WHAT INSIGHT DO MARKET PARTICIPANTS GAIN FROM DIVIDEND INCREASES?

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This study examines the reactions of market makers and investors to large dividend increases to identify the motives for dividend increases. Uniquely, this study simultaneously tests the signaling and agency abatement motivations as explanations of the impact of dividend increases on stock prices and bid-ask spreads. The *agency abatement hypothesis* argues that increased dividends constrict management's future behavior, abating the agency problem with shareholders. The *signaling hypothesis* asserts that dividend increases signal that managers expect higher or more stable cash flows in the future.

Mean stock price responses to dividend increase announcements during 1995 are examined over both short (−1, 0) and long (−1, 504) windows. Changes in bid-ask spreads are examined over a short (−1, 0) window and an intermediate (81 day) period. This study partitions dividend increases into a sample motivated by agency abatement and a sample motivated by cash flow signaling. Further, this study examines the agency abatement and cash flow signaling explanations of relative bid-ask spread responses to announcements of dividend increases. Estimated generalized least squares models of market reactions to sampled events support the agency abatement hypothesis over the

cash flow signaling hypothesis as a motive for large dividend increases as measured by Tobin’s Q and changes in the distribution of cash flows.

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CHAPTER I

INTRODUCTION

A cash dividend payment represents the decision that an increased portion of the shareholders' wealth should be held outside rather than inside the firm. For years, financial economists have been puzzled by and corporations have struggled with the issue of dividend policy. Inquiry into corporate dividend policy changed dramatically with Miller and Modigliani (1961). Under a restrictive set of assumptions, they show the independence of firm value and dividend policy. After a brief period of debate, the Miller and Modigliani dividend irrelevance proposition became widely accepted and research has focused on the effect of relaxing the various Miller-Modigliani assumptions. This is natural, since the world we live in exhibits imperfections such as taxes, transaction costs, information asymmetry, and manager-shareholder agency conflict. Since Miller and Modigliani's dividend irrelevance proposition, researchers and theorists have searched for and proposed a number of dividend relevance theories. The three prominent dividend relevance theories are tax clientele effects, agency abatement, and informational signaling. The tax clientele effect is beyond the scope of this research. It should be noted that the period under study is between the major tax changes involving the treatment of capital gains that occurred in 1986 and 1997. There was no tax differential in this period between dividends and realized capital gains.

Purpose of the Study

This study examines the reactions of market makers and investors to large dividend increases to identify the motives for dividend increases. Specifically, this study tests the signaling and agency abatement motivations as explanations of the impact of dividend increases on stock prices and bid-ask spreads. This study investigates which theory does the better job of explaining the market response and whether the theories apply equally to the responses of market makers and the market as a whole.

This paper examines and tests the role of both the agency abatement and signaling theories in dividend policy while holding constant tax effects. Prior work has tended to emphasize one or the other. For example, Rozeff (1982) focuses on agency abatement, while Benartzi, Michaely, and Thaler (1997) focus on dividend signaling.

The *agency abatement hypothesis* argues that increased dividends constrict management's future behavior, reducing the agency problem with shareholders. The agency abatement hypothesis is explained in more detail in Chapter II.

The agency abatement hypothesis competes with but is not mutually exclusive to the signaling hypothesis. The *signaling hypothesis* asserts that dividend increases signal that management expects higher or more stable cash flows. Chapter II explains the signaling hypothesis in more detail. This paper clarifies the distinctive implications of these two theories and then tests between them using bid-ask spread and stock price responses to dividend increase announcements.

This paper investigates whether there are systematic differences in the stock price reaction and revision in relative bid-ask spread among firms with varying dividend yields, information environment, degrees of the shareholder-manager agency problem, and the motivation to signal a change in the distribution of cash flows. If dividend increases constrain management's future behavior, reducing the agency conflict with shareholders either by monitoring and conveying information about management behavior or more directly by reducing free cash flow, dividend increases should result in a narrowing of the relative bid-ask spread. Furthermore, the association should be strongest for firms with a high degree of agency costs of equity. Additionally, there should be a positive relationship between announcement period abnormal returns and dividend increases with the presence of a high degree of agency cost of equity intensifying the relationship.

Also, this work examines whether dividend increases impart important insight to the market concerning future cash flows. Watts (1973) and Benartzi, Michaely, and Thaler (1997) provide evidence that changes in dividends have little predictive ability concerning earnings. Yet, it is clear that the market believes that it is receiving information from dividend increases. Indeed, Mozes and Rapaccioli (1998) provide evidence that analysts are able to separate between dividend increases that signal increased future earnings and those that signal decreased future earnings.

This work differs from previous work in that it examines the mitigating effects of agency costs of equity and dividend signaling needs upon the relative bid-ask spread in addition to stock price changes. Howe and Lin (1992) document a negative relation between dividend yield and bid-ask spreads. However, their evidence is consistent with both the agency abatement and signaling theories. Through testing the hypotheses described below, this work attempts to distinguish between the two alternative hypotheses.

One important practical benefit of clarifying the link between dividend policy and bid-ask spread would be the application to the firm's cost of capital. Amihud and Mendelson (1986) propose that investors require compensation for their trading cost, including spread. They demonstrate a direct relationship between risk-adjusted stock returns and the bid-ask spread. This implies that the cost of capital is an increasing function of the bid-ask spread. Because the present value of the firm's expected future cash flows is a decreasing function of the cost of capital, holding all else equal, shareholder wealth may be inversely related to the bid-ask spread. Then, the firm's managers may have an incentive to pursue spread reducing policies.

Research Question

Consistent with the purpose of the study, the following research question is presented as the framework from which the research hypotheses are developed. Which of two hypotheses, the cash flow signaling hypothesis or the agency abatement hypothesis, better explains the response of stock market participants to large dividend increase announcements? The research hypotheses are developed using this question and are discussed in Chapter III.

Chapter Summary

Financial economists continue to be puzzled by dividend policy and have failed to provide clear direction to corporations. Among the primary explanations for dividend policy are the cash flow signaling and the agency abatement explanations. This study tests the signaling and agency abatement explanations of the impact of dividend increases on stock prices and bid-ask spreads. This study investigates which theory does the better job of explaining the market response and whether the theories apply equally to the response of market makers and the market as a whole. The study is unique in its partitioning of a sample of dividend increases into those whose decision is most likely to be motivated by agency abatement and by those most likely to be motivated by cash flow signaling. Further, this study is unique in its empirical examination of the agency abatement and cash flow signaling explanations by employing relative bid-ask spread responses to announcement of dividend increases.

Short-term price responses to sampled dividend increases support the agency abatement hypothesis over the hypothesis that dividend increases signal an increase in the level of cash flows. However, short-term stock price responses fail to distinguish between the agency abatement hypothesis and the hypothesis that dividend increases signal a reduction in the volatility of cash flows. Long-term stock price responses to sampled events support the agency abatement hypothesis, but not the cash flow signaling hypothesis. Initial bid-ask spread responses support neither the agency abatement nor cash flow signaling hypothesis, in this sample. However, intermediate-term bid-ask spread responses support the agency abatement hypothesis over the hypothesis that dividend increases signal an decrease in volatility of cash flows. Intermediate-term bid-ask spread responses fail to differentiate between the agency abatement hypothesis and the hypothesis that dividend increases signal an increase in the level of cash flows.

CHAPTER II

LITERATURE REVIEW

This literature review examines the theoretical and empirical evidence from the dividend literature. There are five primary strands of corporate dividend policy literature: dividend irrelevance, return reaction to dividend announcement events, agency cost abatement theory, signaling theory, and tax effects. Tax effects are beyond the scope of this paper. This literature review is divided into eight sections. Section one reviews the literature of dividend irrelevance. Section two surveys the existing work on the stock price reaction to dividend changes. The next two sections detail the work on the shareholder/manager agency conflict with the first section looking at the theoretical work and the second section examining the empirical work. Similarly, the following two sections explore the literature on the cash flow signaling hypothesis with the two sections examining the theoretical and empirical work. The seventh section reviews the components of dealer bid-ask spread and how the micromarkets may provide evidence on the information provided by changes in dividends. Finally, the work reviews the scant evidence on bid-ask spread and dividend policy. It is found that the literature is not conclusive concerning any of these issues.

Dividend Irrelevance

Under conditions of perfect capital markets with all information possessed by management (including investment policy) known by investors, the absence of taxes on dividends and capital gains, the absence of transaction costs (i.e., individuals can costlessly buy and sell securities), rational investors with homogeneous expectations, and no agency costs associated with stock ownership, Miller and Modigliani (1961) demonstrate that the value of the firm is independent of dividend policy. Firms can finance any level of payout and investment without affecting firm value. The independence of investment and dividend policies is strongly supported by Smirlock and Marshall's (1983) application of a Granger causality test. Like Miller and Modigliani, Smirlock and Marshall do not account for market imperfections. Partington (1985) also finds investment and dividend policies to be independent and that it is the financing decision, not the dividend decision, that is made on a residual basis.

Stock Price Reaction to Dividend Changes

The positive correlation between stock-price changes and the announcements of dividend changes has been found in several empirical works. These studies indicate that the market finds a change in dividends to be newsworthy and there are possible benefits to paying cash dividends. Studies by Pettit (1972), Aharony and Swary (1980), Wansley et al. (1991), Benartzi, Michaely, and Thaler (1997) and others find that mean risk-adjusted stock returns around the announcement of a dividend change are positively associated with the change in the dividend. Pettit (1972) also finds that the stock price reaction is strongest for the largest dividend changes. Pettit's results for the dividend increase group and the dividend decrease group were similar in magnitude. However, Aharony and Swary (1980) find that the absolute value of the abnormal returns for the dividend decrease group is greater than for the dividend increase group. Brickley (1983) focuses on specially designated dividends (SDDs). Consistent with signaling theory, Brickley finds that both SDDs and unlabeled dividend increases convey good news with unlabeled dividend increases providing the more positive information.

Of all dividend policy changes, initiations and omissions may be the least likely to be anticipated and those contain the most new information. Asquith and Mullins (1983) report a two-day announcement return of 3.7% for a sample of 168 firms that initiate dividends. Healy and Palepu (1988) examine the mean two-day announcement return around dividend omissions and initiations. The mean two-day announcement abnormal return for the omission firms is -9.5% and is significant at the 0.01 level. For dividend initiation firms, the mean announcement abnormal return is 3.9% and is significant at the 0.01 level. The results of Healy and Palepu are reminiscent of Aharony and Swary (1980) in that there is an asymmetric response to omissions and initiations.

On the other hand, Watts' (1973) examination of abnormal returns associated with unexpected dividend changes indicates very little difference between the price responses to unexpected dividend increases and decreases. However, Watts uses monthly returns to calculate abnormal returns. More recent studies have used greater precision. Another reason that Watts may have found little evidence of information content for dividends is that he randomly selected his sample. It may be that dividend changes contain informational content only when they are somewhat extreme. Then, this paper attempts to increase the ability to detect any informational content of dividends with respect to agency and signaling by including only dividend increases with magnitude of at least ten percent in the sample.

Dividends and the Shareholder/Management Agency Problem--Theory

Easterbrook (1984), Rozeff (1982, 1986), and Shleifer and Vishny (1986) maintain that dividends mitigate the shareholder/management agency problem (the agency costs of equity). In this paper, this contention is labeled the *agency abatement hypothesis*. This agency problem is detailed in Jensen and Meckling (1976) and Jensen (1986). Jensen and Meckling (1976) note that the corporate manager acts on behalf of the stockholders. However, the manager has an incentive to divert firm resources to his own benefit, e.g., obtaining plush offices. There will be some divergence of managerial incentive from shareholder wealth maximization anytime the owner/manager (the entrepreneur) has less than 100% ownership. Jensen and Meckling argue that "agency costs" result from this divergence of resources from the maximization of shareholder welfare.

Jensen and Meckling (1976) define agency costs as the sum of (1) the monitoring expenditures by the principal including compensation polices, (2) the bonding expenditures by the agent, and (3) the residual loss. Bonding costs are resources expended by the agent to guarantee that the agent will not take certain actions which would harm the principal or to ensure that the principal will be compensated if the agent does take such actions. The residual loss is due to imperfectly constructed contracts and is the dollar equivalent of the reduction in welfare experienced by the principal due to the divergence between the agent's decisions and those decisions which would maximize the welfare of the principal. In other words, the residual loss is incurred because the cost of full enforcement of contracts exceeds the benefits. Then, agency costs include both the cost of trying to align the objectives of the principals and the agent as well as the costs associated with unaligned objectives.

One possible result of the shareholder/manager agency problem is overinvestment. Jensen (1986) argues that public corporations with substantial free cash flow will tend to overinvest by accepting projects with negative net present values. The overinvestment is financed through internally generated cash (i.e., free cash flow). Jensen defines free cash flow as cash flow in excess of that required to fund all projects that have positive net present values.

Jensen (1989) provides four reasons for the tendency of management to use cash for wasteful investments rather than pay it out to shareholders. First, through the use of free cash flow, managers are able to avoid monitoring associated with raising new cash in the capital markets. Retaining cash gives managers more autonomy from the capital markets. Second, increased firm size enhances executive pay. Third, bias toward growth develops because companies tend to reward middle managers through promotions rather than performance bonuses. Then the firm must grow in order to generate the new positions necessary for promotion. Finally, growth enhances the prestige and power of senior management.

Jensen (1994) supplies the tire industry as an example of the problems with managerial discretion. Because radial tires last three to five times longer than bias-ply tires, world-wide tire capacity had to shrink by about 66%. Tire companies dramatically increased investment in R & D and marketing for their tire business. In such situations managers attitude has been, "This is a very tough business. We have to make major investments so that we have a chair when the music stops." While such behavior is not optimal for shareholders or society at large, it is obvious that managers would find it difficult to initiate a shutdown when such action creates uncertainty and may sidetrack their personal careers.

Jensen (1986) argues that stockholder gains from the decision to go private is due to the mitigation of agency problems associated with free cash flow. Lehn and Polsen (1989) find support for this theory. They find a significant positive relationship between undistributed cash flow and the going private transaction. Additionally, premiums paid to stockholders are positively related to undistributed cash flow.

Easterbrook (1984) and Rozeff (1982, 1986) assert that dividends play a role in reducing the agency cost of equity. Therefore, the agency cost of equity creates a demand for dividends. Rozeff argues that dividend payments reduce the costs stemming from separation of ownership and control by providing additional information to investors about the actions and intentions of management. Unless the firm is able to finance new investment with retained earnings, higher dividends require external funding. With external financing, significant flotation costs will be paid to investment bankers. Stockholders recognize that dividends are offset by costly new financings. The suppliers of new capital require disclosure of the use of the funds. Current shareholders are likely to receive new information from this process.

An alternative to the use of dividends to convey information is to retain the funds and inform shareholders through more direct means--letters, announcements, and presentations. Rozeff argues that dividends are a more efficient and convincing means to convey information concerning the use of funds. Howe and Lin (1992) note that this information should also be available to the dealer, reducing the costs of informational asymmetry and lowering the bid-ask spread. Rozeff (1982) argues that the optimal dividend payout minimizes the sum of flotation costs associated with external financing and implicit agency costs of equity. He argues that there may be a trade-off between the flotation costs of raising external capital and the benefit of reduced agency costs when the firm increases its dividend payout. Thus, the value of the firm may not be independent of dividend policy. Instead, an optimal dividend policy exists. Additionally, Easterbrook (1984) argues that due to dividend induced external financing, the firm's managers are monitored by providers of new capital, investment bankers, and regulators.

Jensen (1986) maintains that managers of firms with substantial free cash flow need to be motivated to disgorge the cash rather than overinvest or waste it on inefficiencies. Both dividends and debt service pay out current cash. However, Jensen argues that debt creation is a stronger mechanism than dividend increases in bonding managers to invest only in high-return projects. He notes that promises of *permanent* increases in the dividend can be broken. Debt results in a strong bond to pay out future cash flows because debtholders have the right to take a firm into bankruptcy court if they do not make interest and principle payments. However, Hansen, Kumar, and Shome (1994) note that too much debt can increases the cost of financial distress and the cost of debt contracting. Then, debt creation and dividend payments can be viewed as weapons in an arsenal capable of combating the agency conflict between managers and shareholders. If the firm retains earnings, an agent has direct and immediate control over these funds. If the earnings are paid as cash dividends, the control of these funds passes to the hands of the principals.

