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Managerial Decision Making and Stockholder Wealth Maximization: A Limited Dependent Variables Model of the Choice Between Dividends and Stock Repurchases

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by

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ABSTRACT

This research attempts to provide an explanation for the firm's choice of using either a dividend or a stock repurchase for distributing cash to its stockholders. It also provides an examination of the impact of the firm's disbursement decision on the stock market's resulting reassessment of the value of the firm.

Before analyzing the disbursement decision, I examine the stock market effects of dividends and stock repurchases using an event study methodology that corrects for the possible variance change effects of cash distribution announcements. I find that the measured wealth effects are statistically significant and similar, for the most part, to that reported in earlier studies, notwithstanding increases in the variance of the abnormal returns distribution. I apply LIMDEP's full information maximum likelihood estimator (FIML) to investigate the factors influencing a firm's disbursement decision. I use proxies to represent the major theories put forward in the literature to explain firms' rationales for making cash disbursements, namely, signaling / asymmetric information, undervaluation hypothesis, agency theory, dividend clientele, corporate control, optimal capital structure theory, managerial incentives hypothesis, financial flexibility and cash flow permanence.

I find that the firm's payout choice is related to the change in annual earnings per share, the residual volatility in daily stock returns prior to the distribution, the level of

undervaluation, the free cash flows of the firm, the size of the firm, the extent of available managerial stock options, the average dividend yield, the volatility of operating earnings, the average daily stock return prior to announcement, the relative proportion of permanent cash flows, and the difference in the levels of permanent cash flows pre and post announcement.

I evaluate the stock market impact of the disbursement choice by using a self-selectivity limited-dependent variables model. The findings indicate that while open market repurchasing firms make optimal disbursement choices, that is reflected in the reaction of the stock market to the disbursement announcement, firms using repurchase tender offers make disbursement decisions detrimental to the welfare of their stockholders. However, similar results were inconclusive with regard to firms choosing to utilize dividends as their cash payout mechanism.

Chapter 1

Introduction

1.1 Why Study Corporate Cash Distributions to Shareholders?

Corporations in the United States utilize various mechanisms to distribute cash to their stockholders. Firms currently use five principal methods of corporate cash distributions: regular cash dividends, specially designated dividends, open-market stock repurchases, intrafirm repurchase tender offers, and targeted or negotiated share repurchases. These forms of cash payout have been the focus of numerous studies in the financial literature over the past years.

Early theoretical work on cash distributions, for the most part, did not differentiate between the different types of disbursements.[1] For example, the agency cost motivation (to alleviate agency problems associated with monitoring and risk aversion of managers) of Easterbrook (1984), the cash flow signaling argument (to inform the market of an increase in the firm's earnings) of Miller and Rock (1985), and the free cash flow theory (to reduce agency costs associated with excess free cash flow) of Jensen (1986) apply equally to both dividends and stock repurchases.

More recent models have considered the *choice* between different payout methods and have suggested possible explanations for the form of cash distribution chosen by firms. Ofer and Thakor (1987) and Persons (1995) suggest signaling models where the level of

asymmetric information (extent of undervaluation) determines the payout choice. Barclay and Smith (1988) propose an alternative asymmetric information model that concentrates on cost-minimization as the determining factor in the firm's choice of the form of the payouts to shareholders. Bagnoli, Gordon, and Lipman (1989), Denis (1990), and Bagwell (1992) identify takeover defense as an alternative motivation for repurchases. Hausch and Seward (1993) model the choice as one between a deterministic (dividends) and a stochastic (share repurchases) disbursement and conclude that it depends on the form of the firm's production function (analogous to absolute risk aversion for a utility function). Jagannathan, Stephens, and Weisbach (2000) and Guay and Harford (2000) hypothesize that the financial flexibility inherent in stock repurchases contributes to the choice of payout method used by firms and indicate that the permanence of the firm's cash flows are important in this regard, while Fenn and Liang (2000) examine the extent to which management stock options influence the choice.

One question that immediately arises from examining the above motivations is whether dividends and repurchases can be considered as true alternative forms of cash disbursements. In this regard it is observed that the different forms of repurchases have peculiar characteristics, as do the varying forms of dividend disbursements.

Open market repurchase programs involve firms merely announcing their intention to buy back shares over an extended period of time at the prevailing market price. It involves an ongoing "*commitment*" by the firm to make cash disbursements to its stockholders (albeit not *all* stockholders). A repurchase tender offer, on the other hand, constitutes a one-time offer by the firm to buy back stock within a specified time frame at a pre-determined price

(or price *range* in the case of dutch auctions) that is usually different from the current market price. Clearly, these two methods are distinct from the perspective of time frame, expectation of recurrence, and concomitant cost.

An increase in the cash dividend generally involves a commitment by the firm to maintain an increased payout over the foreseeable future[2]. Specially designated dividends, instead, are usually perceived as irregular and non-routine payouts (Barclay and Smith (1988) and Chhachhi and Davidson (1997))[3]. Based on these observations, the natural comparisons seem to be open market repurchases with dividend increases (*frequent, periodic payout*) and repurchase tender offers with specially designated dividends (*infrequent, irregular, non-routine payout*). The appropriateness of these comparisons is supported by recent empirical and theoretical work (for example, see Persons (1995), Stephens and Weisbach (1996), Chhachhi and Davidson (1997), Fenn and Liang (2000), and Guay and Harford (2000))[4].

Corporate disbursements also have a significant impact on the stock markets and, hence, stockholders' wealth. Existing empirical studies have revealed significant stock price reactions to announcements of unexpected corporate cash distributions (that is, dividends and stock repurchases) [for example, Brickley (1983); Richardson, Sefcik and Thompson (1986); Smith (1987); Healy and Palepu (1988); Bajaj and Vijh (1990); and Stephenson (1994)]. On average, the market's reaction to stock repurchase announcements has been significantly higher than the reaction to dividend announcements. The average cumulative (3-day) abnormal return on stock repurchase announcements has been documented to be between 5 percent and 9 percent. The corresponding excess returns for unexpected dividend

announcements *(that is, initiations, increases, and specially designated dividends)* have been observed to be between 2 percent and 3 percent.[5]

Notwithstanding the higher observed wealth effect associated with stock repurchase announcements, empirical evidence shows an unexplained preference by firms for using cash dividends (at least up to the mid 1980s).[6] For example, during the period 1983 to 1986, 81 percent of all firms on the New York Stock Exchange (NYSE) used cash dividends while only 14 percent of the firms made stock repurchases.[7] During this period, these cash distributions averaged $94 billion per year -- representing approximately 6 percent of the market value of the total equity base of all the listed firms. Ofer and Thakor (1987), pertaining to the period prior to the mid 1980s, conclude that while the majority of US firms pay dividends, only a relatively small percentage utilizes stock repurchases.

Interestingly, in the subsequent period (post 1980s) there has been a marked decline in the incidence of firms utilizing dividends. Concurrently, the usage of stock repurchases has increased dramatically. Fama and French (2000) reveal that between 1978 and 1999 the proportion of firms paying cash dividends fell from 66.5 percent to20.8 percent. Jagannathan, Stephens, and Weisbach (2000) report quite the reverse for stock repurchases. They indicate that between 1985 and 1996, the number of open market stock repurchase programs announced by U.S. industrial firms increased from 115 to 755 (a 557 percent increase) while the value of these transactions increased from $15.4 billion to $113 billion (a 634 percent increase). However, they observe that while the incidence of dividend payments has decreased the value of these distributions continue to rise over the same period, moving from $67.6 billion to $141 billion (a 109 percent increase). Overall, repurchases have not

replaced dividends as the primary cash disbursement mechanism as dividends continue to be significantly higher in value than repurchases (more than double the total value of actual share repurchases).

Fama and French (2000), among others, surmise that since dividends are usually taxed at a higher rate than capital gains (realized though a stock repurchase), the common presumption is that dividends are less valuable than capital gains. Empirical evidence tends to support this assertion as the stock price reaction and, hence, wealth impact of a stock repurchase announcement on average exceeds the wealth impact associated with a dividend decision (see endnote 4). Given the empirical evidence suggesting that higher wealth gains to shareholders would result from the use of repurchases instead of dividends, the fact that firms continue to increase the size of dividends annually and not increase repurchases at an even faster rate indicate that dividends remain an enigma. The present research attempts to provide some answers in this regard. The problem at hand, then, is to provide insights as to why some firms choose to pay cash dividends while others choose to repurchase their stock, and, consequently, whether the choice made is in the best interest of the firm's stockholders (*that is, is it a wealth maximizing decision?*). My results indicate that while open market repurchasing firms generally are making their payout decisions in order to maximize the returns to their stockholders (through the resulting expected stock market price reaction to the disbursement announcement), firms using repurchase tender offers make disbursement decisions detrimental to the welfare of their stockholders. However, similar results were inconclusive with regard to firms choosing to utilize dividends as their form of cash distribution.

Theoretical and empirical financial research related to corporate cash distributions has focused predominantly on addressing two major issues: (i) what are the determinants of the observed level and frequency of corporate cash distributions? and (ii) what explanations can be put forward for the various forms of cash distributions observed in the market? A third question, arising from the above discussion, remains unaddressed: since stock repurchases create a greater value change in stockholders wealth, are managers maximizing stockholders' wealth when they use other forms of cash distributions? Interest then centers on examining the expected impact on stockholders wealth of management's choice of an alternative distribution method. That is, for firms that used cash dividends (stock repurchases) as their method of cash distribution, what would have been the stock price reaction had they instead decided to repurchase their stock (pay dividends)?

This empirical question, however, cannot be answered by merely assuming that the average wealth effect associated with repurchases would in fact result for a dividend increasing firm that decided to switch distribution methods. It in fact introduces an econometric problem of self-selection. If the choice to belong to one group or another is a function of the expected benefits of belonging to the group, then the data exhibits a *selectivity bias* and valid conclusions can only be drawn by incorporating the choice process explicitly in the empirical model specification. This has previously been ignored in the literature and is addressed in my estimation procedures.

The focus of this study, then, is to fill the gap in the existing literature by empirically examining the stockholder wealth maximization impact of management's disbursement choices, thereby supplementing and extending current research in this area. In this research, I

examine the determinants of the choice between dividends and stock repurchases and the impact of that choice on the stockholders' wealth position. The expectation is that even in the presence of asymmetric information, agency costs, and differing expected stock price reactions to the various mechanisms of cash disbursements, firms, on average, choose the cash distribution method that maximizes the expected gain associated with the distribution. Hence, managers, on average, make stockholder wealth maximizing disbursement choices (that is, the disbursement choice is made with reference to the expected excess returns generated on announcement of the decision). My results find support for this proposition only with regard to firms utilizing open market stock repurchases, notwithstanding the influence of other factors on the decision.

A caveat is in order: while I draw on a broad cross-section of theoretical underpinnings (for example, asymmetric information/signaling, agency costs, free cash flow, cash flow permanence, and financial flexibility) in developing my empirical model, the tests utilized in addressing my primary hypothesis are not designed to differentiate between the effects of these various theories. Further, it is not my intent to test all the possible proxies for the variables identified and utilized in the model. I am primarily concerned with the relationship between the firm's cash disbursement choice (dividend versus stock repurchase) and the impact of that choice on share prices. Therefore, I employ variables from two strands of the cash disbursement literature (not necessarily independent) that have been used in previous studies to explain the disbursement choice and the magnitude of the associated wealth effects.

1.2 Specific Purpose of This Research

In a perfect capital market, the manager's choice of a disbursement method would be irrelevant. Under such conditions, there would exist no market frictions, investors would have perfect information, and, hence, the form of the distribution chosen by management would have no impact on the value of the firm. In this situation, dividends would be equivalent to stock repurchases.[8]

Given, however, that market imperfections do exist, the impact of a firm's choice of distribution method is non-trivial. In fact, the choice facing managers is one that has implications for the value of their firm. For example, Fama and French (2000) indicate that due to tax implications, firms that pay dividends are at a competitive disadvantage since they have a higher cost of equity than firms that use stock repurchases. In addition, Persons (1995) points out that while the administrative expenses associated with paying a dividend are inconsequential, repurchases usually involve substantial transactions costs. Hence, with taxes, transactions costs, and asymmetric information, the firm's choice of a payout method is an important decision with resultant valuation implications.

With the plethora of theoretical and empirical financial research relating firm characteristics to the valuation impact (excess stock market returns) of cash distribution announcements (for example, Dann (1981), Vermaelen (1984), Miller and Rock (1985), John and Williams (1985), Jensen (1986), Bajaj and Vijh (1990), Denis, Denis, and Sarin (1994), Chhachhi and Davidson (1997), Guay and Harford (2000), among others), it would seem an easy task to assess the opportunity cost of a particular disbursement

choice (that is, the difference between the *expected* wealth impact of the method used and that of an alternative method). However, if indeed firms make the disbursement choice on the basis of value maximization, the issue is much more complicated because the disbursement choice would then be endogenized; that is, the wealth effect associated with a particular choice of cash distribution would be directly related to the choice model itself. This introduces the econometric issue of self-selectivity bias (or simply self-selection) mentioned earlier. In this case, correct specification of the *expected* wealth impact of an alternative cash payout method would require joint modeling of the disbursement choice equation and the wealth effects models for both alternative payout methods. This issue has not previously been addressed in the finance literature and serves as the major contribution of the present research. Results indicate that a selectivity bias should be accounted for as self-selection is a characteristic of the cash distribution sample.

This study focuses, therefore, on the firm's choice of cash payout method and the impact of this choice on the firm's stock price. The underlying premise is that the disbursement decision is taken to maximize the net benefit (or minimize the net cost) to stockholders where this benefit is measured by the excess stock market returns generated on announcement of the disbursement decision. I empirically model the manager's choice problem -- determining whether to disburse cash as a dividend or a stock repurchase – and the related benefit arising from the choice (the stock market excess returns associated with the particular payout method chosen) by application of a limited dependent variable methodology, specifically a self-selectivity model, to account for the endogeneity of the

disbursement choice. The approach involves defining the structural model derived from the theoretical arguments above – that is, the three equations model describing (i) the firm's choice of a payout method, and (ii) the benefits (excess stock market returns) model for each alternative payout method. The structural probit equations are then transformed to a reduced form model (by specifically accounting for the relationships between the equations) and solved by a full information maximum likelihood estimation procedure. The discriminatory variables that I use in the model are defined and explained in the methodology section of Chapter 3 of this study. As discussed earlier, I employ variables that have been used in previous studies related to cash distribution policy. They are based on corporate financial theory in the areas of asymmetric information (signaling), agency cost, free cash flow, financial flexibility, corporate control, and optimal capital structure.

Employing a self-selectivity model recognizes and adjusts for the selection bias that may be inherent in earlier studies that ignore the fact that firms may be "non-randomly" included in their sample. If indeed firms choose a particular disbursement method only when it is optimal (that is, in the best interests of the firm's stockholders), then they are said to have self-selected within the sample.

The self-selection arises because the choice of a cash distribution method and the resulting economic variable being analyzed (*the excess returns around the announcement of the disbursement*) are jointly determined by a common set of factors. As a result the error terms in the functional relationships explaining the disbursement choice and the excess stock returns would be correlated and have non-zero expectations. Where self-selection exists and

is not corrected, this non-random sample selection process potentially leads to biased inferences from the study undertaken, since the regression models estimated using ordinary least squares could result in inefficient and inconsistent estimates.

1.3 Important Contributions of This Research

The primary contribution of this study is the use of a self-selectivity model to identify whether firms are making disbursement decisions that maximize their stockholders' wealth. This study is the first attempt, to my knowledge, to address this issue. The research results suggest that the major factors affecting the firm's choice of using either a dividend or a stock repurchase to make cash distributions are stockholder wealth maximization and issues of asymmetric information, signaling, undervaluation, agency, financing cost, managerial incentives, clientele, financial flexibility, and cash flow permanence.

By operating in an integrated framework, that is, by jointly examining the stock market's reactions to dividend and repurchase announcements, the research is able to account for any potential self-selectivity bias that may have been overlooked in previous research. The primary methodology used in examining the information effects of the dividend and stock repurchase announcements is an event study. The research finds that self-selection bias is a critical factor (primarily with regard to stock repurchasing firms) in studying the motivations for firms' disbursement choices. Firms do not appear to randomly choose between the various disbursement methods. Rather, the observed choice is the result

of a deliberate decision made by the firm (generally in the interest of maximizing the wealth position of its stockholders).

