios. At any given payout ratio, the equity agency costs are lower with less diffuse ownership due to increased monitoring. Finally, as we have seen earlier from (Eqn. 5), the minimum transactions cost payout rate, $p_0$, is higher for higher debt levels.

The result of all these effects taken together is that, as debt levels rise, the curves become flatter, move downward and to the right. The minimum point, therefore, occurs at lower total agency costs and at higher payout rates. The transactions cost of issuing a dollar of debt is not affected by the level of debt in the capital structure. At any particular $p_0$,
Figure 6. Equity Agency Costs and Payout Rate with Debt Ratio Changes
the total transactions cost is higher with higher debt ratios reflecting the larger amount of debt that must be issued to maintain the optimal capital structure. Thus there is no significant change in the slope of issuance cost curve, even though its absolute level rises with increasing debt since more debt is issued at the minimum point (Fig 7).

From the foregoing arguments, the locus of minimum total equity agency costs based on the trade-off between dividend-induced monitoring and transactions costs would be downward sloping as debt ratio increased.\textsuperscript{13} The total equity agency cost curve is a function of both the debt ratio and the payout rate. Hence, a three dimensional graph could be used to show the relationship between costs, debt ratio and payout rate. The relationship between the minimum achievable cost and the corresponding debt ratio is depicted in Figure 8. This is analogous to the equity agency cost curve in the Jensen and Meckling framework. Also, the combinations of debt ratios and payout ratios that correspond to the minimum cost points can be graphed as a projection of the curve in Figure 8 into debt ratio-payout rate space. Higher debt ratios shift the curves over in payout space, and thus the minimum points correspond with higher payouts for higher debt as shown in Figure 9.

\textsuperscript{13} The rise in the absolute level of the transactions cost curve can affect the shape of fig. 8. As drawn, the implicit assumption is that the absolute level of the equity agency cost curve in Fig. 7 falls more rapidly with increasing debt than the absolute level of transactions cost curve rises. If this is not so, then at some high debt level it is possible that the curve in Fig. 8 will begin to rise. This does not significantly change anything because an interior optimum capital structure is still obtainable as long as, in some range, the equity agency cost curve in figs. 8 and 10 is falling more rapidly than the debt agency cost curve is rising.
Figure 7. Transactions, Equity Agency, and Total Costs with Debt Ratio Changes
Figure 8. Jensen-Meckling Type Equity Agency Cost Curve Obtained as the Locus of Minimum Total Agency Costs at Different Debt Levels
Figure 9. Projection of the Equity Agency Cost Curve of Fig. 8 into Debt Ratio-Payout Space.
3.3: The Simultaneous Determination of Optimal Capital Structure and Payout Rate

The locus of minimum equity agency costs depicted in Figure 8 now serves as the equity agency cost curve in the Jensen and Meckling (1976) framework for arriving at the optimal debt ratio. The optimal debt ratio is the one at which the marginal (dividend driven) equity agency cost is equal to the marginal debt agency cost and the global total agency cost is minimized. The optimal payout rate corresponding to this optimal debt ratio is now readily obtained from Figure 9. Figure 10 depicts the simultaneous determination of optimal capital structure and payout rate described above.

Note that within the assumptions and the framework of the model just developed, the determination of the optimal capital structure and the optimal payout rate is truly simultaneous, not merely sequential. That is, an equity agency cost curve is derived from a Rozek-type framework in which the sum of equity agency and transactions costs are minimized at all levels of debt. This curve is then combined with a debt agency cost curve in a Jensen and Meckling framework in order to minimize the sum of debt and equity agency costs. The debt level corresponding to the minimum of this total cost is the optimal capital structure. But the optimal debt level has, corresponding to it, a payout rate at which transactions and equity agency costs were minimized for that debt level. Consequently, the optimal debt ratio and optimal payout rate are simultaneously determined. Previous studies 14 that address the relatedness of dividend policy and capital structure only go so far as to say that the two influence each other. None probes the possible co-existence of optima for both financial decisions nor the simultaneous deter-

Figure 10. Determination of the Optimal Payout Ratio once the Optimal Capital Structure has been Determined
mination of both these decisions. A caveat is in order, however. The leitmotif in the development of the simultaneity model has been the cost-effectiveness and efficiency of dividends in controlling equity agency costs. Any other mechanism(s) that either diminishes the power or nullifies the effect of dividends in controlling these costs would necessarily adversely affect the ability of empirical analysis to detect simultaneity. That is, if there are alternative mechanisms that are either superior to dividends or act in conjunction with dividends in reducing equity agency costs, the shape and position of the equity agency cost curve in Figure 8 could change. Agency cost curves may be unrelated to dividend payout due to the use of other more effective or otherwise superior mechanisms. Consequently, to the extent that the model is limited in that it does not endogenize all possible mechanisms, payout rates may not be related to the level of equity agency costs, and in that case simultaneity would not occur. A model that treats all equity agency cost controlling mechanisms endogenously would be an interesting area for future research, but in this study other mechanisms are accounted for by incorporating measures of their use in the empirical analysis to attempt to "hold them constant."

3.4: Summary

Two assumptions drive the model of simultaneity developed in this chapter. First, that an optimal capital structure and dividend payout policy exists to minimize agency costs and transactions costs; second, that dividends are a cost-effective means of controlling equity agency costs. Considering the firm's capital structure, issuance costs are traded off against reductions in equity agency costs until the sum of the two costs is minimized. This procedure is repeated for all debt ratios and a curve is generated which is the locus of all points of minimum sums of equity agency and issuance costs at each level of debt.
This curve serves as the equity agency cost curve in the Jensen-Meckling framework. The trade-off between the equity agency cost curve and the debt agency cost curve that minimizes total agency costs then determines both the optimal capital structure and the payout rate at which the sum of equity agency and issuance costs are minimized.

The model shows that if a firm's optimal capital structure and dividend policies are, in fact, driven primarily by agency cost considerations, then these policy decisions must be interactive and simultaneous. In such an agency-theoretic framework, choosing a dividend policy without consideration of the capital structure (as in the Ross-Easterbrook framework) and/or a capital structure policy without consideration of the impact of dividend policy on equity agency cost (as in the pure Jensen-Meckling framework) will not minimize the global agency cost or maximize the value of the firm. Whether or not particular firms or industry groups do or should make agency-cost-based interactive dividend-financing decisions clearly depends on the efficacy of these decisions in reducing agency costs. The use of dividends to reduce equity agency costs is costly, and as has been discussed in the previous chapter, alternative mechanisms are available in varying degrees of effectiveness for reducing equity agency costs. If these alternative mechanisms, such as choice of compensation packages, the disciplining effect of takeover threats etc., are more effective in reducing equity agency costs than is the dividend mechanism, then the firm's dividend-financing decisions need not be related to equity agency costs or be interactive and simultaneous. This is an empirical question addressed in the following chapters of this dissertation.
4.1: Introduction

The model just developed establishes that, if agency cost minimization is what motivates decision making in the firm, and dividend payout is the predominant policy option available to monitor equity agency costs, then the capital structure and dividend decisions are interactive and the value-maximizing firm must consider them simultaneously. However, as stated in Chapter 2, the finance literature is replete with discussions of alternative mechanisms available to control equity agency costs. These alternative mechanisms could be the managerial labor market, the threat of takeover, incentive-based compensation packages or regulation. In equilibrium, the value-maximizing management is expected to use a mechanism or a combination of mechanisms that is most cost-effective. The mechanism or combination of mechanisms actually used depends on the availability and efficacy of those mechanisms. The availability and effectiveness of mechanisms other than dividends may vary across industry groups depending on the
characteristics of the industry and the economic and regulatory environment in which it operates. It follows, therefore, that the simultaneity of the dividend and financing decisions in an agency-theoretic framework may depend on industry characteristics.

The central objective of this dissertation is to test this particular hypothesis relating industry characteristics to the use of dividends and capital structure to control agency costs. Accordingly, the research strategy is to develop a simultaneous equations model of the firm's dividend and capital structure decisions in an agency framework and to test it on industry groups that differ in their economic and regulatory environments in general, and in the availability of effective non-dividend monitoring mechanisms in particular. The study tests for simultaneity in three diverse samples; the manufacturing industry (or industrials), the banking industry, and the electric utility industry. The industrials are non-regulated and, as a whole, may employ non-dividend mechanisms, or the dividend mechanism in conjunction with other mechanisms, in which case simultaneity may not occur or may not be as readily observable. However, for a particular subset of industrials, these alternative mechanisms may not be available, and therefore dividend policy would be used to control equity agency costs and simultaneity would be expected.

The banking and electric utility industry are regulated and that may affect the use of dividends. Banking industry regulation may be effective in directly monitoring managerial consumption of perquisites and management risk-taking by regulating the amount of equity financing according to the risk characteristics of the bank. Under such an assumption, regulation serves the purpose of monitoring equity and debt agency costs and, therefore, the use of the costly dividend mechanism is unlikely and simultaneity is not expected. The electric utility industry is also regulated but regulation may increase equity
agency costs through the regulator-shareholder conflict in addition to the shareholder-manager conflict. At the same time, utility regulation effectively removes the takeover threat as a viable mechanism for monitoring equity agency costs. The effect of regulation in the electric utility industry is, thus, to increase equity agency costs and reduce the availability of non-dividend mechanisms, suggesting a greater use of the dividend mechanism to control equity agency costs. In this chapter the characteristics of the three industry groups are described along with the associated hypotheses dictated by these characteristics.

4.2: Industry Characteristics and the Simultaneity Hypothesis

The general form of the simultaneous equations with capital structure and dividend payout as the endogenous variables may be expressed as:

\[ \text{POR} = f(\text{EQR}, \text{A}) \]
\[ \text{EQR} = f(\text{POR}, \text{B}) \]

Where \text{POR} and \text{EQR} are dividend payout rate and equity ratio, respectively. \text{A} is a vector of agency variables related to the dividend mechanism for controlling equity agency costs, and \text{B} is a vector of variables related to debt agency costs. For an industry sample in which dividend and capital structure decisions are based on minimizing global agency costs, coefficients of \text{EQR}, \text{POR} and \text{A} and \text{B} are expected to be significant, validating the existence of simultaneity in an agency framework.
4.2.1: Industrials

Industrials are non-regulated and therefore the mechanisms available for controlling agency costs are market mechanisms. As described earlier, the alternatives to the dividend mechanisms that help align agent-principal objectives are the managerial labor market, the market for corporate control, and incentive-based compensation packages. There is likely to be significant cross-sectional variation across the sample of firms and industry groups with respect to the existence and effectiveness of these alternative non-dividend mechanisms. To the extent that this is so, simultaneity in an agency framework is not a universal prediction for all industrial firms. To test for cross-sectional differences of simultaneity, the sample of industrials is stratified according to the prevalence of non-dividend monitoring mechanisms. This study focuses on the alternative monitoring mechanisms that are measurable -- incentive based compensation and the threat of takeover/external monitoring. The incentive component of the managers' compensation package, e.g., performance based bonuses, stock options, etc., is measured for each firm. Firms with above and below average incentive components are classified as having above and below average availability of the compensation mechanism for monitoring equity agency costs.

Measuring the role played by the takeover threat mechanism is difficult because identifying firms that are intrinsically more subject to takeover threats is problematic. Shleifer and Vishny (1986) use the presence of a large minority shareholder as an indication of external monitoring and a takeover threat. Large shareholders can more effectively monitor managers and more easily initiate a takeover if managers' interests significantly deviate from shareholder interests. Firms with minority large shareholdings in excess

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of 5% of the total shares are considered to have a significant availabil
dividend mechanism for monitoring equity agency costs.

Based on the above arguments, two subsamples are identified. Subsample H comprises
firms with high (above average) incentive components in the compensation package and
high threat of takeover, based on large single shareholdings in excess of 5%. Subsample
L consists of firms that are low in both attributes. That is, below average incentive
component and single shareholding below 5%. For subsample H, given the use and
availability of alternative mechanisms, the dividend mechanism may not be prominent.
It is therefore hypothesized that simultaneity does not exist and the coefficients for EQR
and POR are expected to be insignificant. For subsample L, the dividend mechanism is
more likely to be used because of the dearth of other mechanisms, and the dividend-
capital structure decisions are hypothesized to be interactive and simultaneous. The
analysis is repeated for the total sample with an expectation of simultaneity if the ma-
jority of the firms have low usage and availability of alternative mechanisms.