Shleifer and Vishny (1986) provide a model in which small shareholders (normally individuals) prefer capital gains to dividends while large shareholders (often corporations) prefer dividends. The payment of dividends to large shareholders compensates them to remain shareholders and to monitor management. Then, the payment of dividends reduces the agency cost of equity.

Crockett and Friend (1988) note that reduction of agency costs of equity through cash dividends would be a true rationale for dividend preference. They compare it to investor preference for reduced transaction costs and liquidity risks.

Dividends and the Agency Costs of Equity--Empirical Evidence

Rozeff (1982, 1986) uses a multiple cross-sectional regression model that regresses dividend payout against independent variables that include proxies for the agency costs of equity and transaction costs. As proxies for agency costs, Rozeff uses two variables. The first is the percentage of stock held by insiders and is used as a *negative* surrogate for agency costs. The second proxy for agency costs is natural log of the number of stockholders. He finds that inside ownership is negatively related to and the number of shareholders is positively related to the dividend payout ratio.

Dempsey and Laber (1992) update Rozeff's study and show similar results. Crutchley and Hansen (1989) find that managerial ownership, financial leverage, and dividend policy are determined jointly determined by management in order to control the agency costs of equity. Jensen, Solber, and Zorn (1992) find that high insider ownership firms choose lower levels of dividends. Jahera, Lloyd, and Modani (1986) use the percentage of stock held by the dominant shareholder or a dominant family complex as a proxy for agency costs. Their results support Rozeff in that they find inside ownership is negatively related to the payout ratio and the number of shareholders is positively related to the dividend payout ratio. Agrawal and Jayaraman (1994) examine all-equity firms. They find that firms with a low percentage of outstanding equity owned by managers have higher dividend payout ratios, suggesting that dividends are used to reduce agency costs in all-equity firms. Consistent with the agency abatement hypothesis Hansen, Kumar, and Shome (1994) find that utilities use dividend-induced equity financing to control costs from stockholder-manager agency conflicts.

Lang and Litzenberger (1989) test the hypothesis that for firms which overinvest, higher dividends mitigate the overinvestment problem by reducing free cash flow. Lang and Litzenberger use Tobin's Q as a negative proxy for overinvestment. A Q ratio under unity is considered to indicate overinvestment. A ratio above one is believed to indicate value-maximization. They find that the dividend announcement effect is more pronounced for companies with average Q's less than unity. In contrast to Lang and

Litzenberger (1989), Denis, Denis, and Sarin (1994) find that announcement period excess returns are unrelated to Tobin's *Q*. They simultaneously control for the standardized dividend change, dividend yield, and Tobin's *Q*.

Alli, Khan, and Ramirez (1993) use factor analysis and multiple regression in a two step procedure to explain dividend payout policy. Their findings support the role of dividends in reducing agency problems. Kallapur (1994) finds that earnings response coefficients are positively related to payout ratios. This implies that shareholders value earnings more highly if a larger portion will be immediately paid out rather than retained and perhaps wasted. However, he fails to find the earnings response coefficient-payout association for a sample of “free cash flow firms.” Kallapur also finds that firms earn a lower rate of return on projects financed by retained earnings than that earned by market return proxies. Moh d, Perry, and Rimbey (1995) use time-series cross-sectional analysis to show that managers adjust the dividend payout ratio in response to the agency cost/flotation cost structure. Chen and Steiner (1999) use a nonlinear simultaneous equation technique to examine the interrelationships among managerial ownership, risk taking, debt policy, and dividend policy. They find substitution-monitoring effects between managerial ownership and dividend policy.

The Signaling Hypothesis--Theory

The signaling hypothesis holds that dividend changes signal information about either the cash flow or earnings probability distributions of the firm. Miller and Modigliani (1961) suggest that dividends may convey manager’s inside information about future cash flows when markets are less than perfect. The models begin with the idea that management has valuable inside information that outside investors do not know. Such information would include unannounced sales and cost figures and the firm's investment opportunity set. If management has information about future and/or current cash flows that investors do not have, the market will take dividends changes as well as nonchanges as providing insight into management's assessment of the firm's future cash flows. Positive dividend changes will be viewed as good news with respect to cash flows. That is, management expects that cash flows will be higher and/or more stable (see Kale and Noe 1990), meaning that the distribution of cash flows has shifted rightward and/or has become less dispersed. Negative dividend changes signal that management expects permanently lower cash flows and/or less stable cash flows. The regularity of the quarterly dividend payment which many companies pay ensures a periodic flow of information. Therefore, information provided in dividends results in a lower level of information asymmetry than would exist without such a signal.

A common view of dividend policy holds that managers make dividend increases only when management is relatively confident that the higher payments can be maintained, meaning that management believes that earnings have permanently increased. This idea has roots in Lintner's (1956) study on dividend policy. Lintner surveyes corporate managers. His survey suggests that firms have long-run target dividend payout ratios. However, when earnings change, the firm moves only partway toward their target payout. Then, Lintner's model suggests that the dividend depends in part on the firm's current earnings and in part on the previous dividend. Lintner reports that managers are reluctant to make sharp changes in dividends and do so only when the earnings potential of the firm has changed. Then the level of dividend payments selected will become a quasi-fixed expense of the company. Fama and Babiak (1968) report results consistent with this hypothesis. Dividend payments only partially adjust to changes in corporate profits. Black (1976) finds that managers are especially reluctant to reduce dividends.

Pettit (1972) relies on the inflexibility of dividends described by Lintner (1956). If dividends are "sticky", then dividends changes can provide the market with insight into management's assessment of long run cash flows and liquidity. Managers tend to increase dividends only when the probability of achieving cash flow levels adequate to support the new payment level is high and decrease dividends only when the likelihood of supporting present dividend levels is low. Over time, knowledge of this managerial behavior pattern is built into investor perceptions of dividend policy changes. Then, in efficient markets, positive dividend change is viewed as "good news" and negative dividend change is viewed as "bad news." Thus, dividends provide utility in the form of information.

Akerlof (1970) shows the possible consequences of asymmetric information and the need for information transmittal. He notes that in many markets, it may be difficult or impossible to distinguish good quality from bad. In such markets, prices will reflect average quality. In this situation, there is incentive for sellers to market poor quality goods. Firms producing high quality goods will lose money because they will receive a price reflecting the lower average of quality. When these firms either reduce their quality or leave the market, the average quality will further fall, and equilibrium will be consistent only with poor quality ("lemons").

Akerlof (1970) uses the automobile market as an example of his model. He begins with a discrete, two-quality-grade case. He assumes that cars are new or used and are of either good or bad quality. After owning the car for a while, the owner can update the probability that his/her car is a lemon. This updated estimate is more accurate than the original estimate. Thus, sellers of used cars have better estimates concerning the quality of used cars than do buyers. Asymmetry in information concerning used cars exists. Good cars and bad cars will sell at the same price. Not only can the owner of a good car not receive the true value of his or her car, the owner cannot even obtain the expected value of a used car. Most cars traded will be lemons. That is, the bad cars drive out the good. In the more continuous case of asymmetric information, Akerlof (1970) demonstrates that it is possible to have the bad driving out the not-so-bad driving out the medium driving out the not-so-good driving out the good so that there is complete market failure in which case no trading will take place. Akerlof's "Lemons Principle" has led to counteracting institutions including: guarantees, brand-name goods, chains, licensing, certification, and the granting of degrees. These institutions can be viewed as methods of signaling quality.

Spence (1973) details the conditions necessary for a signal to be effective. Spence finds that a potential signal may become an actual signal only if the signaling costs are negatively correlated with the unknown characteristic of interest. This is a necessary, but not a sufficient condition. It is also necessary that a sufficient number of signals be available within the appropriate cost range. Additionally, indices also have a potential informational impact on the market. Spence's (1973) conclusions concerning signaling imply that dividends have the potential to be signals of future firm cash flows, only if the cost of issuing dividends decreases as cash flow prospects improve.

Spence (1974) develops a formal partial-equilibrium descriptive analysis of market signaling under competition. Spence's results imply that, over some range of cash flows, the additional benefit to a firm of issuing one more dollar of dividends has to be less than the marginal cost of issuing another dollar. Otherwise, all firms would issue dividends up to some hypothetical maximal limit and no information would be imparted to the market. Another implication is that in markets with asymmetric information concerning cash flows prospects and dividends as a signal of the prospects, the properties of equilibrium may be quite different than the properties that would be found in the absence of signaling through dividends or if increasing dividends were costless.

Leland and Pyle (1977) provide the basis for asymmetric information among managers and outside investors and the need for a method of signaling. Moral hazard prevents direct information transfer. In other words, asymmetric information persists because of agency costs. Unable to distinguish among various projects with respect to quality, investors assign average project quality to projects. Then, market value reflects average project quality. If the supply of poor projects is large relative to the supply of good projects, low average project quality will cause the cost of capital to be high. Then projects which are known to be good (by the entrepreneur) cannot be undertaken. This result is reminiscent of Akerlof's (1970) "Lemons Principle."

Models of the signaling hypothesis with external signaling cost have been developed by Bhattacharya (1979), Eades (1982), John and Williams (1985), Miller and

Rock (1985), Kale and Noe (1990) and Brick, Frierman, and Kim (1998). All six papers exhibit consistency with Spence (1973) and predict that dividend announcements provide investors with information about cash flows. Additionally, Bhattacharya (1980) has developed a dividend signaling model that does not rely on dissipative signaling costs.

Bhattacharya (1979) relies on asymmetric information. If dividends are taxed at a higher rate than capital gains, taxes operate as a cost of using dividends as a signal of true cash flow. Additionally, if there is a shortfall of cash flow (D - X) where D is the committed dividend level and X is the level of cash flows, there are costs to current shareholders due to the costs of raising unanticipated financing. If outside investors are unable to determine the productivity of assets across different firms, the market will make inferences from changes in the firm's dividend policy. Firms with sufficient cash flow will increase their dividend payouts. This action can be imitated by lesser firms only at a prohibitive cost. In equilibrium, firms will signal their true positions and investors will correctly draw inferences from their signals. Thus, cash dividends may be used as a mechanism to signal investors. Bhattacharya shows that signaling equilibria are feasible, even if the signaling costs that are negatively related to expected cash flows are small, if there are other signaling costs not related to cash flows.

Bhattacharya (1980) uses an environment in which there are no exogenous costs associated with communicating ex post earnings. This means that accounting reports are free of moral hazard. Additionally, dividends and capital gains are taken to be taxed at the same rate and shareholders are risk-neutral. The models considered are intertemporal. In a three-time-point model, t = 0, 1, 2, the current generation of shareholders plans to sell out to a new generation at $t = 1$. Bhattacharya shows that there is a market-based adjustment of liquidation value at $t = 1$, based on the discrepancy between the ex ante ($t = 0$) signal and the actual cash flow at $t = 1$. In the environment of the model, signaling through dividends accelerates the timing of information transmittal from insiders to the outside market about the firm's earnings prospects.

Eades (1982) presents a one-period dividend signaling model in which dividends act as a signal of the riskiness of the firm’s end of period liquidation value. The intuition of the model is that if dividend signaling costs are a function of risk, then dividends will also be a function of risk. He uses a two-parameter (mean and variance) normal distribution function for the firm’s end of period value. The cost of the signal is the moral hazard penalty assessed by the market on firms unable to make promised payments. A result of the model is that the level of dividends is a decreasing function of the variance of the end of period liquidation value. Indeed, his empirical results show that the firm’s stock return volatility and dividend yield are negatively correlated. However, he finds a positive relationship between the information content of dividend changes and the firm’s risk level.

In the model of Miller and Rock (1985), managers are assumed to have information concerning the return on past investment (i.e., current earnings) not available to outside investors. Investors draw inferences about implied changes in expected net operating cash flow from corporate dividend announcements. Miller and Rock's results also parallel Spence (1973). The unobserved attribute is expected earnings, and the cost of signaling is foregone productive investment. This cost is inversely related to the actual level of future earnings. Corporate insiders signal with cash distributions and satisfy the firm's sources and uses of funds constraint by altering investment. Insiders in firms with larger cash inflows can distribute more cash and still invest as much as firms with smaller cash inflows. If insiders in the less valuable firms try to match the cash payment levels of the more valuable firms, they must invest less and forego projects with higher marginal returns than the projects forgone by the more valuable firms.

Miller and Rock (1985) show dividend announcement effects to be a natural outcome of the basic finance model of the firm's investment/financing/dividend decision. The strength of the price response to unexpected earnings varies directly with the degree of persistence in the firm's underlying income stream.

Miller and Rock (1985) show that when both trading and asymmetric information are incorporated into the investment/financing/dividend decision model, consistent equilibrium leads in general to less than the Fisherian optimum levels of investment. In other words, profitable investment opportunities are wasted. There is under investment. Additionally, the level of dividends is higher than under standard full information models.

If the market assumes that the firm is following the Fisherian optimum investment policy, there is a temptation to pay more dividends than the market expects in order to increase the stock price. As the deception becomes known to the market, price will eventually fall back. However, the potential gain to postannouncement sellers is greater than the loss to nonselling shareholders.

If outside investors take into account the temptation managers have to exploit asymmetric information on behalf of the selling shareholders, their offer price will discount the likely departure from the Fisherian optimum investment policy. Management, knowing that investors have allowed for this departure, will provide it. That is, no one is fooled. The expectations of outside investors and management can be fulfilled and time consistency can be restored. However, efficiency has been lost. The departure from Fisherian optimum is directly related to (1) the weight of the market determined current stock price (as opposed to the price insiders know to be deserved) in the determination of social welfare, (2) the turnover parameter indicating the number of shares sold upon dividend announcement, and (3) the degree of persistence in the firm's underlying income stream.

Contractual provisions or legal restrictions that change both the information asymmetry or the possibility of profiting from it can eliminate both inefficiency and time inconsistency. However, these provisions are likely to also carry a dead-weight loss.

Miller and Rock (1985) show that dividends and external financing are two sides of the same coin. They show that dividend announcement effects emerge naturally as implications of the basic valuation model because investors draw inferences about the firm's internal operating cash flows. The firm's dividend announcements provide enough pieces of the firm's sources and uses of funds statement for the market to deduce current earnings. That earnings figure serves as a basis for estimating future earnings. Miller and Rock suggest that positive dividend surprises are associated with larger-than-expected internally generated cash flows from operations. Hence, dividend increases represent good news for investors.

In the analysis of John and Williams (1985), funding for investment must come from either the issuance of new shares or from retirement of fewer outstanding shares. Likewise, current stockholders must sell existing shares to raise cash. In either case, the ownership position of current shareholders is diluted by the sale of shares to meet liquidity needs. The higher tax rates on dividends relative to capital gains serves as the signaling cost. Insiders are assumed to have information not available to outside investors concerning the firm's complete production technology. With investment assumed a constant, cash revealed by public audit, and the dollar amount of new financing residually determined, the firms aggregate market price is a function only of its dividend. Insiders have incentive to reduce dilution through larger dividends and accompanying higher stock prices whenever they possess favorable inside information. Outsiders recognize this relationship and bid up the price of stock when dividends are distributed, thus reducing dilution. For firms with more favorable inside information, the premium paid for stocks with marginally larger dividends equals the incremental personal taxes on the dividends. Insiders are assumed to be unable to trade anonymously, precluding a false signal. The market contains a pricing mechanism which separates firms with more favorable inside information from those with less. Insiders control dividends optimally, while outsiders pay the correct price for the firm's stock.

John and Williams (1985) find that the levels of dividends and stock prices are higher for dividend declaring firms with more favorable inside information. Insiders optimally smooth dividends relative to the stock's true value. Signaling equilibrium does not occur if there are no dissipative costs such as taxes associated with paying dividends. The marginal cost of signaling is the incremental personal taxes less the gain from reduced dilution. Consistent with Spence (1973), the marginal cost of signaling decreases in the unobservable attribute being signaled. That is, the marginal rate of substitution between dividends and shareholder wealth decreases in the present value of future cash flows. In other words, the ratio of the marginal increase in personal taxes on dividends and the lower dilution due to the stock price premium paid for a marginally larger dividend is lower for firms having a higher present value of future cash flows.