The remainder of this research paper is organized as follows. I provide in Chapter 2 a more detailed treatment of the theories related to corporate cash disbursements. I define in Chapter 3 the factors used in my model and discuss the methodology applied in the research, as well as indicate my data sources and outline the hypotheses that are examined. Chapter 4 then provides the results of the study and presents an interpretation of these results in the present research context. A summary of the research concludes the study in Chapter 5.

Chapter 2

Review of Related Literature

In this chapter I provide a detailed examination of the current literature in finance, both theoretical and empirical, as related to both the differing motivations posited as explanations of the varying forms of cash disbursements considered and the factors impacting the choice between disbursement methods.

In order to provide a more structured survey and to facilitate application to the present research, this survey of the literature is presented with reference to disbursement type. The first and second sub-sections review empirical and theoretical research related to dividend disbursements and stock repurchases respectively. In examining the literature related to dividend disbursements, I also separately consider the theoretical motivations posited for dividend increases and specially designated dividends. In the third sub-section I summarize existing research that considers the choice between different payout methods.

Additionally, since the decision to *begin* paying dividends involves other confounding factors, for the purpose of this study dividend disbursements focus only on dividend increases and special dividends. Dividend initiations are not considered.

2.1 Dividend Theories

2.1.1 Theoretical Motivations for Dividend Increases

Three main theoretical arguments are presented in the literature to explain why managers make distributions in the form of dividend payments. These are (i) the cash flow signaling hypothesis, (ii) resolution of agency conflicts, and (iii) the taxation clientele hypothesis.

2.1.1.1 Cash Flow Signaling. Modigliani and Miller (1964) provide the foundation for the signaling argument, as related to managers' decisions to increase dividends, by positing that managers will increase the firm's dividend payout only when they believe the firm can sustain the increased payments over the foreseeable future. This is so because they are reluctant to cut dividends, as the market penalizes the firm severely for so doing (empirical studies, e.g. Lintner (1956), Aharony and Swary (1980), and Kwan (1981) support the observation that the stock market reacts more negatively to an unexpected dividend cut than it does positively to an unexpected dividend increase of the same proportion).

The cash flow signaling arguments are based on the work of Bhattacharya (1979) and Miller and Rock (1985) and posit that, in markets with asymmetric information, managers of firms with high earnings prospects signal this information to the market by paying cash dividends. The signal becomes credible because less profitable firms are not

able to mimic the signal and adopt such a policy, due to the high opportunity cost of foregone investments.

The major signaling costs in Bhattacharya (1979), that lead dividends to function as a signal of expected cash flows, arise from the assumption made that dividends are taxed at a higher rate than capital gains. He develops a tax-based signaling cost model in an intertemporal setting, enabling the identification of the relative weights placed on the benefits (derives from the rise in liquidation value caused by a committed, and actually paid, dividend level) and costs (tax-cost ensuing because cash payouts in the form of dividends are assumed to be taxed at a higher personal tax rate than capital gains) of signaling with dividends. Under these conditions, it is shown that dividends function as a signal of expected future cash flows. One other interesting result of the model is that the shorter the horizons over which shareholders have to realize their wealth, the higher is the equilibrium proportion of dividends to expected earnings.

Miller and Rock (1985) evaluate announcement effects and their consequences under conditions of asymmetric information (where the firm's managers are assumed to know more than outside investors about the true state of the firm's current earnings) using a two-period, one decision, no-tax, uncertainty model of the firm's combined dividend, investment, and financing decision. Their model is based on the familiar cash flow identity, namely, that the sources of funds to the firm (earnings plus financing) must be equal to its uses of funds (dividends plus investment). Given that the investment and financing decisions are known (or fixed), they show that in a world of rational expectations, the firm's dividend announcements provide just enough pieces of the firm's sources and uses statement for the

market to deduce the unobserved piece, that is, the firm's current earnings. The dividend announcement conveys information indirectly, and need not represent any deliberate attempt by the managers of the firm to reveal their private information. The dividend announcement merely provides the market with the missing piece of the cash flow identity that allows the market to estimate the firm's current earnings. It is then the earnings estimate, rather than the dividend itself, that the market utilizes to estimate the expected future earnings, and thereby the firm's market value. Dividends can, therefore, by this indirect route, acquire an important informational signal content.

John and Williams (1985) also present a similar model to Miller and Rock (1985), in the framework of a signaling equilibrium, where they show that firms with more favorable inside information optimally pay higher dividends and receive appropriately higher prices for their stock. In their model, taxes are paid only on dividends, no transaction costs are incurred when issuing, retiring, or trading shares, and all sources and uses of the firms' funds are fully observed by outsiders through costless public audits. They show that under these circumstances, corporate insiders distribute taxable dividends, which the market interprets as a dissipative signal, if and only if the demand for cash by both the firm and its current stockholders exceeds the supply of internal funds. The intuition behind their signaling equilibrium lies in the fact that current stockholders will suffer some dilution in their fractional ownership of the firm when the firm needs to raise investment funds (by selling new shares or retiring fewer outstanding shares), or the current stockholders need to raise cash on personal account (by selling existing shares). Reducing this dilution will be more valuable to current stockholders when their private information is more favorable. Hence,

insiders, acting in their stockholders best interests, may distribute a taxable dividend if outside investors recognize this relationship, bid up the stock price, and thereby reduce current stockholders' dilution.

A number of empirical papers have appeared in the literature providing support for the cash flow signaling argument. Ofer and Siegel (1987) document significant analyst forecast revisions following dividend changes and indicate that this evidence lends support to the information signaling hypothesis.

Denis, Denis, and Sarin (1994), integrate the cash flow signaling, free-cash flow / agency cost, and clientele hypotheses in a single testing framework and find support for the cash flow signaling argument. They use a standard event study methodology with market model coefficients to calculate the two day excess returns around the dividend change announcement. The data sample consisted of 6,777 dividend change announcements of at least 10 percent (5,992 dividend increases and 785 dividend decreases) made by NYSE/AMEX firms over the period 1962-1988. Their sample exhibited a significant two-day announcement period excess returns of 1.25 percent for dividend increases and –5.71 percent for dividend decreases. Using a cross-sectional multiple regression model to simultaneously control for the standardized dividend change, dividend yield, and Tobin's Q, they find that announcement period excess returns are positively related to the magnitude of the standardized dividend change and to the dividend yield, but unrelated to Tobin's Q. They provide further evidence on the signaling argument by showing that analysts significantly revise their earnings forecasts (using a moving average technique to estimate the unexpected

revision in analysts' earnings per share forecasts) following dividend changes[9] and that Q<1 firms actually increase their capital expenditures following dividend increases.

An alternative signaling hypothesis presented by Grullon, Michaely, and Swaminathan (1999) is that dividend increases signal a firm's long-term transition from growth phase to a more mature phase (with a resultant decrease in systematic risk). Using a sample of 7,642 dividend changes announced between 1968 and 1993 they find that firms that increase dividends experience a significant decline in their systematic risk (as measured by changes in the factor loadings from the Fama-French (1993) three factor model) and that the positive market reaction to the announced dividend increase is related to the decline in systematic risk.

2.1.1.2 Resolving Agency Conflicts*:* The general arguments presented in these theories are that by increasing dividend payments firms help to mitigate agency problems existing between managers and shareholders. The specific mechanism by which this is accomplished differs, however, among the various models.

Rozeff (1982) presents an ownership structure hypothesis suggesting that the characteristics of a firm's stockholdings significantly impact its optimal financial policies, implying that firms which initiate dividend payments should either have lower insider shareholdings or have experienced a larger reduction in insider shareholdings since their initial offering, than comparable non-dividend paying firms. Newly public firms maintaining a cohesive ownership structure -- with high levels of insider and/or institutional shareholdings – are assumed to generate few agency costs by nature, as ownership and

control are tightly integrated (hence, agency problems are deemed to arise as a direct result of the separation of ownership and control). These firms are thus unlikely to initiate or increase dividend payments (for the purpose of resolving agency conflicts). The reverse also holds true -- the lack of a *compact* structure induces agency costs due to the separation of ownership and control of the firm, and dividends are used by the firm to alleviate these costs.

Easterbrook (1984) hypothesizes that dividends serve as a means of inducing managers to more frequently raise funds from the public capital market -- where monitoring and control activities can be more effectively enacted -- thus alleviating agency problems associated with monitoring costs and risk aversion on the part of managers. This is so because dividends dissipate the firm's supply of internally generated funds (cash) and induce firms to float new securities to generate funds for investment projects. His capital market monitoring theory implies that firms that use dividend payments to alleviate serious agency problems, as related to the above, should subsequently issue debt and/or equity securities more frequently than comparable non-dividend firms.

Jensen (1986) posits that a firm with free cash flow, that is, cash flow in excess of that necessary to fund all available positive net present value projects, should experience a positive stock market reaction to an increase in its dividend payment. His argument is founded on the premise that payouts to shareholders reduce the resources under managers' control, thereby reducing managers' power, and making it more likely they will incur the monitoring of the capital markets which occurs when the firm must obtain new capital (similar to the argument of Easterbrook (1984) above). Free cash flow in the hands of managers generates agency costs as managers have incentives to expend funds on perquisites

or sub-optimal investments and acquisitions, rather than making payments to shareholders. Their willingness to relinquish control of free cash flow -- by distributing dividends – therefore indicates their commitment to acting in shareholders best interests, hence a reduction in agency costs and an increase in shareholder wealth.

The empirical findings tend to lend some measure of support for the agency cost resolution theories. In their study, Lang and Litzenberger (1989) document the existence of a strong relationship between the generation of excess free cash flow and the decision by firms to begin paying dividends. They suggest that unexpected dividend change announcements by "overinvestor" firms (that is, those firms that invest in negative net present value (NPV) projects) convey information regarding the firms' future investment levels. A dividend increase suggests that the firm will invest less in the future than was expected. This will be interpreted favorably by the market since the firm was expected to have invested in negative NPV projects otherwise. Using Tobin's Q as an indicator of the profitability of new investment opportunities they find that firms with $Q<1$ have greater price reactions, on average, to dividend changes than do $Q>1$ firms.

Additionally, in the agency theory realm, Handjinicolaou and Kalay (1984) hypothesize that managers may use dividend increases as a mechanism to redistribute wealth from bondholders to stockholders. This "wealth redistribution" hypothesis states that unexpected dividend increases would transfer wealth from the bondholders to the equityholders if the dividends are financed by issuing new debt at equal or higher seniority than outstanding debt, or by reducing investment outlays. The wealth redistribution results from the increase in the risk of the firm's currently outstanding bonds that accompany the

two aforementioned mechanisms (debt-financed or investment-financed dividends). The implication of this is that the positive (negative) impact of dividend announcements on stock prices should be accompanied by negative (positive) effects on the bond prices.

They tested their hypothesis by examining 255 bonds chosen randomly from NYSE firms announcing dividend payments during 1975 to 1976 (the 255 sample firms made 1,967 dividend announcements over the period). They used the mean-adjusted returns model of Brown and Warner (1980) to estimate the bond price effects (excess returns) for the day 0 and 30-day (–15 to +15) announcement period windows. Their results indicated that bond prices are not affected by dividend increases but react negatively to dividend reductions. This finding thus contradicted their wealth redistribution hypothesis and instead supported the information signaling hypothesis for dividend announcements.

2.1.1.3 Taxation Clienteles. The body of literature in this section is based on the hypothesis that high income tax bracket investors will tend to prefer low dividend yield stocks, with the reverse also holding true. Elton and Gruber (1970) provide support for this argument by documenting a positive correlation between the dividend yield of securities and the proportionate size of their relative ex-dividend price drop. They also show that the ex-dividend price drop is smaller than the dividend per share, which infers a tax effect.

Bajaj and Vijh (1990) suggest dividend clienteles as a partial explanation of the observed stock price reaction to dividend change announcements. They theorize that the price reaction is influenced by the yield preferences of the marginal investor in the firm's shares. Hence, the market reaction to the announcement will be related to the firm's dividend

yield, that is, *dividend-yield* surprises will be perfectly correlated with *dividend* surprises. They examine 1,188 dividend decreases and 7,322 dividend increases between 1962 and 1987 for firms listed on the 1987 CRSP daily master file (NYSE and AMEX stocks), and use the market model to measure the cumulative abnormal returns for the 3-day period (-1 to +1) around the dividend announcement, splitting the sample into three sub-groups of high, medium, and low dividend yield firms. Using the firm's preannouncement yield as a proxy for the market's anticipated yield, they find that the magnitude of the stock price reaction to the dividend change announcement is greater the higher the anticipated yield (their average 3-day CAR around dividend increase announcements was statistically significant at 1.04 percent for the entire sample). Litzenberger and Ramaswamy (1979) provide similar evidence by examining the relationships between firms' stock prices and their respective dividend yields.[10]

Kalay (1982) attempts to refute these arguments by showing that marginal tax rates cannot be inferred from the existing data without additional information. However, after adjusting for the dual potential biases in the earlier research, his results remain "consistent" with a tax effect. Barclay (1987) provides strong rebuttal for the taxation clientele hypothesis, providing documentary evidence that taxes are not a *primary* factor in the dividend decision -- since dividends were in fact being paid before they were subject to taxation and continued to be popular thereafter.

2.1.2 Theoretical Motivations for Specially Designated Dividends

Two major arguments are presented with respect to theoretical justification for specially designated dividends (SDDs). As suggested from the earlier discussion in chapter 1, these are similar to the explanations for regular dividends, namely cash flow signaling and agency cost resolution (specifically free cash flow hypothesis).

2.1.2.1 Cash Flow Signaling. Theory would suggest that the labeling of dividends as "special", "extra", or "year-end" conveys information to the market about future earnings and dividends. Financial texts suggest that special dividends convey information that is of a "temporary" or "transitory", rather than permanent, nature -- indicating a lower probability (as compared to regular dividend increases) of the "increase" being sustained. Brickley (1983) reveals that SDDs provide positive but "weaker" information than regular dividends. He concludes that SDDs provide information of more than a transitory or temporary nature -- information that is not obviously differentiated from that provided by regular dividend increases. Jayaraman and Shastri (1988) show that the level of information conveyed by SDDs is negatively related to the frequency of the dividend. They find no evidence of bondholder wealth expropriation -- the gains accrue solely to shareholders. Howe, He, and Kao (1992) also provide indirect support for the signaling hypothesis. They find no significant difference in stock price reactions to SDDs for high Tobin's-Q (value-maximizers) versus low Tobin's-Q (overinvestors) firms.

2.1.2.2 Resolving Agency Conflicts (Free Cash Flow Theory). This is essentially the Jensen argument presented in the other dividend sections -- this theory cannot discriminate among the different forms of dividend payments cited. Further support for this explanation is provided by Kanatas and Ofer (1992) who develop a model showing that a one-time payment (SDDs) does not provide sufficient information necessary to induce appropriate managerial effort, thereby minimizing agency problems.

2.2 Stock Repurchases Theories - Open Market and Tender Offers

2.2.1 Information Signaling Hypothesis

The signaling hypothesis theorizes that a firm's management will repurchase its shares if it is believed the stock represents a good investment, that is, signaling to the market that the shares are undervalued and/or that the firm's prospects -- cash flow, earnings, and risk -- are positive. The cost to signal such information is, however, not the same for all firms. In fact, firms without such positive information will have a much higher signaling cost, and this prevents such firms from sending false signals. To be a valid signal, management must commit not to sell its own shares back to the firm during the repurchase program.[11] The signal becomes credible because the managers would then be acting against their own best interests to falsely signal positive information while at the same time retain their own shares in the firm.

Vermaelen (1981) examined this proposal by observing the pricing behavior of securities of firms repurchasing their own shares. His results provide support for the signaling hypothesis and he concludes:

> "...firms offer premia for their own shares mainly in order to signal positive information...the market uses the premium, the target fraction, and the fraction of insider holdings as signals in order to price securities around the announcement date."

