Stockholder Wealth Implications of the Firm's Choice Between Dividends and Stock Repurchases

by

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An Abstract:

Corporate disbursements 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). Notwithstanding the higher observed wealth effect associated with stock repurchase announcements, empirical evidence shows an unexplained preference by firms for using cash dividends.

Drawing on data gathered from firms trading on the US stock markets (NYSE, AMEX, and NASDAQ) between 1984 and 1995, this research empirically addresses the question arising from the above observation: since stock repurchases create a greater value change in stockholders' wealth, are managers maximizing stockholders' wealth when they use other forms of cash distributions?

Applying a limited dependent variable methodology known as self-selectivity, I examine the determinants of the choice between increasing dividends and utilizing an open market stock repurchase 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. The findings indicate that open market repurchasing firms make optimal disbursement choices that is reflected in the reaction of the stock market to the disbursement announcement. However, similar results were inconclusive with regard to firms choosing to utilize dividends as their cash payout mechanism.

SECTION 1: INTRODUCTION

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

[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.

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 (1994) 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 (1991) 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 (2001) examine the extent to which management stock options influence the choice.

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.[2]

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[2] 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)].

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).[3] 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.[4] 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 (2001) 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 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). 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 (2001), 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

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

[4] 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.

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 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). However, similar results were inconclusive with regard to firms choosing to utilize dividends as their form of cash distribution.

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/signalling, 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.

The remainder of this research paper is organized as follows. In the next section I further develop my hypothesis and define the factors to be used in my model, as well as discuss the methodology to be applied in the research, indicating my data sources. Section 3 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 Section 4.

SECTION 2: RESEARCH DESIGN

2.1 Motivation and Development of Hypothesis

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 (2001) 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 (1994) 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 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 firm’s make the disbursement choice on the basis of value maximization, the issue is much more complicated since 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. 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. My primary hypothesis, then, 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.

2.2 Methodology Development and Determination of Test Statistics

The present study examines a firm's choice between dividends and stock repurchases, specifically, the choice between a dividend increases and an open market stock repurchases. An increase in the cash dividend generally involves a commitment by the firm to maintain an increased payout over the foreseeable future[5]. 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). The natural comparison between open market repurchases and dividend increases (*frequent, periodic payout*) is supported by recent empirical and theoretical work (for example, see Chhachhi and Davidson (1997), Stephens and Weisbach (1998), Guay and Harford (2000), and Fenn and Liang (2001)).

In modeling the above choice I apply a limited dependent variables estimation technique known as self-selectivity. Self-selectivity implies that we do not observe firms randomly 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, we would not expect the same average effect to be observed for firms randomly choosing to engage in the event. The process generating observed abnormal stock market returns is thus modeled as a "switching regression model with endogenous switching",[6] 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

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5 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).

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

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:

$$CAR_{Di} = X_{Di}\beta_D + \mu_{Di} \quad iff \;\; I_i^* \geq 0 \qquad (3)$$

$$CAR_{Ri} = X_{Ri}\beta_R + \mu_{Ri} \quad iff \;\; I_i^* < 0 \qquad (4)$$

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

$$I_i = Z_i\gamma - \mu_i \qquad (5)$$

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:

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

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:

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

The likelihood function for the model is then given by:

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

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[7]:

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

and

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

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

7. 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.

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 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 ordinary least squares 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.

We 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 we 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 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) we 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[8] 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:

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

We 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.

2.2.1 Tests for Unconditional Wealth Effects

We are 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. Since the cumulative abnormal returns observed around the disbursement announcement is the dependent variable in the self-selectivity models (specifically the wealth effects regression equations), it is prudent to first investigate the statistical significance of the abnormal returns associated with dividend and repurchase announcements, conditional on any variance changes (since the variance changes would overstate the true wealth effect). In light of this, I examine the effect of stock repurchase and dividend announcements on firm volatility by using the unconditional mean (wealth) effects test of significance suggested by Sanders and Robins (1991), that incorporates the effect of an event induced change in the variance of the stock 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:

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

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

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

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

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^2_i ≡ 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[9].

2.3 Sample Selection and Description

The data used in the study 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[10]. In addition, to minimize the effect of outliers, I impose an upper bound of 700 percent on the size of the dividend increase. Further, to identify and quantify *unexpected* dividend signals, the dividend increase must be the first in any series of consecutive regular quarterly increases of

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9. 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

10 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.

similar magnitude. To quantify the dividend changes I apply the naive 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 is 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[11]. 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.

2. 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:

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

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.[12]

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)[13].

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 and 1,931 open market repurchases. 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 1990. This can be accounted for by the documented increase in repurchase authorizations after 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.

2.4 Identification of Explanatory Variables

A number of factors emerge from the finance literature as potential discriminators of disbursement type. Based on the overwhelming support for information signaling by financial researchers, proxies for signaling should be useful in empirically differentiating between managers'

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12. There were 59 firms that announced both a dividend increase and an open market repurchase program simultaneously.

13. 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

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.