In the two-period model of Kale and Noe (1990), dividend policy serves as a signal of the stability of the firm’s future cash flows. Stability is the reciprocal of total risk (both systematic and unsystematic). Firms are assumed to be all equity financed. The cost of signaling through higher dividends is the increased expected underwriting costs from issuing equity. The promise of higher dividends increases the probability that the firm will have to issue equity and pay underwriting costs. All firms have access to projects which are identical in expected value of cash flows. Firms differ only in the uncertainty of future cash flows. Dividend payments are announced one period ahead to time. If cash flows at the end of the first period are insufficient to meet the sum of desired investment and previously announced dividends at the end of the first period, new equity will be issued to make up the shortfall. The dividend signaling benefit-to-cost ratio ties dividend levels to the risk of cash flows. Increases in cash flow risk increase the risk of a cash shortfall, increasing the cost of signaling through dividends. Hence, dividends are a credible signal. Firms with less volatile future cash flows pay a higher dividend.

Ravid and Sarig (1991) argue that debt and dividend policies are informationally equivalent since both activities essentially commit the firm to make future periodic cash outlays. Then, dividend payments and leverage are characterized by Ravid and Sarig as two technologies of information dissemination. Together the policies form a commitment package signaling the quality of the firm to outside investors. The optimal committing mix is selected such the marginal cost of committing with either policy is the same. In equilibrium, better firms pay higher dividends and are more highly leveraged than lower quality firms.

In contrast to Ravid and Sarig (1991), Brick, Frierman, and Kim (1998) provide a signaling model in which higher quality firms issue new equity (decreasing leverage) while offering cash dividends. The model incorporates a “dividend related dead weight” cost such as cost of outside financing and personal taxes. The higher quality firm is distinguished from lower quality firms by having a lower variance (but the same mean). Firms use debt and dividends to signal information about the variance of cash flow.

The Signaling Hypothesis--Empirical Evidence

The evidence supporting the signaling theory is mixed at best. Watts (1973) was among the first to empirically examine the information that dividends might provide about future cash flows. Watts uses regressions to study the significance of current and past earnings and dividends upon future earnings. Watts estimates regression coefficients of future earnings on current dividends. Also, he regresses future earnings on unexpected changes in dividends. Watt's regressions of future earnings on current dividends indicates that the relationship is positive, but the *t*-statistics are very low. Watt's regression of future earnings on unexpected changes in dividends indicates a positive but weak relationship. Next, Watts examines the relationship between the sign of the unexpected change in current dividends and the sign of detrended future earnings changes. The sign test indicates dependence between unexpected change in future earnings and unexpected change in dividends, however the average standardized unexpected change in earnings associated with unexpected change in dividends is very small. Watts concludes that if there is any information in dividends, it is very small.

Healy and Palepu (1988) examine firm earnings performance for five years before and five years after 131 dividend initiations and 172 dividend omissions. They standardize earnings with the stock price. They find that there are significant and rapid standardized earnings increases the year before and the year of the dividend initiation and that standardized earnings continue to increase for two years following the initiation. Firms that omit dividends suffer an earnings decline in the year of the omission, but recover during the subsequent several years. Then, their results concerning initiations support the dividend signaling hypothesis. However, their results with omissions are the opposite of what signaling theory would predict.

Wansley et al. (1991) test the relationship between dividend announcement effects and earnings stability. Consistent with Eades (1982), Miller and Rock (1985), Kale and Noe (1990), and Brick, Frierman, and Kim (1998), dividend announcement effects are generally stronger when the firm's earnings are more volatile. It should be noted that Wansley et al. only use quarterly earnings for the eight quarters before the announcement. This paper examines the relationship between the announcement effect and the change in volatility of cash flows using cash flows from the eight quarters before the announcement and the eight quarters after the announcement.

DeAngelo, DeAngelo, and Skinner (1996) study 145 NYSE firms that suffer an earnings decline after at least nine consecutive years of earnings growth. Of this sample, 99 firms (68.3%) increase dividends in the initial year of the earnings decline. They conclude that, "dividends are not pervasively useful signals of future earnings performance." Their results indicate the failure of dividends to be reliable signals is due to (1) managerial overoptimism and (2) and the modest cash commitments associated with the increase in dividends.

Brook, Charlton, and Hendershott (1998) construct a sample of firms with four years of flat cash flow that subsequently experience a sharp permanent cash flow jump. They find support for cash flow signaling in that these firms tend to boost their dividends before their cash flow jumps. Additionally, for the partition of these firms whose cash flow remains at least 30% above year 0 levels for all four of the subsequent years, the stock return outperforms the broad market by an average of 17.5% in year 0 and 29.3% in year 1.

Benartzi, Michaely, and Thaler (1997) examine whether dividend changes convey information about preceding and subsequent earnings changes. Signaling theory implies that the sign of unexpected earnings in years 1 and 2 will be positively related to both the direction and magnitude of dividend changes in year 0. Using categorical analysis, the authors find that dividend-increasing firms show no obvious pattern of unexpected earnings in years 1 and 2. They find the perverse result that dividend-decreasing firms have strongly positive unexpected earnings in year 1. However, there is a strong positive relationship between the sign of the dividend change and the sign of both concurrent unexpected earnings changes and unexpected earnings changes in year -1. Dividends seem to be reacting to current and past earnings. Thus, the authors conclude that the predictive ability of changes in dividends is limited, except for dividend cuts which signal an increase in future earnings.

Benartzi, Michaely, and Thaler (1997) also regress the changes in earnings in years 0, 1, and 2 on several variables including dividend changes in year 0 to see whether dividend changes add explanatory power. While dividend changes help to explain earnings changes in year 0, they provide little help in explaining earnings changes in years 1 and 2. However, it should be noted that Benartzi, Michaely, and Thaler do not control for the investment opportunity set. Rozeff (1982) and Smith and Watts (1992) provide empirical evidence that there is a negative relationship between growth options and dividends. Then, firms that are beginning to face limited growth options (mature firms) will increase their payout ratio, to signal maturity and the return of cash rather than rising earnings.

Consistent with Benartzi, Michaely, and Thaler, Penman and Sougiannis (1997) find that increases in current dividends are followed by decreases in earnings. Additionally, Mozes and Rapaccioli (1998) find that earnings declines follow large dividend increases. The next two sections review the literature on the components of dealer bid-ask spread and how the micromarkets may provide evidence on the signaling and agency abatement theories.

Models of Market Maker Behavior and
Components of Bid-ask Spread

This section reviews literature on the determination of the bid-ask spread. It surveys research that indicates that analysis of bid-ask spreads can be used to investigate the information content of events as well as research indicating which factors should be controlled in event studies of this nature.

The bid-ask spread is set by a person who stands ready and waiting to trade (a market maker). In the case of the auction-market exchanges, the market makers are the exchange specialists. In the case of NASDAQ, dealers assume the role of the market maker. The theoretical work on the bid-ask spread asserts that a market maker sets the spread to cover her/his costs, including compensation for risk-taking. Two models dominate the literature: inventory control and adverse selection or asymmetric information models. Inventory control models focus on the use of spreads as portfolio management tools for the market maker.[1] According to inventory control models, the risk of the market maker is inventory risk. Inventory levels are adjusted according to the dealer's risk aversion by altering bid and ask prices. Dealers lower (raise) prices when inventory is considered to be too high (low).

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[1]See Demsetz (1968), Garman (1976), Stoll (1978a), Amihud and Mendelson (1980), Ho and Stoll (1981), and O'Hara and Oldfield 1986).

Adverse selection models analyze dealer behavior in markets characterized by asymmetric information.[2] The models typically assume that market-maker inventory has no impact on prices. These models focus an the adverse selection exposure of a dealer who is unable to distinguish between informed and uninformed traders. In these models, the market-makers recoup losses suffered in trades with informed traders through gains in trades with uninformed (liquidity) traders by widening the spread as informational asymmetry increases. Adverse selection models imply that corporate events which decrease (increase) information asymmetry cause bid/ask spreads to become smaller (larger). Thus, adverse selection models are used to analyze the information revealed by changes in the bid-ask spread.

Much of the empirical literature supports the view that information costs are a substantial portion of the total spread. Benston and Hagerman (1974) use firm-specific risk as a proxy for adverse information and find a positive relationship between bid-ask spread and firm-specific risk. Chiang and Venkatesh (1988) use insider shareholdings as a proxy for informational asymmetry and find that it is positively related to the percentage bid-ask spread. Glosten and Harris (1988) find that a significant portion of NYSE spreads is due to asymmetric information. Stoll (1989) estimates that informed trading risk constitutes roughly 43 percent of the quoted spread for stocks trading on the NASDAQ. Madhavan and Smidt (1991) develop and test a Bayesian model of specialist pricing behavior that incorporates both asymmetric information and inventory control

[2]See Bagehot (1971), Copeland and Galai (1983), Glosten and Milgrom (1985), Kyle (1985), Easley and O' Hara (1987), Admati and Pfleiderer (1988), George, Kaul, and Namalendran (1994), and Spiegel and Subrahmanyam (1995).

effects. They analyze transaction data and find no short-run price effect due to inventory control. They emphasis a specialist's role as an investor. The specialist chooses a desired long-term inventory level based on portfolio considerations. They show that the specialist's target inventory may shift over time in response to changes in the risk profile of the stock. They suggest that inventory holding costs are small and find strong support for information asymmetry. George, Kaul, and Nimalendran (1991) also suggest that the cost of holding inventory levels which differ from the desired level is relatively small. They estimate that the adverse selection component of spread at 8 to 13 percent of the total spread.

George, Kaul, and Nimalendran (1994) provide theoretical analysis indicating that the willingness of informed traders to trade aggressively on their private information increases as informational asymmetry increases. The specialist responds by widening the bid-ask spread for each level of net order flow. This decreases the willingness of all agents (both liquidity traders and informed traders) to trade.

Spiegel and Subrahmanyam (1995) provide a model indicating that market makers have more information than liquidity traders, but still must face adverse selection. Market makers tend to have more information than "outside investors" because the former monitors the market continuously. However, some outside investors (termed "discretionary outsiders") can time when they will enter the market. The discretionary outsiders tend to enter the market at times that allow them to offset the order flow.

Manaster and Mann (1996) find evidence that neither the inventory control or adverse selection models accurately describe market maker behavior. Using information from Chicago Mercantile Exchange futures, they find that dealers tend to become net sellers whenever they hold positive inventory, as predicted by inventory control models. However, they tend to sell at higher prices, in contradiction to traditional inventory control models. They infer that market makers are active profit-seeking agents with differing levels of information and/or trading skill.

Madhavan, Richardson, and Roomans (1997) use an approach similar to the Glosten and Harris (1988) model to estimate spread components for NYSE stocks. They estimate that the adverse selection component comprises approximately 43 percent of the spread.

Although adverse selection models imply that corporate events which decrease (increase) information asymmetry cause bid/ask spreads to become smaller (larger), the effect is not likely to be immediate. Dealers may react defensively on days that there are large price changes, no matter what the informational event. Morse and Ushman (1983) find an increase in absolute dollar spread on days of large price changes. These increases occurred on days of large increases as well as decreases in price.

Bid-ask Spread and Dividend Policy

Venkatesh and Chiang (1986) find information asymmetry increases before earnings or dividend announcements that follow other earnings or dividend announcements by between 10 and 30 days inclusive. They did not find significant increases in preannouncement asymmetry otherwise. Because their work deals with preannouncement bid-ask spread rather than reaction to dividend increase announcements, it does not specifically address dividend policy. Howe and Lin (1992) argue that if dividend payments reduce the costs stemming from separation of ownership and control by providing additional information to investors about the actions and intentions of management, the information will also be available to market makers. Howe and Lin (1992) find that there is an inverse relationship between dividend yield and bid-ask spreads after controlling for other determinants of the spread (price level, trading volume, return variance and the number of market makers). However, these findings are consistent with both the signaling hypothesis and the agency abatement hypothesis.

Using a sample of 90 NYSE firms, Brooks (1994) measures the total bid-ask spread as well as the adverse selection component of bid-ask spread around dividend increases that occur in 1988. He finds that both the total spread and the adverse selection component around the announcement period is not significantly different from the nonevent period. The sample is not partitioned in a way that allows investigation of either the signaling or agency abatement hypotheses.

Mitra and Rashid (1997) examine dividend initiations and find that the mean percentage spread significantly narrows on announcement day and remains lower, on average, over the next year. As with Howe and Lin (1992), Mitra and Rashid's findings are consistent with both the signaling hypothesis and the agency abatement hypothesis.

Chapter Summary

A positive stock price reaction to dividend increases has been well documented in the literature. Both cash flow signaling and agency abatement remain plausible explanations. There is a need to determine which hypothesis best succeeds in explaining the phenomenon. Additionally, the bid-ask spread response to dividend increases remains relatively unexplored. Prior to this study, the cash flow signaling and agency abatement explanations for spread reaction had not been examined.

CHAPTER III

METHODOLOGY

This chapter presents the research hypotheses that were tested. It details the sample selection procedure. The variables and event study procedures used are described in detail. Also outlined are the statistical analyses that were used to test the research hypotheses. The chapter is divided into five sections. These sections are research hypotheses, sample selection, variable definitions, estimated generalized least squares modeling of CPEs, CHGSPDs, and CMASs, and chapter summary. The research hypothesis section provides hypotheses for short-term price effects from dividend increases, long-term price effects from dividend increases, and spread effects from dividend increases. Data sources for each variable are included with the variable definitions.

Research Hypotheses

The research question advanced in Chapter One is answered by testing the hypotheses presented in this section. First, a brief review of the theories from which the hypotheses are drawn is given.

Agency theory predicts that firms will be prone to become overinvestors (Jensen 1986). Investments may be made to assure survival through diversification of the earnings stream and thereby reduce managers' compensation risk. Additionally, projects may be undertaken to improve career opportunities and status rather than maximizing firm value.

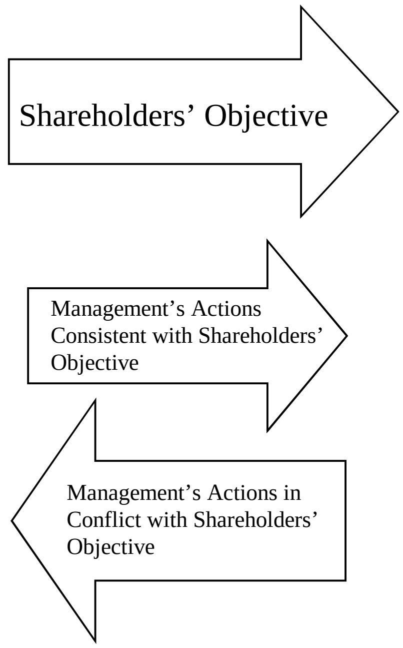
Agency theory suggest that dividends constrict management actions through improved monitoring (Easterbrook 1984), disclosure of information (Rozeff 1982), and by reducing free cash flow (Lang and Litzenberger 1989). Through the dividend decision, firms can designate cash flows to shareholders facing superior investment opportunities rather than to negative net present value ventures. The agency abatement theory of dividends is illustrated in Figure 1.

Lang and Litzenberger (1989) show that Tobin's Q ratio is an indicator of firms that overinvest in this manner. Thus, agency theory suggests that firms that possess high levels of owner/manager agency risk will exhibit a low Q. Managers wishing to create shareholder wealth are likely to use dividend increases as a method to temper the agency risk for owners. Conversely, those firms with high Q are unlikely to pose significant agency risk to shareholders. Managers of these firms are unlikely to make dividend decisions on the basis of agency mitigation.

Signaling models developed by Pettit (1972), Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985) suggest that dividend increases signal information about the level of future cash flows. Ofer and Siegel (1987) find analysts revise their earnings forecast based upon the size of unexpected dividend changes. This version of dividend signaling theory is illustrated in Figure 2 Panel A.

Figure 1. Agency Abatement Theory: Dividend Increase Constricts Management's Behavior, Reducing the Shareholder/Manager Agency Problem.

Shareholders' Objective (Maximization of Shareholder Wealth) and Some of the Actions of Management are in Conflict before the Dividend Increase.



Shareholders' Objective and Management Actions are More Closely Aligned After Dividend Increase.