4.2.2: Utilities

Electric utilities are natural monopolies that are regulated to simulate competitive pric-
ing. Regulators can do so by 'allowing' utilities to earn revenues equal to the sum of
operating expenses and a competitive market return on capital. Utilities have dividend
payout rates more than twice that of industrials in spite of their high capital intensity.
Hansen, Kumar, and Shome (1990) point out that utilities resort to equity-financed
dividends. That is, they repeatedly sell large quantities of common stock while simul-
taneously paying out larger amounts in dividends, resulting in large flotation costs and
inflicting potentially large taxation penalties on shareholders. Miller (1987), speculating
on this apparently 'wasteful' policy states that: "Public utility managements have found a policy of high dividends combined with frequent external equity financing to be a useful strategy for forcing regulators to keep utility rates high enough to continue attracting funds from investors." In a similar vein, Smith (1986) suggests that "by paying high dividends, the regulated firm subjects both its regulatory body as well as itself to capital market discipline more frequently." These lines of reasoning clearly imply an agency rationale for the dividend policy of the utility industry. Hansen, Kumar, and Shome (1990) expand on this idea and develop empirical tests of the agency rationale for dividends. They make the following agency-theoretic arguments for the utility industry's dividend policy:

1. The potential equity agency costs for regulated utilities are higher, increasing the need for capital market monitoring. In addition to the shareholder-manager conflict, utilities are subject to a shareholder-regulator conflict. The regulatory agency cost arises because, regulators as short-term political appointees act as the agents of consumers who are the authority-delegating principals. If it is assumed that regulators are subject to political pressure from their principals and, perhaps, have future political aspirations of their own, then regulators may, in the short run, transfer wealth from shareholders to ratepayers by keeping the rates too low. As Miller and Smith have suggested, utilities can subject both managers and regulators to capital market monitoring by paying high dividends which induce frequent visits to the market to raise new capital. If the allowed rates have been kept artificially low, new capital will be available only at exorbitant rates or, in the extreme case, not available at all. This would cause deterioration in the financial soundness of utilities and disruption in services and construction programs and regulators would be perceived as failing to act in the interests of their principals. With respect to managerial agency
costs, regulation has a two-pronged effect. It monitors direct perquisite consumption thereby reducing equity agency costs. On the other hand, the nature of the cost-plus rate of return regulation creates adverse incentives to increase costs and overcapitalize, increasing equity agency costs. Overall, the equity agency costs - managerial and regulatory - are likely to be higher for utilities.

2. Regulation not only increases the overall equity agency costs and raises the need for capital market monitoring, but also, by subjecting acquirers of utilities to regulation, takes away the threat of takeover as an alternative non-dividend mechanism for controlling the shareholder-manager conflict. Furthermore, there is empirical evidence that the compensation of utility managers is positively related to sales rather than stockholder income. Thus, there does not appear to be an alignment of interests between managers and shareholders through the compensation mechanism. Finally, even if the takeover and compensation mechanisms were in place, they would control only the manager-shareholder conflict but be ineffective in addressing the shareholder-regulator conflict.

3. Given high potential agency costs and the non-availability or ineffectiveness of other mechanisms, the marginal benefits of dividends are expected to be higher, relative to industrials. At the same time, to the extent that flotation costs are at least partially passed on to the ratepayers in the regulatory process, the marginal costs of the dividend mechanism are expected to be lower relative to industrials.

From the above arguments it seems highly probable that, for the utility industry, the dividend mechanism is the predominant policy tool for controlling managerial and regulatory agency costs.

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Whereas the equity agency costs are higher for utilities than for industrials, the debt agency costs are expected to be lower. Utility managers do not have discretionary, growth-oriented projects to invest in and, therefore, the Myers' agency cost of underinvestment is less relevant for utilities than for industrials. Further, the debt agency costs associated with potential wealth transfers from bondholders to shareholders, through unanticipated investment risk increases is likely to be insignificant given the very limited capital investment choices of utility managers. Finally, if regulation can be reasonably expected to allow revenues that at least cover fixed interest charges, then agency costs associated with bankruptcy and financial distress are also negligible.\textsuperscript{16}

Overall, the utility industry has high equity agency costs with dividend policy as the primary tool for controlling these costs. It has low debt agency costs which, if insignificant, imply that the capital structure decision is not driven by agency cost considerations. It is therefore hypothesized that the coefficients of vector $A$ variables in equation (1) will be significant, vector $B$ variables in equation (2) will be insignificant, with no simultaneity of the dividend-capital structure decisions though capital structure may be dependent upon dividend policy.

4.2.3: Banks

At different periods in time, the banking industry has been regulated in different ways. The various regulatory requirements have been designed, at least in principle, to address and correct several problems affecting banks. This dissertation focuses on only those

\textsuperscript{16} This raises the question of why different firms in the utility industry have different bond ratings. Arguably, the risk lies in the possibility of an environmental catastrophe, subsequent litigation and delayed or deferred payments. Accordingly, utilities with nuclear generating plants would be riskier than ones with a coal-fired plants. However, this riskiness does not seem to correspond to the risk of bankruptcy. The Three Mile Island plant is still operating.
aspects of regulation that pertain to the agency problem. Specifically, capital adequacy regulation and how it seeks to protect the bank’s depositors against its shareholders (a debt agency problem) is the main concern. Also the role played by deposit insurance, its effect on capital adequacy, the transfer of risk from depositors to the insuring body, and consequently, the agency problem that this engenders are issues relevant to the dissertation.

A large portion of a bank’s liabilities are insured by the Federal Deposit Insurance Corporation (FDIC) with the result that the FDIC has a strong interest in ensuring that banks not take undue risk. Several researchers, notably Buser, Chen and Kane (1981), Furlong and Keeley (1987) and Arshadi (1989) investigate the propensity of banks to make high risk loans, the agency problem that such behavior represents, and the role of capital regulation in controlling it. Buser, Chen and Kane note that: “...the need to establish regulatory disincentives to bank risk-taking is at the heart of the controversy over the adequacy of bank capital and the ability to close risky banks…” In order to limit managerial incentives to assume high risk levels, the FDIC sets capital standards that banks are obliged to maintain. Since depositors, for the most part, consider their deposits risk-free, any wealth that is expropriated as a result of excessive risk taking by the banks’ managers comes from the insurer of deposits, thereby putting the full onus of monitoring on the FDIC. That role of the FDIC, a substitute monitor for depositors, was one of the key features initially instilled in the FDIC.

The FDIC cannot, except through capital regulation, limit the amount of liability, in the form of deposits, taken on by the bank. Further, banks do not go through a capital market monitoring process when they take deposits because there are no investment bankers or other monitoring bodies involved. The only recourse the FDIC has, then, is
to demand a capital level that is some percentage of the banks assets and so limit the bank from taking on more deposits than its capital can safely support.\textsuperscript{17} The part played by regulators, however, is not as simple as it appears at first glance. If it is assumed that regulators act to maximize their own objective functions, then a conflict can arise between regulators and shareholders. Regulators will attempt to impose capital levels on banks that will minimize the probability of failure, prevent the externalities that result from such failure, and minimize the possible loss to the FDIC. Bankers, acting in the interests of shareholders, will not accept arbitrarily high capital levels because this will raise their cost of capital, decrease their capital budget and generally be economically inefficient. This is specifically the problem addressed by Buser, Chen and Kane. Regulators are aware that the "explicit" premium they charge is underpriced and raises incentives for bankers acting in the interests of shareholders to take on additional risk. However, in order to protect the depositors and its own insurance reserves, the FDIC charges a contingent "implicit" premium\textsuperscript{18} that is activated in the event the bank, as perceived by the FDIC, has a level of risk unsupported by its capital base. In such an environment, it is entirely conceivable that the incentive for risk-taking by banks on the one hand, and regulatory pressure from the FDIC on the other, drives capital structure to the extent that it becomes the primary decision. In other words, once a bank has paid the "explicit" premium, it has incentive to increase risk (and debt) until stopped by the regulators. Consequently, the capital structure decision is not dependent on the dividend decision.

\textsuperscript{17} For simplicity, in the discussion it is assumed that the FDIC is the only regulatory body. In reality, however, the Comptroller of the Currency and the Federal Reserve play equally important regulatory roles.

\textsuperscript{18} This takes the form of entry regulation, examination, deposit/withdrawal regulation and disposition of failed banks.
Having argued that regulation can have a significant effect on the capital structure of banks, we now consider how the debt agency cost curve in Figure 10 needs to be modified to account for regulatory effects in the banking industry. Assume that, as far as depositors are concerned, debt is risk free. That is, all the risk inherent in debt is borne by the FDIC. Thus, any debt agency problems exist between the bank's shareholders and the FDIC. The FDIC charges the bank a premium for the insurance it affords depositors. This premium has an explicit and an implicit component (Buser, Chen and Kane, 1981). The explicit component includes the actual monetary amount plus the cost to the bank of subjecting itself to periodic scheduled examinations. The implicit cost component is activated when the examiners perceive that the bank has gone beyond some predetermined level of riskiness. The implicit premium takes the form of increased surveillance of the bank's loan activities, more frequent examinations and other related costs. The thrust of this argument is that, at least in the range of debt ratios where only the explicit premium matters, the agency costs of debt are captured by the premium and, as a result, the debt agency cost curve is flat. If the tax subsidy on debt is taken into account, the debt agency cost curve is actually falling with rising debt. The curve falls until the point where the implicit agency costs are triggered and then begins to rise. The rise is rapid because the implicit costs are assumed to be a penalizing deterrent to excess risk-taking by banks. To the extent this argument is valid, we have a situation where the equity agency curve is falling for its entire length and the debt agency curve is falling and then rising. So long as this rise is more rapid than the rate at which the equity agency curve is falling over the same region of debt level, an interior optimum (or even a range of optima) is assured. (See Figure 11.)

The foregoing discussion has focused on the modification of the debt agency cost curve for banks. This modification essentially has no effect on the equity agency cost curve
Figure 11. Debt, Equity and Total Agency Cost Curves for Banks
except to the extent that regulators are able to monitor bankers' perquisite consumption. However, it has also been argued that bankers will take on as much debt financing as possible up to the point where the implicit costs are triggered. Consequently, the capital structure decision is the primary concern of bankers, and the dividend decision is subordinate to it. Accordingly, it is hypothesized that in equation (1) vector A may be significant depending on how effective dividends are, in the presence of regulation, in controlling equity agency costs but EQR will be significant, while in equation (2) vector B will be significant but POR will not. That is, simultaneity is not expected for the banking industry but POR is expected to be dependent on EQR.

4.3: Summary

The central premise of this dissertation is that the simultaneity of the capital structure and dividend decisions in an agency framework is not universal but a function of the characteristics of firms and industry groups. This is tested on three disparate samples: industrial or manufacturing firms, electric utilities, and banking firms. This chapter describes the salient characteristics of these industries and the a priori hypotheses dictated by these characteristics. In the case of industrials, the availability and effectiveness of non-dividend mechanisms for controlling equity agency costs are expected to vary across firms and, consequently, so is the observance of simultaneity. It is hypothesized that for the sample of firms with high takeover threat, as measured by large single shareholdings, and high incentive-based compensation, simultaneity will not exist. For a sample of firms low in these attributes, the dividend mechanism will be necessary to monitor equity agency costs and simultaneity will be observed.
For the electric utilities, regulation increases the equity agency cost through the addition of the regulator-shareholder conflict and eliminates the takeover threat as an alternative non-dividend monitoring mechanism. Compensation packages of utilities do not appear designed to align manager-shareholder interests. For these reasons the marginal benefits of the dividend mechanism are expected to be high. The marginal cost is expected to be low because of the partial flow through of flotation costs to the ratepayers. From these arguments it follows that dividends are likely to be the dominant mechanism in controlling equity agency costs. The debt agency costs of utilities, however, are expected to be low because the fixed nature of asset portfolios eliminates the agency costs of underinvestment and wealth transfers and regulation minimizes the potential agency cost of bankruptcy. To the extent that the capital structure decision is unlikely to be driven by agency cost considerations, the absence of simultaneity is hypothesized.

Banks' regulation, through requirements on the capital level and insurance, acts to influence the debt agency cost curve. Consequently, the capital structure decision becomes the focus of bankers and the dividend decision becomes secondary. Once again, simultaneity is not expected but capital structure should be a significant factor in the determination of payout rates.