Additional support for signaling, as applied to stock repurchase announcements, has been provided by Klein and Rosenfeld (1988), Hertzel and Jain (1991), Bartov (1991), and Tsetsekos (1993), among others.

2.2.2 Leverage / Optimal Capital Structure Hypothesis

The theory developed here has its foundation in theoretical models developed by Jensen and Meckling (1976) and DeAngelo and Masulis (1980) reflecting the valuation effects of capital structure changes. The hypothesis states that a corporation's managers provide information that the firm is moving closer to its optimal capital structure -- replacing equity with tax-deductible debt -- by repurchasing the company's shares.

Jensen and Meckling (1976) model agency costs for the firm characterized by a separation of ownership and control, and show that these costs (monitoring and bonding expenditures and the residual loss from investment decisions of managers) are reduced by the existence of risky debt in the firm’s capital structure. Monitoring provided by debtholders results in the firm’s total monitoring costs being less when both debt and equity

financing comprise the firm's capital structure, than for the firm being fully equity financed. Thus, some proportion of debt financing will be necessary to minimize total agency costs and thereby maximize firm value. Hence, a firm with a lower proportion of debt than the level required to minimize total agency costs will benefit from an increase in leverage.

DeAngelo and Masulis provide evidence that builds on the earlier work of Modigliani and Miller (1963) that an increase in corporate debt provides increased tax-deductible interest payments, thereby increasing the firm's debt tax shield and hence the value of the firm. They show that individual tax preferences against debt -- that treat equity income more favorably than debt income -- diminish but do not completely offset the corporate advantage of debt.

Empirical analysis of this position has been provided by Masulis (1980b), who considered the impact of capital structure change announcements on security prices and reported significant price adjustments in firms' common stock, preferred stock, and debt related to these announcements. His results are consistent with both the leverage hypothesis and the wealth expropriation hypothesis discussed below. The work of Smith (1987) also provides support for a leverage or tax effect.

2.2.3 Wealth Expropriation Hypothesis

The argument posited here is that since repurchasing stock reduces the assets of the firm and increases its leverage, thus reducing the safety of outstanding debt, it thereby transfers wealth from the corporate debtholders to the shareholders -- an effect similar to that

produced by spin-offs, as documented by Galai and Masulis (1976) -- if debtholders are not completely protected by covenants.

This idea has been advanced by Masulis (1980a) and Dann (1981) but has not received strong empirical support. Dann finds no significant loss in wealth being suffered by bondholders upon a repurchase announcement, while Masulis (1980b) finds that only debtholders devoid of complete covenant protection against the issue of subsequent debt instruments -- equal or senior standing -- experience significant negative returns.

2.2.4 Agency Cost & Free Cash Flow Theory

Again, this is Jensen's argument that distributing excess free cash flow -- in this case a current accumulation that is not necessarily expected to continue in the future -- signals to the market management's acting in the best interests of shareholders by relinquishing control of such free cash flow, thereby reducing agency costs. Jensen's theory is unable to discriminate among the various forms of corporate cash disbursement policies and is equally applicable to dividends and repurchases. Vermaelen's (1984) results provide additional tentative support for the hypothesis that stock prices reflect adverse managerial incentives.

2.2.5 Corporate Control Hypothesis

In addition to the traditional motivations presented above, more recent research has focused on the use of stock repurchases as a mechanism of corporate control. Bagnoli,

Gordon, and Lipman (1989) present a model with stock repurchases serving as a defense against takeovers by signaling managers' private information about the value of the firm. Denis (1990) and Bagwell (1992) also identify takeover defense as an alternative motivation for repurchases.

Sinha (1991) uses repurchases as a mechanism for disciplining managers to act in shareholders best interests. A debt-financed repurchase, through the threat of bankruptcy and the subsequent loss of perquisites, ensures that managers carry out investments that increase firm value. The optimal mix of investment and debt-financed repurchase is determined by a trade-off between the benefits of a reduced probability of takeover and the cost of an increased probability of bankruptcy.

2.3 Studies Incorporating Both Disbursement Types

There exists a paucity of financial research examining firms' choice of disbursement mode in an integrated framework. Most of the work to date has focused not on developing a choice model but instead on postulating a cost-benefit analysis for the choice and examining the stock market's reaction to one type of disbursement conditioned by the firm's prior use of other types.

Ofer and Thakor (1987) were perhaps the first to examine the interaction of dividends and stock repurchases by exploring the informational roles of both simultaneously. They develop a joint dissipative signaling model in which managers transmit their privately held information through both corporate cash-distribution methods. Managers are thus able

to signal the true value of their firms by using either a dividend, a stock repurchase, or both. The central assumption of their model that creates a signaling-cost structure difference between dividends and repurchases is that managers are excluded from tendering in a repurchase -- an assumption that has been supported in the empirical literature. Additionally, they require a managerial incentive contract necessary to provide the manager a reason to signal: one such that a nontrivial component of the manager's compensation is driven positively by the postsignal value of the firm. From their model, they show that both dividends and repurchases will generally be used as signals and neither dominates under all circumstances. They were also able to rationalize and explain why a stock repurchase elicits a significantly higher average stock market reaction than a dividend announcement. However, as per their own conclusion, their model "seems particularly suited to relatively small firms in which insiders can be expected to have sizable stock holdings."[12]

Barclay and Smith (1988) approach the choice between dividends and repurchases from a cost minimization perspective. To explain the empirically documented overwhelming use of cash dividends by firms, they argue that there exists a previously unrecognized cost associated with *open-market repurchases* that does not arise with dividend payments. Their information-asymmetry hypothesis posits that more trading by informed managers increases the bid-ask spread, reduces the liquidity of the firm's shares, and thereby increases the firm's cost of capital -- hence reducing its market value. This liquidity cost arises since the specialist, on observing additional informed traders entering the market, finds that he no longer covers the opportunity cost of his time and invested capital at the current bid-ask spread. Since these costs of repurchases do not arise with cash dividends, their analysis

implies that repurchases do not dominate dividends as a form of making cash distributions to shareholders.

Hausch and Seward (1993) provide a more esoteric signaling model to determine a firm's choice between stock repurchases and dividends. They consider the manager's problem of selecting a cash distribution method as the choice between deterministic and stochastic disbursements. Their model is, however, a univariate signaling model and, as such, they are not able to explain why firms utilize different forms of stochastic distributions. Their study concludes that the firm's choice of a deterministic or stochastic distribution depends on a property of the firm's production function that is analogous to absolute risk aversion for the utility function. The high quality firm prefers to signal quality with a stochastic (deterministic) disbursement when there is decreasing (increasing) absolute risk aversion.

Fama and French (2000) examined the incidence of dividend payers among NYSE, AMEX, and NASDAQ firms over the period 1926-99. They reveal that while the proportion of firms paying cash dividends increased from 33.6 percent to more than 90 percent between 1933 and 1962, the proportion of firms paying cash dividends fell from 66.5percent to 20.8 percent between 1978 and 1999. They conclude that this is due partly to the changing characteristics of publicly traded firms, with a shift towards small firms with low profitability and strong growth opportunities. However, even after controlling for these factors they find that firms have, over the sample period, exhibited a lower propensity to pay dividends (that is, a declining likelihood of paying dividends). This they interpret to mean that the perceived benefits of dividends decline through time.

Jagannathan, Stephens, and Weisbach (2000) examine the growth in open market repurchases and the determinants of payout policy from a sample of repurchase programs announced between 1985 and 1996. They indicate that between this period the number of open market stock repurchase programs announced by U.S. industrial firms increased from 115 to 755 (a 650 percent increase) while the value of these transactions increased from $15.4 billion to $113 billion (a 750 percent increase). However, they observe that while the incidence of dividend payments has decreased the value of these distributions continue to rise over the same period, moving from $67.6 billion to $141 billion (a 109 percent increase). Their primary hypothesis is that dividends represent an ongoing commitment and are used to distribute permanent cash flows, while repurchases are used to pay out cash flows that are potentially temporary. Their empirical evidence indicates that stock repurchases are used by firms with higher "temporary" non-operating cash flows, greater earnings volatility, and following poor stock market performance. On the other hand, firms tend to increase dividends following good performance and when they have higher "permanent" operating cash flows.

Guay and Harford (2000) arrive at similar conclusions to Jagannathan, Stephens, and Weisbach (2000), but use a different empirical approach. They reiterate that cash-flow shocks preceding a dividend increase will have a larger permanent component than that preceding a repurchase and that the market uses the firm's payout choice to update its belief about the permanence of cash-flow shocks.

Fenn and Liang (2000) examine the effect of managerial stock incentives on corporate payout policy using a sample of 1,108 non-financial firms listed in the S&P 500,

S&P Midcap 400, or S&P Smallcap 600 indices. They find that managerial stock options are related to the composition of cash payouts. In particular, their empirical evidence shows a negative relationship between dividends and the level of management stock options and a positive relationship between repurchases and the level of management stock options. They conclude that the growth in managerial stock options partially explains the increase in repurchases relative to dividends.

2.4 Summary

The literature on corporate payout policy is extensive. In my survey I have concentrated primarily on the two strands relevant to the research question being considered. On the one hand, I have considered various viewpoints as to the important factors associated with the magnitude of the stock price announcement effects related to corporate cash disbursements. Our discussion indicates that among the relevant factors in this regard would be the size of the firm, the level of asymmetric information (incorporating earnings and systematic risk expectations), the prior dividend yield (representing the clientele effect), the level of free cash flows (potential for reduction of agency costs), and the current debt level of the firm (purported by the optimal capital structure hypothesis).

On the other hand, I have focused my attention on the factors that have been theorized and empirically examined as having an impact on the choice of corporate payout method (repurchases or dividends). Our review suggests that the level of asymmetric information, extent of undervaluation in the firm's stock price, financial flexibility inherent

in the firm (measured by the permanence of the firm's cash flows, the volatility of its earnings, and the prior market performance of its stock), the extent of available managerial stock options, the level of its free cash flows (and associated agency costs), and the existence of hostile takeover attempts facing the firm are the factors influencing the choice.

As I develop my empirical model in the next chapter proxies for these variables will be applied in examining the research question posited and will form the basis of our conclusions developed in the context of the statistical testing of that model.

Chapter 3

Research Design

3.1 Specific Hypothesis Considered

The design of the present research and the methodologies applied therein take into account the factors discussed earlier in Chapters 1 and 2. The main purpose of the research is to investigate whether managers' choices between dividends and stock repurchases as alternative payout methods are value maximizing from the perspective of the firm's stockholders.

The specific hypothesis that I examine may be stated as:

H_o: *Managers do not discriminate in their choice of a payout method.*

H_a: *Managers discriminate between dividends and repurchases by maximizing the expected abnormal returns following the disbursement announcement.*

The validity of the hypothesis is examined in two stages. First, relevant variables are extracted from the literature as it relates to motivations for cash disbursements and these are utilized in jointly estimating (using a self-selectivity modeling approach) the manager's disbursement decision and the resulting stock market excess returns around the

announcement of the decision. In step two I examine what the expected excess returns would have been had the alternate choice been made by the manager and then conclude whether the choice was a stockholder wealth maximizing one.

3.2 Methodology Development and Determination of Test Statistics

From the earlier discussions in chapter 1 of this study the decision between stock repurchases and dividends is looked at in two regards. These are the choices between:

1. Dividend Increases and Open Market Stock Repurchases, and
2. A Specially Designated Dividend and a Repurchase Tender Offer.

In modeling the above choices I apply a limited dependent variables estimation technique known as self-selectivity. Self-selectivity implies that firms are not indifferent in choosing to distribute cash to their stockholders in the form of dividends or stock repurchases. Rather, the observed choice of disbursement method is the result of a deliberate and specific decision made by the firm. According to Maddala (1991):

> "The self-selection model is based on the idea that individuals choose one of two groups on the basis of expected benefits from belonging to the two groups. …Sometimes the benefits can be captured by the stock price…"

As such, the observed cross-sectional "informational" effect is conditional on the choices made. Therefore, I would not expect the same average effect to be observed for firms choosing to engage in either event. The process generating observed abnormal stock market returns is thus modeled as a "switching regression model with endogenous switching",[13]

requiring the researcher to simultaneously estimate: (i) the unconditional cross-sectional announcement period cumulative abnormal return experienced for each event type, (ii) the decision process adopted by the firm in choosing between the different methods of disbursement, and (iii) the impact of the firm's choice of disbursement type on the observed announcement period cumulative abnormal returns.

Our foundational premise is that a firm, having decided to distribute cash to its stockholders, will make a dividend payment only if the net gain from this option is greater than the gain arising from a stock repurchase. That is, dividends will be used as the cash disbursement choice if

$$(V_{Di} - V_{0i}) - (V_{Ri} - V_{0i}) > C_{Di} - C_{Ri} \quad (1)$$

where V_{Di} and V_{Ri} are the values of the firm after making the dividend payment or stock repurchase, respectively, V_{0i} is the value of the firm before making the cash distribution, and C_{Di} and C_{Ri} are the respective costs associated with the dividend payment or the stock repurchase. If we standardize all variables in terms of the value of the firm before the disbursement, V_{0i}, then the firm will utilize dividends if

$$I_i^* = R_{Di} - R_{Ri} - c_i > 0 \quad (2)$$

where I_i^* is the net gain from paying dividends rather than repurchasing stock, R_{Di} is the return from making a dividend payment, R_{Ri} is the return from making a stock repurchase, and c_i is the difference in cost of making a dividend payment relative to a stock repurchase expressed as a fraction of the value of the firm.

I_i^*, the decision variable, is a latent unobservable variable. The firm will make a dividend payment where the net gain, I_i^*, is greater than zero and utilize a stock repurchase

where it is less than zero. Although the decision variable is not observed, we do however observe the firm's choice, and this is modeled by the binary selection index (dummy variable) defined as:

$$I_i = 1 \quad if \ I_i^* \geq 0 \qquad \text{(for dividends)}$$
$$I_i = 0 \quad if \ I_i^* < 0 \qquad \text{(for stock repurchases)}$$

Similarly, for each firm making a cash distribution, the cumulative abnormal return around the announcement of the disbursement choice is observed *ex-post*. We can thus specify the excess returns equations for firms making dividend payments and stock repurchases as follows:

$$CAR_{Di} = X_{Di}\beta_D + \mu_{Di} \quad iff \ I_i^* \geq 0 \tag{3}$$
$$CAR_{Ri} = X_{Ri}\beta_R + \mu_{Ri} \quad iff \ I_i^* < 0 \tag{4}$$

Equation (3) represents the cumulative abnormal return to be expected by a firm on announcement of a dividend disbursement while equation (4) represents a similar effect for the firm choosing a stock repurchase. The X_i terms represent the exogenous factors expected to influence the wealth effect associated with the disbursement. These are outlined and discussed in a later section. β_D and β_R are vectors of coefficients that may differ depending on which disbursement choice is used, while μ_{Di} and μ_{Ri} are the error terms in the respective regression equations. We can substitute equations (3) and (4) into equation (2) to yield a reduced form selection index, namely:

$$I_i = X_i(\beta_D - \beta_R) + (\mu_{Di} - \mu_{Ri})$$

or

$$I_i = Z_i\gamma - \mu_i \tag{5}$$

The coefficients in equation (5) are not directly observable, however, due to the self-selectivity bias resulting from the disbursement choice being endogenously determined. That is, the selection bias arises because the choice of a disbursement method and the abnormal returns on announcement of the decision are jointly determined by a common set of unobservable factors. The result is that the error terms in equation (3) and (4) will be correlated with the error term in equation (5) and will have non-zero expectations. According to Shehata (1991):

> "Recent developments in econometrics suggest that, in the presence of self-selection bias, using OLS in the usual fashion to estimate regression models could result in inefficient and inconsistent estimates".