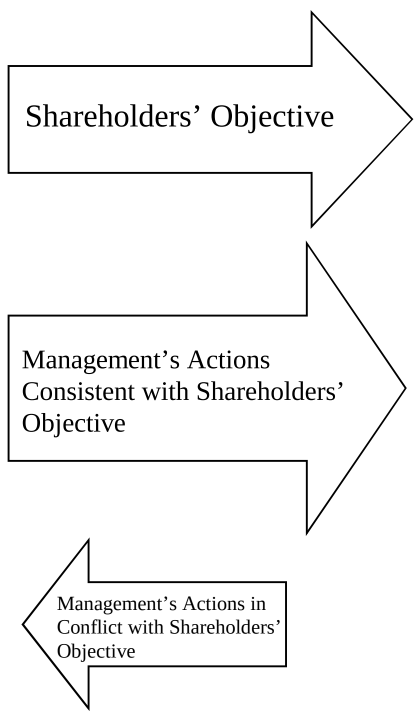
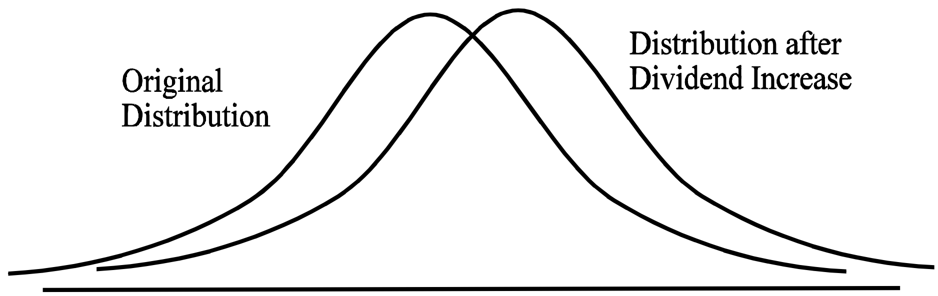
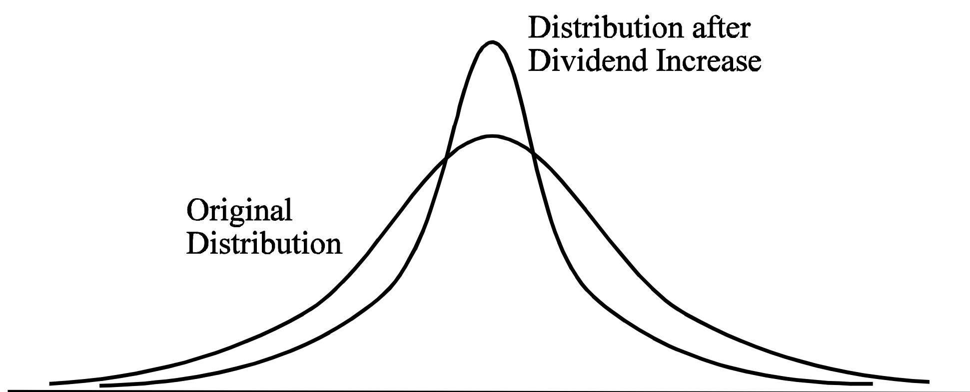


Figure 2. Dividend Increase Signals a Change in the Distribution of Cash Flow.

Panel A. Dividend Increase Signals an Increase in the Mean Cash Flow.



Panel B. Dividend Increase Signals a Decrease in the Variability of Cash Flows.



Eades (1982), Kale and Noe (1990), Brick, Frierman, and Kim (1998) provide models in which dividend increases signal stability of cash flows. This version of dividend signaling theory is illustrated in Figure 2 Panel B.

Tables 1 and 2 partition the agency abatement and cash flow signaling motives to increase dividends. In the spirit of Pettit (1972), Bhattacharya (1979), John and Williams

Table 1--Dividend Increase Motivation Table with Signaling-motivated Dividend Increases Characterized by a Subsequent Increase in the Mean Cash Flow

Agency-motivated dividend increases, as illustrated in Figure 1, are characterized by low Tobin's Q. Signaling-motivated dividend increases are characterized by a high subsequent change in cash flow as in Panel A of Figure 2. Partitions of firm/events in Cells 1 and 4 are used to test hypotheses HS1, HL1, HM1, and HI1 as explained later in the chapter. Agency abatement theory is supported if Cell 1 response is greater than Cell 4 response. Otherwise, cash flow signaling theory is supported.

	STRONG AGENCY MOTIVATION Low Tobin's Q	***WEAK AGENCY MOTIVATION*** High Tobin's Q
WEAK SIGNALING MOTIVATION Low change in cash flow	Decision motivated by agency abatement. (AGENCY1) (1)	Motivation is indeterminate. (2)
STRONG SIGNALING MOTIVATION High change in cash flow	Decision consistent with both agency abatement and cash flow signaling. (3)	Decision motivated by cash flow signaling. (SIGNAL1) (4)

(1985), and Miller and Rock (1985), Table 1 uses change in cash flow to partition firms into those with either low or high signaling motivation. Firms with Tobin's Q less than or equal to the sample median are classified as low Tobin's Q firms and are placed in the left column; otherwise, firms are designated as high Tobin's Q firms and are placed in the right column. Firms with a negative change in cash flow are considered low change in cash flow firms and are placed in the top row; otherwise, firms are designated as high change in cash flow firms and are placed in the bottom row. Within Table 1, firms in Cell 1 are labeled AGENCY1 and firms in Cell 4 are labeled SIGNAL1.

Firms in Cell 1 are considered to be those whose dividend decision is motivated by the owner/manager agency problem but not by cash flow signaling. These are over-investing firms which currently are investing in projects with negative net present value. That is, they are investing in projects with rates of return below their cost of capital. These firm's will have low Q ratios. Firms in Cell 4 are believed to be motivated by cash flow signaling and not by agency abatement. They have cash flows that are rising and are at low risk for shareholder/management agency conflict. The motivation for firms in Cell 2 is indeterminate within the context of informational signaling and agency costs. Firms in Cell 3 are likely to be motivated by either cash flow signaling or agency abatement or both. Since this paper focuses on the relative importance of agency abatement and cash flow signaling, interest centers on firms in Cells 1 and 4.

In the spirit of Eades (1982), Kale and Noe (1990) and Brick, Frierman, and Kim (1998), Table 2 uses change in coefficient of variation of cash flow to separate firms into those with low or high signaling motivation. Firms exhibiting a positive change in coefficient of variation of cash flows are considered to be high change in coefficient of variation of cash flows firms. These firms are not motivated to signal improved cash flows due to the deterioration of the cash flow distribution and are placed in row 1; otherwise firms are placed in row 2. Firms in Cell 4 are believed to be motivated by cash flow signaling and not by agency abatement. They are at low risk for shareholder/management agency conflict and are experiencing reduced volatility of cash flows. As with Table 1, firms in Cell 1 are considered to be those whose dividend decision is motivated by the owner/manager agency problem but not by cash flow signaling. Within Table 2, firms in Cell 1 are labeled AGENCY2 and firms in Cell 4 are labeled SIGNAL2. Again, the focus is on Cells 1 and 4.

Table 2--Dividend Increase Motivation Table with Signaling-motivated Dividend Increases Characterized by a Subsequent Decrease in the Variability of Cash Flows

Agency-motivated dividend increases, as illustrated in Figure 1, are characterized by low Tobin's Q. Signaling-motivated dividend increases are characterized by a low subsequent change in the coefficient of variation of cash flow as in Panel B of Figure 2. Partitions of firm/events in Cells 1 and 4 are used to test hypotheses HS2, HL2, HM2, and HI2 as explained later in the chapter. Agency abatement theory is supported if Cell 1 response is greater than Cell 4 response. Otherwise, cash flow signaling theory is supported.

	STRONG AGENCY MOTIVATION Low Tobin's Q	***WEAK AGENCY MOTIVATION*** High Tobin's Q
WEAK SIGNALING MOTIVATION High change in the coefficient of variation of cash flow	Decision motivated by agency abatement. (AGENCY2) (1)	Motivation is indeterminate. (2)
STRONG SIGNALING MOTIVATION Low change in the coefficient of variation of cash flow	Decision consistent with both agency abatement and cash flow signaling. (3)	Decision motivated by cash flow signaling. (SIGNAL2) (4)

Hereafter, the collective structure of Tables 1 and 2 is referred to as the "motivation table." This structure is used to map the hypotheses presented in this chapter, the results are presented and discussed in Chapter 4.

Hypotheses drawn from agency theory and cash flow signaling theory are presented below. These hypotheses aid in identifying specific contexts in which dividend decisions should be value-enhancing, value-destroying, or value-neutral as well as spread decreasing or increasing. The hypotheses system for identifying hypotheses may be summarized as follows: the letter "S" in the second position indicates the use of a (days

−1, 0) window for cumulative abnormal returns (CARs), the letter “L” indicates the use of a (days −1, 504) window for CARs, a “M” indicates that the use of a (days −1, 0) window for controlled mean abnormal spreads, and an “I” indicates the use of a change in spread (CHGSPD) as measured by the ratio of mean relative spread from day 40 to day 20 (a 21 day period) over mean relative spread from day -20 to day -40. Each set of hypotheses consists of a null and an alternative. In each case the null is labeled with an “0” subscript and the alternative is labeled with an “A”.

Hypotheses Involving Short-term Stock Price Response

The first set of hypotheses represents the possibility that initial stock price reaction to the announcement of dividend increases differs between firms with a strong need to abate the shareholder/manager agency problem but without a motivation to signal a change in the level of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal a rise in the level of cash flows. This set of hypotheses and the following one are tested using estimated generalized least squares regressions modeling the (days −1, 0) CPE.

$HS1_0$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is not a difference between the initial stock price reaction to sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 1, Cell 1 versus Cell 4).

$HS1_A$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is a difference between the initial stock price reaction to sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem.

The next set of hypotheses represents the possibility that initial stock price reaction to the announcement of dividend increases differs between firms with a strong need to mitigate the shareholder/manager agency problem but without a motivation to signal a change in the stability of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal reduced volatility of cash flows.

$HS2_0$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is not a difference between the initial stock price reaction to sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 2, Cell 1 versus Cell 4).

$HS2_A$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is a significant difference between the initial stock price reaction to sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem.

Hypotheses Involving Long-term Stock Price Response

Hypotheses concerning stock-price reaction to large dividend increases over a longer time period are also tested. Fama (1998) states that there is "developing literature . . . arguing . . . that stock prices adjust slowly to information." In response to those arguments, the next set of hypotheses represents the possibility that long-term stock drift following the announcement of dividend increases differs between firms with a strong need to abate the shareholder/manager agency problem but without a motivation to signal a change in the level of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal a rise in the level of cash flows. This set of hypotheses and the following one are tested using estimated generalized least squares regressions modeling the (days −1, 504) CPE.

$HL1_0$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is not a difference between the long-term stock price drift following sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 1, Cell 1 versus Cell 4).

$HL1_A$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is a difference between the long-term stock price drift following sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem

The next set of hypotheses represents the possibility that long-term stock price drift following the announcement of dividend increases differs between firms with a strong need to mitigate the shareholder/manager agency problem but without a motivation to signal a change in the stability of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal reduced volatility of cash flows.

$HL2_0$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is not a significant difference between the long-term stock price drift following sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 2, Cell 1 versus Cell 4).

$HL2_A$: Controlling for dividend yield, price-standardized dividend change, and free-cash flow, there is a significant difference between the long-term stock price drift following sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem.

Hypotheses Involving Short-term Bid-Ask Spread Response

The next set of hypotheses represents the possibility that initial bid-ask percentage spread response to the announcement of dividend increases differs between firms with a strong need to abate the shareholder/manager agency problem but without a motivation to signal a change in the level of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal a rise in the level of cash flows. This set of hypotheses and the following one are tested using estimated generalized least squares regressions modeling the (days −1, 0) CMAS.

$HM1_0$: Controlling for dividend yield, price-standardized dividend change, free-cash flow, change in trading volume, change in return variance, and change in closing price, there is not a difference between the initial bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 1, Cell 1 versus Cell 4).

$HM1_A$: Controlling for dividend yield, price-standardized dividend change, free-cash flow, change in trading volume, change in return variance, and change in closing price, there is a difference between the initial bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem.

The next set of hypotheses represents the possibility that initial bid-ask percentage spread response to the announcement of dividend increases differs between firms with a strong need to mitigate the shareholder/manager agency problem but without a motivation to signal a change in the stability of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal reduced volatility of cash flows.

$HM2_0$: Controlling for dividend yield, price-standardized dividend change, free-cash flow, change in trading volume, change in return variance, and change in closing price, there is not a significant difference between the initial bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 2, Cell 1 versus Cell 4).

$HM2_A$: There is a significant difference between the initial bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem.

Hypotheses Involving Intermediate-term Bid-Ask Spread Response

Because spreads may increase during time periods surrounding any informational event (see Morse and Ushman 1983), micromarket structure response is also tested over an intermediate length time period that excludes a short-period around the actual dividend increase announcement. The next set of hypotheses represents the possibility that bid-ask percentage spread response to the announcement of dividend increases over an intermediate period of time differs between firms with a strong need to abate the shareholder/manager agency problem but without a motivation to signal a change in the level of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal a rise in the level of cash flows. This set of hypotheses and the following one are tested using estimated generalized least squares regressions modeling the change in relative spread (CHGSPD) which is described in more detail in the variable definitions section of this chapter.

$HI1_0$: Controlling for dividend yield, price-standardized dividend change, free-cash flow, change in trading volume, change in return variance, and change in closing price, there is not a difference between the intermediate-term bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 1, Cell 1 versus Cell 4).

$HI1_A$: Controlling for dividend yield, price-standardized dividend change, free-cash flow, change in trading volume, change in return variance, and change in closing price, there is a difference between the initial bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem.

The next set of hypotheses represents the possibility that the intermediate-term bid-ask percentage spread response to the announcement of dividend increases differs between firms with a strong need to mitigate the shareholder/manager agency problem but without a motivation to signal a change in the stability of cash flows and firms without a strong need to mitigate the shareholder/manager agency problem but with a motivation to signal reduced volatility of cash flows.

$HI2_0$: Controlling for dividend yield, price-standardized dividend change, free-cash flow, change in trading volume, change in return variance, and change in closing price, there is not a significant difference between the intermediate-term bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem (Table 2, Cell 1 versus Cell 4).

$HI2_A$: There is a significant difference between the intermediate-term bid-ask spread response to sampled dividend increase announcements of firms (1) without motivation to signal relatively more stable cash flows but with a strong need to mitigate the shareholder/manager agency problem and (2) with a motivation to signal relatively more stable future cash flows but without a strong need to mitigate the shareholder/manager agency problem.

Sample Selection

Firms were included or excluded from the sample based upon the following criteria:

1. Returns on securities identified by CRSP as other than ordinary common shares (CRSP share codes 10 and 11) were excluded.

2. The dividend increase must have been declared in 1995.

3. The current dividend and the four prior dividends must be quarterly dividends (code No. 1232 on the CRSP tape).

4. Only cash dividend increases with a magnitude of at least ten percent were included in the sample. A dividend change is defined, for purposes of inclusion, as the difference between quarter t dividend and quarter $t - 1$ dividend. The dividend in the quarter prior to the dividend change must have been at least $0.10. Obviously, the sample excludes dividend initiations.

5. Daily rates of return must have been available on the CRSP tapes.

6. Declaration dates of quarterly dividend payments must be available from CRSP tapes.

7. In order to reduce the effects of noise and to ensure that the sample consists of "real operating companies", the sample was limited to firms with a stock price of $6 two days prior to the declaration date. The SEC defines penny stocks as those issued by thinly capitalized companies which are trading under $5.[3] Further, the cash dividend must not be a completely liquidating dividend.

8. Firms with SIC codes beginning with 67** were excluded. This excludes investment companies, certain trusts, and bank holding companies. The agency problem is expected to be less for these firms due to either their ownership structure or regulation.

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[3] *Wall Street Journal*, January 29, 1998, Section C, p. 15.

9. Class B, C, etc. stock was excluded when identified as such. The role of dividends in reducing the agency problem across various classes of stock is uncertain. Additionally, often the payouts across the different classes move in lockstep, resulting in duplication of information.

10. Cash dividends per share and stock prices must be available from the Center for Research in Security Prices (CRSP) tape for the period 1993-1997 in order to be included.