The next chapter describes the econometric methodology used to test for simultaneity. Empirical results are presented and discussed in the following chapter.
Chapter 5

Methodology

5.1: Introduction

In the equations developed from the model and specified in the previous chapter, EQR and POR are endogenous variables and the rest are exogenous or predetermined. The simultaneous nature of these equations makes estimation by Ordinary Least Squares (OLS) unsuitable because of the non-zero correlation between the endogenous variables and the error terms. This correlation makes the OLS estimates both biased and inconsistent, since one of the working assumptions of OLS is that the error terms be independent of the right hand side variables. One way around this problem is to solve for the endogenous variables in terms of the exogenous variables to get the so-called reduced form equations. Once these are obtained, OLS may be used since the right hand side variables are no longer correlated with the error terms. The reduced form parameter estimates may then be used to arrive at the parameters in the original or structural equations. Unfortunately, in our case, we run into the problem of overidentification so
that the reduced form coefficients no longer yield unique coefficients for the structural equations. In general, when the equations are overidentified, the issue of simultaneity is related to the structural rather than the reduced-form equations. To resolve these problems and arrive at structural parameters that are asymptotically unbiased, consistent and efficient we use a procedure called Three Stage Least Squares (3SLS). It is this procedure that is developed below.

5.2: Three Stage Least Squares

The relationship specified by the theory we have developed is

\[ \text{POR} = f(EQR, A) \]  \hspace{1cm} (1)
\[ \text{EQR} = f(POR, B) \]  \hspace{1cm} (2)

The general form of these equations for econometric purposes is

\[ \beta Y + \Gamma X + U = 0 \]

where

- \( Y \) is a \( K \times 1 \) column vector of jointly determined endogenous variables.
- \( X \) is a \( M \times 1 \) column vector of exogenous or predetermined variables.
- \( \beta \) and \( \Gamma \) are \( K \times K \) and \( K \times M \) matrices of unknown coefficients, respectively.
- \( U \) is a \( K \times 1 \) vector of disturbance terms with zero mean and variance-covariance matrix \( \Sigma \).
The major problem with the estimation of such equations using ordinary least squares (OLS) is that the OLS estimates of the parameters in the matrices $\beta$ and $\Gamma$ are both biased and inconsistent because of the non-zero correlation between the endogenous variables and the disturbance terms. That is, $E(YU) \neq 0$ regardless of sample size, so even asymptotic assumptions do not apply. One method of solving this problem is to find other variables, or 'instruments', to replace the endogenous variables in such a manner that the instrumental variables are highly correlated with the endogenous variables they replace, but not correlated with the error terms. A commonly followed procedure is to use the exogenous variables as instruments since, by assumption, their exogeneity renders them uncorrelated with the errors. However, in a case where there are several available exogenous variables and few endogenous ones needing replacement, the question arises as to which exogenous variables to choose. All are usually acceptable and each one will usually give a different parameter estimate.

Another potential problem with simultaneous equations models is the identification problem. There are two aspects to this problem. First, if the equations are not identified simultaneous estimation by any means is impossible. Second, even if the equations are identified, the problem of overidentification can arise where the structural parameters cannot be uniquely determined from the reduced form parameters. That is, if the set of structural equations is given by

$$\beta Y + \Gamma X + U = 0$$

then the endogenous variables can be solved in terms of the exogenous variables to give the so-called reduced form equations

$$Y = \Pi X + V$$

19 The exogenous variables most highly correlated with the endogenous ones are obviously the best ones to choose.
where $\Pi$ is a $K \times M$ matrix of reduced form coefficients and $V$ is a $K \times 1$ vector of errors such that $\Pi = -\beta^{-1} \Gamma$ and $V = -\beta^{-1} U$, and $\beta$ is assumed non-singular.

Identification is determined by whether the elements of $\Pi$ will yield unique, multiple, or no estimates of the elements of $\beta$. This problem needs to be addressed before estimation is undertaken. Two conditions are available to determine, a priori, whether the structural equations are identified. The first condition may be described as follows:

1. Set the equations in rows with the endogenous and exogenous variables forming the columns. Mark a 1 if a variable occurs in an equation and a 0 if it doesn’t. Then, to determine whether a particular equation is identified,

2. Delete the row for that equation,

3. Pick up the columns corresponding to the elements that have zeros in that row.

4. If from this array of rows and columns (g-1) rows and columns can be found that are not all zeros, where $g$ is the number of endogenous variables, then the equation is identified. Otherwise it is not.

This condition is called the rank condition and it is both necessary and sufficient for identification. However, the rank condition only indicates whether the equation in question is identified or not. It says nothing about whether the equation is exactly identified or overidentified. The second, or order, condition determines whether the equation is exactly identified or overidentified. The order condition says that if $g$ is the number of endogenous variables in the system and $k$ the total number of variables (both endogenous and exogenous) missing from the equation under consideration then:
• If \( k = g - 1 \), the equation is exactly identified

• If \( k > g - 1 \), the equation is overidentified

• If \( k < g - 1 \), the equation is underidentified.

The order condition is necessary but not sufficient and so it is possible for an equation to appear identified under the order condition but underidentified under the rank condition. The proper procedure to follow is to check for identification using the rank condition and then, if the equation is identified, to check whether it is exactly identified or overidentified using the order condition. Once the identification problem has been resolved, estimation can proceed.

If it is determined that the system of equations is exactly identified (i.e. each equation is exactly identified), then OLS may be used on the reduced form equations \( Y = \Pi X + \epsilon \) to obtain the reduced form parameters in \( \Pi \). From this, the parameters in \( \beta \) can be uniquely determined.\(^{20}\) However, when equations are overidentified, the reduced form coefficients yield multiple estimates of the structural parameters and there is no way of telling which of these, if any, is the right one.

In this study, both equations are overidentified and procedures other than ILS must be used to estimate the structural parameters. To this end, two methods are available:

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\(^{20}\) This procedure is called Indirect Least Squares (ILS), and is seldom used because it is computationally cumbersome due to the requirement of successive substitution to reach the reduced form coefficients, even when there are relatively few parameters in the structural equation.
1. Single equation methods that estimate each equation separately, even when interdependence has been recognized. These methods yield consistent estimates, but ignore some of the available information.

2. Full information methods, where all parameters are estimated simultaneously and all information is utilized. These methods give consistent estimates that are more efficient than those given by the limited information methods.

The estimation procedure used in this study is Three Stage Least Squares (3SLS). This is one of the available "full information" procedures that is conceptually and computationally simple. We start with the general equation:

\[ \beta Y + \Gamma X + U = 0 \]

where \( E(XU) = 0 \) because the Xs are assumed to be predetermined, but \( E(YU) \neq 0 \). The first stage of the 3SLS procedure is identical to that of a limited information procedure: Two Stage Least Squares (2SLS). The \( Y_i, (i = 1...K) \) are regressed on all the predetermined variables \( X_i, (j = 1...M) \). That is we run the regressions

\[ Y_i = \alpha_0 + \alpha_{i1}X_1 + \alpha_{i2}X_2 + \ldots + \alpha_{im}X_m + U_i \]

for all \( Y_i, (i = 1...K) \).

Once the parameters \( \hat{\alpha}_{ij}, (i = 1..K, j = 1..M) \) have been obtained, the \( \hat{Y}_i \) are computed as

\[ \hat{Y}_i = \hat{\alpha}_0 + \hat{\alpha}_{i1}X_1 + \hat{\alpha}_{i2}X_2 + \ldots + \hat{\alpha}_{im}X_m \]

That is,

\[ Y_i = \hat{Y}_i + \hat{U}_i \]
But now, $E(\hat{Y}U) = E(X\hat{\alpha}U) = \hat{\alpha}E(XU) = 0$.

Note that this procedure chooses as the instruments a weighted average of the available predetermined variables, thereby solving the problem mentioned earlier of which exogenous variables to choose as instruments. Furthermore the weights are chosen so as to maximize the correlation between the instruments and the endogenous variables. Thus, the 2SLS estimator is an instrumental variables estimator where the instrument chosen, by maximizing its correlation with the endogenous variable under consideration, indirectly minimizes the variance of the estimated parameter. Once the fitted values of the endogenous variables have been computed, these fitted values are used to replace the right hand side endogenous variables in the structural equations. The parameters for the variables on the right hand side of each equation, both endogenous and exogenous are then determined by running an OLS regression for each equation. These parameters can be shown to be asymptotically consistent provided that $X$ contains truly exogenous predetermined variables.

2SLS is a perfectly acceptable procedure for estimating the parameters of overidentified simultaneous equation systems. However, in 2SLS no recognition is taken of the excluded endogenous variables - those not appearing in the particular equation but appearing in other equations. That is, all the information in the predetermined variables is used, but that in the endogenous variables not appearing in a particular equation is not when the parameters for that equation are being estimated. To remedy this shortcoming, full information methods have been developed, which estimate all the structural

---

21 2SLS presents no computational problems when the reduced form of the model has less than 20 predetermined variables.

22 If the equations contain lagged endogenous variables as predetermined variables and the errors are autocorrelated, the 2SLS estimates cannot be shown to be consistent.
equations simultaneously. Since the estimation is based on more information, the estimates are not only consistent but also more efficient than those obtained by limited information methods.

The full information procedure used in this study is the Three Stage Least Squares (3SLS) method. 3SLS involves the application of generalized least squares (GLS) estimation to the system of equations that have already been estimated using 2SLS. Once the 2SLS parameters are available, the residuals of each equation are used to estimate the cross-equation variances and covariances (i.e. the variance-covariance matrix of the error terms). The 3SLS procedure does not make the standard assumption that the variance-covariance matrix, $\Sigma$, is diagonal, thus allowing for autocorrelation in the sample, as well as heteroscedasticity, if the error variances are non-constant. The presence of autocorrelation and heteroscedasticity affect the efficiency of the parameter estimates because the variance of the estimates increases. The GLS procedure specifically takes into account the existence of a non-diagonal $\Sigma$ and the GLS estimator is more efficient than the OLS estimator. In the third and final stage GLS parameter estimates are obtained. The 3SLS procedure can be shown to yield more efficient parameter estimates than 2SLS. In the special case where all cross-equation covariances are zero, 3SLS and 2SLS yield identical estimates.
Chapter 6
Data and Results

6.1: Introduction

This chapter contains a description of the equations and of the measurement of the variables used in the study - the endogenous variables POR and EQR and the variables in the vectors A and B - as well as results of regressions from the simultaneous equations model developed in Chapter 3. Ordinary Least Squares estimates of the POR and EQR specifications based on Rozell (1982), and Bradley, Jarrell, and Kim (1984), but modified to accommodate the model in Chapter 3, are also reported.

Most of the data used in this dissertation is drawn from the COMPUSTAT database. For the industrials and utilities, the Industrial COMPUSTAT is used and for banks, the Bank COMPUSTAT. Other major sources for data were Value Line Investments Survey and Proxy Statements. Some specialized data was obtained from sources such as Salomon Brothers' regulatory ranking, Forbes magazine, Corporate Data Exchange...
(CDE) database, the Registered Offering Statistics (ROS) tape and from Newport Associates' BancBase 1. The sample for the industrials is a pooled sample of year-end data for 1986 through 1988. Pooling was carried out after verifying time stationarity of the estimates and thus increased sample size and allowed separation of the industrial data based on the presence, or lack thereof, of alternative equity-agency-cost-controlling mechanisms such as incentive-based compensation and the threat of takeover. A Chow test was carried out to ascertain whether the regression coefficients of the individual years, 1986 through 1988, belonged to the same structure. The null hypothesis that the estimated coefficients belonged to the same structure could not be rejected at the 5% level in the industrial sample. For utilities, however, the null hypothesis was rejected and hence the results are reported for each of the years 1986 through 1988. In the case of banks, data on some variables were available only from 1986 onwards, and since no averaging could be carried out for those variables except for 1988 (three year average of 1986, 1987 and 1988 data), results are reported for 1988 only. In any event, regulatory policies on capital requirements that became fully effective only in 1986 would probably have precluded coefficient stability during the years 1986 through 1988.

The rest of this chapter is divided into sections according to industry. Each section is self-contained in the sense that the measurement of variables, their hypothesized signs, regression results and the discussion of results is contained within the section.
6.2: Industrials

6.2.1: Model Specification and Variable Measurement

The general simultaneous equation specification for industrials developed earlier is as follows:

\[ \text{POR} = f(EQR, A) \]
\[ \text{EQR} = f(POR, B). \]

EQR and POR are the endogenous variables. The exogenous variables in the vector A are based upon equity agency cost proxies derived from Rozeff (1982), transactions/flotation cost proxies from Booth and Smith (1986) and the minimum transactions cost point developed in the model in Chapter 3. The exogenous variables in the vector B are based upon debt agency costs proxies derived from Bradley, Jarrell, and Kim (1984). Accordingly, the full industrial model is specified below:

\[ \text{POR} = f(EQR, \text{INS}, \text{LNSH}, \text{VRET}, \text{LNAST}, \text{GR}) \]
\[ \text{EQR} = f(POR, \text{ADR}, \text{SIGMA}, \text{NDTS}). \]

where
- \text{INS} = \text{Fraction of insider holding},
- \text{LNSH} = \text{Log of the number of shareholders},
- \text{VRET} = \text{Variance of stock returns},
- \text{LNAST} = \text{Log of asset book value},
- \text{GR} = \text{Ratio of forecast growth in equity to forecast return on equity},
- \text{ADR} = \text{Ratio of advertising and R&D expenses to sales},
- \text{SIGMA} = \text{Earnings volatility},
- \text{NDTS} = \text{Non-debt tax shield}.
The primary industrial sample is comprised of firms drawn from the S&P 400 firms on the INDUSTRIAL COMPUSTAT (Filecode 11). The final (pooled) sample is considerably smaller than the expected 1200 observations across three years because the sample is the intersection of the various databases for which there were no missing values for any variable. The final sample has 362 observations. The rationale behind these variables, their measurement and expected sign is discussed below.