Table 1. Distribution of Sample Announcements by Type and Year

Year	Dividend Increases	Open Market Repurchases	**TOTAL**
1984	203	117	**320**
1985	217	55	**272**
1986	168	62	**230**
1987	230	254	**484**
1988	268	61	**329**
1989	268	167	**435**
1990	222	307	**529**
1991	147	110	**257**
1992	157	171	**328**
1993	168	155	**323**
1994	188	240	**428**
1995	187	232	**419**
TOTAL	**2423**	**1931**	**4354**

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 we use RVOL as a proxy for the level of information asymmetry. Ofer and Thakor

telephone companies) are omitted because their payout policies may be significantly affected by their regulated status (Fenn and Liang, 2001).

(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, we 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 we 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,[14] we 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[15]. 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 capital structure hypothesis 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 (2001), 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 (2001) 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 (2001) 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.

[14] See Ofer and Thakor (1987) for a theoretical justification of this observation.
[15] Data on hostile takeover target announcements are taken from the Securities Data Company database.

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 we 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 (2002) 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 4354 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.

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 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; 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	-14.99130	2.34022
TKOVER	0.01374	0	0.11642	0	1
LTDEQ[1]	54.90368	24.75900	407.41702	-2217.60000	15986.59000
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).

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 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 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; 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.

Based on the foregoing discussions, I have summarized in Table 4 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 section and form the foundation of the concluding section.

Table 4. 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[16]	--	+ve	neutral	Risk signaling
BENEFIT	+ve	--	--	Wealth maximization

SECTION 3: 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.[17] As a measure of the degree of multicollinearity in the sample, I examine the pairwise

16. 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.

17 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.

Table 5. 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.

correlations among the quantitative variables. From Table 5 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.

3.1 Unconditional Wealth Effects

The question we 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).

The results of the tests are presented in Table 6 below. For the sample of open market repurchase announcements (provided in Panel A of Table 6), 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. 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.

From Panel B, 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). The reported AVGCARs are also similar to what has been reported in earlier studies[18]

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[18]. The results in Tables 6 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).

Table 6. Statistical Results For Unconditional Wealth Effects

Results are given for the market model estimations 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: Dividend Increases	
Sample Size	2423
ACAR	0.0071*
t-statistic	10.16
AVGCAR	0.0086*
z-statistic	13.21

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

3.2 Results for Self-Selectivity Model

Having established from the previous section that the disbursement events in fact yielded statistically significant wealth effects, we can thus proceed confidently to address the issue of self-selectivity. The selectivity model is developed using the full information maximum likelihood approach (FIML) outlined in LIMDEP.

3.2.1 Reduced Form Probit Model

Maximum likelihood estimates of the reduced form probit choice model, that includes all predetermined explanatory variables, is presented in Table 7. For the full sample of dividend paying and stock repurchasing firms, the reduced form estimation results are as suggested from the univariate results in Table 3.

Table 7. Reduced Form Probit Model 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
CONSTANT	2.21106*
DEPS	-0.00475
RVOL	-40.39690*
TOBINQ	0.11080*
FCF	0.33359*
TKOVER	-0.07152
LTDEQ	0.00018
SIZE	-0.07098*
MNSTK	-0.27700*
DIVYLD	0.03345*
EARVOL	-5.43440*
AVGRET	270.97200*
RELPERM	0.04654
CFPERM	-0.96587*
DBETA	0.05059
Chi-Squared	773.33*
Pseudo R^2	0.4937
% Correctly Classified	67.73
Sample Size	4354

* - Statistically significant at the 1% level respectively

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). 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 4) 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 sections of this study, and thus supports the findings of earlier research in this area.

The model has a high pseudo-R^2 of 49 percent, 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.

3.2.2 Abnormal Return Regression Equations

The next stage of the analysis required the fitted values from the reduced form probit equation 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. These results are presented in Table 8 below.

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%.

Table 8. Comparison of Selection (ML) Model and OLS Coefficient Estimates

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

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.

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.

3.2.3 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. Initial 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 9 and further support our earlier conclusions.

Table 9. 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
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)

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

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 10. Structural Form Probit Model 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
CONSTANT	2.45617*
DEPS	0.03796
RVOL	-34.52300*
TOBINQ	0.18279*
FCF	0.38702*
TKOVER	-0.14241
LTDEQ	0.00027
SIZE	-0.08102*
MNSTK	-0.39769*
DIVYLD	0.04094*
EARVOL	-6.82179*
AVGRET	325.82200*
RELPERM	0.24561*
CFPERM	-0.83811**
BENEFIT	6.18198
Chi-Squared	773.33*
Pseudo R^2	0.4937
% Correctly Classified	67.73
Sample Size	4354

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

3.2.4 Structural Form Probit Equations

Further insight into the primary research question is provided from an examination of the structural form probit model presented in Table 10. The structural form probit equation includes 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.

3.3 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. 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 11 and Table 12.

Table 11. 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.

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 12. 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.

3.4 Summary

In this section, 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 2.1.

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.

SECTION 4: 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 firms that increase their regular cash dividends and firms that initiate open market stock repurchase programs.

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 (1994), 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. Fenn and Liang (2001) 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 model provides 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.

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 it would also be interesting to more closely analyze the choice between the various forms of stock repurchases.

In summary, I have attempted to provide in this section 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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