Given the observations I_i, I use the probit maximum likelihood to estimate the parameter γ. However, γ is estimable only up to a scale factor and I thus set Var (μ_i)=1 [Maddala (1991) indicates that the assumption of Var(u_i)=1 is because I_i* is observed only as a dichotomous indicator]. Finally, I assume that μ_{Di}, μ_{Ri}, and μ_I have a trivariate normal distribution with mean vector zero and covariance matrix:

$$\Sigma = \begin{pmatrix} \sigma_D^2 & \sigma_{DR} & \sigma_{DU} \\ \sigma_{DR} & \sigma_R^2 & \sigma_{RU} \\ \sigma_{DU} & \sigma_{RU} & 1 \end{pmatrix} \qquad (6)$$

Since σ_{DR} is not estimable by maximum likelihood (by design I treat repurchases and dividends as separate observations and never group these for the same firm), I can set it equal to zero and transform the Σ matrix in (6) to obtain:

$$\sum = \begin{pmatrix} \sigma_D^2 & 0 & \sigma_{DU} \\ 0 & \sigma_R^2 & \sigma_{RU} \\ \sigma_{DU} & \sigma_{RU} & 1 \end{pmatrix} \tag{6a}$$

The likelihood function for the model is then given by:

$$L\left(\beta_D, \beta_R, \sigma_D^2, \sigma_R^2, \sigma_{D\mu}, \sigma_{R\mu}\right) = \prod \left[\int_{-\infty}^{Z_i\gamma} g\left(CAR_{Di} - X_{Di}\beta_D, \mu_i\right) d\mu_i \right]^{I_i} \left[\int_{Z_i\gamma}^{\infty} f\left(CAR_{Ri} - X_{Ri}\beta_R, \mu_i\right) d\mu_i \right]^{(1-I_i)} \tag{7}$$

where *g(.)* and *f(.)* are the bivariate normal density functions of (μ_{Di}, μ_i) and (μ_{Ri}, μ_i) respectively. Although maximization of the likelihood function in equation (7) is possible, it can be quite cumbersome. Lee (1978) outlined a simpler two-stage "structural probit" estimation method that involves first estimating γ from the reduced form binary choice equation (5) by probit maximum likelihood (ML) and then using this estimate to transform and solve equations (3) and (4) by ordinary least squares (OLS). The predicted benefit differential, ($\hat{CAR}_{Di} - \hat{CAR}_{Ri}$), is then introduced in the disbursement choice equation (5) to obtain the "structural form" probit equation that allows for consistent estimation, again by applying maximum likelihood procedures. The detailed "two-stage structural probit estimation procedure" is as follows:

First, obtain the expected values of μ_{Di} and μ_{Ri} conditional on the firm's choice of being in the sample (another way to think of this is that we are considering the expectation of the abnormal returns conditional on the distribution being observed, whether a dividend or a repurchase), which is defined as[14]:

$$E\left(\mu_{Di} \middle| \gamma' Z_i \geq \mu_i\right) = \sigma_{D\mu} \frac{\phi\left(\gamma' Z_i\right)}{\Phi\left(\gamma' Z_i\right)} \tag{8}$$

and

$$E\left(\mu_{Ri} \middle| \gamma' Z_i < \mu_i\right) = \sigma_{R\mu} \frac{-\phi\left(\gamma' Z_i\right)}{\left(1 - \Phi\left(\gamma' Z_i\right)\right)} \tag{9}$$

In equations (8) and (9) the first term on the right-hand side of the equations measures the relationship (covariance) between the manager's decision (choice of disbursement method) and the outcome of the decision (resulting abnormal return), which indicates whether managers are acting on shareholders' behalf. It essentially is the linear regression coefficient that results from regressing the error terms in the decision model (equation (5)) against the error terms in the abnormal returns models (equations (3) and (4)).

The second term, referred to as the *Inverse of the Mills' Ratio* (or the non-selection hazard), is an expectation of the value of the error term in the decision model conditional on the firm using either a dividend or a stock repurchase respectively (since the conditional distributions of these error terms are *normal*). The *Inverse of the Mills' Ratio* is the ratio of the probability to the cumulative density functions evaluated at the point at which the distribution is "separated". As the probability of being in the selection sample (in this case, distributing through dividends) increases, the cumulative density function approaches one and the probability density function approaches zero, so the *Inverse of the Mills' Ratio* approaches zero. Hence, a positive (negative) coefficient on this variable in the dividend (repurchase) abnormal returns equation indicates that sample selection is important and that indeed managers are making decisions with regard to the welfare of the firm's stockholders.

This result implies that the error terms in the abnormal return regression equations will have non-zero expectations (and, hence, the *self-selectivity bias*).

Given these two expectations, define $W_{Di} = \frac{\phi(\gamma' Z_i)}{\Phi(\gamma' Z_i)}$ and $W_{Ri} = \frac{-\phi(\gamma' Z_i)}{(1-\Phi(\gamma' Z_i))}$, and then I can rewrite equations (3) and (4) as:

$$CAR_{Di} = \beta'_D X_{Di} + \sigma_{D\mu} W_{Di} + \varepsilon_{Di} \quad for\ I_i = 1 \tag{3a}$$

$$CAR_{Ri} = \beta'_R X_{Ri} + \sigma_{R\mu} W_{Ri} + \varepsilon_{Ri} \quad for\ I_i = 0 \tag{4a}$$

where the new error terms, ε_{Di} and ε_{Ri} have zero conditional means.

Equations (3a) and (4a) provide an insight into the self-selectivity issue. Instead of linear equations we have two non-linear equations after the non-zero means have been adjusted. Equation (3a) shows that the expected *CAR* for a firm that announces a dividend consists of two separate components. The first term, $\beta'_D X_{Di}$, is the expected stock market effect for a *random* firm that elects to announce a dividend payment. The second term, $\sigma_{D\mu} W_{Di}$, is the adjustment for self-selectivity that may be inherent in the sample. The covariance term, $\sigma_{D\mu}$, is of particular importance. It indicates that a randomly selected firm, were it to choose to pay a dividend, would not experience a similar stock price effect to that experienced by firms that actually paid dividends. Similar reasoning would apply to the terms in equation (4a).

Using our estimate of γ from the probit maximum likelihood estimation of equation (5) we obtain estimates for W_{Di} and W_{Ri} in equations (3a) and (4a) respectively. We then proceed to solve these equations by OLS regression, which will provide consistent estimates for β_D, β_R, $\sigma_{D\mu}$, and $\sigma_{R\mu}$. A test for the presence of self-selectivity bias is then performed by

examining the statistical significance of the coefficient on the W_i terms in the revised abnormal returns equations (3a) and (4a).

Two potential problems arise with this estimation procedure, however. First, the residuals ε_{Di} and ε_{Ri} in equations (3a) and (4a) are heteroscedastic. The second potential problem with the "two-stage structurtal probit" approach was identified by Lee, Maddala, and Trost (1980) who show that the true variances in equations (3a) and (4a) will be underestimated since the selectivity variables are themselves estimates, that is, they are "generated regressors". However, the computer package used in estimating these equations in the present research, LIMDEP, provides a full information maximum likelihood estimator (FIML) that jointly estimates all the parameters in the model and corrects for these difficulties. This methodological approach is thus utilized in the present study instead of the two-stage structural probit approach outlined above.

Having estimated the two abnormal return regression equations, Maddala (1991) suggests that our next step is to examine whether there are, in fact, any significant changes in the estimates of the effect of the explanatory variables. This is done by comparing the coefficients on the variables in the regression equations estimated with and without correction for the self-selectivity bias. This will indicate whether ignoring the "non-random" selection process has indeed produced misleading results.

I next proceed to estimate what the "predicted" abnormal return would have been had the firm used the alternate disbursement choice, by applying the relevant variables into the estimated CAR models. This, in effect, is the main purpose of the analysis. In this procedure the selectivity terms are not needed and, hence, are omitted. The purpose of

estimating the selectivity equations (3a) and (4a) was to obtain estimates of β_D and β_R that are free of the selectivity bias and hence any further analyses uses these parameter estimates. If managers are making their disbursement decisions in the best interests of the firm's stockholders then I would expect that the difference between the excess returns resulting from the firm's disbursement choice and the predicted excess returns from choosing the alternate payout method would be positive and statistically significant. This is tested by examining the difference between the mean abnormal returns for firms that made a particular disbursement choice and the mean predicted abnormal return for those firms had they chosen the alternate method.

The final step in the two-stage procedure is to estimate a benefit differential (BENEFIT), calculated as the difference between the predicted abnormal returns for all firms if they choose to use dividend payments and the predicted abnormal returns had they instead chosen a stock repurchase (that is, $C\hat{A}R_{Di} - C\hat{A}R_{Ri}$). This additional explanatory variable is then included in the disbursement choice equation (5), producing a "structural form selection index", which is re-estimated by the probit maximum likelihood method. A statistically significant coefficient on the benefit differential variable indicates that managers make their choice of a disbursement method on the basis of the differential in the expected abnormal returns (net-benefit).

To estimate equations (3a) and (4a) I need to provide unbiased estimates of the unconditional *CAR* experienced by firms around the announcement of the relevant disbursements. This is done using standard event-study procedures employing estimated market-model parameters. For this purpose I use returns for each firm (from the CRSP data

base) over 190 trading days (approximately nine calendar months) from day -210 to day -21, relative to the announcement day, to estimate a market model of the form:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{10}$$

R_{it} is the return on firm *i*'s stock on day *t*, R_{mt} is the return on the CRSP value-weighted index[15] on day *t*, ε_{it} is the error term in the model (assumed to be normally distributed with a common mean but unequal or nonhomogenous variance -- that is, heteroscedastic), and α_i and β_i are the parameters that will be estimated in the OLS regression. The estimation period is chosen so as to be close enough to the event period to approximate the true beta during the announcement interval while being far enough to be uncontaminated by the event. Using the returns generated from the estimated model, the abnormal return for firm *i*'s stock on day *t* (AR_{it}) is calculated as the deviation of the predicted (estimated) return for day *t* from the actual return on day *t*. That is:

$$AR_{it} = \varepsilon_{it} = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{mt}\right) \tag{11}$$

The abnormal returns for each firm are then summed for days -1 to +1 to arrive at the three day cumulative abnormal return around the announcement:

$$CAR_i = \sum_{t=-1}^{+1} AR_{it} \tag{12}$$

I include in the announcement interval day -1 because a leakage of information may cause a substantial price reaction on this day while day +1 is included to account for announcements that are made after the stock market has closed for trading. The CAR_i values are then used in the OLS (or WLS) estimations of equations (3a) and (4a). The significance of the coefficients on β_D and β_R, as well as the coefficients on the self-selectivity variable, can then be examined by using standard t-test statistics.

3.2.1 Tests for Unconditional Wealth Effects

I am primarily interested in examining the disbursement choices of managers and its impact on stockholders' wealth as measured by the abnormal returns observed around the disbursement announcement. However, Ross (1989) shows that increases in the rate of flow of idiosyncratic information manifest themselves in increases in stock price volatility. In light of this, changes in the variance of the stock returns distribution may be mistakenly identified as wealth effects. Sanders and Robins (1991) (SR) show that potential bias may exist in the size of the abnormal return (and, hence, the reported "wealth" effect) when an event induces a change in the residual variance of the abnormal returns distribution (σ_i^2) and the mean-effects test procedures applied to detect wealth effects do not incorporate such variance changes (for example, the *z*-test frequently used in event studies would here have a magnifying effect with a tendency to reject a correct null too often). Under these circumstances, the researcher is likely to misclassify as a wealth effect the information effect represented by the change in variance.

Whereas both wealth and variance effects relate to the release of "new" information to the market, a practical distinction between the two may be considered by looking at the level of uncertainty contained in the information released. That is, where the new information is known to contain either "good" or "bad" news about the firm, then the market will incorporate this as a wealth effect. However, when there is uncertainty as to the nature

of the new information (whether it is "good" or "bad" news), then this will be incorporated by the market as a variance effect.

To avoid potential bias in misrepresenting the wealth effect resulting from the managers' disbursement choices, I test the following hypothesis prior to the self-selectivity modeling:

Hypothesis: Did the disbursement event unconditionally change the mean of the abnormal returns distribution?

To provide an unconditional test of the mean *CAR* around the event announcement, Robins and Sanders (1993) (RS) suggested a multiple-day event period analog to the *t-statistic* developed by Collins and Dent (1984)(CD) to test single-day average abnormal returns measures. The CD statistic is shown to be asymptotically the best linear unbiased estimator of the average abnormal return and incorporates in its formulation any serial correlation between the market returns over the estimation period. The RS analog is calculated as follows:

$$t_{CAR} = \frac{ACAR}{\sqrt{\frac{\sum_{i=1}^{I}\left[\left(CAR_i - ACAR\right)^2 / \sigma^2_{CAR_i}\right]}{(I-1)\sum_{i=1}^{I}\left(1/\sigma^2_{CAR_i}\right)}}} \tag{13}$$

ACAR, the average cumulative abnormal return, is calculated using the formula:

$$ACAR = \frac{\sum_{i=1}^{I}\left(CAR_i/\sigma^2_{CAR_i}\right)}{\sum_{i=1}^{I}\left(1/\sigma^2_{CAR_i}\right)} \tag{14}$$

and:

$$\sigma^2_{CAR_i} = \sigma^2_i\left[K + \frac{K^2}{T_i} + \frac{\left(\sum_{t=-1}^{+1}\left(r_{mt} - \bar{r}_m\right)\right)^2}{\sum_{\tau=-150}^{-10}\left(r_{m\tau} - \bar{r}_m\right)^2}\right] \tag{15}$$

where:

σ_i^2 ≡ residual variance from estimation of the market model for firm i
K ≡ 3; the number of days accumulated in the calculation of CAR_i
T_i ≡ number of returns used to estimate the market model for firm i
r_{mt} ≡ return to the market portfolio on event-day t
$r_{m\tau}$ ≡ return to the market portfolio on estimation day τ
$\bar{r}_m$ ≡ mean return to the market portfolio over the estimation period

This procedure, in effect, employs an estimated generalized least squares methodology to calculate the cumulative abnormal returns (CAR_i). Under the null hypothesis that the average cumulative abnormal returns equals zero, t_{CAR} follows a Student-t distribution with *I-1* degrees of freedom. For comparative purposes, I also calculate the simple average cumulative abnormal return (*AVGCAR*) and a *Z*-test based upon the average standardized cumulative abnormal return (*ASCAR*), as these are frequently reported in the event study literature. These are:

$$AVG\ CAR = \frac{\sum_{i=1}^{I} CAR_i}{I} \tag{16}$$

and

$$Z_{CAR} = \sqrt{I}\left(\frac{\sum_{i=1}^{I}\left[CAR_i / \sigma_{CAR_i}\right]}{I}\right) = \sqrt{I}\,(ASCAR) \tag{17}$$

Although the *Z*-test adjusts for and incorporates any serial correlation in the prediction errors (abnormal returns), it nevertheless ignores any event induced changes in the residual variance of the abnormal returns distribution.

Further, Denis and Kadlec (1994) observed that non-synchronous trading -- the tendency for prices recorded at the end of a day to represent the outcome of a transaction

occurring earlier in that day -- causes serial cross-correlations in security returns, leading to biased estimates of systematic risk when using simple ordinary least squares regression to estimate the market model. In addition, they find significant decreases in trading activity following share repurchases. Given that I have required firms in my sample to have no missing returns during the announcement period and no more than 15 days missing returns during the estimation periods, this is not expected to be a cause for concern in this study[16].

3.3 Sample Selection and Description

Due to the nature of the specific research to be undertaken, the data sample that I use in this study is taken from various sources. The sample covers the period 1984 - 1995 and consists of the following sub-samples:

1. The sample of firms with dividend increases are selected by randomly searching the Center for Research in Security Prices (CRSP) Daily Returns Master File for firms with increases in consecutive regular quarterly dividends per share over the period covered by the study. In addition, no other type of distribution must be made by the firm during the period between the two quarterly dividends. This comprises all firms listed on either the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), or the North American Securities Dealers Automated Quotation (NASDAQ) System.

The market reaction theories presented earlier predict a price reaction only to announcements of *unexpected* dividend increases. In an attempt to capture this, I require that

the increase must be at least 10 percent in order for the announcement to be included in the sample. This lower bound of 10 percent ensures that only economically significant dividend changes are included in the sample[17]. In addition, to minimize the effect of outliers, I impose an upper bound of 700 percent on the size of the dividend increase. To quantify the dividend changes I apply the naïve expectations model, which states:

$$\hat{D}_{i,t} = D_{i,t-1}$$

That is, the best estimate at time *(t-1)* of dividends in time *(t)* is the dividends paid at time *(t-1).* Using this model, unexpected dividends are thus represented by the actual amount of the dividend increase.