11. Limited partnerships and firms labeled as ADR's, ADS's, American Shares, or ODR's were excluded.

12. Firms with Wall Street Journal earnings announcements on event days −3, −2, −1, 0, and 1 (where day −1 is the declaration date) were omitted.

13. Some firms were eliminated (somewhat arbitrarily) because of major news during the event window. Examples of news that would result in elimination are rebuff of a takeover attempt, stock split or stock dividend announcements, stock repurchases, and announcement of charges against earnings.

14. There must be sufficient information available on *Compustat PC Plus* to calculate the independent variables used to explain event abnormal returns. This information may be on either the active or research data base. The research data base was used to reduce survivorship bias.

The sample was obtained in the following manner: there were a 258 dividend increase events that met the dividend and stock price requirements and with adequate daily return availability on the CRSP tapes. Of those, 82 events were dropped due to confounding events around the announcement date. Another 81 firms were eliminated due to lack of information on *Compustat* needed to calculate independent variables. The final sample size of events resulting from these screens was 95. These 95 events are distributed within the cells of Table 1 as follows: 14 in Cell 1, 11 in Cell 2, 33 in Cell 3, and 37 in Cell 4. The distribution within the cells of Table 2 are as follows: 20 in Cell 1, 17 in Cell 2, 27 in Cell 3, and 31 in Cell 4.

Additionally, a matched control portfolio of firms that did not increase their dividend by 10% or more during 1995 was formed. Each firm in the large dividend increase sample was matched with a control firm on (1) four digit *Standard and Poors* SIC code and (2) 1994 total assets. Matched firms were determined by examining all firms with the same SIC code, excluding firms whenever there were not enough daily returns for a (days −1, 504) event study window, and finally selecting the firm with closest total assets to the firm in the dividend increase sample. If there were not a close SIC match, firms were matched from the "key competitors" list of *Hoover's Online* (www.hoovers.com). Only seven dividend increase firms were not matched with control firms at the four digit SIC level. Of these seven, four match at the two digit SIC level. Three matching firms were selected from the competitors list of *Hoover's Online*. This process resulted in 93 matched pairs. The dividend increase and control firms are listed in Table 3. Table 4 shows the size distribution of the dividend increase and matching samples. The table shows that the size (book value of assets) distribution of the matching firms is smaller than their large dividend increase counterparts.

Variable Definitions

Variable definitions and data sources are described in this section.

Tobin's Q Ratio (Q)

Tobin's Q (TOBINQ) is used as a proxy of a firm's agency cost of equity. Tobin and Brainard (1968) and Tobin (1969) defined Q as the ratio of a firm's market value to the replacement of cost assets. As previously stated, firms that possess high levels of agency risk should exhibit a low Q (see Lang and Litzenberger 1989). The replacement cost of assets proxies for the alternative-use value of assets. Firm's that use their assets to create high market values relative to the cost of replacing them are deemed to be using

Table 3. Sample Firm/Events

Dividend Increase Firm	Dividend Declaration Date	SIC of Dividend Increase Firm	Matching Firm	SIC of Matching Firm
ABBOTT LABORATORIES	2/10/95	2834	BRISTOL MYERS SQUIBB	2834
ABM INDUSTRIES INC	12/19/95	7340	HEALTHCARE SERVICES GROUP	7340
AMERICAN GREETINGS -CL A	6/23/95	2771	GIBSON GREETINGS INC	2771
AMERICAN WATER WORKS INC	1/5/95	4941	CALIFORNIA WATER SERVICE GP	4941
ARMSTRONG WORLD INDS INC	4/24/95	3089	CONTINENTAL CAN/DE	3089
AUTOMATIC DATA PROCESSING	5/19/95	7374	FISERV INC	7374
AVON PRODUCTS	8/2/95	2844	CARTER-WALLACE INC	2844
BADGER METER INC	5/19/95	3824	MARCUM NATURAL GAS SVCS INC	3824
BANDAG INC	11/14/95	3011	TREADCO INC	5010
BANTA CORP	12/5/95	2750	BOWNE & CO INC	2750
BECKMAN COULTER INC	2/3/95	3826	PERKIN-ELMER CORP	3826
BECTON DICKINSON & CO	11/28/95	3841	U S SURGICAL CORP	3841
BEMIS CO	2/2/95	2670	PARAGON TRADE BRANDS INC	2670
BOSTON ACOUSTICS INC	2/14/95	3651	KOSS CORP	3651
CABOT CORP	7/14/95	2890	NALCO CHEMICAL CO	2890
CARLISLE COS INC	8/2/95	3714	WALBRO CORP	3714
CENTRAL NEWSPAPERS -CL A	9/12/95	2711	LEE ENTERPRISES	2711
CHESAPEAKE CORP	6/13/95	2631	GAYLORD CONTAINER CP	2631

CHRYSLER CORP	5/18/95	3711	NAVISTAR INTERNATIONAL	3711
CHRYSLER CORP	12/7/95	3711	NAVISTAR INTERNATIONAL	3711
CLOROX CO/DE	7/18/95	2842	SPECIALTY CHEM RES	2842

Table 3 (Continued). Sample Firm/Events

Dividend Increase Firm	Dividend Declaration Date	SIC of Dividend Increase Firm	Matching Firm	SIC of Matching Firm
COCA-COLA CO	2/16/95	2080	TRIARC COS INC -CL A	2080
CONAGRA INC	9/28/95	2000	SARATOGA BRANDS INC	2000
CONSOLIDATED PAPERS INC	4/24/95	2621	ABITIBI CONSOLIDATED INC	2621
DIAGNOSTIC PRODUCTS CORP	4/3/95	2835	IDEXX LABS INC	2835
DOW CHEMICAL	5/11/95	2821	GEON COMPANY	2821
EATON CORP	4/26/95	3600	WATERS INSTRUMENT INC	3612
ECOLAB INC	12/18/95	2840	SYBRON CHEMICALS INC	2840
EDWARDS (A G) INC	11/17/95	6211	ADVEST GROUP INC	6211
SCRIPPS E W CO (CLASS A)	5/1/95	2711	Not matched	
FINOVA GROUP INC	8/10/95	6153	ARCADIA FINANCIAL LTD (OLYMPIC)	6153
FIRST BRANDS CORP	10/27/95	3081	SEALED AIR CORP	3081
FRANKLIN RESOURCES INC	12/11/95	6282	EQUITABLE COS INC	6282
FULLER (H. B.) CO	4/20/95	2891	PACER TECHNOLOGY	2891
GALLAGHER (ARTHUR J.) & CO	1/23/95	6411	BLANCH E W HLDGS INC	6411
GENERAL ELECTRIC CO	12/15/95	3600	MAGNETEK INC	3612
GENERAL MOTORS CORP	5/1/95	3711	FORD MOTOR CO	3711
GEORGIA-PACIFIC GROUP	5/2/95	2600	MERCER INTL INC	2600
GILLETTE CO	2/16/95	3420	STANLEY WORKS	3420

Table 3 (Continued). Sample Firm/Events

Dividend Increase Firm	Dividend Declaration Date	SIC of Dividend Increase Firm	Matching Firm	SIC of Matching Firm
GOODYEAR TIRE & RUBBER CO	4/10/95	3011	COOPER TIRE & RUBBER	3011
GRAINGER (W W) INC	4/26/95	5000	COOPER INDUSTRIES	3640
HERSHEY FOODS CORP	8/1/95	2060	WRIGLEY (WM) JR CO	2060
ILLINOIS CENTRAL CORP	11/29/95	4011	ST JOE CO	4011
ILLINOIS TOOL WORKS	8/4/95	3560	INGERSOLL-RAND CO	3560
INTERPUBLIC GROUP OF COS	5/16/95	7311	TRUE NORTH COMMUNICATIONS	7311
JOHN ALDEN FINANCIAL CORP	3/9/95	6321	CONSECO INC	6321
JOHNSON & JOHNSON	4/27/95	2834	LILLY (ELI) & CO	2834
KELLY SERVICES INC -CL A	5/17/95	7363	COASTAL PHYSICIAN GROUP INC	7363
LA-Z-BOY INC	7/31/95	2510	WINSLOEW FURNITURE INC	2510
LANCASTER COLONY CORP	11/20/95	2030	ORANGE-CO INC	2030
LEGGETT & PLATT INC	2/8/95	2510	FURNITURE BRANDS INTL (INTERCO)	2510
LIQUI-BOX CORP	9/15/95	3089	QUIXOTE CORP	3089
LOUISIANIA-PACIFIC CORP	5/1/95	2421	POPE & TALBOT INC	2421
MODINE MFG CO	5/17/95	3714	STANDARD PRODUCTS CO	3714
NORDSON CORP	11/17/95	3569	ESCO ELECTRONICS CORP	3569
ORION CAPITAL CORP	9/11/95	6331	NAC RE CORP	6331
OXFORD INDUSTRIES INC	1/9/95	2320	HAGGAR CORP	2320
PENNEY (JC) CO	3/8/95	5311	MAY DEPARTMENT STORES CO	5311
PENTAIR INC	1/18/95	3550	THERMO FIBERTEK INC	3550

PIONEER HI-BRED INTERNATIONAL	6/13/95	100	MYCOGEN CORP	100
PITNEY BOWES INC	2/13/95	3579	KRONOS INC	3579
PRICE (T. ROWE) ASSOCIATES	12/13/95	6282	PIONEER GROUP INC	6282

Table 3 (Continued). Sample Firm/Events

Dividend Increase Firm	Dividend Declaration Date	SIC of Dividend Increase Firm	Matching Firm	SIC of Matching Firm
PROCTER & GAMBLE CO	7/11/95	2840	STEPAN CO	2840
RAVEN INDUSTRIES INC	7/20/95	3080	PVC CONTAINER CORP	3080
RAYONIER INC	2/17/95	2400	PLUM CREEK TIMBER CO -LP	2400
READERS DIGEST ASSN -CL A	10/12/95	2731	GOLDEN BOOKS FAMILY ENTMT	2731
RELIASTAR FINANCIAL CORP	4/13/95	6311	TORCHMARK CORP	6311
REYNOLDS METALS CO	5/19/95	3334	ALCAN ALUMINIUM LTD	3334
REYNOLDS METALS CO	11/17/95	3334	ALCAN ALUMINIUM LTD	3334
ROHM & HAAS CO	7/24/95	2821	BORDEN CHEM&PLAST -LP COM	2821
RUBBERMAID INC	10/24/95	3089	SYNETIC INC	3089
SHERWIN-WILLIAMS CO	2/15/95	2851	PPG INDUSTRIES INC	2851
SMITH (A O) CORP	4/6/95	3621	PACIFIC SCIENTIFIC CO	3621
SPRINGS INDUSTRIES -CL A	8/17/95	2211	CONE MILLS CORP	2211
STURM RUGER & CO INC	1/20/95	3480	ALLIED RESEARCH CORP	3480
SYSCO CORP	11/3/95	5140	SUPERVALU INC	5140
TANDY CORP	12/18/95	5731	CIRCUIT CITY STR CRCT CTY GP	5731
TCA CABLE TV INC	12/14/95	4841	JONES INTERCABLE INC -CL A	4841
TELEFLEX INC	4/28/95	3841	STRYKER CORP	3841
TEMPLE-INLAND INC	8/4/95	2631	MEAD CORP	2631

TENNECO INC	12/5/95	3714	Not matched	
TEXTRON INC	2/22/95	3720	BOEING CO	3721
TIMKEN CO	11/3/95	3562	WOLVERINE TUBE INC	3350
TRW INC	10/25/95	3714	DANA CORP	3714

Table 3 (Continued). Sample Firm/Events

Dividend Increase Firm	Dividend Declaration Date	SIC of Dividend Increase Firm	Matching Firm	SIC of Matching Firm
UST INC	12/14/95	2100	BROOKE GROUP LTD	2111
VALSPAR CORP	12/13/95	2851	RENTECH INC	2851
VULCAN MATERIALS CO	2/16/95	1400	CALMAT CO	1400
WALLACE COMPUTER SVCS INC	9/7/95	2761	STANDARD REGISTER CO	2761
WEIS MARKETS INC	7/12/95	5411	HANNAFORD BROTHERS CO	5411
WHIRLPOOL CORP	2/21/95	3630	MAYTAG CORP	3630
WILLAMETTE INDUSTRIES	2/9/95	2621	BOWATER INC	2621
WILLIAMS COS INC	1/23/95	4922	SONAT INC	4922
WORTHINGTON INDUSTRIES	5/24/95	3310	STEEL TECHNOLOGIES	3310
WYNN'S INTERNATIONAL INC	2/16/95	3050	FURON CO	3050
ZERO CORP/DE	1/26/95	3460	SHILOH INDUSTRIES INC	3460

these scarce resources in a manner than maximizes shareholder wealth. Those firms with low time specific Q's are judged to be using resources poorly from the perspective of shareholders. That is, firms with low relative Q's are the type of firm that Lang and Litzenberger label as *overinvestors*. Tobin's Q is unobservable and can only be estimated. Here, Tobin's Q was estimated using the methodology proposed by Lewellen and Badrinath (1997) as modified by Lee and Tompkins (1999). Specifically,

$$Q = \frac{MVE + MPS + MDEBT}{BTA - BI - BFA - BODEBT + RCI + RCFA}, \quad (1)$$

where MVE is the market value of the firm's equity (end-of-year common share price

Table 4–1994 Book Value of Total Assets for Sample of Large Dividend Increases and Associated Matching Firms

	1994 Book Value of Total Assets in Millions of Dollars	
Percentile	Dividend Increase Firms	Matching Firms
Minimum	32.90	5.95
10th	288.43	78.57
20th	504.26	170.71
30th	807.82	257.34
40th	1,238.96	408.37
50th (Median)	1,697.57	542.90
60th	2,305.37	850.00
70th	3,463.63	1,174.98
80th	7,224.69	3,258.96
90th	13,548.60	8,003.05
Maximum	198,598.70	219,354.00

times number of outstanding shares), MPS is the annual required preferred dividend divided by the prevailing Standard and Poor's preferred stock yield, MDEBT is the book value of the firm's short-term debt plus the estimated market value of long-term debt, BTA is the book value of total assets, BI is the book value of inventories, BFA is the book value of fixed assets, BODEBT is the book value of spontaneously generated non-interest bearing liabilities, RCI is the estimated replacement cost of inventories, RCFA is the estimated replacement cost of fixed assets. The market value of long-term debt, RCI, and RCFA were estimated using the Lewellen and Badrinath (1997) algorithms. All components for the calculation were obtained from COMPUSTAT PC PLUS. All components were for the calendar year prior to the dividend declaration. TOBINQ was used to distinguish high agency firms from other firms in the sample. TOBINQ was calculated for the end of calendar 1994.

Free Cash Flow (FCF)

As previously stated, firms that have high levels of free cash flow are often proposed to be firms with high levels of agency risk. Following Lang, Stulz, and Walking (1991), free cash flow was estimated as operating income before depreciation minus taxes, interest expense, preferred dividends, and common dividends, all divided by the book value of total assets. Lang, Stulz, and Walking (1991) present a theoretical argument against scaling by market value of equity. FCF was computed for the calendar 1994 (the year prior to the declaration date). All inputs for the calculation were obtained from COMPUSTAT PC PLUS. The measure of free cash flow defined from COMPUSTAT data items is

$$\text{FCF} = \frac{\text{A13} - \text{A317} - \text{A15} - \text{A127}}{\text{A6}}. \qquad (2)$$

Change in Cash Flow (CHGCF)

The change from ex ante mean quarterly operating cash flows to ex post mean operating cash flow was used to measure cash flow variability. Quarterly operating cash flows for the eight quarters prior to the declaration was used to calculate the ex ante mean quarterly operating cash flow. Similarly, quarterly operating cash flows for the eight quarters following the declaration was used to calculate the ex post mean quarterly operating cash flow. The difference between the ex post mean quarterly operating cash flow and ex ante mean quarterly operating cash flow was scaled by total assets. Because rising mean cash flow should be consistent with dividend increases according to the signaling hypothesis, CHGCF is used as a proxy of signaling motivation. Operating cash flows are defined as net cash flows from operating activities plus interest. This definition is selected because in reflects the firm's day-to-day activities of producing and selling. Interest is added back because it is a financing expense. Additionally, it thought that there is less informational asymmetry concerning future interest expense than other components of operating cash flow as defined by FASB 95. The measure of cash flow defined from *COMPUSTAT* data items is

$$\text{Quarterly Cash Flow} = \frac{Q108 + Q22}{A6}. \tag{3}$$

Change in Cash Flow Variability (CHGCFVAR)

The need for firms to signal cash flow is nonobservable and requires a proxy. Theory suggests that firms with rising and/or stable future cash flows have the highest need to signal that information to shareholders through dividend increases. Cash flow variability is used as a measure of cash flow quality and was used as a proxy for signaling motivation. Indeed, Eades (1982), Kale and Noe (1990), and Brick, Frierman, and Kim (1998) have developed signaling models in which firms with less volatile future cash flows pay higher dividends. The higher the cash flow variability, the lower the quality. The percentage change from ex ante coefficient of variation of operating cash flows to ex post coefficient of variation of operating cash flow was be used to measure improved cash flow variability. Quarterly operating cash flows for the eight quarters preceding (following) the declaration were used to calculate the ex ante (ex post) coefficient of variation. Falling coefficients of variation should be consistent with dividend increases according to the signaling hypothesis.