POR - the target dividend payout rate: This is the dependent variable in the first equation and an independent variable in the second equation of the simultaneous equation system. POR is measured as the ratio of the five year arithmetic average of a firm's dollar dividend payout divided by the five year average of income available to common stockholders. Since this is a pooled sample, dividends for years 1982 through 1986 are averaged to obtain the target rate for 1986; similarly, 1983 through 1987 are used for 1987 and 1984 through 1988 for 1988. This method of measurement is similar to that used by Rozell (1982), though he averages over seven years. If a firm had negative earnings in a given year, the payout ratio for that year is undefined. In the case of negative earnings, the measurement period is extended backwards for up to two years. If, including these additional two years, less than five valid observations were obtained for averaging, that firm is eliminated from further consideration. For industrials and utilities, POR is the five year sum of COMPUSTAT #20 divided by the five year sum of (COMPUSTAT #18 - COMPUSTAT #19). From the model developed in Chapter 3, POR and debt ratio should be positively related. Therefore, POR is expected to be negatively related to EQR in the second equation, if simultaneity exists.

EQR - the firm's equity ratio: This is the dependent variable in the second equation and an independent variable in the first. Following Bradley, Jarrell, and Kim (1984), EQR
is measured as the 20-year average of the market value of equity over the sum of the market value of equity and the book value of long term debt. Again, since the sample is pooled, years 1970 through 1986 are used to calculate EQR for 1986; similarly, 1970 through 1987 are used for 1987 and 1970 through 1988 are used for 1988. The data comes from the 1989 COMPUSTAT database, so the averaging process always has less than 20 observations - 17 for 1986, 18 for 1987 and 19 for 1988. EQR is the product of COMPSTAT #24 and Compustat #25 divided by the sum of the same product and COMPUSTAT #9. Following the argument for POR above, EQR is hypothesized to be negatively related to POR in the first equation in the presence of simultaneity.

INS - the percentage insider holding: Rozell uses the percentage of stock held by insiders as reported in Value Line in his study. A more accurate measure is used in this dissertation. The actual number of shares held by insiders in the given year is obtained from the proxy statement for that year and this number is then divided by the number of shares outstanding during that year (COMPSTAT #25). The higher the insider holding, the lower the agency costs of equity and the less the need for dividends as a means to controlling these costs. Consequently, INS is expected to be negatively related to POR.

LNSH - The logarithm of the number of shareholders: This variable is taken directly from the COMPUSTAT database in the form of the number of shareholders (COMPSTAT #100). The natural log is then taken to correct for scale effects. The greater the number of shareholders, the greater the dispersion of ownership, the less effective the monitoring, the higher the agency costs of equity, and the higher the dividend payout needed to induce capital market monitoring. Thus, LNSH and POR are expected to be positively related.
VRET - the variance of stock returns: This is one of the two instrumental variables that proxy for flotation costs, the other being LNAST, the log of asset size. The daily return stream for a period of five years preceding and including the year in question is drawn from the CRSP tapes and the variance calculated. Note that this is the variance of total returns. For example, for 1986, the return stream used runs from the beginning of January 1982 to the end of December 1986. If less than fifty observations for a firm were available during this period, the firm was dropped from consideration. Following Booth and Smith (1986), the larger the variance of returns, the larger the degree of information asymmetry and the greater the effort expended by investment bankers in resolving this asymmetry. Consequently, the greater the cost to the issuing firm. Thus VRET is a proxy measure for issuance costs and is expected to be negatively related to POR.

LNAST - the logarithm of asset size: This is the natural log of a five year average up to and including the year in question and is a second proxy for issuance costs. Booth and Smith (1986) use the log of issue size and hypothesize that, due to scale effects, issuance costs will be negatively related to size. However, it is also arguable that information asymmetry and, consequently, issuance costs will be lower for larger firms simply because of greater trading activity in large firm securities. Again, due to scale effects, it is unlikely that the dependent variable is linear in raw assets, hence the log transformation. For example, LNAST for 1986 is the natural log of (the sum of COMPSTAT #6 from 1982 through 1986 divided by 5). LNAST is expected to be positively related to POR.

GR - ratio of forecast growth in equity to forecast return on equity: Forecast equity growth is taken directly from the Value Line Investment Survey and is the five year forecast. Thus, for 1986, the forecast growth is for the period 1986-1991. The forecast return on equity is also taken from Value Line and calculated as the quotient of five-year
forecast earnings per share and book value per share. 21 From the model in Chapter 3, the minimum transactions cost payout rate is one less the ratio of growth to return on equity. Thus, GR is expected to be negatively related to POR.

ADRD - the firm's advertising and R&D expenditure: As in Bradley, Jarrell and Kim, this is the sum of annual advertising plus research and development expenses divided by annual net sales. Due to the limited availability of these items on the COMPUSTAT tapes and in view of the smaller sample size, a five-year averaging period is used here instead of the ten years used by Bradley, Jarrell and Kim. Thus ADRD = (COMPUSTAT #45 + COMPUSTAT #46)/ COMPUSTAT #6, where both numerator and denominator are five-year averages. As before, 1982 through 1986 is used for the 1986 average. This variable is unavailable for banks and utilities. According to Myers (1977) advertising and R&D expenses are discretionary. They create assets that may be viewed as options, which will be exercised or not depending on the firm's financial well-being. Thus the debt agency costs associated with these assets are higher than those for other assets. Therefore ADRD is expected to be negatively related to debt levels and positively related to EQR.

SIGMA - firm volatility: As in Bradley, Jarrell, and Kim, SIGMA is calculated as the standard deviation of the first difference in annual earnings before interest, depreciation and taxes over a 20-year period, divided by the average value of total assets over the same period. That is SIGMA = (The standard deviation of the first difference of (COMPUSTAT #13 and COMPUSTAT #61)) over 20 years divided by average of COMPUSTAT #6 over 20 years. SIGMA is a measure of the firm's operating risk and

21 Note that it does not matter whether growth in assets or growth in equity is used in the calculation of GR. If the model is correct, and firms seek to maintain their preferred capital structure, then asset growth, equity growth and debt growth are the same thing.
hence a proxy for potential bankruptcy-related agency costs. It is expected to be negatively related to debt and positively related to EQR.

NDTS - level of non-debt tax shields: This is a non-agency related variable and is included to eliminate the possibility of missing variable bias. Again, as in Bradley, Jarrell, and Kim, the level of non-debt tax shields is calculated as the ratio of the 20-year sum of annual depreciation plus investment tax credits divided by annual earnings before interest, depreciation and taxes over the same period. That is, \( \text{NDTS} = \frac{\text{20-year average of COMPSTAT #14 and #51}}{\text{20-year average of COMPSTAT #13 and #61}} \). This variable is unavailable for banks. The relation between NDTS and EQR may be positive or negative. According to DeAngelo and Masulis (1980) non-debt tax shields substitute for debt tax shields and so the higher NDTS is the lower should be the debt ratio and the higher EQR. Following Scott (1976) firms with large investments in tangible assets will have large depreciation and investment tax credits, leading to large non-debt tax shields. Debt secured by these assets will be less risky and the firm can have a higher debt level. Consequently, NDTS is expected to be negatively related to EQR. The issue can only be resolved empirically.

To test the main hypothesis of the study that the existence of simultaneity is a function of industry characteristics, the total sample is separated into two subsamples on the basis of the availability of non-dividend mechanisms for controlling equity agency costs. The non-dividend mechanisms considered are threat of takeover and incentive-based compensation package. Firms with an outside shareholder with above 5% stock ownership and incentive-based compensation above the sample mean are placed in the high subsample. Firms with outside stockholders with less than 5% stock ownership and incentive-based compensation below the mean are placed in the low subsample. As dis-
cussed in Chapter 4, simultaneity is expected for the low subsample but not for the high one. The measurement of the two separating variables is described below.

TKE - threat of takeover: All stockholders who own more than 0.2% of firm stock for Fortune 500 companies are mentioned in the CDE Directory. Firms with a single stockholding in excess of 5% were included in the high subsample and the remaining in the low subsample.

COMP - incentive based compensation package: This variable is taken from the annual survey by Forbes magazine and is calculated as total compensation to the firm’s top executive less the salary component, the difference divided by total compensation. This fraction is then the incentive-based component of compensation. Firms with above average incentive component are included in the high subsample and the rest in the low subsample.

6.2.2: Results and Discussion

Pooled Sample

Table 1 reports summary statistics of the variables used in the regression with the pooled sample. Table 2 contains the results of the various pooled regressions. Panel A contains OLS results of the dependent variable, POR, regressed on variables that proxy for the equity agency problem, issuance costs, and the minimum transactions cost payout rate. Except for the coefficient on LNAST, which proxies for issuance costs and is insignificantly different from zero, all the coefficients are significant and have the hypothesized
sign. That is, the modified Rozeff hypothesis is validated and, in addition, the variable controlling for the minimum transactions cost payout is significant.

Panel B contains the results of EQR regressed on variables that proxy for the agency costs of debt. The regression equation is almost identical to the one used by Bradley, Jarrell, and Kim, the only difference is that the equity ratio is the dependent variable instead of the debt ratio. SIGMA is the only variable that is insignificant. ADRD is significant and has the expected sign. NDT5 could, ex ante, have either sign depending on whether the arguments of DeAngelo and Masulis (1980) or Scott (1976) were being validated. NDT5 has a significant negative coefficient, affirming Scott’s theory24.

Panel C reports the results of the 3SLS regression. All the exogenous variables have the same signs and significance as they did in the OLS regressions in Panels A and B. However, the coefficients on both endogenous variables, POR and EQR, are insignificantly different from zero. This is not contrary to what was hypothesized in the empirical framework in Chapter 4. The dividend and capital structure decisions, in an agency framework, appear unrelated for industrial firms as a whole; however, the argument of simultaneity was predicated on the dividend mechanism being available for controlling equity agency costs, holding other mechanisms constant. The use of other mechanisms may also vary across firms, and unless the presence of these alternative mechanisms is controlled for, simultaneity between dividend payout and equity ratio may not be found. The evidence of the regression does indicate, however, that firms do use dividends, at least to some extent, to control the agency costs of equity. The agency and issuance cost variables have significant coefficients indicating that the equity agency cost problem is

Table 1. Summary Statistics for Industrials: Pooled Sample

\[ N = 362 \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.8223</td>
<td>0.1276</td>
<td>0.4439</td>
<td>1.000</td>
</tr>
<tr>
<td>POR</td>
<td>0.4153</td>
<td>0.2427</td>
<td>0.0473</td>
<td>1.954</td>
</tr>
<tr>
<td>INS</td>
<td>0.0508</td>
<td>0.0859</td>
<td>0.0006</td>
<td>0.4921</td>
</tr>
<tr>
<td>LNSH</td>
<td>10.214</td>
<td>1.1535</td>
<td>8.0497</td>
<td>14.786</td>
</tr>
<tr>
<td>VRET</td>
<td>0.3843</td>
<td>0.1318</td>
<td>0.1377</td>
<td>1.159</td>
</tr>
<tr>
<td>LNAST</td>
<td>7.933</td>
<td>1.0856</td>
<td>5.0066</td>
<td>11.385</td>
</tr>
<tr>
<td>GR</td>
<td>64.764</td>
<td>33.508</td>
<td>-68.88</td>
<td>349.74</td>
</tr>
<tr>
<td>ADRD</td>
<td>0.0585</td>
<td>0.0473</td>
<td>0.0009</td>
<td>0.2789</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0412</td>
<td>0.0247</td>
<td>0.0106</td>
<td>0.1905</td>
</tr>
<tr>
<td>NDT$</td>
<td>0.2867</td>
<td>0.1118</td>
<td>0.0655</td>
<td>0.5939</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR = Equity Ratio  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
VRET = Variance of Total Returns  
LNAST = Log(Assets in millions of dollars)  
GR = Ratio of Asset Growth and Return on Equity  
ADRD = Advertising and R&D Expenses  
SIGMA = Earnings Volatility  
NDT$ = Non-Debt Tax Shield
Table 2. OLS and 3SLS Estimates for Industrials: Pooled Sample