The use of the naïve model is supported by the empirical observation that firms generally do not change their dollar dividends frequently and hence follow a fairly stable, predictable dividend payment policy. Damodaran (2001), using data from Compustat, reports that between 1989 and 1998, in most years the number of firms that do not change their dollar dividends far exceeds the number that do[18].

Lintner (1956) in his classic study on how managers make dividend decisions, found that they stabilize dividends with gradual, sustainable increases whenever possible, establish an appropriate target payout ratio, and avoid dividend cuts, if at all possible. Fama and Babiak (1968) reevaluated Lintner's model and concluded that it continues to perform well relative to alternative specifications using both economywide earnings and dividend data as well as data for individual firms.

In addition to this (that is, to identify and quantify *unexpected* dividend signals) the dividend increase must be the first in any series of consecutive regular quarterly increases of

similar magnitude. That is, in a series of consecutive quarterly increases, I exclude from the sample all subsequent increases unless they represent a percentage change larger than that observed in the previous quarter.

2. The initial sample of specially designated dividends is taken from the CRSP daily master files. To be included in my initial sample (through searching on distributions coded as "year-end", "extra", or "special") the distribution must be the first specially designated dividend declared by the firm in at least a 2-year period. This is to avoid pulling those distributions labeled as specially designated dividends but that are in reality annual dividends. I also use a similar procedure to search for special dividend announcements on the Wall Street Journal Index (WSJI) of the LEXIS/NEXIS reference database.

3. I identify the initial sample of open market repurchase programs and repurchase tender offer announcements from the following sources:

- The appendix to Comment and Jarrell (1991) covering announcements from 1984 to 1989.
- A general search of the repurchases database of the Securities Data Company (SDC).
- A general search of the WSJI of the LEXIS/NEXIS reference database.
- A general search of the CRSP master file.

This sample is reduced by exclusion of repurchase offers available only to odd-lot holders, those offers by closed-end investment companies, and offers whose intention was to take the firm private.

The initial samples are reduced by applying the following screens to the data:

1. Since the model implies a mutually exclusive choice between dividends and repurchases, I exclude from the sample firms that concurrently announce both a dividend and a stock repurchase.[19]

2. Firms must have returns data available on CRSP for at least 250 trading days (one calendar year) before and 150 trading days (seven calendar months) after the date of the disbursement announcement. In addition, there can be no more than 15 days missing returns during the estimation period from 210 to 21 days prior to the event date, and no missing returns over the 3-day event period.

3. Firms must have the relevant accounting data available on the COMPUSTAT database for calculation of the various measures used in the decision models (these are detailed in a later section).

4. I eliminate from the sample financial firms (SIC codes 6000 - 6999), utilities (SIC codes 4900 - 4949), and regulated telephone companies (SIC code 4813)[20].

Event dates for the various announcements are taken from the relevant sources (that is, CRSP, WSJI, SDC database, or Comment & Jarrell's Appendix). The final sample consists of 2,423 dividend increases, 1,931 open market repurchases, 313 special dividends, and 222 repurchase tender offer announcements. Table 1 shows the distribution of announcements across the sample period, broken down with respect to disbursement type and year.

It appears that the observations are fairly evenly spread across the sample period. The notable exception to this is the number of open market repurchase announcements in 1987 and 1989/90. This can be accounted for by the documented increase in repurchase authorizations around the period of the stock market crashes in 1987 and 1990, supposedly

in response to the belief that stocks were highly undervalued at these times. Overall, the sample of disbursement announcements does not display any major problems of clustering in any single year.

Table 1. Distribution of Sample Announcements by Type and Year

	Announcement Type				
Year	Dividend Increases	Open Market Repurchases	Special Dividends	Repurchase Tender Offers	**TOTAL**
1984	203	117	54	22	**396**
1985	217	55	12	18	**302**
1986	168	62	15	15	**260**
1987	230	254	16	10	**510**
1988	268	61	45	15	**389**
1989	268	167	36	29	**500**
1990	222	307	43	19	**591**
1991	147	110	25	23	**305**
1992	157	171	17	16	**361**
1993	168	155	21	20	**364**
1994	188	240	16	17	**461**
1995	187	232	13	18	**450**
TOTAL	**2423**	**1931**	**313**	**222**	**4889**

3.4 Identification of Explanatory Variables

Considering the theories developed and discussed in chapters 1 and 2, a number of factors emerge as potential discriminators of disbursement type. Much support for dividends as a signaling device has been provided by many of the researchers cited previously. As

discussed above, the characteristics of the signal for stock repurchases appear to be distinct from that for regular dividends. Based on the overwhelming support for information signaling by financial researchers, proxies for signaling should be useful in empirically differentiating between managers' choices of the form of their cash distributions.

I use two proxies to "measure" managers' signaling of private information and the level of information asymmetry. These are (i) the change in annual earnings per share between the year prior to and the year subsequent to the disbursement, scaled by the firm's stock price 5 days before the announcement date (DEPS), and (ii) the residual volatility in daily stock returns in the year preceding the event announcement, (RVOL), measured as the standard deviation in the market-adjusted daily stock returns.

DEPS is used to proxy for signaling since the theory posits that improved operating performance is included in the "content" of the signal. Dierkins(1991) and Krishnaswami and Subramaniam (1999) suggest that information asymmetry (high when managers have a relatively large amount of value-relevant, firm-specific information that is not shared by the market) can be captured by the market-adjusted standard deviation of the daily stock price abnormal returns ($R_{it} - R_{mt}$). Hence I use RVOL as a proxy for the level of information asymmetry. Ofer and Thakor (1987) suggest that greater information asymmetry should be characteristic of the stock repurchasing firms relative to firms that use dividend payments. Hence, I expect comparatively larger values for these variables to be associated with the use of repurchases, while smaller values should be associated with dividends.

The signaling hypothesis also posits that repurchasing firms are undervalued and, in this regard, I would expect the market's valuation of firms utilizing repurchases to be lower,

ceteris paribus, than for those distributing cash through dividends. Tobin's Q, (TOBINQ) a measure of the firm's investment opportunity set, is used as a proxy for classifying firms as either growth firms / value-maximizers (Q>1) or overinvestors (Q<1). I adopt Chung and Pruitt's (1994) equation 2 to proxy for Tobin's Q:

$$q = (MVE + PS + DEBT) / TA$$

where *MVE* is the market value of the firm's common stock, *PS* is the liquidating value of the firm's outstanding preferred stock, *DEBT* is the value of the firm's short-term liabilities net of its short-term assets, plus the book value of the firm's long-term debt, and *TA* is the book value of the total assets of the firm. They show that this approximation to Q explains at least 96.6 percent of the variability in the more theoretically correct model of Tobin's Q.

Lang and Litzenberger (1989) find that firms with Q<1 have, on average, greater stock price reactions to dividend changes than do firms with Q>1. Denis, Denis, and Sarin (1994) also find evidence that Tobin's Q and dividend yield are negatively correlated. Since Q is used as a measure of growth opportunities I expect that higher ratios should be associated with higher-valued firms and lower ratios associated with lower valued firms. Because the signaling/undervaluation hypothesis suggests that repurchases are used mainly by firms that are undervalued, I expect firms choosing dividends to be those with higher ratios for Tobin's Q.

Closely linked to this is the use of a proxy measure for the level of free cash flow existing within the firm at the time of the disbursement decision, (FCF). As previously used by Maquiera and Megginson (1994), this is calculated as the after-tax undistributed cash flow of the company (cash flow from operations net of debt payments, preferred dividends

and common dividends) divided by the market value of its equity. Free cash flow theory posits that corporate disbursements are used to reduce free cash flows and thereby lower the associated mitigating agency costs. Taking this into consideration, as well as the empirical observation that the monies distributed by companies during stock repurchases usually represent a larger fraction of their outstanding equity as compared with dividends,[21] I can expect higher levels of free cash flow to be associated with greater utilization of stock repurchases. However, as discussed earlier, only a small percentage of repurchases should be undertaken for the specific purpose of reducing agency costs -- since empirical observations suggest that repurchases usually involve external financing. In this regard, it is not certain, *ex-ante*, how well the level of free cash flow will perform as a discriminatory variable.

A potentially useful factor in the model, as suggested by Bagnoli, Gordon, and Lipman (1989) and Bagwell (1991), is a measure for corporate control, specifically defense against hostile takeovers (TKOVER). This is introduced as a dummy variable representing the presence of such activities facing the firm within one year preceding the disbursement announcement[22]. In the present framework only stock repurchases has been suggested as a possible mechanism for such control. I would thus expect a variable measuring the presence of takeover activity (and possibly the existence of agency problems) to be related to the form of disbursement used by the firm.

One testable prediction of the capital structure hypothesis discussed in chapter 2 (Section 2.2.2) is that repurchasing firms should have less leverage than non-repurchasing firms. In the decision model, I use the firm's debt/equity ratio (LTDEQ) -- measured as long-

term debt divided by the book value of equity -- as a measure of the firm's financial leverage.

Fenn and Liang (2000), in studying the relationship between open market repurchases and dividend payment, find that repurchases are positively related to proxies for free cash flow and negatively related to proxies for marginal financing costs. Firm size has been empirically related to both market return and disbursement characteristics, and is a plausible proxy (inverse) for marginal financing costs. Hence, I include a factor for size, (SIZE*)*, calculated as the natural log of the market value of the firm's equity 5 days prior to the announcement date. However, since Fama and French (2000) conclude that smaller firms are less likely to pay dividends, the *ex-ante* relationship of firm size to disbursement choice is not certain. Fenn and Liang (2000) also conclude that the presence and level of management stock options induces a preference for open market repurchases compared to dividend payments. Given this, I include a proxy for management stock options (MNSTK) in the disbursement decision equation. The proxy I use is adopted from their paper and is calculated as the number of common shares reserved for conversion for stock options, convertible securities, and warrants, divided by the total number of shares the firm has outstanding. Given their finding that managerial stock incentives might serve to mitigate agency costs I would expect a positive relationship between managerial stock options and the abnormal returns around disbursement announcements.

Dividend yield is also expected to be an important variable in the firm's choice between dividends and repurchases. This can be considered as a proxy for a firm's "tax-clientele". The variable DIVYLD represents the average dividend yield of the firm for the

three years leading up to the disbursement announcement. Based on the clientele argument, firms with high dividend yields prior to the disbursement will be more likely to continue using dividends as a means to distribute cash to shareholders. Additionally, if stock repurchases and dividends are partial signaling substitutes, then I would expect the stock market's price reaction to a repurchase announcement to be negatively related to the firm's prior dividend yield.

The financial flexibility hypotheses of Guay and Harford (2000) and Jagannathan, Stephens, and Weisbach (2000) indicate that measures of earnings volatility, cash flow permanence, and prior stock performance are important in discriminating between dividends and repurchases. In similar fashion, I use EARVOL – the standard deviation in the ratio of operating income to total assets of the firm over the five years leading up to the announcement – to measure earnings volatility and AVGRET – the average daily stock return in the year preceding the announcement – to estimate prior stock performance. I apply two variants of their measures of cash flow permanence: RELPERM measures the relative proportion of permanent cash flows and is calculated as the average of the ratio of operating to total income (operating plus non-operating income) over the three years prior to the announcement and CFPERM measures the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement.

Finally, in line with the conclusions of Grullon, Michaely, and Swaminathan (1999) that the abnormal returns around dividend announcements are related to the decline in systematic risk, I include DBETA in the abnormal returns equations to proxy for the change

in systematic risk (measured as the difference in the CRSP market-model beta of the firm, estimated for 150 trading days before and after the announcement).

Descriptive statistics for each of the factors mentioned above are provided in Table 2 for the 4,889 firms in the final sample (separated according to the disbursement method used). SIZE, AVGRET, CFPERM, and DBETA appear to be approximately normally distributed. However, all the other variables display definitely skewed distributions, with the means generally being larger than the corresponding median (except for FCF and RELPERM that have medians higher than their means). The average size of firms in the sample was 19.76 (equivalent to $382 million), while the mean (median) dividend yield was 2.29 percent (1.81 percent). Only 1.4 percent of firms in the sample faced hostile takeover activity within a year preceding the disbursement announcement.

From a preliminary analysis of the differences in the means of the variables between dividend increasing and open market repurchasing firms, as provided in Table 3, it appears that RVOL, TOBINQ, FCF, SIZE, MNSTK, DIVYLD, EARVOL, AVGRET, RELPERM and DBETA are the variables of primary interest in discriminating between the disbursement types. The mean RVOL for the dividend sample was 1.93 percent while that for the repurchase sample was 2.45 percent. TOBINQ and FCF averaged 1.325 (1.078) and 0.045 (0.012) respectively for dividend increasing (open market repurchasing) firms. Stock repurchasing firms also appear to be smaller, with an average equity market value of $304 million (SIZE = 19.53), compared to $553 million (SIZE = 20.13) for dividend paying firms. For the firms using dividends, MNSTK averaged 10.99 percent of shares outstanding while stock repurchasing firms had an average of 17.79 percent. Dividend paying firms had an

average DIVYLD of 2.28 percent compared to 1.62 percent for repurchasing firms. Dividend increasing firms also had an average of 0.0319, 0.00095, 0.9316, and 0.00016 for EARVOL, AVGRET, RELPERM, and DBETA respectively, while the averages for repurchasing firms were 0.0438, 0.00033, 0.8888, and -0.0461 respectively.

Table 2. Descriptive Statistics for Decision Variables in Final Sample

Variables measured are: DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; and DBETA is the change in systematic risk subsequent to the announcement.

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
DEPS	0.00901	0.00431	0.57053	-26.33846	22.45415
RVOL	0.02209	0.01911	0.01176	0.00689	0.14784
TOBINQ	1.17792	0.90518	1.02008	-0.58456	12.92904
FCF	0.01489	0.05680	0.38726	-14.9913	2.34022
TKOVER	0.01374	0	0.11642	0	1
LTDEQ[1]	54.90368	24.75900	407.41702	-2217.60[1]	15986.59
SIZE	19.75509	19.69585	1.96581	14.26429	25.15223
MNSTK	0.14291	0.08114	0.31562	0	16.53088
DIVYLD	2.28767	1.81400	5.30069	0	150.71067
EARVOL	0.03921	0.02890	0.05124	0.00162	2.61573
AVGRET	0.00069	0.00067	0.00135	-0.00552	0.01181
RELPERM	0.91318	0.94427	0.46380	-21.21218	13.96224
CFPERM	-0.00750	-0.00635	0.06146	-0.42028	0.73210
DBETA	-0.01750	-0.02345	0.51662	-5.19600	3.18831

1 Note: Because I use book value of equity, firms can have negative debt/equity ratios due to the effect of accumulated losses (resulting in negative stockholder's equity).

Table 3. Sample Characteristics: Dividend Increases versus Open Market Repurchases

Variables measured are: DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; and DBETA is the change in systematic risk subsequent to the announcement.

	DIVIDEND INCREASES		OPEN-MARKET REPURCHASES	
Variable	Mean	Median	Mean	Median
DEPS	0.00625	0.00447	-0.01430	0.00386
RVOL*	0.01925	0.01760	0.02450	0.02134
TOBINQ*	1.32534	1.03579	1.07752	0.82884
FCF*	0.04508	0.05680	0.01205	0.05816
TKOVER	0.01007	0	0.00950	0
LTDEQ	51.46277	25.36400	42.54777	22.89700
SIZE*	20.13075	20.10306	19.53346	19.41784
MNSTK*	0.10986	0.06668	0.17794	0.10742
DIVYLD*	2.28276	2.01350	1.62104	1.17600
EARVOL*	0.03194	0.02490	0.04377	0.03222
AVGRET*	0.00095	0.00086	0.00033	0.00033
RELPERM*	0.93160	0.95098	0.88879	0.93950
CFPERM	-0.00848	-0.00728	-0.00671	-0.00542
DBETA*	0.00016	-0.01322	-0.04610	-0.04002

* A t-test for difference among the means was significant for these variables at the 10% level.

The means of the variables for special dividend and repurchase tender offer firms are provided in Table 4. Here it appears that DEPS, RVOL, TOBINQ, TKOVER, SIZE, MNSTK, and DIVYLD are the primary discriminatory variables.