Price Standardized Dividend Change (DIVCHG)

As in Denis, Denis, and Sarin (1994), price-standardized dividend change is calculated as the change in dividend divided by the share price two days prior to the dividend declaration:

$$\text{DIVCHG} = \frac{D_t - D_{t-1}}{P_{n-2}} \times 100, \tag{4}$$

where $D_{i,t}$ is the quarter t dividend, $D_{i,t-1}$ is the quarterly dividend just prior to the dividend change, and $P_{i,n-1}$ is the stock price two days prior to the dividend declaration. The information was calculated from information on the CRSP files.

Dividend Yield (DIVYLD)

Dividend yield is defined as the sum of dividends paid during the four quarters prior to the dividend declaration divided by the closing price two days before the declaration date:

$$\text{DIVYLD} = \frac{\sum_{i=1}^{4} D_{t-i}}{P_{n-2}} \times 100. \tag{5}$$

DIVYLD was calculated from information on the CRSP files. DIVYLD is included to control for possible clientele effects. If there are heterogeneous marginal valuations of dividends, the stock price reaction to dividend increases will be stronger for high yield stocks. Bajaj and Vijh (1990) and Denis, Denis, and Sarin (1994) find that announcement period excess returns are significantly and positively related to yield.

Mean (Days −1, 0) Cumulative Prediction Error (CPE)

Using Eventus software, and following Mikkelson and Partch (1988) and others, an ordinary least squares of the following form was used to estimate the market model parameters used in estimating firm CPEs (often called abnormal return),

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_{jt}, \tag{6}$$

where R_{jt} is the rate of return of the jth security in time period t, R_{mt} is the investment relative of the market, and ϵ_{jt} is the random error term incorporating unique risk. The prediction error is defined as

$$\hat{\delta}_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{mt}). \tag{7}$$

The cumulative prediction error is measured as

$$\widehat{CPE}_j = \sum_{t=-1}^{0} \hat{\delta}_{jt}. \tag{8}$$

In obtaining parameter estimates from the market model, an estimation period of 400 days (with minimum estimation period of 200 days) was used. The last day of the estimation period is thirty days before the event date. Both the CRSP value weighted market index and the CPSP equally weighted index were used in separate market parameter estimations. The event date (day −1) is defined as the actual declaration date from the CRSP files. The day 0 would normally be the *Wall Street Journal* announcement date.

The reported *Z* statistic for cumulative prediction errors is that described by Patell (1976). The Mikkelson and Partch (1988) correction for serial dependence of cumulative prediction errors was used.

Mean (Days −1, 504) Cumulative Prediction Errors

In the spirit of Karafiath, Mynatt, and Smith (1991), a matched portfolio was formed from two portfolios:

1. the 'large dividend increase' portfolio comprised of the sampled firm/events previously described of dividend increases of 10% or more in 1995. However, two firms from the complete dividend increase sample did not have enough available returns to estimate a (days −1, 504) window. This process resulted in a sample 93 dividend increases greater than 10 percent.

2. the matched control portfolio of 93 firms previously described.

The matched portfolio consists of a long position in one of firms from the large dividend increase samples and short position in the appropriate firm from the matched control portfolio. The return to each matched pair is

$$R_{hpt} = R_{ijt} - R_{ckt}, \tag{9}$$

where

R_{ijt} = return to large dividend increase firm j,

R_{ckt} = return to the control firm k matched to firm j, and

R_{hpt} = return to the matched position comprised of a long position in firm j and a short position in firm k. The return to the matched portfolio is calculated as

$$R_{ht} = R_{it} - R_{ct}, \quad (10)$$

where

R_{ht} = return to the matched portfolio,

R_{it} = return to the large dividend increase portfolio, and

R_{ct} = return to the control portfolio.

The market model parameters for the matched pairs were estimated using the OLS procedure previously described by equation (7). The parameter estimation period was from day −430 to day −31. The cumulative prediction errors (CPEs) were calculated by summing prediction errors as in equation (8) except that the prediction errors are summed from day −1 to day 504. Thus, prediction errors were summed over approximately two years. The mean (days −1, 504) CPEs and the Patell (1976) *Z* statistic were reported for that same subsets as those for which the mean (days −1, 0) CPEs are reported and which were previously described.

The matched portfolios approach was used to control for systematic risk, industry wide structural changes, and size effects. This is particularly appropriate because the paper's conclusions are based upon comparisons of abnormal performance of high agency motivation and high signaling motivation samples. If systematic risk, industry specific structural change, or typical firm size differs between these two samples, a bias would have been introduced.

The Controlled Mean Value of Abnormal Percentage Spread (CMAS)

Following Tripathy and Rao (1992) and others, the daily percentage spread was calculated for each firm as

$$S_i = \%spread = \frac{ask - bid}{(ask + bid)/2}. \tag{11}$$

The numerator of the daily percentage spread is the "inside" spread (highest bid and lowest ask) at the daily close. Percentage spreads rather than dollar spreads were examined in order to eliminate scale effects caused by differing stock prices and changes in stock price levels across time. To identify the timing and magnitude of bid-ask spread responses to dividend announcements, the paper will estimate "normal" or expected spread according to the comparison period method of Tripathy and Rao (1992). The average comparison period spread for a particular stock should compensate dealers for holding costs, order costs, and adverse information costs for that particular stock. The last day of the benchmark period precedes the dividend declaration by 30 days. This is due to a possible increase in information asymmetry prior to a dividend announcement. Venkatesh and Chiang (1986) find information asymmetry increases before earnings or dividend announcements that follow another announcements by at least ten days but no more than thirty days. However, Venkatesh and Chiang (1986) do not find significant increases in asymmetry for announcements that do not follow another announcement in the prior thirty days for announcements or for joint announcements of earnings and dividends. Additionally, Mitra and Rashid (1997) find that average percentage spreads increase significantly prior to dividend initiations. However, Brooks (1994) finds that spreads before dividend increases are not significantly different than those of a nonevent period.

Closing bid-ask quotes are available on the Trade and Quote (TAQ) database, made available by the NYSE. Issues of the TAQ CD-ROM database are available starting January of 1993. The CRSP documentation indicates that the tapes carry reliable bid-ask quotes for NASDAQ National Market securities only.[4] CRSP secondary prices may be either closing bid and ask prices, or the highest and lowest transaction prices of the day. The TAQ database provides quotes for New York Stock Exchange, American Stock Exchange, NASDAQ National Market System, and SmallCap securities.

In this study, the comparison period begins 429 trading days before the dividend declaration and ends trading 30 days before the declaration. The minimum comparison period is 200 days. The abnormal percentage spread for stock *i* on day *t* is

$$AS_{it} = S_{it} - MSC_i, \quad (12)$$

where S_{it} is the spread on day t and MSC_i is the mean value of the percentage spread for the stock during the comparison period and is calculated as:

$$MSC_i = (1/400) \sum_{t=-31}^{-430} S_{it}. \quad (13)$$

The mean value of the abnormal percentage spread (MAS_i) over a two day window (−1, 0), with the declaration date of the dividend change set at −1, will be computed as:

$$MAS_i = (1/2) \sum_{t=-1}^{0} AS_{it}. \quad (14)$$

In order to provide some control for systematic risk, industry wide structural changes, size effects, and stock market price trends, the difference between the MASs for each dividend increase firm i and each control firm k was used to test the bid-ask percentage spread reaction to the dividend increases. Notice that a stock price trend

[4]See CRSP Stock File Guide, Version 1996.S01, p. 33.

effects the denominator of the percentage spread as determined in equation (11) in a manner unrelated to decisions of the market maker. The same control firms used to calculate the matched portfolio (days −1, 504) CPEs were used for this purpose. Thus, the controlled mean abnormal spread is calculated as

$$CMAS_i = MAS_i - MAS_k. \tag{15}$$

The mean (days −1, 0) CMASs and both the *t*-test for a zero mean controlled abnormal spread and the nonparametric sign test are reported for the same subsets as those for which the mean (days −1, 0) and (days −1, 504) CPES are reported and which were previously described.

Change in Relative Spread (CHGSPD)

Because the use of control firms may introduce noise into the micromarket methodology and because spreads may increase around any event which causes large price changes (see Morse and Ushman 1983), relative spread is also tested over an intermediate length time period that excludes a short-period around the actual dividend increase announcement. The measure used to measure the change in relative spread is the ratio of the average relative spread from day 40 to day 20 (a 21 day period) and average closing price from day −20 to day −40. The TAQ database provided the required information.

Change in Trading Volume (CHGVOL)

The average daily share trading volume over the 20-day period ending one day prior to the dividend declaration (day −21 to day −2) divided by the average daily share trading volume over the 20-day period beginning two trading days after the declaration (day 1 to day 20) is used as a measure of the change in trading volume and is used as a control in EGLS procedures using (days −1, 0) CMAS. The daily trading volume was obtained from the CRSP datafile.

Change in Return Variance (CHGRVAR)

Using the daily trading volume records from the CRSP datafiles, the 20-day variance of returns from day 1 to day 20 divided by the 20-day variance of returns from day −21 to day −2 is used to measure the change in return variance and is used as a control in EGLS procedures using (days −1, 0) CMAS.

Change in Closing Price (CHGPRC)

The ratio of average closing price (or Bid/Ask Average) from day −21 to day −2 to average closing price from day 1 to day 20 is used to measure stock price change and is used as a control in EGLS procedures using (days −1, 0) CMAS. The CRSP primary price files provided the required information.

Intermediate-term Change in Trading Volume (ICHGVOL)

The average daily share trading volume over the 21-day period ending twenty days prior to the dividend declaration (day −40 to day −20) divided by the average daily share trading volume over the 21-day period beginning twenty trading days after the declaration (day 20 to day 40) is used as a measure of the change in trading volume and is used as a control in EGLS procedures using CHGSPD. The daily trading volume was obtained from the CRSP datafile.

Intermediate-term Change in Return Variance (ICHGRVAR)

Using the daily trading volume records from the CRSP datafiles, the 21-day variance of returns from day 20 to day 40 divided by the 21-day variance of returns from day −20 to day −40 is used to measure the change in return variance and is used as a control in EGLS procedures using CHGSPD.

Intermediate-term Change in Closing Price (ICHGPRC)

The ratio of average closing price (or Bid/Ask Average) from day −40 to day −20 to average closing price from day 20 to day 40 is used to measure stock price change and is used as a control in EGLS procedures using (days −1, 0) CHGSPD. The CRSP primary price files provided the required information.

Estimated Generalized Least Squares Modeling of CPEs, CMASs, and CHGSPDs

Mean equally weighted market index CPEs, CMASs, and CHGSPDs were compared based upon different partitions of the sample to determine whether there are significant differences between mean (days −1, 0) CPEs, mean (days −1, 504) CPEs, (days −1, 0) CMASs, and CHGSPDs of various segments of the sample. In terms of the motivation table, the tests compared Cells 1 and 4 from Table 1 and Cells 1 and 4 from Table 2. Estimated generalized least squares regression models were developed to detect a difference between the CPEs, CMASs, and CHGSPDs of these two partitions.

An ordinary least squares approach to modeling the relationship between CPEs and firm characteristics provides unbiased parameter estimates. However, unless the variance of error component is the same for each value of the firm characteristics, standard errors are biased (see Sefcik and Thompson 1986). Because of possible hetroscedasticity when CPEs, CMASs, and CHGSPDs are used as the dependent variable in cross sectional regressions, an EGLS procedure is used to "explain" abnormal performance. Following Ramanathan (1992, 350-351) and Judge et al. (1985, 439-441) an estimated generalized least squares procedure (EGLS) is used to model equally weighted market index cumulative prediction errors (CPEs), CMASs, and CHGSPDs against the independent variables. EGLS was used to model both the (days −1, 0) and (days −1, 504) CPEs as well as the (days −1, 0) CMASs and CHGSPDs. The procedure has seven steps:

1. Estimate the model by ordinary least squares.
2. Compute the residuals and their squares.
3. In an auxiliary regression, estimate a model of the natural log of the squared residuals against the independent variables, squares of the each of the variables (quadratic terms), and cross-products of the variables.
4. Obtain predicted error variances by taking the antilog of the predicted logged squared residuals.
5. Obtain predicted error standard deviations by taking the square root of the predicted variances.
6. Obtain weights by taking the inverse of the predicted error standard deviations.
7. Obtain the estimated generalized least squares estimates by using the weights obtained in step six in weighted least squares.

Estimates obtained in this manner yield consistent estimates for the standard errors.

Dummy variable DCL1T1 is coded such that 1 indicates membership in Cell 1 of Table 1 (AGENCY1 events) and 0 indicates membership in Cell 4 of Table 1 (SIGNAL1 events). Dummy variable DCL1T1 is used in the EGLS procedures involving the cells of Table 1. Dummy variable DCL1T2 is used in EGLS procedures involving the cells of Table 2 and is coded such that 1 indicates membership in Cell 1 of Table 2 (AGENCY2 events) and 0 indicates otherwise. The EGLS procedure is used to estimate the following models for the (days −1, 0) window and (days −1, 504) CPEs:

$$CPE_i = \beta_0 + \beta_1 DCL1T1_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \epsilon_i \qquad (16)$$

and

$$CPE_i = \beta_0 + \beta_1 DCL1T2_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \epsilon_i \qquad (17)$$

The model of equation (16) is used to test hypotheses HS1 and HL1. Equation (16) tests the agency abatement theory of Figure 1 against cash flow signaling of the form of Pettit (1972), Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985) and illustrated in Panel A of Figure 2. The model of equation (17) is used to test hypotheses HS2 and HL2 in which agency abatement theory is tested against cash flow signaling of the form illustrated in Panel B of Figure 2 which is in the spirit of Eades (1982), Kale and Noe (1990), and Brick, Frierman, and Kim (1998).

FCF, DIVYLD, and DIVCHG are included as controls in all of the EGLS procedures. FCF is included as a control for two reasons. First, the level of free cash flow may vary inversely with the information content of dividend announcements. Firms with high levels of free cash flow can increase dividends more easily in the absence of permanent increases in cash flow. Second, the level of free cash flow has been hypothesized to increase overinvestment (see Jensen 1986). DIVYLD is included because announcement period excess returns are significantly related to yield (see Denis, Denis, and Sarin 1994). Because stock price reaction is significantly related to the magnitude of the size of the dividend change (see Pettit 1972), DIVCHG is included as a control.

The relationship between the (days −1, 0) CMAS and a number of independent variables is examined cross-sectionally using estimated generalized least squares analysis of the following form:

$$CMAS_i = \beta_0 + \beta_1 DCL1T1 + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 CHGVOL_i + \beta_6 CHGRVAR_i + \beta_7 CHGPRC_i + \epsilon_i. \quad (18)$$

and

$$CMAS_i = \beta_0 + \beta_1 DCL1T2 + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 CHGVOL_i + \beta_6 CHGRVAR_i + \beta_7 CHGPRC_i + \epsilon_i. \quad (19)$$

The model of equation (18) was used to test Hypothesis HM1 (agency abatement theory of Figure 1 versus cash flow signaling of Figure 2 Panel A), while the model of equation (19) was used to test Hypothesis HM2 (agency abatement theory of Figure 1 versus cash flow signaling of Figure 2 Panel B). Since the purpose of estimated generalized least squares procedure in modeling CMAS is to determine the change in the adverse selection component of spread, it is appropriate to control for changes in inventory holding and order processing costs around the dividend announcement. Therefore, CHGVOL, CHGRVAR, and CHGPRC are included as additional control variables. Raman and

Tripathy (1993) suggest that changes in trading volume, price variance, and stock price can proxy and control for changes in holding and order-processing costs.