(N = 362)

<table>
<thead>
<tr>
<th>PANEL A (OLS)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>POR = 0.3302 - 0.2988 INS** + 0.0487 LNSH.** - 0.2245 VRET*** - 0.015 LNAST</td>
<td></td>
</tr>
<tr>
<td>(2.66)</td>
<td>(2.38)</td>
</tr>
<tr>
<td></td>
<td>(-2.07)</td>
</tr>
<tr>
<td>- 0.0029 GR***</td>
<td></td>
</tr>
<tr>
<td>(-8.74)</td>
<td></td>
</tr>
<tr>
<td>R² = 0.288</td>
<td></td>
</tr>
<tr>
<td>F = 30.20***</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PANEL B (OLS)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR = 0.9011 + 0.7637 ADRD*** + 0.0625 SIGMA - 0.4460 NDTSS***</td>
<td></td>
</tr>
<tr>
<td>(44.8)</td>
<td>(6.1)</td>
</tr>
<tr>
<td>R² = 0.2783</td>
<td></td>
</tr>
<tr>
<td>F = 47.40***</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PANEL C (3SLS)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>POR = 0.5969 - 0.227 EQR - 0.319 INS** + 0.0557 LNSH*** - 0.283 VRET***</td>
<td></td>
</tr>
<tr>
<td>(2.51)</td>
<td>(-1.15)</td>
</tr>
<tr>
<td></td>
<td>(-1.30)</td>
</tr>
<tr>
<td>-0.0314 LNAST - 0.0029 GR***</td>
<td></td>
</tr>
<tr>
<td>(-1.24)</td>
<td>(-9.12)</td>
</tr>
<tr>
<td>R² = 0.305</td>
<td></td>
</tr>
<tr>
<td>F = 28.36***</td>
<td></td>
</tr>
</tbody>
</table>

| EQR = 0.9211 - 0.0361 POR + 0.7855 ADRD*** - 0.0353 SIGMA - 0.448 NDTSt*** |
|   (34.4)   |   (-0.88) |   (6.51)   |   (-8.39)   |
| R² = 0.297 |
| F = 40.68*** |

t-statistics in parentheses

* Statistically significant at the 10% level.
** Statistically significant at the 5% level.
*** Statistically significant at the 1% level.
R² adjusted for degrees of freedom
being addressed by dividends. However, the lack of simultaneity suggests that the presence of other mechanisms may need to be addressed explicitly in the model.

**High Subsample**

Table 3 reports summary statistics for the industrial sub-sample in which both the threat of takeover and incentive component of the compensation package were high. That is, for these firms non-dividend monitoring mechanisms are available and consequently, dividends may not be expected to play as significant a role in controlling equity agency costs and thus simultaneity may not appear. Regression results are reported in Table 4. None of the agency cost-related variables in vectors A and B of the POR and EQR equations is significant. This strongly suggests that in the presence of effective non-dividend mechanisms for controlling equity agency costs, the firm's capital structure and dividend decisions are not simultaneous. It is, however, observed that POR is significantly and positively associated with EQR in the second equation. It is speculated that, in the absence of an agency motivation for dividends, this positive association is consistent with a dividend signalling hypothesis. Firms with higher payout rates signal higher equity market values resulting in higher EQR as defined.²⁵

**Low Subsample**

At the other end of the spectrum, in the low subsample, are firms with a low incentive component in the compensation package and a low threat of takeover. For these firms, dividends should play a more significant role in controlling equity agency costs, and simultaneity is predicted. Summary statistics for these firms are in Table 5. 3SLS regression results are reported in Table 6. The agency variables LNSH and ADRD are

²⁵ See Miller and Rock (1985) and John and Williams (1985).
Table 3. Summary Statistics for Industrials: Sample with High Takeover Threat and High Compensation Package\(^1\)

\(^{1}\) These are firms with an outside shareholder with greater than 5% stock ownership and managerial incentive-based compensation above the total sample mean of 0.26139.

(N = 42)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.7658</td>
<td>0.1325</td>
<td>0.4439</td>
<td>0.9818</td>
</tr>
<tr>
<td>POR</td>
<td>0.3303</td>
<td>0.1301</td>
<td>0.1219</td>
<td>0.706</td>
</tr>
<tr>
<td>INS</td>
<td>0.0663</td>
<td>0.1083</td>
<td>0.0015</td>
<td>0.4921</td>
</tr>
<tr>
<td>LNSH</td>
<td>10.041</td>
<td>1.2593</td>
<td>8.1914</td>
<td>13.617</td>
</tr>
<tr>
<td>VRET</td>
<td>0.4257</td>
<td>0.1359</td>
<td>0.2437</td>
<td>0.7504</td>
</tr>
<tr>
<td>LNAST</td>
<td>7.933</td>
<td>1.1206</td>
<td>6.4104</td>
<td>11.385</td>
</tr>
<tr>
<td>GR</td>
<td>69.060</td>
<td>30.531</td>
<td>-23.93</td>
<td>122.51</td>
</tr>
<tr>
<td>ADRD</td>
<td>0.0605</td>
<td>0.0362</td>
<td>0.0053</td>
<td>0.1742</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0466</td>
<td>0.0253</td>
<td>0.0169</td>
<td>0.1031</td>
</tr>
<tr>
<td>NDT5</td>
<td>0.3208</td>
<td>0.1120</td>
<td>0.1444</td>
<td>0.5514</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR = Equity Ratio  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
VRET = Variance of Total Returns  
LNAST = Log(Assets in millions of dollars)  
GR = Ratio of Asset Growth and Return on Equity  
ADRD = Advertising and R&D Expenses  
SIGMA = Earnings Volatility  
NDT5 = Non-Debt Tax Shield

Data and Results
Table 4. 3SLS Estimates for Industrials: Sample with High Takeover Threat and High Compensation Package

(N = 42)

\[
\begin{align*}
\text{POR} &= 0.175 + 0.294 \text{EQR} + 0.025 \text{INS} + 0.0189 \text{LNISH} - 0.318 \text{VRET} - 0.017 \text{LNAST} \\
&(0.511) \quad (0.375) \quad (0.165) \quad (0.584) \quad (-1.299) \quad (-0.424) \\
&\quad + 0.0001 \text{GR} \\
&(0.196) \\
\text{R}^2 &= 0.0597 \\
\text{F} &= 1.434 \\
\text{EQR} &= 0.5867 + 0.913 \text{POR}^{**} + 0.430 \text{ADRD} - 0.104 \text{SIGMA} - 0.447 \text{NDTS}^{**} \\
&(3.32) \quad (2.33) \quad (0.92) \quad (-0.16) \quad (-2.10) \\
\text{R}^2 &= 0.309 \\
\text{F} &= 5.58^{***}
\end{align*}
\]

* t-statistics in parentheses
* Statistically significant at 10%
** Statistically significant at the 5% level.
*** Statistically significant at the 1% level.
* F adjusted for degrees of freedom.
* These are firms with an outside shareholder with greater than 5% stock ownership and managerial incentive-based compensation above the total sample mean of 0.26139.
significant with the expected signs in the POR and EQR equations, respectively. More interesting, POR is negatively significant in the EQR equation and EQR is significant in the POR equation. The significant exogenous variables indicate the presence of debt and equity agency problems for these firms. Alternatives to the dividend mechanism are not employed in addressing these problems in this subsample (or the alternatives are being held constant within the sample), and thus POR plays a significant role in the determination of capital structure. That capital structure feeds back into the determination of the optimal payout rate. In other words, both endogenous variables have significant coefficients with the hypothesized signs, leading to the conclusion that the dividend and capital structure decisions are simultaneous in an agency cost environment where alternative mechanisms are either unavailable, ineffective, too costly to use, or are adequately taken account of.

6.2.3: Summary

This section of the chapter reports the empirical results for the industrial sample. For the subsample consisting of firms that are high in the availability and use of alternative, non-dividend mechanisms for monitoring equity agency costs, no simultaneity in the dividend-capital structure decision is observed, as hypothesized. For the subsample for which such alternative mechanisms are not in place, making necessary the use dividend payout and associated financing to monitor equity agency costs, strong simultaneity in the dividend-capital decision is observed, as predicted. For the total sample there is no evidence of simultaneity implying that for the average industrial firm dividends are likely used in combination with other market mechanisms but that their use is not the dominant criterion for establishing a dividend policy. Overall, the results support the main hypothesis of the dissertation that simultaneity, in an agency framework, is a function
Table 5. Summary Statistics for Industrials: Sample with Low Takeover Threat and Low Compensation Package

(N = 96)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.8303</td>
<td>0.1164</td>
<td>0.4680</td>
<td>0.9981</td>
</tr>
<tr>
<td>POR</td>
<td>0.5444</td>
<td>0.3214</td>
<td>0.2342</td>
<td>1.954</td>
</tr>
<tr>
<td>INS</td>
<td>0.0196</td>
<td>0.0281</td>
<td>0.0008</td>
<td>0.152</td>
</tr>
<tr>
<td>LNSH</td>
<td>10.59</td>
<td>0.9803</td>
<td>8.50</td>
<td>13.577</td>
</tr>
<tr>
<td>VRET</td>
<td>0.3580</td>
<td>0.1032</td>
<td>0.1654</td>
<td>0.6442</td>
</tr>
<tr>
<td>LNAST</td>
<td>8.299</td>
<td>0.8401</td>
<td>6.866</td>
<td>11.157</td>
</tr>
<tr>
<td>GR</td>
<td>52.083</td>
<td>28.36</td>
<td>-10.61</td>
<td>181.78</td>
</tr>
<tr>
<td>ADRD</td>
<td>0.0641</td>
<td>0.0521</td>
<td>0.0012</td>
<td>0.2697</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0392</td>
<td>0.0230</td>
<td>0.0107</td>
<td>0.1679</td>
</tr>
<tr>
<td>NDTST</td>
<td>0.2907</td>
<td>0.1129</td>
<td>0.0666</td>
<td>0.5930</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR = Equity Ratio  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
VRET = Variance of Total Returns  
LNAST = Log(Assets in millions of dollars)  
GR = Ratio of Asset Growth and Return on Equity  
ADRD = Advertising and R&D Expenses  
SIGMA = Earnings Volatility  
NDTST = Non-Debt Tax Shield  

1: These are firms with an outside shareholder with less than 5% stock ownership and managerial incentive-based compensation below the total sample mean of 0.26139.
Table 6. 3SLS Estimates for Industrials: Sample with Low Takeover Threat and Low Compensation Package¹

(N = 96)

\[
\begin{align*}
\text{POR} &= 0.774 - 1.168 \text{EQR}^{**} - 0.304 \text{INS} + 0.1430 \text{LNSH}^{***} + 0.355 \text{VRET} \\
&\quad - 0.0839 \text{LNAST} - 0.0038 \text{GR}^{***} \\
&\quad (-1.52) \quad (-2.54) \quad (-0.37) \quad (2.75) \quad (1.25) \\
R^2 &= 0.349 \\
F &= 9.48^{***} \\
\text{EQR} &= 0.9036 - 0.164 \text{POR}^{***} + 0.791 \text{ADRD}^{***} + 0.423 \text{SIGMA} - 0.177 \text{NDTS} \\
&\quad (17.69) \quad (-2.92) \quad (3.83) \quad (0.987) \quad (-1.86) \\
R^2 &= 0.294 \\
F &= 10.89^{***}
\end{align*}
\]

¹: Statistics in parentheses
* Statistically significant at 10%
** Statistically significant at the 5% level.
*** Statistically significant at the 1% level.
R^2 adjusted for degrees of freedom
¹: These are firms with an outside shareholder with less than 5% stock ownership and managerial incentive-based compensation below the total sample mean of 0.26139.
of firm characteristics, in particular the availability and use of mechanisms other than dividend payout to monitor equity agency costs.

6.3: Utilities

6.3.1: Model Specification and Variable Measurement

The simultaneous equation specification for utilities is different from that for industrial firms reflecting the differences in industry characteristics and the fact that utilities are regulated.

\[
\begin{align*}
\text{POR} &= f(\text{EQR, INS, LNSH, FCOST, GR, CRNK}) \\
\text{EQR} &= f(\text{POR, SIGMA, NDT})
\end{align*}
\]

where

\( \text{FCOST} = \text{Flotation costs as a percentage of gross proceeds} \)

\( \text{CRNK} = \text{Ranking of regulatory commissions} \)

All other variables are defined as in the case of industrials. As mentioned earlier, the variable ADRD is not reported on the COMPUSTAT tape reflecting insignificant advertising and R&D expenses and, consequently, insignificant debt agency costs of underinvestment.