Table 4. Sample Characteristics: Special Dividends versus Repurchase Tender Offers

Variables measured are: DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; and DBETA is the change in systematic risk subsequent to the announcement.

	SPECIAL DIVIDENDS		REPURCHASE TENDER OFFERS	
Variable	Mean	Median	Mean	Median
DEPS*	-0.00163	0.00386	0.26398	0.00753
RVOL*	0.02516	0.02189	0.02771	0.02098
TOBINQ*	0.93233	0.68135	0.78597	0.64562
FCF	-0.10372	0.04284	-0.12766	0.04255
TKOVER*	0.03165	0	0.06726	0
LTDEQ	117.40620	19.53300	115.50317	48.35600
SIZE*	18.65012	18.55814	19.12846	18.91800
MNSTK*	0.11252	0.06107	0.23950	0.13031
DIVYLD*	6.59464	2.77967	2.22082	1.55733
EARVOL	0.05139	0.04012	0.06205	0.03856
AVGRET	0.00093	0.00076	0.00081	0.00072
RELPERM	0.91767	0.92530	0.92073	0.93579
CFPERM	-0.00927	-0.00821	-0.00115	-0.00312
DBETA	-0.00643	0.00680	0.02681	-0.03629

* A t-test for difference among the means was significant for these variables at the 10% level.

DEPS averaged -0.0016 for firms paying special dividends and 0.264 for firms utilizing repurchase tender offers. The mean RVOL for the dividend sample was 2.52 percent while that for the repurchase sample was 2.77 percent. TOBINQ averaged 0.932 and 0.786 respectively for dividend paying and repurchasing firms. Only 3.17 percent of dividend paying firms faced hostile takeover activity within a year of the dividend announcement, compared to 6.73 percent of the firms using stock repurchases. Stock

repurchasing firms are also larger, with an average equity market value of $203 million (SIZE = 19.13), compared to $126 million (SIZE = 18.65) for dividend paying firms. For the firms using dividends, MNSTK averaged 11.25 percent of shares outstanding while stock repurchasing firms had an average of 23.95 percent. Dividend paying firms had an average DIVYLD of 6.59 percent compared to 2.22 percent for repurchasing firms.

3.5 Summary

In this chapter I have sought to provide an outline of the hypotheses that were examined, the sources of the data, and the techniques and procedures that I used in addressing the issues presented in this study.

I have sought to address the self-selectivity problem inherent in studies of this nature by simultaneously modeling the manager's decision process and the stock market's reaction to the announcement of the firm's chosen disbursement type through a full information maximum likelihood modeling technique. The expectation is that the firm's disbursement choice will be positively related to the associated stock price implications of the choice, with managers acting to maximize their stockholders' wealth.

Based on the foregoing discussions, I have summarized in Table 5 the variables that are used in the analyses and their expected signs in the relevant equations, as well as the rationale behind their inclusion. These are analyzed and the findings discussed in the following chapter and form the foundation of the concluding section.

Table 5. Proxy Variables Used in Statistical Analyses

Proxy Variable	Hypothesized Sign: Choice Equation	Hypothesized Sign: Benefits Regression: Dividend	Hypothesized Sign: Benefits Regression: Repurchase	Rationale
DEPS	-ve	+ve	+ve	Signaling
RVOL	-ve	+ve	+ve	Asymmetric information
TOBINQ	+ve	-ve	-ve	Undervaluation
FCF	-ve / +ve	+ve	+ve	Agency, free cash flow
TKOVER	-ve	neutral	-ve	Corporate control
LTDEQ	+ve	-ve	-ve	Capital structure hypothesis
SIZE	-ve / +ve	-ve	-ve	Financing cost
MNSTK	-ve	-ve	-ve	Managerial incentives
DIVYLD	+ve	+ve	-ve	Clientele
EARVOL	-ve	-ve	-ve	Financial flexibility
AVGRET	+ve	+ve	+ve	Financial flexibility
RELPERM	+ve	+ve	+ve	Cash flow permanence
CFPERM	+ve	+ve	+ve	Cash flow permanence
DBETA[23]	--	+ve	neutral	Risk signaling
BENEFIT	+ve	--	--	Wealth maximization

Chapter 4

Results and Interpretation

Due to the large number of variables involved in the regression models considered in this research, the possibility exists that strong or severe multicollinearity could be present in the sample.[24] As a measure of the degree of multicollinearity in the sample, I examine the pairwise correlations among the quantitative variables. From Table 6 it can be seen that a number of pairs of factors have correlation coefficients larger than 0.10. The largest of these are 0.579 between RVOL and SIZE and 0.376 between TOBINQ and SIZE. The other coefficients above 0.10 are between DEPS and CFPERM, RVOL and EARVOL, RVOL and AVGRET, TOBINQ and AVGRET, TOBINQ and CFPERM, and FCF and DIVYLD. From this cursory examination, it would not appear that multicollinearity is a major problem in the present sample.

4.1 Unconditional Wealth Effects

The question I sought to answer was whether the disbursement events unconditionally changed the mean of the abnormal returns distributions, resulting in a statistically significant wealth effect (as measured by the three day cumulative abnormal return).

Table 6. Correlation Matrix of Factors in the Decision Model

Factors:	DEPS	RVOL	TOBINQ	FCF	LTDEQ	SIZE	MNSTK	DIVYLD	EARVOL	AVGRET	RELPERM	CFPERM	DBETA
DEPS	1.000												
RVOL	0.053	1.000											
TOBINQ	0.015	-0.102*	1.000										
FCF	-0.029	-0.098	0.032	1.000									
LTDEQ	0.044	0.050	-0.016	-0.071	1.000								
SIZE	-0.021	-0.579*	0.376*	0.071	-0.009	1.000							
MNSTK	0.034	0.058	-0.052	-0.045	0.036	-0.034	1.000						
DIVYLD	-0.005	-0.086	-0.050	-0.263*	0.015	0.034	-0.023	1.000					
EARVOL	0.025	0.272*	0.069	-0.005	0.019	-0.206*	0.040	-0.023	1.000				
AVGRET	-0.028	0.135*	0.214*	0.031	0.022	0.064	-0.023	0.031	0.035	1.000			
RELPERM	0.005	-0.007	0.056	0.001	-0.001	0.053	-0.012	-0.007	0.043	0.049	1.000		
CFPERM	0.117*	0.036	0.115*	0.053	0.026	0.017	0.033	-0.058	0.006	0.079	-0.021	1.000	
DBETA	-0.008	-0.004	0.013	-0.018	0.049	-0.018	-0.003	0.036	-0.008	0.080	0.003	0.010	1.000

* - Pairwise correlation coefficients greater than 0.10.

DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; and DBETA is the change in systematic risk subsequent to the announcement.

The results of the tests are presented in Table 7 and Table 8 below. For the sample of open market repurchase announcements (provided in Panel A of Table 7), both the conditional and unconditional mean effects test statistics, using the standard market model (z = 19.97 and t = 11.04 respectively), are statistically significant at the 1 percent level. This suggests that open market repurchases have elicited a significant wealth effect notwithstanding the associated information effect represented by the possible change in the variance of the returns distribution.

Table 7. Statistical Results for Unconditional Wealth Effects - Repurchases

Results are given for the market model estimation using returns data from 210 to 21 days before the event. Standard t and z tests are calculated based on an unconditional average cumulative abnormal return (ACAR as per Robins and Sanders (1993)) and a simple average cumulative abnormal return (AVGCAR) for the 3-day event window from day -1 to +1.

Panel A: Open Market Stock Repurchases	
Sample Size	1931
ACAR	0.0127*
t-statistic	11.04
AVGCAR	0.0204*
z-statistic	19.97
Panel B: Repurchase Tender Offers	
Sample Size	222
ACAR	0.0230*
t-statistic	6.12
AVGCAR	0.0271*
z-statistic	11.54

* - Statistically significant at the 1% level using a two-tailed test

The qualitative results for the Repurchase Tender Offer sample are similar to those for the sample of open market repurchases. Both the conditional and unconditional mean effects test statistics are statistically significant at the 1 percent level.

In general, the observed stock market reactions for the open market repurchase sample are in accord with the results of earlier studies, with an AVGCAR of 2.0 percent. However, the AVGCAR for the Repurchase Tender Offer sample appears somewhat low (2.7%) compared with an average of between 5 percent and 9 percent from previous studies.[25]

Table 8. Statistical Results for Unconditional Wealth Effects - Dividend Announcements

Results are given for the market model estimation using returns data from 210 to 21 days before the event. Standard t and z tests are calculated based on an unconditional average cumulative abnormal return (ACAR as per Robins and Sanders (1993)) and a simple average cumulative abnormal return (AVGCAR) for the 3-day event window from day -1 to +1.

Panel A: Dividend Increases	
Sample Size	2423
ACAR	0.0071*
t-statistic	10.16
AVGCAR	0.0086*
z-statistic	13.21
Panel B: Special Dividends	
Sample Size	313
ACAR	0.0232*
t-statistic	6.28
AVGCAR	0.0323*
z-statistic	14.30

* - Statistically significant at the 1% level using a two-tailed test

Table 8 provides results for the statistical tests of the stock market's reaction to dividend announcements. From Panel A, the information effect for dividend increase announcements, represented by the change in the mean of the returns distribution, is statistically significant and positive (AVGCAR of 0.86 percent and z-statistic = 13.21). Similar results are displayed for the sample of Special Dividends with statistically significant conditional and unconditional wealth effects. The reported AVGCARs are also similar to what has been reported in earlier studies[26].

4.2 Results for Self-Selectivity Models

Having established from the previous section that the disbursement events in fact yielded statistically significant wealth effects, I can thus proceed confidently to address the issue of self-selectivity. The selectivity models were developed using the full information maximum likelihood approach (FIML) as outlined in chapter 3 of this study.

4.2.1 Reduced Form Probit Model

Maximum likelihood estimates of the reduced form probit choice models, that include all predetermined explanatory variables, are presented in Table 9. For the sample of dividend increasing and open market stock repurchasing firms, the reduced form estimation results are as suggested from the univariate results in Table 3 and Table 4. The probability of utilizing a dividend increase versus making an open market stock repurchase is statistically significantly positively related to the level of undervaluation

(TOBINQ), the free cash flows of the firm (FCF), the average dividend yield (DIVYLD), and the one year average daily stock return prior to announcement (AVGRET).

Table 9. Reduced Form Probit Models Predicting the Choice of Disbursement

Results for the probit maximum likelihood decision models (with dependent variable I=1 for dividends and 0 for repurchases) using the Full Information Maximum Likelihood (FIML) approach. DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; and DBETA is the change in systematic risk subsequent to the announcement

Variable	Dividend Increases versus Open Market Repurchases	Special Dividends versus Repurchase Tender Offers
CONSTANT	2.21106*	3.89893*
DEPS	-0.00475	-0.41001
RVOL	-40.39690*	-19.44250*
TOBINQ	0.11080*	0.30171*
FCF	0.33359*	0.05540
TKOVER	-0.07152	-0.45758
LTDEQ	0.00018	0.00019
SIZE	-0.07098*	-0.18201*
MNSTK	-0.27700*	-0.98729*
DIVYLD	0.03345*	0.05091*
EARVOL	-5.43440*	-1.50950
AVGRET	270.97200*	80.58510**
RELPERM	0.04654	0.02881
CFPERM	-0.96587*	-0.57376
DBETA	0.05059	-0.08330
Chi-Squared	773.33*	101.38*
Pseudo R^2	0.4937	0.6296
% Correctly Classified	67.73	69.16
Sample Size	4354	535

* (**) - Statistically significant at the 1% and 10% level respectively.

The probability of utilizing a dividend increase versus making an open market stock repurchase is statistically significantly negatively related to the residual volatility in the firm's daily stock returns (RVOL), the market value of the firm's equity (SIZE), the extent of available managerial stock options (MNSTK), the volatility of the firm's operating earnings (EARVOL), and the difference in the levels of permanent cash flows of the firm pre and post announcement (CFPERM).

However, the coefficients on the change in annual earnings per share (DEPS), the firms exposure to hostile takeovers (TKOVER), the debt to equity ratio (LTDEQ), the relative proportion of permanent cash flows (RELPERM), and the change in systematic risk (DBETA) are not statistically significant. The signs of the coefficients on the explanatory variables are generally as hypothesized (see Table 5) with the only exception being the negative sign on CFPERM. This lends support to the theoretical underpinnings of the model specification, as developed in the earlier chapters of this study, and thus supports the findings of earlier research in this area.

The model had a high pseudo-R^2 of 49percent attesting to the overall explanatory power of the reduced form choice equation. The model was able to correctly classify the disbursement type approximately seventy percent of the time. The statistically significant Chi-squared value also indicates that at least one of the discriminatory variables is able to detect significant differences between firms that increase dividends and those that repurchase their stock.

Results are qualitatively similar for firms choosing between a special dividend and a repurchase tender offer. All the coefficients on the explanatory variables have the expected sign, with the exception of CFPERM (but, the coefficient is not statistically

significant) although the t-tests are generally not as strong. For this sub-sample DEPS, FCF, TKOVER, LTDEQ, EARVOL, RELPERM, and DBETA are also not statistically significant determinants of disbursement choice.

4.2.2 Abnormal Return Regression Equations

The next stage of the analysis required the fitted values from the reduced form probit equations being used to construct the inverse Mills ratios for the dividend and repurchase sub-samples. The abnormal return equations (equations 3a and 4a) obtained by adding these variables to the corresponding abnormal return equations (equations 3 and 4) are now estimated consistently (using maximum likelihood (ML) for the FIML approach. These results are presented in Table 10 for the dividend increasing and open market repurchase sub-sample and Table 11 for the special dividend and repurchase tender offer sub-sample.

The question of the existence of a self-selection bias is examined from these results in two ways. First, I examine the difference in the coefficient estimates between the selectivity model and the standard OLS model and second, I consider the statistical significance of the coefficient on the selectivity variable (that is, the inverse Mills ratio variable (Wi)). For the dividend increasing firms there is very little difference between the OLS and the selectivity coefficients. With the exception of the MNSTK variable (which is not statistically significant), the largest percentage difference between the coefficients on the alternate models is 9.48%. Further, the signs of the coefficients are identical between both models (again with the exception of the sign on MNSTK). At this

preliminary stage then, it would appear that the dividend increasing firms do not self-select, but would have created more wealth for their stockholders by offering to instead repurchase their shares. This is further supported by the lack of a statistically significant coefficient on the selectivity variable (Wi).

Notwithstanding the failure to detect a significant sample selection bias, the abnormal returns equations are in accord with the findings of other researchers and our earlier expectations. The signs of the coefficients are generally as expected (the exception to this only applies to variables that are not statistically significant in the regression equation, that is, TOBINQ, LTDEQ, MNSTK, and AVGRET). The variables that are statistically significantly related to the disbursement announcement abnormal returns for the dividend increasing firms are DEPS, SIZE, DIVYLD, CFPERM, and DBETA, indicating that asymmetric information/signaling, clientele effects, and cash flow permanence play a role in explaining the observed stock price reaction.

A contrasting picture emerges for the open market repurchasing firms. The coefficient estimates are significantly different on average, and have opposite signs a number of times, from the corresponding coefficient estimates using standard ordinary least squares without correcting for the selection bias. In fact, the percentage differences between the coefficients on the alternate models range from as low as 26 percent to just over 2330 percent. Additionally, the estimated coefficient on the inverse Mills ratio variable (Wi), which corrects for the selection bias, is negative and statistically significant at an alpha of 1 percentage point.

Table 10. Comparison of Selection (ML) Model and OLS Coefficient Estimates: Dividend Increases and Open Market Repurchases

Results for the ML regressions with self-selectivity adjustment variable and OLS regressions without the selectivity adjustment. The dependent variable is the 3-day CAR around the disbursement announcement. Variables measured are: DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; DBETA is the change in systematic risk subsequent to the announcement; and Wi is the selectivity adjustment term (the Inverse Mills Ratio). Significance of independent variables are tested using standard t-tests.