The relationship between CHGSPD and the independent variables is examined cross-sectionally using estimated generalized least squares analysis of the following form:

$$CHGSPD_i = \beta_0 + \beta_1 DCL1T1 + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 ICHGVOL_i + \beta_6 ICHGRVAR_i + \beta_7 ICHGPRC_i + \epsilon_i. \quad (20)$$

and

$$CHGSPD_i = \beta_0 + \beta_1 DCL1T2 + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 ICHGVOL_i + \beta_6 ICHGRVAR_i + \beta_7 ICHGPRC_i + \epsilon_i. \quad (21)$$

The model of equation (20) was used to test Hypothesis HI1 (agency abatement theory of Figure 1 versus cash flow signaling of Figure 2 Panel A), while the model of equation (21) was used to test Hypothesis HI2 (agency abatement theory of Figure 1 versus cash flow signaling of Figure 2 Panel B). ICHGVOL, ICHGRVAR, and ICHGPRC are included to control for changes in inventory holding and order processing costs around the dividend announcement.

Chapter Summary

This study used event study methodology to examine the response of market participants to dividend increase announcements. The sample consisted of 1995 cash dividend increases with a magnitude of at least ten percent. After screening for data availability and eliminating events with confounding events around announcement day, a sample of 95 events was obtained. The sampled firms were highly heterogeneous, including small and large firms. Both industrial and service firms were included in the sample.

Using Eventus software and the methodology of Mikkelson and Partch (1988) and others, event CPEs with a (days −1, 0) window were estimated. This methodology was modified in the spirit of Karafiath, Mynatt, and Smith (1991) to estimate (days −1, 504) CPEs. A matched control portfolio of 93 firms was used to construct matched portfolios. This methodology helps to control systematic risk, industry specific structural changes, and size effects.

Following a methodology similar to Tripathy and Rao (1992) and using the matched control portfolio, (days −1, 0) CMASs were calculated. Additionally, CHGSPDs were determined. Partitions of the dividend increase sample were constructed using the existing agency abatement and cash flow signaling theories detailed in Chapter II. The partitions were designed to indicate firm's likely motives for increasing dividends. Tables 1 and 2 illustrated the partitioning. These partitions were used to develop and test the research hypotheses.

Tests for significant stock price response were conducted for the entire sample and the relevant partitions using Patell's (1976) *Z* statistic. Test for significant changes in near-term bid-ask spreads for the sample and relevant partitions were conducted using the single sample *t*-test and the nonparametric sign test. The (days −1, 0) window CPEs were modeled using estimated generalized least squares analysis in order to test the research hypotheses. Additionally, this chapter provided a description of the independent and dependent variables.

CHAPTER IV

RESULTS AND DISCUSSION

The results of the analysis of the data collected are presented in this chapter. Simple statistics and Pearson correlation coefficients are listed. The (days −1, 0) and (days −1, 504) CPEs and (days −1, 0) CMASs and their significance or lack thereof are reported. The results of estimated generalized least squares regression modeling the (days −1, 0) CPEs, (days −1, 504) CPEs, (days −1, 0) CMASs, and CHGSPDs are presented. The findings are also discussed in this chapter.

Simple Statistics and Pearson Correlation Coefficients

Table 5 displays the simple statistics for the complete sample as well as events in each of the cells from Tables 1 and 2. The mean (days −1, 0) CPE of Cell 1, Table 1 (AGENCY1 firm/events) is almost four times that for the complete sample. The mean (days −1, 0) CPE of Cell 4, Table 1 (SIGNAL1 firm/events) is essentially zero, while the cell's mean (days −1, 504) CPE is about 11 times lower than of the complete sample. The mean (days −1, 504) CPE of Cell 1, Table 2 (AGENCY2 firm/events) is about 15 percentage points higher than for the complete sample. The mean (days −1, 504) of Cell 4, Table 2 (SIGNAL2 firm/events) is about 11 times lower than the complete sample.

Table 6 lists the Pearson correlation coefficients for the variables used to form partitions or used in the regression models for the complete sample. It should be noted

Table 5. Simple Statistics

Panel A Complete Sample

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	95	0.54	0.41	2.20	−4.73	7.79	2.56
(−1, 504) CPE[b]	93	−1.15	3.90	48.48	−131.30	144.71	46.45
CMAS	93	0.15956	−0.05088	3.18539	−9.95800	15.35977	1.23382
CHGSPD	95	0.93228	0.90245	0.21015	0.47383	1.60516	0.25195
TOBINQ	95	1.66484	1.32550	1.12593	0.11244	7.75471	1.19414
CHGCF	95	0.00812	0.00628	0.01674	−0.03068	0.08495	0.01402
CHGCFVAR	95	12.56094	−10.61535	244.47075	−750.38408	1668.15856	60.66234
FCF	95	0.09911	0.09635	0.04781	0.01004	0.27785	0.05958
DIVYLD	95	2.14	2.03	0.77	0.75	4.07	1.05
DIVCHG	95	0.08	0.07	0.05	0.02	0.24	0.05

Panel B Cell 1, Table 1 Firm/Events (AGENCY1)

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	14	2.02	1.82	2.67	−2.35	7.79	2.61
(−1, 504) CPE[b]	13	−0.99	7.06	41.38	−120.34	42.46	33.23
CMAS	13	0.40574	0.14759	0.59881	−0.24219	1.71546	0.46016
CHGSPD	14	0.90694	0.93975	0.16231	0.66893	1.29672	0.17534
TOBINQ	14	0.92200	1.03033	0.32013	0.12170	1.29569	0.35179
CHGCF	14	−0.00645	−0.00315	0.00783	−0.03068	−0.00101	0.00597
CHGCFVAR	14	114.38223	21.13778	502.00519	−750.38408	1668.15856	185.86956
FCF	14	0.07729	0.07448	0.05056	0.01004	0.17819	0.07026
DIVYLD	14	2.23	2.14	0.68	1.03	3.34	1.20
DIVCHG	14	0.07	0.07	0.02	0.04	0.10	0.02

[a]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.
[b]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

Table 5 Continued. Simple Statistics

Panel C Cell 2, Table 1 Firm/Events

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	11	0.71	0.87	1.64	−1.80	3.95	2.45
(−1, 504) CPE[b]	11	−15.17	−22.85	72.90	−131.30	−144.71	67.50
CMAS	11	−0.61768	−0.26887	5.29236	−9.95800	9.07300	6.85608
CHGSPD	11	1.05025	1.06534	0.28946	0.69129	1.60516	0.49506
TOBINQ	11	2.25201	2.16243	0.82274	1.32550	4.19850	1.05692
CHGCF	11	−0.00876	−0.00784	0.00607	−0.02185	−0.00208	0.00923
CHGCFVAR	11	−55.20522	1.68234	169.68566	−504.41271	101.94262	109.30981
FCF	11	0.09496	0.09460	0.03669	0.03955	0.15292	0.06126
DIVYLD	11	2.35	2.15	0.87	1.20	3.92	1.54
DIVCHG	11	0.08	0.07	0.03	0.04	0.16	0.03

Panel D Cell 3, Table 1 Firm/Events

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	33	0.47	0.13	1.83	−2.87	5.15	2.26
(−1, 504) CPE[b]	33	16.56	8.41	48.90	−80.71	138.78	46.12
CMAS	33	0.43865	0.24244	2.80424	−9.02629	10.95575	1.27814
CHGSPD	33	0.93234	0.88026	0.25378	0.47383	1.59701	0.35327
TOBINQ	33	0.93243	0.95448	0.28553	0.11244	1.32385	0.40859
CHGCF	33	0.01240	0.00778	0.01642	0.00028	0.08595	0.00859
CHGCFVAR	33	−13.87385	−17.63766	147.88975	−469.82140	492.44069	41.05708
FCF	33	0.07520	0.08427	0.03372	0.01076	0.12617	0.05388
DIVYLD	33	2.48	2.28	0.73	1.28	4.07	0.93
DIVCHG	33	0.11	0.10	0.06	0.04	0.24	0.07

[a]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.
[b]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

Table 5 Continued. Simple Statistics

Panel E Cell 4, Table 1 Firm/Events (SIGNAL1)

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	37	−0.01	0.05	2.28	−4.73	5.83	2.03
(−1, 504) CPE[b]	36	−13.17	−8.66	37.16	−84.42	80.38	47.34
CMAS	36	0.05232	−0.26344	3.32543	−5.15213	15.35977	1.27412
CHGSPD	37	0.90675	0.90245	0.14178	0.58369	1.19915	0.18135
TOBINQ	37	2.42459	2.09786	1.26796	1.33776	7.75471	1.09638
CHGCF	37	0.01484	0.01023	0.01506	0.00003	0.07211	0.01433
CHGCFVAR	37	17.75764	-20.59095	177.50920	−104.34235	1028.10000	48.54876
FCF	37	0.12992	0.12584	0.04440	0.06659	0.27785	0.05895
DIVYLD	37	1.73	1.65	0.62	0.75	3.81	0.73
DIVCHG	37	0.06	0.06	0.02	0.02	0.13	0.02

Panel F Cell 1, Table 2 Firm/Events (AGENCY2)

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	20	1.42	1.34	2.46	−2.87	7.79	3.20
(−1, 504) CPE[b]	19	14.00	14.37	54.76	−120.34	127.45	54.65
CMAS	19	0.32161	0.14759	3.43433	−9.02629	10.95575	1.34436
CHGSPD	20	0.94373	0.94344	0.20189	0.68445	1.34939	0.34803
TOBINQ	20	0.91380	0.95086	0.29226	0.12170	1.29569	0.41248
CHGCF	20	0.00586	−0.00036	0.02283	−0.03068	0.08595	0.01320
CHGCFVAR	20	171.37274	40.05670	373.25437	0.01349	1668.15856	147.73124
FCF	20	0.07304	0.07448	0.04519	0.01004	0.17819	0.06160
DIVYLD	20	2.34	2.21	0.64	1.45	4.04	0.75
DIVCHG	20	0.08	0.07	0.04	0.04	0.19	0.04

[a]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

[b]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

Table 5 Continued. Simple Statistics

Panel G Cell 2, Table 2 Firm/Events

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	17	0.25	0.53	1.99	−2.86	5.10	2.10
(−1, 504) CPE[b]	17	−14.96	−26.10	56.08	−94.25	144.71	54.45
CMAS	17	−1.37109	−0.96410	4.17572	−9.95800	9.07300	5.35167
CHGSPD	17	0.92019	0.93292	0.24492	0.58369	1.60516	0.31711
TOBINQ	17	2.19940	2.16243	0.72520	1.32550	3.83595	0.84011
CHGCF	17	0.00222	0.00197	0.01171	−0.02185	0.02003	0.01359
CHGCFVAR	17	102.72313	28.42169	242.73689	0.41307	1028.10070	50.95319
FCF	17	0.11507	0.11264	0.03534	0.06103	0.16806	0.06296
DIVYLD	17	1.90	1.69	0.79	0.75	3.92	0.88
DIVCHG	17	0.07	0.07	0.04	0.02	0.16	0.03

Panel H Cell 3, Table 2 Firm/Events

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	27	0.57	0.13	1.96	−2.35	5.68	2.28
(−1, 504) CPE[b]	27	9.92	7.06	41.96	−80.71	138.78	38.06
CMAS	27	0.50517	0.31022	1.29011	−2.36049	4.51332	1.26448
CHGSPD	27	0.91073	0.87105	0.24983	0.47383	1.59701	0.27890
TOBINQ	27	0.94083	0.96828	0.29814	0.11244	1.32385	0.37740
CHGCF	27	0.00746	0.00638	0.01071	−0.00962	0.04706	0.00827
CHGCFVAR	27	−84.59040	−31.16361	168.46506	−750.38408	−1.46504	41.37838
FCF	27	0.07788	0.08427	0.03430	0.01076	0.14088	0.04521
DIVYLD	27	2.46	2.42	0.78	1.03	4.07	0.99
DIVCHG	27	0.11	0.09	0.06	0.04	0.24	0.07

[a]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.
[b]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

Table 5 Continued. Simple Statistics

Panel I Cell 4, Table 2 Firm/Events (SIGNAL2)

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Inter-quartile Range
(−1, 0) CPE[a]	31	0.10	0.05	2.28	−4.73	5.83	2.15
(−1, 504) CPE[b]	30	−12.89	−5.53	41.99	−131.30	80.38	46.89
CMAS	30	0.61325	−0.15263	3.47010	−2.93066	15.35977	1.11838
CHGSPD	31	0.95029	0.90961	0.15984	0.71179	1.29868	0.18562
TOBINQ	31	2.48684	2.09786	1.36110	1.33776	7.75471	1.18868
CHGCF	31	0.01338	0.00955	0.01798	−0.01438	0.07211	0.01872
CHGCFVAR	31	−54.72638	−34.49366	91.74200	−504.4127	−4.57967	28.86488
FCF	31	0.12566	0.12078	0.04952	0.03955	0.27785	0.04818
DIVYLD	31	1.86	1.80	0.70	0.87	3.81	0.82
DIVCHG	31	0.06	0.60	0.02	0.03	0.13	0.02

[a]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.
[b]CPE is the cumulative prediction error (using the equally weighted market index) over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

that the regressors DIVYLD and DIVCHG are highly positively correlated (*p*-value = 0.0001) as are FCF and CHGCF (*p*-value = 0.0011). Additionally, FCF is highly correlated with TOBINQ (*p*-value = 0.0001). Although TOBINQ is not a regressor, it is used to partition the sample and thus in the formation of the dummy variables. Results not reported here show that coefficients on dummy variables DCL1T1 and DCL1T2 are similar when FCF is not included in the EGLS procedures. FCF was retained in the EGLS procedures based upon the theoretical reasons given in Chapter 3.

Table 6. Pearson Correlation Coefficients for Complete Sample. Prob value for Ho: Rho=0 in Parentheses.

Variable	(−1, 0) CAR	(−1, 504) CAR	(−1, 0) CMAS	CHGSPD	TOBINQ	CHGCF	FCF	DIVYLD	DIVCHG
(−1, 0) CAR	1.00000 (0.0)	-0.06946 (0.5082)	0.02142 (0.8385)	−0.06901 (0.5064)	-0.04379 (0.6735)	−0.14915 (0.1491)	−0.14074 (0.1737)	0.12792 (0.2167)	0.02822 (0.7860)
(−1, 504) CAR	-0.06946 (0.5082)	1.00000 (0.0)	0.22073 (0.0335)	0.03293 (0.7540)	−0.03864 (0.7131)	0.21292 (0.0404)	−0.02638 (0.8018)	0.12350 (0.2382)	0.06228 (0.5531)
(−1, 0) CMAS	0.02142 (0.8385)	0.22073 (0.0335)	1.00000 (0.0)	0.07951 (0.4487)	0.18116 (0.0822)	−0.02588 (0.8055)	0.16973 (0.1038)	0.01091 (0.9173)	0.05737 (0.5849)
CHGSPD	−0.06901 (0.5064)	0.03293 (0.7540)	0.07951 (0.4487)	1.00000 (0.0)	−0.02500 (0.8100)	−0.12447 (.2294)	−0.06071 (0.5589)	0.23983 (0.0192)	0.02743 (0.7919)
TOBINQ	-0.04379 (0.6735)	−0.03864 (0.7131)	0.18116 (0.0822)	−0.02500 (0.8100)	1.00000 (0.0)	0.05970 (0.5655)	0.64873 (0.0001)	−0.10911 (0.2926)	−0.18576 (0.0715)
CHGCF	−0.14915 (0.1491)	0.21292 (0.0404)	−0.02588 (0.8055)	−0.12447 (.2294)	0.05970 (0.5655)	1.00000 (0.0)	0.32924 (0.0011)	−0.14262 (0.1680)	0.01619 (0.8762)
FCF	−0.14074 (0.1737)	−0.02638 (0.8018)	0.16973 (0.1038)	−0.06071 (0.5589)	0.64873 (0.0001)	0.32924 (0.0011)	1.00000 (0.0)	−0.26857 (0.0085)	−0.18418 (0.0740)
DIVYLD	0.12792 (0.2167)	0.12350 (0.2382)	0.01091 (0.9173)	0.23983 (0.0192)	−0.10911 (0.2926)	−0.14262 (0.1680)	−0.26857 (0.0085)	1.00000 (0.0)	0.59381 (0.0001)
DIVCHG	0.02822 (0.7860)	0.06228 (0.5531)	−0.18576 (0.0715)	0.02743 (0.7919)	−0.18576 (0.0715)	0.01619 (0.8762)	−0.18418 (0.0740)	0.59381 (0.0001)	1.00000 (0.0)

Findings and Discussion Involving (Day −1, 0) CPEs

The mean (days −1, 0) CPEs from the event study procedure are presented in Table 7 with Patell's (1976) *Z* statistic. The (days −1, 0) CPEs for the entire sample are positive and significant using both the value weighted and equally weighted indices. The initial stock price reaction to sampled dividend increase announcements is positive. This is consistent with Pettit (1972), Aharony and Swary (1980), Wansley et al. (1991), Benartzi, Michaely, and Thaler (1997), and many others.