The sample of utility firms is drawn from the Industrial COMPUSTAT database by SIC Code (DNUM = 4911 or DNUM = 4931), and consists of 64 firms in 1986, 65 firms in 1987 and 67 firms in 1988. All the variables except CRNK and FCOST are measured in exactly the same way as in the case of industrials and are expected to have the same signs.
FCOST - flotation costs: This is a direct measure of flotation costs associated with equity issues, as reported on the Security and Exchange Commission's Registered Offering Statistics (ROS) tape. For each utility, FCOST is measured as a historical average of issuance costs, as a percentage of gross proceeds, over the period 1971-1987. The direct measurement of FCOST differs from issuance cost measures used for industrials and banks where instrumental variables, VRET and LNAST, were used. The reason for using these proxy variables is that unlike utilities, banks and industrials issue equity very infrequently and a meaningful average measure of direct flotation costs is not available for a large number of firms. The FCOST variable, in general, is expected to be inversely related to POR. However, in the case of utilities, to the extent that these costs can be passed on to the ratepayers through the regulatory process, the variable may have an insignificant impact on the payout rate decision.

CRNK - commission ranking: Applicable to utilities only, this variable, following Hansen, Kumar, and Shome (1989), is a categorical variable. Salomon Brothers' Regulatory Ranking of utility regulatory commissions ranks commissions from a high of A for commissions highly favorable to their utilities, to a low of E- for unfavorable commissions. This ranking is then converted to a numerical scale of 13 to 1, with A corresponding to 13 and E- to 1. Since CRNK is an indication of how favorably disposed the regulatory commission is towards shareholders, it is a measure of the degree of shareholder-regulator conflict, or lack of conflict. The more favorable the commission, the lower the conflict and the less the need for dividends to resolve the conflict. Thus CRNK is expected to be negatively related to POR.
6.3.2: Results and Discussion

For utilities, since the Chow test for stability of the coefficients across years failed, results are reported separately for each of the three years 1986 through 1988. Summary statistics for each of the three years are reported in Tables 7, 9 and 11 and OLS and 3SLS results are for each year are reported in Tables 8, 10 and 12. In the POR equation estimates, FCOST is insignificant in all the years, implying a significant flow-through of these costs to the ratepayers. The agency cost variables and GR have the right sign but are generally insignificant. The explanatory power of the specification is disappointingly low. All the explanatory variables in the EQR equation are insignificant, consistent with the hypothesis developed in Chapter 4. In general, the debt agency costs of utilities are likely to be insignificant, given regulation, fixed technology and insignificant discretionary capital investments. The capital structure decision of utilities is not likely to be based on agency cost considerations.

The 3SLS estimates do not support simultaneity. The POR coefficient is negative and significant in the EQR equation in all three years, but the EQR variable in the POR equation is insignificant. An interpretation of this result is that the poor explanatory power of the agency variables in the POR equation might be due to specification or measurement problems and that dividend policy is, in fact, based on considerations of minimizing equity agency costs as hypothesized in Chapter 4. Further, given this argument and supporting empirical evidence that EQR is not based on agency considerations, the agency cost-based choice of POR determines EQR, but EQR has no influence on POR.
Table 7. Summary Statistics for Utilities: Year = 1986

(N = 64)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.4381</td>
<td>0.0487</td>
<td>0.3124</td>
<td>0.5252</td>
</tr>
<tr>
<td>POR</td>
<td>0.6921</td>
<td>0.1219</td>
<td>0.4021</td>
<td>1.045</td>
</tr>
<tr>
<td>INS</td>
<td>0.0037</td>
<td>0.0081</td>
<td>0.0001</td>
<td>0.0563</td>
</tr>
<tr>
<td>LNSH</td>
<td>10.948</td>
<td>0.8428</td>
<td>9.16</td>
<td>12.60</td>
</tr>
<tr>
<td>FCOST</td>
<td>0.0375</td>
<td>0.0067</td>
<td>0.0226</td>
<td>0.0511</td>
</tr>
<tr>
<td>GR</td>
<td>24.56</td>
<td>17.38</td>
<td>-47.56</td>
<td>47.32</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0179</td>
<td>0.0106</td>
<td>0.0083</td>
<td>0.0786</td>
</tr>
<tr>
<td>NDTs</td>
<td>0.2431</td>
<td>0.0255</td>
<td>0.1410</td>
<td>0.2884</td>
</tr>
<tr>
<td>CRNK</td>
<td>6.859</td>
<td>1.850</td>
<td>1.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR = Equity Ratio  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
FCOST = Flotation Costs as a Percentage of Issue Size  
GR = Ratio of Asset Growth and Return on Equity  
SIGMA = Earnings Volatility  
NDTs = Non-Debt Tax Shield  
CRNK = Regulatory Commission Ranking
Table 8. OLS and 3SLS Estimates for Utilities: Year = 1986

(N = 64)

**PANEL A (OLS)**

\[
\text{POR} = 0.7468 - 2.126 \text{ INS} + 0.0132 \text{ LNSH} - 2.193 \text{ FCOST} - 0.013 \text{ CRNK} - 0.0008 \text{ GR}
\]

\[
\begin{align*}
(2.89) & & (-1.06) & & (0.67) & & (-0.93) & & (-1.53) & & (-0.97) \\
R^2 & = 0.063 \\
F & = 1.85
\end{align*}
\]

**PANEL B (OLS)**

\[
\text{EQR} = 0.4358 - 0.3751 \text{ SIGMA} + 0.0369 \text{ NDTX}
\]

\[
\begin{align*}
(6.71) & & (-0.62) & & (0.147) \\
R^2 & = 0.0 \\
F & = 0.241
\end{align*}
\]

**PANEL C (3SLS)**

\[
\text{POR} = -3.72 + 6.72 \text{ EQR} + 2.30 \text{ INS} + 0.159 \text{ LNSH} + 5.11 \text{ FCOST} - 0.047 \text{ CRNK}
\]

\[
\begin{align*}
& - 0.006 \text{ GR} \\
(0.81) & & (0.226) & & (0.64) & & (0.34) & & (-0.96) & & (-0.78) \\
R^2 & = 0.9 \\
F & = 0.41
\end{align*}
\]

\[
\text{EQR} = 0.5969 - 0.274 \text{ POR}^* - 0.764 \text{ SIGMA} + 0.184 \text{ NDTX}
\]

\[
\begin{align*}
(4.964) & & (-1.79) & & (-1.00) & & (0.655) \\
R^2 & = 0.01 \\
F & = 1.211
\end{align*}
\]

t-statistics in parentheses

* Statistically significant at 10%

** Statistically significant at the 5% level.

*** Statistically significant at the 1% level.

R² adjusted for degrees of freedom.
Table 9. Summary Statistics for Utilities: Year = 1987
(N = 65)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.4497</td>
<td>0.0523</td>
<td>0.3347</td>
<td>0.5698</td>
</tr>
<tr>
<td>POR</td>
<td>0.7160</td>
<td>0.1243</td>
<td>0.4163</td>
<td>1.010</td>
</tr>
<tr>
<td>INS</td>
<td>0.0043</td>
<td>0.0076</td>
<td>0.0002</td>
<td>0.0465</td>
</tr>
<tr>
<td>LNSH</td>
<td>10.912</td>
<td>0.8403</td>
<td>9.10</td>
<td>12.62</td>
</tr>
<tr>
<td>FCOST</td>
<td>0.0377</td>
<td>0.0068</td>
<td>0.0226</td>
<td>0.0511</td>
</tr>
<tr>
<td>GR</td>
<td>22.36</td>
<td>14.79</td>
<td>-12.27</td>
<td>46.25</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0190</td>
<td>0.0084</td>
<td>0.0078</td>
<td>0.0497</td>
</tr>
<tr>
<td>NDTTS</td>
<td>0.2452</td>
<td>0.0255</td>
<td>0.1477</td>
<td>0.2921</td>
</tr>
<tr>
<td>CRNK</td>
<td>6.907</td>
<td>1.523</td>
<td>2.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR = Equity Ratio  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
FCOST = Flotation Costs as a Percentage of Issue Size  
GR = Ratio of Asset Growth and Return on Equity  
SIGMA = Earnings Volatility  
NDTTS = Non-Debt Tax Shield  
CRNK = Regulatory Commission Ranking
Table 10. OLS and 3SLS Estimates for Utilities: Year = 1987

(N = 65)

<table>
<thead>
<tr>
<th>PANEL A (OLS)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>POR = 0.892 - 1.305 INS + 0.096 LNSH - 1.141 FCOST - 0.009 CRNK - 0.003 GR***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3.53)</td>
<td>(-0.62)</td>
<td>(0.096)</td>
<td>(-0.52)</td>
<td>(-1.03)</td>
</tr>
<tr>
<td>R² = 0.185</td>
<td>F = 3.90***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PANEL B (OLS)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR = 0.4377 + 0.3380 SIGMA + 0.0206 NDTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6.19)</td>
<td>(0.422)</td>
<td>(0.085)</td>
<td></td>
</tr>
<tr>
<td>R² = 0.0</td>
<td>F = 0.089</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PANEL C (3SLS)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>POR = -1.35 + 3.82 EQR - 1.28 INS + 0.064 LNSH - 0.495 FCOST - 0.033 CRNK</td>
<td>(-0.31)</td>
<td>(0.59)</td>
<td>(-0.39)</td>
<td>(0.39)</td>
<td>(0.07)</td>
<td>(-0.52)</td>
</tr>
<tr>
<td>0.0056 GR*</td>
<td>(-1.68)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² = 0.003</td>
<td>F = 1.033</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| EQR = 0.577 - 0.245 POR* + 1.37 SIGMA + 0.091 NDTS |
| (5.22) | (-1.91) | (1.39) | (0.328) |
| R² = 0.01 | F = 1.288 |

* t-statistics in parentheses
** Statistically significant at 10%
*** Statistically significant at the 5% level.
**** Statistically significant at the 1% level.
R² adjusted for degrees of freedom
Table 11. Summary Statistics for Utilities: Year = 1988

( N = 67 )

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR</td>
<td>0.4592</td>
<td>0.0522</td>
<td>0.3314</td>
<td>0.5781</td>
</tr>
<tr>
<td>POR</td>
<td>0.7397</td>
<td>0.1335</td>
<td>0.4044</td>
<td>1.048</td>
</tr>
<tr>
<td>INS</td>
<td>0.0041</td>
<td>0.0069</td>
<td>0.0002</td>
<td>0.0448</td>
</tr>
<tr>
<td>LNSH</td>
<td>10.801</td>
<td>0.8941</td>
<td>8.81</td>
<td>12.62</td>
</tr>
<tr>
<td>FCOST</td>
<td>0.039</td>
<td>0.0092</td>
<td>0.0226</td>
<td>0.0832</td>
</tr>
<tr>
<td>GR</td>
<td>19.86</td>
<td>16.21</td>
<td>-20.97</td>
<td>52.69</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0210</td>
<td>0.0121</td>
<td>0.0073</td>
<td>0.0858</td>
</tr>
<tr>
<td>NDT</td>
<td>0.2470</td>
<td>0.0266</td>
<td>0.1625</td>
<td>0.3037</td>
</tr>
<tr>
<td>CRNK</td>
<td>6.791</td>
<td>1.542</td>
<td>2.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR = Equity Ratio  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
FCOST = Flotation Costs as a Percentage of Issue Size  
GR = Ratio of Asset Growth and Return on Equity
SIGMA = Earnings Volatility  
NDT = Non-Debt Tax Shield  
CRNK = Regulatory Commission Ranking
Table 12. OLS and 3SLS Estimates for Utilities: Year = 1988

(N = 57)

**PANEL A (OLS)**

\[
\begin{align*}
\text{POR} & = 0.685 - 3.342 \text{INS} + 0.111 \text{LNSH} + 0.124 \text{FCOST} - 0.0036 \text{CRNK} - 0.0016 \text{GR} \\
& (2.34) \quad (-1.28) \quad (0.49) \quad (0.062) \quad (-0.33) \quad (-1.43)
\end{align*}
\]

\[
R^2 = 0.051 \\
F = 1.71
\]

**PANEL B (OLS)**

\[
\begin{align*}
\text{EQR} & = 0.457 - 0.544 \text{SIGMA} + 0.0531 \text{NDTS} \\
& (7.00) \quad (-0.99) \quad (0.213)
\end{align*}
\]

\[
R^2 = 0.0 \\
F = 0.59
\]

**PANEL C (3SLS)**

\[
\begin{align*}
\text{POR} & = -0.43 + 1.425 \text{EQR} + 0.677 \text{INS} + 0.062 \text{LNSH} + 1.56 \text{FCOST} - 0.023 \text{CRNK} \\
& - 0.003 \text{GR} \\
& (-0.10) \quad (0.222) \quad (0.085) \quad (0.42) \quad (0.346) \quad (-0.41)
\end{align*}
\]

\[
R^2 = 0.035 \\
F = 1.399
\]

\[
\begin{align*}
\text{EQR} & = 0.7245 - 0.364 \text{POR}^* - 0.399 \text{SIGMA} + 0.051 \text{NDTS} \\
& (4.811) \quad (-1.92) \quad (-0.54) \quad (0.174)
\end{align*}
\]

\[
R^2 = 0.016 \\
F = 1.475
\]

\[\text{t-statistics in parentheses}\\
* \text{Statistically significant at 10\%}\\
** \text{Statistically significant at the 5\% level.}\\
*** \text{Statistically significant at the 1\% level.}\\
R^2 \text{ adjusted for degrees of freedom}\]
6.3.3: Summary

The empirical results for utilities reported in this section support the hypothesis that the equity ratio for utilities is not based on agency cost considerations because the debt agency costs of utilities are not likely to be significant. Unexpectedly, the results do not find equity agency costs to be significant determinants of the utility's payout rate decision. The 3SLS estimates do not support simultaneity but indicate that the payout rate choice affects the equity ratio, but not vice versa. This particular result is consistent with the Chapter 4 hypothesis that the dividend payout decision is based on agency cost considerations but the capital structure decision is not.