	Parameter Estimates					
	Dividend Increases Sample			Open Market Repurchases Sample		
Independent Variables	ML (Selection)	OLS	% Δ in Coeff.	ML (Selection)	OLS	% Δ in Coeff.
CONSTANT	0.04399**	0.04436*	0.83%	0.11822*	-0.00528	2339.36%
DEPS	0.02941**	0.02938*	-0.09%	0.00547**	0.00248	-120.10%
RVOL	0.52285	0.50400*	-3.74%	0.64250*	1.69300*	62.05%
TOBINQ	0.00100	0.00105	4.19%	0.00976*	0.00284	-243.05%
FCF	0.00295	0.00311	5.11%	0.00599	-0.00062	1063.58%
TKOVER	-0.00811	-0.00814	0.33%	-0.01984	-0.01574	-26.08%
LTDEQ[1]	0.00000	0.00000	2.26%	0.00002	0.00001	-64.45%
SIZE	-0.00256**	-0.00259*	1.17%	-0.00386*	-0.00140	-175.14%
MNSTK	0.00007	-0.00011	161.38%	-0.02104*	-0.01056	-99.28%
DIVYLD	0.00187*	0.00188*	0.72%	0.00292*	0.00106**	-175.99%
EARVOL	-0.02439	-0.02691	9.36%	-0.16614*	0.03399	588.79%
AVGRET	-1.40567	-1.284***	-9.48%	5.54962*	-5.64400*	198.33%
RELPERM	0.00288	0.00291	0.70%	0.01375*	0.01045*	-31.55%
CFPERM	0.03236***	0.03195***	-1.27%	0.07305*	0.10900*	32.98%
DBETA	0.00915*	0.00917*	0.20%	-0.00061	-0.00360	83.02%
Wi	-0.0008			-0.0737*		
F-statistic	10.510*	11.190*		17.990*	17.460*	
Adjusted R^2	0.056	0.056		0.117	0.107	
Sample Size	2423			1931		

* (**) (***) - Statistically significant at the 1 (5) (10) % level respectively

1 Note: Although the coefficients are rounded to zero the percentage differences reflect the change in the actual and not rounded coefficients (hence, non-zero percentage differences).

From equations (3a) and (4a) in the earlier development of the structural model a negative (positive) coefficient on this selectivity adjustment variable for the repurchasing

(dividend) sample indicates that the firm is better off choosing this form of disbursement, compared with the alternative, on the expectation of a higher wealth effect.

At this preliminary stage then, it would appear that the repurchasing firms exhibit a severe sample selection bias, and are in fact making their disbursement decisions in the best interests of their stockholders. The abnormal returns equation seems fairly well specified, with an adjusted R^2 value of 11.7 percent and with most of the variables being statistically significant. For the open market repurchase sample DEPS, RVOL, TOBINQ, SIZE, MNSTK, DIVYLD, EARVOL, AVGRET, RELPERM, and CFPERM are significantly related to the abnormal returns indicating that asymmetric information/signaling, undervaluation, managerial incentives, financial flexibility, and cash flow permanence also provide insight into the observed stock price reaction.

From these results I want to argue that there is a significant selection bias in the sample of repurchasing firms, and that any analysis ignoring the selection process will produce misleading results. This indicates that when firms elect to repurchase their stock, they do so because they gain more, other things being equal, than if they had instead utilized a dividend increase for the cash distribution.

Table 11 report results for the abnormal returns equations for the special dividends and repurchase tender offer firms. While qualitatively similar, the results are, nevertheless, statistically much weaker than the results reported for the dividend increasing and open market repurchasing firms.

Table 11. Comparison of Selection (ML) Model and OLS Coefficient Estimates: Special Dividends and Repurchase Tender Offers

Results for the ML regressions with self-selectivity adjustment variable and OLS regressions without the selectivity adjustment. The dependent variable is the 3-day CAR around the disbursement announcement. Variables measured are: DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; DBETA is the change in systematic risk subsequent to the announcement; and Wi is the selectivity adjustment term (the Inverse Mills Ratio). Significance of independent variables are tested using standard t-tests.

	Parameter Estimates					
	Special Dividends Sample			Repurchase Tender Offers Sample		
Independent Variables	ML (Selection)	OLS	% Δ in Coeff.	ML (Selection)	OLS	% Δ in Coeff.
CONSTANT	0.13529	0.15800*	14.38%	-0.22246**	0.11500	293.44%
DEPS	0.06383***	0.06068***	-5.19%	-0.00160	-0.00283	43.61%
RVOL	1.38201*	1.19400*	-15.75%	0.60784	-0.18300	432.15%
TOBINQ	0.00007	0.00188	96.08%	-0.01756	-0.00483	-263.65%
FCF	0.01628	0.01663	2.12%	0.00199	0.00782	74.53%
TKOVER	-0.02390	-0.02679	10.77%	0.05539***	0.02497	-121.82%
LTDEQ[1]	0.00000	0.00000	-114.59%	0.00000	0.00001	79.87%
SIZE	-0.00676	-0.00838*	19.37%	0.00858	-0.00455	288.45%
MNSTK	-0.01021	-0.02224	54.10%	0.06950**	0.00337	-1963.48%
DIVYLD	0.00083	0.00099*	16.28%	-0.00560**	-0.00178	-215.39%
EARVOL	0.07367	0.05706	-29.10%	0.05986	0.01333	-349.03%
AVGRET	-4.09968	-3.32800	-23.19%	-5.03856	0.49600	1115.84%
RELPERM	-0.00310	-0.00281	-10.15%	-0.00494	0.01022	148.31%
CFPERM	-0.10693	-0.10900	1.90%	0.09088	0.00688	-1221.71%
DBETA	-0.01762**	-0.01818**	3.08%	0.00496	-0.00345	243.85%
Wi	-0.0192			0.1015*		
F-statistic	4.240*	4.110*		1.500**	0.830	
Adjusted R^2	0.135	0.122		0.033	0.011	
Sample Size	313			222		

* (**) (***) - Statistically significant at the 1 (5) (10) % level respectively

1 Note: Although the coefficients are rounded to zero the percentage differences reflect the change in the actual and not rounded coefficients (hence, non-zero percentage differences).

I find that the selectivity variable is statistically significant for the repurchasing firms but not for the firms using special dividends. The selectivity variable on the repurchase equation is positive, however, and not negative as expected. This indicates that while sample selection exists, it implies that the firms are actually making decisions to the detriment of their stockholders. That is, the shareholders would in fact have been better off if the firms had issued special dividends instead of repurchasing their stock. This observation requires further research, particularly in light of the recent corporate scandals of the late 1990s and early 200s involving such firms as Enron, Tyco, and WorldCom, among others.

Only DEPS, RVOL and DBETA (all related to information signaling theory) are found to have a statistically significant relationship with the abnormal returns on announcement of special dividends. However, the sign on the coefficient of DBETA is opposite to what was expected. For the firms utilizing repurchase tender offers TKOVER, MNSTK and DIVYLD are the only variables having statistically significant coefficients. However, for both sub-samples the F-statistics are statistically significant indicating that the overall models for explaining the abnormal returns are useful. Other factors that have not been accounted for are the major drivers in explaining the market's reaction to special dividends and tender offer repurchase announcements.

One possible alternative explanation is provided by Bagwell (1992) with respect to the stock market price reaction to repurchase tender offers. He documents that firms face upward-sloping supply curves when they repurchase shares in a Dutch auction. His analysis concludes that to repurchase its shares, a firm must offer a premium above its pre-announcement market price. Hence, the observed price increase on announcement

may merely be a movement along an upward-sloping supply curve. However, in this study I am primarily concerned with the relationship between the firm's cash disbursement choice (dividend versus stock repurchase) and the impact of that choice on share prices. Hence, while this alternative rationale for the observed stock price reaction to a stock repurchase is valid, the tests utilized in addressing my primary hypothesis are not designed specifically to differentiate between the effects of these various theories. Bagwell's (1992) results, therefore, in no way invalidate the general findings of the present study.

4.2.3 Comparison of Actual and Predicted Abnormal Returns

The primary hypothesis being examined was whether managers are making their disbursement decisions in the best interests of the firm's stockholders. Additional insight into this question is provided by examining the difference between the mean abnormal returns for firms that made a particular disbursement choice and the mean predicted abnormal return for those firms had they chosen the alternate method. The result of this analysis is provided in Table 12 and further support our earlier conclusions.

Panel A indicates that for dividend increasing firms, the actual abnormal returns on announcement of their payout choice was statistically significantly lower than if they had made the alternate disbursement. For open market stock repurchasing firms, the actual abnormal returns on announcement of their payout choice was statistically significantly higher than if they had utilized dividends.

This indicates that for these firms, the choice consistently maximized returns to their shareholders. I am, however, not able to conclusively support the hypothesis of stockholder wealth maximizing behavior for firms that choose to increase their dividends.

Table 12. Comparison of Actual Excess Returns Upon Disbursement Announcement and Predicted Excess Returns for Alternate Payout Method

Results comparing the actual CAR upon announcement of a dividend or repurchase and the predicted CAR if the firm in question had used the alternative payout method (that is, if the firm that paid dividends had instead repurchased its stock). Significance of results are tested using standard t-tests (t-statistics are in brackets).

	Sample Size	Actual CAR	Predicted CAR for alternative payout choice	Difference between actual and predicted CAR
Panel A: Dividend Increases and Open Market Repurchases				
All Firms	4354	0.01380* (14.70)	0.05132* (81.75)	-0.037512* (-32.90)*
Dividend Increases	2423	0.00835* (9.52)	0.08336* (206.29)	-0.07501* (-81.71)
Open Mkt. Repurchases	1931	0.02065* (11.49)	0.01110* (22.62)	0.00954* (5.32)
Panel B: Special Dividends and Repurchase Tender Offers				
All Firms	535	0.03071* (8.82)	-0.03486* (-5.81)	0.06558* (9.104)
Special Dividends	313	0.03306* (6.91)	-0.09836* (-17.55)	0.13143* (16.74)
Rep. Tender Offers	222	0.0274* (5.49)	0.05466* (5.93)	-0.02726** (-2.56)

* (**) - Statistically significant at the 1% and 5% level respectively

Panel B of Table 12 report on the difference between the mean abnormal returns for firms that utilized special dividends and repurchase tender offers and the mean predicted abnormal return for those firms had they chosen the alternate payout method. Firms utilizing special dividends are found to be maximizing stockholder wealth (as measured by the

resulting announcement period abnormal returns) in their disbursement choice. In contrast, firms repurchasing their stock could have been better off if they had instead paid a special dividend (the difference between the actual and predicted abnormal returns is statistically significant and negative). This result is somewhat puzzling given that tender offer repurchases have traditionally elicited a higher stock market reaction than special dividends. Closer examination, however, reveals that our results may be sample specific, as the average abnormal returns for our sample of dividend payers (3.29 percent) is higher than that for the repurchasing firms (2.71 percent).

An alternative explanation of this anomaly is provided by DeAngelo, DeAngelo, & Skinner (2000) who document that while in recent years there has been a dramatic overall decline in special dividend payments, the incidence of very large special dividends has increased and has not been displaced by stock repurchases. Concurrently, as reported by Jagannathan, Stephens, and Weisbach (2000), the incidence and value of tender offer repurchases has shown a marked decline in the 1990s. Whereas tender offer repurchases were primarily used as takeover defenses and for leveraged recapitalizations, in more recent times there have been more privately negotiated transactions. The mean abnormal return for the special dividend sub-sample is larger in the post 1990 period compared with the pre 1990 period (the difference is not statistically significant) while the mean abnormal return is smaller in the post 1990 period (statistically significant difference) for the tender offer repurchase sub-sample. There has thus been a shift in corporate payout policy during the sample period which tends to shed some doubt on the actual substitutability of special dividends and tender offer stock repurchases.

4.2.4 Structural Form Probit Equations

Further insight into the primary research question is provided from an examination of the structural form probit models presented in Table 13. The structural form probit equations include an explanatory variable measuring the expected gain from utilizing dividends relative to repurchasing stock (BENEFIT), allowing for consistent estimation of the model. The model is also statistically identified since the abnormal return equation included at least one predetermined variable (DBETA) that is not included in the structural form.

The results for the dividend increasing and open market stock repurchasing sample reinforce our preliminary conclusions on managerial motivation in disbursement choice. The coefficient on BENEFIT is positive as expected but not statistically significant. The fact that we found selectivity bias in only the repurchase sub-sample could explain this lack of significance. Further research decomposing the sub-samples and analyzing them independently may shed light on this puzzling issue. Additionally, the coefficients on all the variables, with the exception of DEPS and CFPERM, have the hypothesized signs. Similarly, all the predetermined variables that were statistically significant in the reduced form probit remain statistically significant. This indicates that wealth maximization is not the only factor affecting the choice of disbursement. Instead, issues of asymmetric information, signaling, undervaluation, agency, financing cost, managerial incentives, clientele, financial flexibility, and cash flow permanence also have an impact on the decision, supporting the conclusions of earlier research in this area.

Table 13. Structural Form Probit Models Predicting the Choice of Disbursement

Results for the probit maximum likelihood decision models (with dependent variable I=1 for dividends and 0 for repurchases). DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; and BENEFIT is the difference between the predicted CAR for a dividend payout and a stock repurchase.

Variable	Dividend Increases versus Open Market Repurchases	Special Dividends versus Repurchase Tender Offers
CONSTANT	2.45617*	2.77110***
DEPS	0.03796	-0.67622***
RVOL	-34.52300*	-14.59780**
TOBINQ	0.18279*	0.21259***
FCF	0.38702*	0.07948
TKOVER	-0.14241	-0.25662
LTDEQ	0.00027	0.00022
SIZE	-0.08102*	-0.14060**
MNSTK	-0.39769*	-0.94729**
DIVYLD	0.04094*	0.02930
EARVOL	-6.82179*	-0.85271
AVGRET	325.82200*	35.34110
RELPERM	0.24561*	0.06100
CFPERM	-0.83811**	-0.02464
BENEFIT	6.18198	2.88970
Chi-Squared	773.33*	101.39*
Pseudo R^2	0.4937	0.6296
% Correctly Classified	67.73	69.16
Sample Size	4354	535

* (**) (***) - Statistically significant at the 1 (5) (10) % level respectively.

The results for the special dividend and tender offer repurchase sample also strengthen our preliminary inferences. The BENEFIT variable has a positive coefficient as expected, but it is also not statistically significant. Otherwise, the qualitative results are

similar to that found for the sample of dividend increases and open market repurchases. The indication, therefore, is that while the maximization of stockholder wealth may result from the firm's disbursement choice, that choice is primarily driven by concerns as to signaling, asymmetric information, undervaluation, corporate control, financing cost, managerial incentives, and the firm's stockholder clientele.

4.3 Model Specification/Robustness Test

The adjustments for sample selection bias that I have utilized in this study have been found to be very sensitive to the assumption of normality (see Maddala (1991)). As a consequence, and in the absence of utilizing more generalized distributions or semi-parametric methods, I run two alternate specifications of the model as a test of the robustness of the results presented earlier. These are estimated for the sample of dividend increasing and open-market repurchasing firms. The alternative models are formulated by alternating the variables introduced to proxy for signaling, financial flexibility, and cash flow permanence, respectively. That is, along with the other variables used, one model includes only DEPS, EARVOL, and RELPERM, while the other includes RVOL, AVGRET, and CFPERM, respectively. I present the results for these two alternative specifications of the model in Table 14 and Table 15.

For both alternative model specifications the general results remain qualitatively similar to that presented in our full model. In both cases the coefficients on the variables in the reduced probit models have similar signs and statistical significance as was observed earlier. The only exception to this is the SIZE variable in Model 1 which has the opposite

sign to that found in our original model. The same is true of the abnormal returns regression equations. In the case of the dividend increasing firms, for both alternative model specifications, MNSTK is the only variable with a sign different to that reported earlier.

Table 14. Robustness Test with Alternate Model Specification - Model 1

Results for the Full Information Maximum Likelihood (FIML) estimation of the structural equations with alternate specifications. DEPS is the change in the annual EPS subsequent to the announcement scaled by the stock price; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable (=1 if the firm faces hostile takeover activity within a year prior to the announcement, =0 otherwise); LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; EARVOL is the standard deviation in the ratio of operating income to total assets over the five years up to the announcement; RELPERM measures the relative proportion of permanent cash flows over the three years prior to the announcement; DBETA is the change in systematic risk subsequent to the announcement; BENEFIT is the difference between the predicted CAR for a dividend payout and a stock repurchase; and Wi is the selectivity adjustment term (the Inverse Mills Ratio).

Variable	Reduced Probit	Dividend Regression	Repurchase Regression	Structural Probit
CONSTANT	-0.88635*	0.00819	0.09539*	-0.15740
DEPS	0.29225	0.03964*	-0.00177	-0.07653
TOBINQ	0.13139*	0.00403*	-0.00572*	0.11026*
FCF	0.32403*	0.01127***	-0.01391*	0.37569*
TKOVER	-0.17557	-0.01029	-0.00950	-0.06390
LTDEQ	0.00015	0.00000***	0.00001	0.00031
SIZE	0.04021*	-0.00195*	-0.00787*	0.00041
MNSTK	-0.25719*	-0.00877***	0.00436	-0.20676*
DIVYLD	0.05213*	0.00294*	-0.00276*	0.02275**
EARVOL	-6.38829*	-0.20246*	0.37396*	-4.31607*
RELPERM	0.24963*	0.01033**	0.00656*	0.11528**
DBETA	0.10716*	0.01103*	-0.01076*	--
BENEFIT	--	--	--	5.06056*
Wi	--	0.03739*	-0.08062*	--
[1]Chi-Squared / F	374.34*	11.96*	10.66*	374.34*
[2]Pseudo R^2/Adjusted R^2	0.4392	0.0515	0.0567	0.4392
% Correctly Classified	64.56	--	--	64.56
Sample Size	4354	2423	1931	4354

* (**) (***) - Statistically significant at the 1 (5) (10) % level respectively.
[1] Chi-Squared is calculated for the probit equations and the F-statistic for the regression equations.
[2] Pseudo R^2 is presented for the probit equations and the Adjusted R^2 for the regression equations.

Table 15. Robustness Test with Alternate Model Specification - Model 2

Results for the Full Information Maximum Likelihood (FIML) estimation of the structural equations with alternate specifications. RVOL is the residual volatility in daily stock returns in the year preceding the announcement; TOBINQ is Tobin's Q as defined by Chung and Pruitt (1994); FCF is free cash flow as used in Maquiera and Megginson (1994); TKOVER is a dummy variable representing the firm's facing hostile takeover activity within a year prior to the announcement; LTDEQ is the percentage of Total Long Term Debt to Stockholder's Equity; SIZE is the natural log of the market value of the firm's equity 5 days prior to the event day; MNSTK is the number of shares reserved for conversion as a fraction of the total number of shares outstanding; DIVYLD (in %) is the average dividend yield for the three years up to the announcement; AVGRET is the average daily stock return in the year preceding the announcement; CFPERM is the difference in the average ratio of cash flow from operations to total assets in the three years before and after the announcement; DBETA is the change in systematic risk subsequent to the announcement; BENEFIT is the difference between the predicted CAR for a dividend payout and a stock repurchase; and Wi is the selectivity adjustment term (the Inverse Mills Ratio).

Variable	Reduced Probit	Dividend Regression	Repurchase Regression	Structural Probit
CONSTANT	1.88858*	0.04009*	0.11396*	2.13742*
RVOL	-45.16500*	0.62441	0.48334*	-40.39370*
TOBINQ	0.08489*	0.00088	0.00887*	0.14503*
FCF	0.29336*	0.00418	0.00553	0.33707*
TKOVER	-0.10057	-0.00927	-0.02086	-0.18054
LTDEQ	0.00017	0.00000	0.00001	0.00024
SIZE	-0.05536*	-0.00235*	-0.00307**	-0.05775*
MNSTK	-0.29865*	-0.00005	-0.02313*	-0.43176*
DIVYLD	0.03180*	0.00183*	0.00286*	0.03864*
AVGRET	268.13500*	-1.29396	5.90997*	323.22300*
CFPERM	-0.85002*	0.04052*	0.07414*	-0.69677***
DBETA	0.04863	0.00918*	-0.00096	--
BENEFIT	--	--	--	5.92056
Wi	--	-0.00070	-0.07397*	--
[1]Chi-Squared / F	697.63*	10.88*	21.47*	697.63*
[2]Pseudo R^2/Adjusted R^2	0.4773	0.0467	0.1129	0.4773
% Correctly Classified	67.48	--	--	67.48
Sample Size	4354	2423	1931	4354

* (**) (***) - Statistically significant at the 1 (5) (10) % level respectively.
[1] Chi-Squared is calculated for the probit equations and the F-statistic for the regression equations.
[2] Pseudo R^2 is presented for the probit equations and the Adjusted R^2 for the regression equations.

However, in the case of Model 1, the selectivity variable is now statistically significant (and positive as expected). For the sub-sample of repurchasing firms, Model 1 exhibits the greatest departure from the results reported earlier. The coefficients on FCF, MNSTK, and EARVOL have opposite signs to those reported in our full model and all are

statistically significant. However, the selectivity variable remains statistically significant and has the correct negative sign in both Model 1 and Model 2. As this is the major focus of the model the other departures are not cause for major concern.

Turning our attention to the structural probit equations, the general results, qualitatively, are identical to that found in our original model. All the variables that were statistically significant continue to exhibit such characteristic and only DEPS and SIZE in Model 1 have coefficients of a different sign than was reported earlier. However, while the BENEFIT variable continues to have a positive sign in both alternative model specifications, it is now statistically significant in Model 1. I would, thus, conclude that the earlier results do not appear to be driven by the model specification, but are, in fact, quite robust to alternative specifications of the structural equations.

4.4 Summary

In this chapter, I have presented the results of all the statistical analyses undertaken, together with an interpretation of these results in the context of the present research hypotheses. I conducted the study primarily to examine the specific hypothesis mentioned earlier in section 3.1.

Some evidence was provided to reject the null hypotheses that managers do not discriminate in their choice of a payout method (albeit, primarily for the sample of firms that repurchase their stock). Specifically, the selectivity models provide support for and strengthen the argument that self-selection bias is a critical factor in studying the motivations for firms' disbursement choices. Dividend paying and stock repurchasing firms display

significant differences in firm characteristics. Further, firms do not appear to randomly choose between the various disbursement choices. In the case of firms utilizing open-market stock repurchases, the observed choice of disbursement method is the result of a deliberate and specific decision made by the firm in the interest of maximizing the wealth position of its stockholders (based on the specific characteristics of the firm). The stock market then reflects these choices when it assesses the firm's value on announcement of the distribution.

Chapter 5

Research Summary and Conclusions

The primary goal of this research was to empirically examine the disbursement choices made by managers. The main research question is whether firms choose specific cash distribution methods, based on explicit firm characteristics, so as to maximize their stockholders wealth position. The research is motivated by a need to resolve competing theoretical motivations for the various forms of cash distributions, particularly given the differing observed stock market wealth effect resulting from the disbursement announcements. Previous studies, for the most part, do not allow unbiased comparisons of the alternative disbursement mechanisms, as they examine each distribution method independently without considering their potential interactions. My analyses avoids this potential sample selection bias by integrating and examining simultaneously (i) firms that increase their regular cash dividends and firms that initiate open market stock repurchase programs, and (ii) firms that announce specially designated dividends and those that undertake repurchase tender offers.

Many of the propositions and conclusions drawn from previous studies in this area are supported by my results. In accord with Ofer and Thakor (1987) and Persons (1995), I find that the level of asymmetric information (extent of undervaluation) has an impact on the payout choice. Jagannathan, Stephens, and Weisbach's (2000) and Guay and Harford's (2000) hypotheses that the financial flexibility inherent in stock repurchases contributes to

the choice of payout method used by firms and that the permanence of the firm's cash flows are important in this choice are also supported (primarily as regards the choice between a dividend increase and an open market stock repurchase). Fenn and Liang (2000) concluded that the extent to which management stock options are available influences the choice and suggest that the growth in stock options may help to explain the rise in repurchases at the expense of dividends. My results also support this view.

While the above research conclusions were drawn from independent examination of the differing motivations, my results stem from jointly analyzing the various motivations and simultaneously allowing for the impact of a stockholder wealth maximization incentive on the decision. Consequently, the self-selectivity models provide results suggesting that firms do not randomly assign themselves to disbursement methods. Instead, the choice of a disbursement method is optimally made, with respect to firms choosing to utilize open market stock repurchases, and is reflected in the reaction of the stock market to the firm's distribution announcement. I find that even in the presence of asymmetric information, agency costs, and differing expected stock price reactions to the various mechanisms of cash disbursements, these firms, on average, choose the cash distribution method that maximizes the expected gain associated with the distribution. Hence, managers utilizing open market stock repurchases, on average, make stockholder wealth maximizing disbursement choices, notwithstanding the influence of other factors on the payout decision. Similar results were inconclusive with regard to firms choosing to utilize dividends, while those firms using repurchase tender offers were found to be making decisions detrimental to the welfare of their stockholders.

The acute self-selection problem identified suggests that previous researchers have overstated the expected market responses to disbursement announcements made by a firm chosen at random. The approach used in this study thus provides a more complete understanding of the *ex-ante* information content of stock repurchases and dividend distributions, while also revealing significant discriminatory factors that influence the firm's choice of a specific disbursement method.

Although this study has provided additional insights on the rationales for the various disbursement methods, and thereby contributed to the existing literature in this area of research, much still remains to be done to completely understand and model managerial decision making and incentives.

Future extensions of this research lie in utilizing the limited dependent /qualitative variables methodology (modeled in this study by an endogenous switching regression) in extending standard event-study methodology used in previous research on disbursement mechanisms. The importance in recognizing the existence of self-selection is that it leads to non-random samples and hence biased inferences when standard event-study methodology is applied. The limited dependent/qualitative variables model provides a direct test for self-selectivity bias and thus produces a more complete description of the *ex-ante* information content and returns distribution process for cash disbursements. Additionally, the model can be extended to the analysis of any corporate event where potential self-selectivity exists.

Another interesting extension lies in investigating the disbursement decisions of managers across different markets. This would be an attempt to assess whether the results and conclusions arrived at in the present research applies across the various markets. This could also provide additional insights into the differences and similarities between the major

stock markets. Given the results of this study, which implies some differentiation in the motivation for open market stock repurchases and repurchase tender offers, it would also be interesting to more closely analyze the choice between these two forms of stock repurchases.

In summary, I have attempted to provide in this chapter a general overview of the motivation for, research questions examined, and interpretation of results obtained from this research. I have also sought to highlight the important contributions of this study and suggest future opportunities for research extending the present work.

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Endnotes

1. Except for the tax-clientele theories, early research into this question treated stock repurchases and dividends as equivalent mechanisms for cash payout to stockholders.

2. Empirical findings indicate that firms are unlikely to increase dividends unless they perceive that the increased dividend can be maintained. See for example Miller and Rock (1985), Ofer and Siegel (1987), and Denis, Denis, and Sarin (1994).

3. DeAngelo, DeAngelo, and Skinner (2000) indicate to the contrary that firms have typically paid specials almost as predictably as they paid regular dividends, with the exception of very large specials (equal or exceed 5% of equity value).

4. The model utilized in this study assumes that the choice is mutually exclusive. Thus, firm either pay dividends or repurchase their stock, but not both. For this reason, any firm that simultaneously paid dividends and repurchased its stock was excluded from my sample.

5. The reaction to open-market repurchases is significantly lower than that to tender-offers -- 4 percent compared to between 7 percent to 15 percent [see Masulis (1980a), Vermaelen (1981), and Stephenson (1994)]. This observation also applies to dividends, with the reaction to special dividends averaging 1 percent, dividend increases 1 percent to 2 percent, and dividend initiations 3 percent to 4 percent [see Brickley (1983), Denis, Denis, and Sarin (1994), and Reynolds (1994)].

6. Ofer and Thakor (1987), Barclay and Smith (1988), and Hausch and Seward (1993), provide only partial explanations for this phenomenon.

7. Extracted from Table I, Barclay and Smith (1988, p.62). The remaining 5 percent of firms is divided approximately equally between the firms that utilized special dividends and those that neither paid dividends nor repurchased stock over the period covered by their study.

8. Modern finance theory has shown that in perfect markets capital structure does not affect firm value. Value is determined solely by the earning potential of the firm's assets.

9. In performing this test their sample was limited to 2,068 of the original 6,777 dividend change announcements – including 1,865 dividend increases and 203 dividend decreases.

10. Further empirical support for the clientele hypothesis is provided by Denis, Denis, and Sarin (1994), as discussed earlier in section 2.1.1.1.

11. See Vermaelen (1984), Ofer and Thakor (1987), and Comment and Jarrell (1991).

12. Ofer and Thakor, *ibid*., pg. 386.

13. See Maddala (1983), pg. 223 *et seq.* for a more detailed treatment of the model.

14. This is a necessary correction for the conditional expectation given that we have non-random selection, that is, certain units from the underlying population do not appear in a random sample due to their individual disbursement choice.

15. CRSP provides a single composite index incorporating all firms on NYSE, AMEX, and NASDAQ.

16. Notwithstanding, results of all the above statistical tests are reported after re-estimating the market model (more specifically the systematic risk component, β) using the methodology proposed by Scholes and Williams (1977). As reported in Fowler and Rorke (1983), the re-estimated *beta* is given by the following, shown to be a consistent estimator:

$$p\lim \hat{\beta}_i = \frac{\left(\beta_i^{-1} + \beta_i^{0} + \beta_i^{+1}\right)}{\left(1 + 2\,\rho_1\right)}$$

where:

β_i^{-1} = the parameter estimate obtained from the simple regression of R_{it} against R_{mt-1}

β_i^{0} = the parameter estimate obtained from the synchronous simple regression

β_i^{+1} = the parameter estimate obtained from the simple regression of R_{it} against R_{mt+1}

ρ_1 = the first order serial correlation coefficient for the market index, R_m

17. Eliminating small dividend changes would also minimize problems arising from misspecification in the model of expected dividends since large dividend changes are likely to be categorized as dividend surprises regardless of the expectation model employed.

18. See Damodaran (2001) Figure 21.6, page 663.

19. There were 59 firms that announced both a dividend increase and an open market repurchase program while one firm announced a tender offer and a special dividend simultaneously.

20. Financial firms are consistently omitted from similar studies primarily because their repurchases are not consistently reported (Fenn and Liang, 2001), (Fama and French, 2001). Heavily regulated firms (utilities and telephone companies) are omitted because their payout policies may be significantly affected by their regulated status (Fenn and Liang, 2001).

21. See Ofer and Thakor (1987) for a theoretical justification of this observation.

22. Data on hostile takeover target announcements are taken from the Securities Data Company database.

23. The solution to the selection bias problem, as outlined in Maddala (1991), requires that there be at least one exogenous variable affecting selection that does not appear in the structural equation. DBETA was excluded from the structural equation as there was no extant theoretical research justifying its inclusion.

24. Even in the presence of multicollinearity the regression estimates will still be unbiased and consistent. The effect of multicollinearity is that the coefficient estimates will tend to have large standard errors, causing us to increasingly accept the null hypothesis of a zero coefficient and thereby increasing the probability of a Type II error.

25. See endnote 4 from Chapter 1.

26. The results in Tables 7 and 8 are consistent regardless of the methodology used and appear quite robust. Adjusting beta for non-synchronous trading using the Scholes and Williams (1977) methodology has no noticeable impact on the qualitative results. As a consequence, all the remaining statistical analyses utilized the standard market model cumulative abnormal returns and ignored the Scholes-Williams beta adjustment, since the results would be qualitatively identical. The estimated abnormal returns calculated with and without the non-synchronous trading adjustment are almost perfectly positively correlated (correlation coefficient of 0.995 for the sample of dividend increases and open market repurchases and 0.998 for the sample of special dividends and repurchase tender offers)

About the Author

Noel Reynolds received a Bachelor's Degree in 1986 and a Master's Degree in 1988, both in Accounting, from the University of the West Indies, Jamaica. After completing the Master's program, he started teaching as an Assistant Lecturer in Finance and Accounting at the University of the West Indies until 1990. He then went on to private practice, being employed to KPMG Peat Marwick and Partners, Jamaica as a Financial Management Consultant until he entered the Ph.D. program at the University of South Florida in 1992.

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