6.4: Banks

6.4.1: Model Specification and Variable Measurement

For banks the simultaneous equations specification is:

\[
POR = f(EQR1, INS, LNSH, VRET, LNAST, GR) \\
EQR1 = f(POR, SIGMA, NLL, NPA)
\]

and

\[
POR = f(EQR2, INS, LNSH, VRET, LNAST, GR) \\
EQR2 = f(POR, SIGMA, NLL, NPA)
\]

where, except for EQR2, NLL and NPA, all variables are identical to those described in the section on Industrials. EQR1 is identical to EQR. However, EQR2 is a regulatory definition of capital ratio and is described below together with NLL and NPA which are the bank's net loan losses and non-performing assets, respectively.

Data and Results
The initial sample comprises all firms on the Bank COMPSTAT database and consists primarily of bank holding companies. Several regulatory changes were effected during the 1980s that had significant implications for capital structure choice by banks. In particular, the regulatory requirements on primary and secondary capital for banks were fully in place only in 1986. Hence, a three year average equity ratio is used for banks, as being more representative of the target equity ratio. Thus, for banks, EQR1 has the same measurement as in the case of industrials, but averaged over three years instead of 20. An additional measure of equity ratio is also used, one that satisfies the regulatory definition of capital. The regulatory definition, EQR2, is measured as the sum of the book value of equity, capital notes and debentures, and half the loan loss reserves, divided by total assets, again measured as a three year average. As mentioned earlier, ADRD and NDTS are unavailable for banks. Also, the effects of regulation are hypothesized to render the threat of takeover negligible and compensation packages are believed to be unrelated to market value maximization and thus for controlling equity agency costs. However, to proxy for the effects of regulation on bank capital requirements, two additional variables are used in the second equation.

Sineky (1979) states that one of the primary measures used by the FDIC to determine bank capital adequacy is the Net Capital Ratio (NCR). This is defined as the sum of the banks total capital accounts, valuation reserves, and nonbook sound banking values less the sum of loan losses, doubtful assets and substandard assets, the difference divided by gross assets. Consequently, loan losses, doubtful loans and non-performing (substandard) loans are all indicators of the riskiness of the bank's assets. The doubtful loan category is not publicly available, but loan losses and non-performing assets as defined

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26 The change in the Control act and the Bank Holding Company Act require approval of takeover from the Federal Reserve Board. Thus there is a less effective automatic self-correcting mechanism to force managers to align their interests with those of shareholders.
below are used as measures of bank risk and proxies for the point where regulators decide that the bank has attained its allowable level of riskiness. That is, loan losses and non-performing assets proxy for the point where the debt agency curve in Figure 11 begins to rise.

NLL - the bank’s net loan losses: This variable is taken from the Newport Associates’ BancBase I database on bank data drawn from the FDIC data tapes. NLL is defined as the bank’s net loan losses as a percentage of average loans for the year. This data item was available only from 1986 onward and restricted testing to data for 1988. NLL is calculated as the sum of the net loan loss rates (as a percentage of assets) for 1986, 1987 and 1988 divided by three.

NPA - the bank’s nonperforming assets: Also taken from BancBase I, NPA is the bank’s nonperforming assets as a percentage of average assets for the year. This data item too was available only from 1986 on and is calculated as a three year average of nonperforming assets from 1986 through 1988.

6.4.2: Results and Discussion

As mentioned earlier, due to data availability, OLS and 3SLS results for banks are reported only for 1988. Summary statistics on all regression variables are reported in Table 13. Table 14 has results on the OLS and 3SLS regressions using the market definition of equity ratio, EQR1, similar to the one used by Bradley, Jarrell, and Kim. Table 15 has results on regressions in which the regulatory definition of capital is used for the equity ratio, EQR2.
The results for banks, in many ways, run completely counter to those expected. Before discussing these results, it is helpful to return to the development of the model for banks to review the basis for the expected results. Following the arguments of Buser, Chen, and Kane, the model presumed that regulators monitor the bank's decision makers, who stay within regulatory guidelines because of the so-called 'implicit' costs they incur should they stray. Regulators 'stand in the shoes' of depositors who would want to control debt agency costs - costs associated with shareholder incentives to expropriate wealth from depositors by increasing the risk of the bank. The presumption, then, is that regulators desire to operate in this context, are able to effectively do so and, in fact, actually do so. Although depositors take no action to reduce the agency costs of debt, they assume that regulators will act in their interests and control these costs.

Testing the descriptive power of the model involves tests of a joint hypothesis. First, dividends are hypothesized to serve as a mechanism in reducing the agency costs of equity and thereby precipitate the simultaneity of the dividend-capital structure decision. Second, regulators are hypothesized to be effective in controlling the bank's managers' propensity to risk-taking, i.e., debt agency costs. Rejecting the hypothesis of simultaneity does not indicate which of the two parts of the joint hypothesis is inaccurate. Dividends may not serve as a control mechanism or regulators may not be effective controllers. In the latter case there would be no positive slope to the debt agency cost curve (assuming that depositors are unable to ascertain that regulators are ineffective) and the equity agency cost curve may not be a function of the debt ratio except in an accounting context. If regulators are ineffective, or, alternatively and equivalently, if the regulatory policies contain enough slack, then managers, acting in the interests of shareholders, will expropriate the wealth of claimholders. Given the low equity levels in banks and the concomitant low initial equity agency costs, the knowledge that managers are acting in
shareholder interests by attempting to increase bank risk may be enough to offset their fears with regard to managerial perk consumption and possibly make equity agency costs immaterial. Should this transpire, the interior optimum capital structure still occurs at the lowest point of the debt agency cost curve, but dividends have no role to play in lowering the agency costs of equity, since the equity agency cost curve, such as it is, is influenced more by the debt level than by the payout rate. Consequently, the dividend decision is dependent on the capital structure decision, which, in turn, is contingent on how far regulators will permit bankers to go. Following the same line of reasoning, bankers may use dividends to expropriate wealth by financing dividends with deposits. This argument serves as a starting point for the discussion of results in Tables 14 and 15.

In Panel A of Table 14, the only significant variable with the hypothesized sign is VRET, indicating that transactions costs have a negative effect on payout rate. Recall that VRET proxies for the degree of informational asymmetry between insiders/existing shareholders and the suppliers of new capital, and, subsequently, for the cost to the firm of resolving this asymmetry through intermediaries. In the case of banks, VRET proxies primarily for the cost of issuing new equity not new debt, mainly because in the process of issuing new deposits, banks do not avail themselves of the services of any intermediary. Thus higher VRET indicates higher transactions costs and a lower optimal payout ratio in order to avoid the transactions costs of an equity issue. The argument that banks do not incur significant transactions costs when obtaining new funds (since these come from deposits) is further reinforced below. It may be seen that the coefficients on both INS and GR are significant and have signs opposite to those hypothesized. It appears that banks with high insider holdings pay out more of their net incomes as dividends, which is just the opposite of what they would do if they were trying to control the agency
Table 13. Summary Statistics for Banks: Year = 1988
(N = 70)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQR1</td>
<td>0.0735</td>
<td>0.0232</td>
<td>0.0265</td>
<td>0.1322</td>
</tr>
<tr>
<td>EQR2</td>
<td>0.0704</td>
<td>0.0097</td>
<td>0.0484</td>
<td>0.0996</td>
</tr>
<tr>
<td>POR</td>
<td>0.3479</td>
<td>0.0896</td>
<td>0.0359</td>
<td>0.7732</td>
</tr>
<tr>
<td>INS</td>
<td>0.0834</td>
<td>0.0897</td>
<td>0.0044</td>
<td>0.4191</td>
</tr>
<tr>
<td>LNSH</td>
<td>9.051</td>
<td>0.8776</td>
<td>6.78</td>
<td>10.91</td>
</tr>
<tr>
<td>VRET</td>
<td>0.2754</td>
<td>0.1511</td>
<td>0.0870</td>
<td>1.065</td>
</tr>
<tr>
<td>LNAST</td>
<td>8.74</td>
<td>1.118</td>
<td>5.270</td>
<td>12.135</td>
</tr>
<tr>
<td>GR</td>
<td>1.155</td>
<td>0.460</td>
<td>0.6719</td>
<td>2.859</td>
</tr>
<tr>
<td>SIGMA</td>
<td>0.0059</td>
<td>0.0033</td>
<td>0.0017</td>
<td>0.0149</td>
</tr>
<tr>
<td>NLL</td>
<td>0.7508</td>
<td>0.4621</td>
<td>0.0766</td>
<td>2.13</td>
</tr>
<tr>
<td>NPA</td>
<td>1.549</td>
<td>0.971</td>
<td>0.416</td>
<td>4.72</td>
</tr>
</tbody>
</table>

POR = Payout Rate  
EQR1 = Equity Ratio (Market Definition)  
EQR2 = Equity Ratio (Regulatory Definition)  
INS = Insider Holding  
LNSH = Log of the Number of Shareholders  
VRET = Variance of Total Returns  
LNAST = Log(Assets in millions of dollars)  
GR = Ratio of Asset Growth and Return on Equity  
SIGMA = Earnings Volatility  
NLL = Net Loan Losses (Reported as a percentage)  
NPA = Non-Performing Assets (Reported as a percentage)
Table 14. OLS and 3SLS Estimates for Banks with EQR1: Year = 1988

(N = 70)

**PANEL A (OLS)**

\[
\text{POR} = 0.1747 + 0.281 \text{ INS}^{**} + 0.0003 \text{ LNSH} - 0.3038 \text{ VRET}^{***} + 0.0147 \text{ LNAST} \\
(1.75) \hspace{1cm} (2.62) \hspace{1cm} (0.02) \hspace{1cm} (-5.07) \hspace{1cm} (1.02) \\
\hspace{2cm} + 0.0879 \text{ GR}^{***} \\
(4.645)
\]

\[
R^2 = 0.406 \\
F = 10.45^{***}
\]

**PANEL B (OLS)**

\[\text{EQR1} = 0.0995 - 0.1871 \text{ SIGMA} - 0.0146 \text{ NLL}^{**} - 0.0089 \text{ NPA}^{***} \\
(19.65) \hspace{1cm} (-0.228) \hspace{1cm} (-2.186) \hspace{1cm} (-2.81)
\]

\[
R^2 = 0.3599 \\
F = 13.93^{***}
\]

**PANEL C (3SLS)**

\[
\text{POR} = -0.393 - 1.813 \text{ EQR1}^{*} + 0.3107 \text{ INS}^{***} + 0.0161 \text{ LNSH} - 0.3611 \text{ VRET}^{***} \\
(1.966) \hspace{1cm} (-1.82) \hspace{1cm} (2.697) \hspace{1cm} (0.709) \hspace{1cm} (-4.59) \\
\hspace{2cm} - 0.0066 \text{ LNAST} + 0.0645 \text{ GR}^{***} \\
(-0.25) \hspace{1cm} (2.712)
\]

\[
R^2 = 0.391 \\
F = 8.37^{***}
\]

\[\text{EQR1} = 0.0988 + 0.0045 \text{ POR} - 0.355 \text{ SIGMA} - 0.0155 \text{ NLL}^{**} - 0.0085 \text{ NPA}^{***} \\
(7.411) \hspace{1cm} (0.11) \hspace{1cm} (-0.45) \hspace{1cm} (-2.19) \hspace{1cm} (-2.765)
\]

\[
R^2 = 0.35 \\
F = 10.29^{***}
\]

\[t\text{-statistics in parentheses} \\
* \text{Statistically significant at 10%} \\
** \text{Statistically significant at the 5% level.} \\
*** \text{Statistically significant at the 1% level.} \\
R^2 \text{ adjusted for degrees of freedom}
\]
costs of equity. Also, firms with a lower minimum-transactions-cost payout rate (as proxied for by GR) pay out higher dividends.

From Figure 1 and the model in Chapter 3, at the minimum-transactions-cost payout rate, the firm has no equity related transactions costs. A firm, therefore, will pay out dividends at a higher rate only if the reduction in equity agency costs is enough to warrant the higher level of transactions costs. It has just been argued, however, that banks may have extremely low equity agency costs if regulators are ineffective, and virtually no transactions costs if they can obtain new funding via deposits. Consequently, with a flat equity agency cost curve and a flat transactions cost curve, there is no tradeoff between equity agency costs and transactions costs as in the Rozeff framework, and dividends become inconsequential as a means for controlling equity agency costs. It may thus be inferred that dividend policy for banks is arbitrary. What the evidence indicates, however, goes beyond arbitrariness. Banks with higher insider holdings pay out dividends at a higher rate, indicating not just the absence of the equity agency problem, but that bankers expropriate claimholder wealth by paying dividends (to themselves) and issuing deposits to do so! This problem may be seen more clearly when the simultaneous equations in Panel C are considered.

Before considering Panel C, however, further evidence of the fact that the debt agency problem for banks is not effectively addressed may be seen in Panel B in which the market-defined equity ratio, EQRI, is the dependent variable. Again, the results are counter to those expected. Banks with a larger percentage of loan losses and higher percentage of non-performing assets appear to have lower equity ratios, demonstrating that banks take opportunities to expropriate wealth from their claimholders, in this case the insuring body, the FDIC.
The results of Panels A and B are even better seen in Panel C in which the simultaneous equations specification is tested. First, it appears that the capital structure decision is the dominant decision for banks. Given that the FDIC insures depositors and, consequently, that depositors consider their deposits risk-free, the bank's stockholders have every incentive, in the absence of regulation, to expropriate as much wealth as possible from the depositors. Therefore, their first priority is to limit their own stakes by maintaining as low a capital ratio as possible, and then making as high risk/high return loans as they can manage to get away with. This is amply demonstrated in Panel C. Banks with low equity ratios pay a greater portion of their incomes as dividends. This is consistent with the positive accounting relationship between minimum cost payout rate and the debt ratio and also with the positive relation between insider holding and dividends. Banks with a lower amount of equity are likely to have a smaller number of shareholders and a larger percentage of these shareholders may be insiders. These insiders will then serve themselves by paying out as much in the way of dividends as they can, even if they have to issue deposits to do it. In summary, it appears that dividends are irrelevant for controlling the equity agency costs of banks and the market, though aware of risk-taking by banks, is ineffective or uninterested in controlling the agency costs of debt.

In several ways the results in Table 15, using the regulatory definition of equity ratio, are different from those in Table 14. The Panel A results are identical with those in Panel A of Table 14, but those in Panels B and C are considerably different. First, none of the coefficients on the variables in Panel B is significant. This may be interpreted to mean that the regulatory equity ratio does not in any way reflect the risk of the bank's assets. In other words, regulators are unable to control wealth expropriation by bank shareholders. Also, in Panel C, the coefficients on INS and EQR2 have lost their significance. Thus, the regulatory definition of equity ratio does not affect the capital structure deci-
Table 15. OLS and 3SLS Estimates for Banks with EQR2: Year = 1988

(N = 70)

**PANEL A (OLS)**

\[
\begin{align*}
POR &= 0.1747 + 0.281 \text{INS}^{**} + 0.0003 \text{LNSH} - 0.3038 \text{VRET}^{***} + 0.0147 \text{LNAST} \\
&\quad + 0.0879 \text{GR}^{***} \\
&\quad (1.75) \quad (2.62) \quad (0.02) \quad (-5.07) \quad (1.02) \quad (4.645)
\end{align*}
\]

\[
R^2 = 0.406
\]

\[
F = 10.45^{***}
\]

**PANEL B (OLS)**

\[
\begin{align*}
\text{EQR2} &= 0.0768 - 0.4017 \text{SIGMA} - 0.0047 \text{NLL} - 0.0003 \text{NPA} \\
&\quad (30.17) \quad (-0.973) \quad (-1.392) \quad (-0.204)
\end{align*}
\]

\[
R^2 = 0.074
\]

\[
F = 2.84^{**}
\]

**PANEL C (3SLS)**

\[
\begin{align*}
\text{POR} &= -0.701 - 7.01 \text{EQR2} + 0.378 \text{INS} - 0.0103 \text{LNSH} - 0.3484 \text{VRET}^{***} \\
&\quad + 0.0259 \text{LNAST} + 0.0618 \text{GR}^{**} \\
&\quad (0.978) \quad (-8.2) \quad (1.595) \quad (-0.157) \quad (-2.927) \quad (0.346) \quad (2.064)
\end{align*}
\]

\[
R^2 = 0.121
\]

\[
F = 2.575^{**}
\]

\[
\begin{align*}
\text{EQR2} &= 0.0763 + 0.001 \text{POR} - 0.338 \text{SIGMA} - 0.0043 \text{NLL} - 0.0008 \text{NPA} \\
&\quad (11.79) \quad (0.07) \quad (-1.12) \quad (-1.52) \quad (-0.88)
\end{align*}
\]

\[
R^2 = 0.061
\]

\[
F = 2.111^{*}
\]

_t-statistics in parentheses
*
Statistically significant at 10%
**
Statistically significant at the 5% level
***
Statistically significant at the 1% level
R^2 adjusted for degrees of freedom
sion, probably because shareholders do not view it as a constraint in their decision making. In other words, there is slack in the regulatory definition of equity and bankers are able to stay within regulatory guidelines without seriously impairing their ability to expropriate wealth. Also, regulation appears to affect the equity agency cost function to the extent that, in the presence of opportunities to shift wealth from debtholders, the equity agency cost curve is lowered so that there is no need for dividends as a mechanism to control these costs. To sum up the results of Tables 14 and 15, both the market and the regulators appear ineffective in controlling risk-taking by banks. In fact, regulation renders debt market forces ineffective in disciplining banks.

6.4.3: Summary

The empirical results for banks reported in this section run counter to expectation. The cause may be attributed chiefly to the apparent ineffectiveness of regulators in controlling bankers’ propensity to risk-taking. This ineffectiveness has the ultimate effect of making the agency costs of equity almost immaterial relative to the opportunities to exploit debt agency costs and, consequently, nullifying any desire to use dividends to control equity agency costs. Furthermore, some evidence suggests that dividends may be used to transfer wealth from claimholders to stockholders rather than as a means of controlling equity agency costs.
Chapter 7

Conclusion

This dissertation develops a simultaneous equations model of dividend and financial decision-making in an agency-theoretic framework. Under the premise that firms have optimal capital structures they try to maintain, agency costs of equity are traded off against the transactions costs of new financing, as in Easterbrook (1984) and Rozell (1982), at various capital structures (debt levels), and the sum of these two costs minimized at all these debt levels. The locus of these minima forms the equity agency cost curve of the Jensen-Meckling framework, in which the agency costs of debt and equity are traded off and the total agency cost (the sum of debt, equity and transactions costs) minimized. The debt level at which these costs are minimized is the firm’s optimal capital structure. This optimal debt level has, corresponding to it a payout rate at which the equity agency and transactions costs were minimized and is the optimal payout rate. Thus, the firm’s dividend and capital structure decisions are simultaneously determined in an agency-theoretic framework, based on the minimization of total agency costs.
The simultaneity of the dividend and capital structure decisions in such an agency cost framework is clearly contingent upon the use of the dividend payout mechanism to control equity agency costs. Alternative non-dividend mechanisms such as incentive-based compensation packages, the threat of takeover, and regulation could also effectively control equity agency costs, in which case the dividend and capital structure decisions of a value-maximizing firm need not be related to agency costs and thus need not be simultaneous in the manner developed here. The availability and effectiveness of these alternative mechanisms is expected to vary across firms and industry groups as are, consequently, predictions of simultaneity. The central hypothesis of this dissertation is that simultaneity of the dividend-capital structure decision in an agency framework is a function of industry characteristics.

To test this hypothesis a simultaneous equation system is specified and tested on three industry groups - industrial firms, utilities, and banks. Industrials are subject to the influence of market mechanisms such as the threat of takeover and compensation packages, and banks and utilities are subject to regulation. The industrial sample was split into two subsamples, one in which the threat of takeover and incentive-based compensation packages were significantly present and one in which they were not. As expected, simultaneity was found in the subsample where these alternative mechanisms were not present, but not in the subsample where they were present.

For utilities, it was argued that regulation, via its effect on the equity agency cost curve would make dividends the dominant mechanism for controlling equity agency costs but, would make the debt agency curve immaterial and, consequently, simultaneity would not be observed. As hypothesized, simultaneity was not found and also, as expected, the
payout rate influenced the equity ratio. However, contrary to expectations and possibly due to noisy data, dividend policy was found to be free of agency cost considerations.

For banks, regulation affects the debt agency cost curve in such a manner as to make the capital structure decision of primary importance and not dependent on dividend policy and, consequently, simultaneity was not expected. Except for the lack of simultaneity, the results for banks were completely opposite to those expected. The results indicate that bank regulation also affects the equity agency curve to the extent of making equity agency costs negligible. Bankers then proceed to expropriate as much claimholder wealth as regulators will allow to the extent of paying dividends by issuing deposits. The inescapable conclusion is that regulation for banks is ineffective and encourages rather than controls bankers' propensity to risk-taking.

To summarize, when dividends are the dominant mechanism for controlling equity agency costs in the industrial sample, simultaneity is found to exist between the dividend and capital structure decisions. No simultaneity is found when alternative mechanisms are dominant. For utilities, the effect of regulation is to render debt agency costs negligible and, consequently, equity ratio is dependent on payout rate, but not vice versa. For banks, on the other hand, regulation renders the equity agency cost curve negligible because of the ineffectiveness of regulators, and payout rate is dependent on equity ratio but the reverse is not true. Thus, of the three industry groups examined, only the industrial subsample with the dividend mechanism dominant has simultaneity. The two regulated industries, banks and utilities, each has either payout rate dependent on capital structure or capital structure dependent on payout rate. That is, a one way relationship exists.
The study is limited to the extent that it does not treat endogenously alternative mechanisms for controlling equity agency costs. Incorporating these mechanisms into the model would significantly strengthen it while removing the need to group the sample by industry characteristics in order to test it. This is left for future research. Other areas for future research would include superior measurement of the proxies used and a larger sample size. An extension of the current study would be to test the dynamics of simultaneity in time series data. This would be particularly interesting for the regulated industries. If regulation affects simultaneity, then changes in regulation should affect it as well. Also worth consideration is the role of repurchases. The model in Chapter 3 shows that equity agency costs via a combined repurchase/dividend policy can be traded off against transactions costs to reduce equity agency costs but does not develop the idea any further. In view of the IRS' stance on repurchases, it is worth investigating whether firms minimize equity agency costs by combining dividends and repurchases to the extent allowed by the IRS.
Bibliography


Vita

Gregory Mario Noronha was born to Stanley and Celine Noronha on the 12th of September, 1954, in Mangalore, India. He lived in Bombay where he attended St. Stanislaus School until 1971, spent a year in St. Xavier's College and, in 1972, entered the Marine Engineering College. He went to sea as a ship's engineer in 1976. In 1983 he left the sea to enroll in the Naval Architecture and Marine Engineering program at the University of Michigan from where he obtained a bachelor's degree. In 1984 he entered the MBA program at Virginia Tech and stayed on to enter the doctoral program in Finance in 1986. He married Colleen Treanor in July 1989. His doctorate was completed in July 1990 and he will join the Finance faculty at Old Dominion University, Norfolk, Virginia as an Assistant Professor in August 1990.