Table 7 also shows significantly positive (days −1, 0) CPEs for both the subsample of firms with a 1994 Tobin's Q below or equal to the sample median and a nonpositive CHGCF (Table 1, Cell 1 events) and the subsample of firms with a 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR (Table 2, Cell 1 events) using both the value weighted and equally weighted indices. However, (days -1, 0) CPEs

were not significantly different from zero for both the partition of firms with a 1994 Tobin's Q above the sample median and a positive CHGCF (Table 1, Cell 4 events) and the partition of firms with a 1994 Tobin's Q above the sample median and a negative CHGCFVAR (Table 2, Cell 4 events).

Table 8 shows the results of the first estimated generalized least squares regression. To compare the initial stock price reaction to large dividend increase announcements by Table 1, Cell 1 firms and Table 1, Cell 4 firms, a dummy variable (DCL1T1) is included (0 = Cell 4, 1 = Cell 1). The estimated coefficient on DCL1T1 indicates the change in the intercept for Cell 1 firms relative to Cell 4 firms. Again, firms in Cell 1 are considered to be those whose dividend decision is motivated by the

Table 7. Mean (Days −1, 0) Cumulative Prediction Errors for a Sample of 95 Dividend Increases in Excess of Ten Percent in 1995 and Partitions. *Z* Test Statistic in Parentheses.

Partition	Value Weighted Market Index	Equally Weighted Market Index
Complete sample, *n* = 95.	0.58% (2.84**)	0.54% (2.65**)
AGENCY1 events (Table 1, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonpositive CHGCF, *n* = 14.	1.81% (3.32***)	2.01% (3.66**)
AGENCY2 events (Table 2, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR, *n* = 20.	1.28% (2.69**)	1.42% (2.98**)
SIGNAL1 events (Table 1, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a positive CHGCF, *n* = 37.	0.00% (0.08)	−0.00% (0.06)
SIGNAL2 events (Table 2, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a negative CHGCFVAR, *n* = 31.	0.19% (0.25)	0.10% (0.12)

*** denotes significance at the 0.001 level.
** denotes significance at the 0.01 level.

Note: The test statistic using standardized abnormal returns follows Patell (1976).

owner/manager agency problem but not by cash flow signaling and firms in Cell 4 are believed to be motivated by cash flow signaling and not by agency abatement.

Examining the results concerning firms in Cells 1 and 4 of the motivation table provides the highest possibility of distinguishing between the agency abatement and cash flow signaling theories.

Table 8. Test of Hypothesis HS1 (Table 1, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results for Event-Time Interval, Days −1 Through 0, Sampled Firms Include Those in Cells 1 and 4 Only.

$CPE_i = \beta_0 + \beta_1 DCL1T1_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \epsilon_i$

N: 51 Adjusted R^2: 0.2776 *F*-value: 5.80 Prob > F: 0.0007

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	1.48100	1.12	0.2671
DCL1T1[a]	2.35070	3.04	0.0039
DIVYLD	−0.94611	−1.32	0.1937
DIVCHG	13.57667	0.65	0.5163
FCF	−5.48470	−0.83	0.4094

[a]Binary variable is equal to 0 for events in Table 1 Cell 4, 1 for events in Table 1 Cell 1.

Note: The highest variance inflation factor among the independent variables is 7.34897 for DIVYLD. The mean variance inflation factor is 4.57941.

Note: CPE_i is the cumulative prediction error (using the equally weighted market index) for firm/event i over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

The significantly positive coefficient on DCL1T1 (*p*-value of 0.0039) indicates significantly more favorable stock price reaction for Cell 1, Table 1 firm/events, after controlling for yield, price-standardized dividend change, and free cash flow. Thus, Hypothesis $HS1_0$ is rejected. This result supports the agency abatement hypothesis over the cash flow signaling hypothesis in explaining (days −1, 0) CPEs. The version of cash flow signaling not supported by this result is the version developed by Pettit (1972), Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985) that suggests dividend increases signal information about the level of future cash flows. There is strong evidence (*p*-value of 0.0039 on the DCL1T1 coefficient) that there is a significant difference between the initial stock price reaction to sampled dividend increase announcement of firms without motivation to signal a change in the level of cash flows but with a strong need to mitigate the shareholder/manager agency problem and firms with a motivation to signal a change in the level of cash flows but without a strong need to mitigate the shareholder/manager agency problem when yield, price-standardized dividend change, and free cash flow are controlled.

The variance inflation factors (VIFs) for this model indicate collinearity problems since the VIF for DIVYLD is 7.34897 and the mean VIF is 4.57941. Multicollinearity tends to reduce the size of the *t*-statistics.

The regression results in Table 9 indicate that none of the independent variables explain the (days −1, 0) CPEs. Hence, the model is unable to distinguish the stock price reaction to announcements by firms in Table 2, Cell 1 from firms in Table 2, Cell 4. Hypothesis $HS2_0$ is not rejected. It is not concluded that there is a significant difference between the initial stock price reaction to sampled dividend increase announcements of firms without motivation to signal a change in the stability of cash flows but with a strong need to mitigate the shareholder/manager agency problem and firms with a motivation to signal a change in the stability of cash flows but without a strong need to mitigate the shareholder/manager agency problem. This result fails to support either the agency abatement theory or the cash flow signaling hypothesis. Again, the difference between Table 1 and Table 2 is that Table 1 reflects the theory that firms signal a change in the level of cash flows through dividend changes, while Table 2 embodies the theory that the signal is of a change in the stability of cash flows.

Table 9. Test of Hypothesis HS2 (Table 2, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results for Event-Time Interval, Days −1 Through 0, Sampled Firms Include Those in Cells 1 and 4 Only.

$$CPE_i = \beta_0 + \beta_1 DCL1T2_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \epsilon_i$$

N: 51 Adjusted R^2: 0.0432 *F*-value: 1.56 Prob > F: 0.1996

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	−0.07096	−0.05	0.9597
DCL1T2[a]	0.80029	1.08	0.2873
DIVYLD	0.53764	0.92	0.3610
DIVCHG	−3.89763	−0.27	0.7851
FCF	−3.21902	−0.55	0.5866

[a]Binary variable is equal to 0 for events in Table 2 Cell 4, 1 for events in Table 2 Cell 1.

Note: The highest variance inflation factor among the independent variables is 2.12901 for DIVCGH. The mean variance inflation factor is 1.88132.

Note: CPE_i is the cumulative prediction error (using the equally weighted market index) for firm/event i over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

Findings and Discussion Involving (Day −1, 504) CPEs

The mean (−1, 504) CPEs from the two-year window event study process and Patell's (1976) *Z* statistic are presented in Table 10. For the entire sample of 93 matched pairs, the CPEs are not significantly different from zero using either the value weighted or equally weighted indices. The test statistic fails to indicate either a post-announcement

Table 10. Mean (Days −1, 504) Cumulative Prediction Errors for a Sample of 93 Matched Pairs and Partitions. *Z* Test Statistic in Parentheses.

Partition	Value Weighted Market Index	Equally Weighted Market Index
Complete sample, *n* = 93 matched pairs.	−1.93% (−0.31)	−1.15% (0.28)
AGENCY1 events (Table 1, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonpositive CHGCF, *n* = 13 matched pairs.	−3.35% (−0.16)	−0.98% (0.12)
AGENCY2 events (Table 2, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR, *n* = 19 matched pairs.	12.82% (1.46)	14.00% (1.73$)
SIGNAL1 events (Table 1, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a positive CHGCF, *n* = 36 matched pairs.	−14.57% (−1.79$)	−13.17% (−1.4)
SIGNAL2 events (Table 2, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a negative CHGCFVAR, *n* = 30 matched pairs.	−14.46% (−1.18)	−12.89% (−0.79)

$ denotes significance at the 0.10 level.

Note: Each matched pair consists of a long position in one of the large dividend increase firms and a short position in the matched firm. Firms are matched on *Standard and Poors* SIC code and total assets.

Note: The test statistic using standardized abnormal returns follows Patell (1976).

drift or a reversal of the initial positive price reaction. The small but significant long-term positive drift found by Benartizi, Michaely, and Thaler (1997) does not hold for this sample. Results for the complete sample fail to indicate a systematic pattern of long-term reevaluation of the dividend increase announcement.

Additionally, Table 10 reports that the mean (−1, 504) CPEs are not significantly different than zero at the five percent level using either the equally weighted or the value weighted indices for the following four subsamples: firms with a nonpositive change in cash flows and with a 1994 Tobin's Q below or equal to the sample median (Table 1, Cell 1 events), firms with a nonnegative change in coefficient of variation of cash flows and with a 1994 Tobin's Q below or equal to the sample median (Table 2, Cell 1 events), firms with a positive change in cash flows and with a 1994 Tobin's Q above the sample median (Table 1, Cell 4 events), and firms with a negative change in the coefficient of variation of cash flows and with a 1994 Tobin's Q above the sample median (Table 2, Cell 4 events).

As seen in Table 11, the dummy variable on the long-term stock response is significantly more positive for Cell 1, Table 1 firm/events than for Cell 4, Table 1 firm/events. Hypothesis HL1 is rejected. There is strong evidence (*p*-value of 0.0129 on the DCL1T1 coefficient) that long-term stock price drift following sampled dividend increase announcements among firms without a motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency conflict is significantly different than that of firms with a motivation to signal rising cash flows but without a strong need to mitigate the shareholder/manager agency problem when yield, price-standardized dividend change, and free cash flow are controlled. This results reported in Table 11 support the agency abatement hypothesis over the cash flow signaling hypothesis in explaining (days −1, 504) CPEs. The version of cash flow signaling not supported by this result is the version suggesting that dividend increases signal information about the level of future cash flows.

Table 11. Test of Hypothesis HL1 (Table 1, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results for Event-Time Interval, Days −1 Through 504, Sampled Firms Include Those in Cells 1 and 4 Only.

$$CPE_i = \beta_0 + \beta_1 DCL1T1_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \epsilon_i$$

N: 49 Adjusted R^2: 0.2742 *F*-value: 5.53 Prob > F: 0.0011

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	−77.94365	−3.95	0.0003
DCL1T1[a]	30.59504	2.59	0.0129
DIVYLD	−2.79856	−0.33	0.7439
DIVCHG	551.67986	2.92	0.0055
FCF	257.33742	2.77	0.0082

[a]Binary variable is equal to 0 for events in Table 1 Cell 4, 1 for events in Table 1 Cell 1.

Note: The highest variance inflation factor among the independent variables is 1.72387 for DIVYLD. The mean variance inflation factor is 1.43110.

Note: CPE_i is the cumulative prediction error (using the equally weighted market index) for firm/event i over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

The regression results in Table 12 show a significantly positive coefficient on DCL1T2. The results indicate a significantly higher (days −1, 504) CPE for Table 2, Cell 1 firm/events than for Table 2, Cell 4 firm/events, after controlling for yield, price-standardized dividend change, and free cash flow. Thus, Hypothesis $HL2_0$ is rejected. There is strong evidence (*p*-value of 0.0084 on the DCL1T2 coefficient) that there is a significant difference between the long-term stock price drift following sampled dividend increase announcements of firms without motivation to signal a change in the stability of cash flows but with a strong need to mitigate the shareholder/manager agency problem

Table 12. Test of Hypothesis HL2 (Table 2, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results for Event-Time Interval, Days −1 Through 504, Sampled Firms Include Those in Cells 1 and 4 Only.

$CPE_i = \beta_0 + \beta_1 DCL1T2_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \epsilon_i$

N: 49 Adjusted R^2: 0.1887 *F*-value: 3.79 Prob > F: 0.0098

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	−72.36408	−2.79	0.0078
DCL1T2[a]	41.19139	2.76	0.0084
DIVYLD	−0.47403	−0.04	0.9661
DIVCHG	227.93375	0.89	0.3790
FCF	349.66956	3.10	0.0033

[a]Binary variable is equal to 0 for events in Table 2 Cell 4, 1 for events in Table 2 Cell 1.

Note: The highest variance inflation factor among the independent variables is 2.24124 for DIVYLD. The mean variance inflation factor is 1.77842.

Note: CPE_i is the cumulative prediction error (using the equally weighted market index) for firm/event i over days −1 and 504, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

and firms with a motivation to signal a change in the stability of cash flows but without a strong need to mitigate the shareholder/manager agency problem when yield, price-standardized dividend change, and free cash flow are controlled. This result supports the agency abatement hypothesis over the cash flow signaling hypothesis in explaining (days −1, 504) CPEs. The version of cash flow signaling not supported by this result is the version developed by Eades (1982), Kale and Noe (1990), Brick, Frierman, and Kim (1998) in which dividend increases signal stability of cash flows.

Table 13. Mean (Days −1, 0) Controlled Mean Abnormal Spreads for a Sample of 93 Matched Pairs and Partitions. *t*-test of H_O: mean CMAS = 0.

Partition	CMAS (*t*- value in parenthesis)
Complete sample, *n* = 93 matched pairs.	0.16% (0.48)
AGENCY1 events (Table 1, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonpositive CHGCF, *n* = 13 matched pairs.	0.41% (2.44*)
AGENCY2 events (Table 2, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR, *n* = 19 matched pairs.	0.32% (0.41)

SIGNAL1 events (Table 1, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a positive CHGCF, *n* = 36 matched pairs.	0.05% (0.09)
SIGNAL2 events (Table 2, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a negative CHGCFVAR, *n* = 30 matched pairs.	0.61% (0.97)
* denotes significance at the 0.05 level.	

Findings and Discussion Involving (Day −1, 0) CMASs

The mean (−1, 0) CMASs from the micromarket event study process are presented in Table 13 along with *t*-test results for the hypothesis that the mean CMAS is zero. For

the entire sample of 93 matched pairs, the CMASs are not significantly different from zero. Additionally, the nonparametric sign test results reported in Table 14 indicate that, for the complete sample, the probability that bid-ask spreads will narrow after dividend-increase announcements is not significantly different than the probability that the spreads will widen. One cannot say that probability that bid-ask spreads will narrow is different than the probability that spreads will widen after sampled dividend increase announcements.

Howe and Lin (1992) find that there is an inverse relationship between dividend yield and bid-ask spreads. This may represent a long-term equilibrium relationship. However, the results of this study using CMASs do not indicate an immediate movement toward this possible long-term state. This result is consistent with Brooks (1994).

Table 13 indicates that the mean (days −1, 0) CMAS are not significantly different than zero for the subsamples of firms with a 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR (Table 2, Cell 1 events), firms with a 1994 Tobin's Q above the sample median and a positive CHGCF (Table 1, Cell 4 events), and firms with a 1994 Tobin's Q above the sample median and a negative CHGCFVAR (Table 2, Cell 4 events).

Table 13 indicates that the mean (days −1, 0) CMAS for the subsample of firms with a 1994 Tobin's Q below or equal to the sample median and a nonpositive CHGCF (Table 1, Cell 1 events) is significantly different than zero at the 0.01 level. The mean CMAS is 0.41%. There is evidence (significance at the 0.05 level) that dividend increase announcements result in an initial widening of bid-ask spreads among firms without a motivation to signal rising cash flows but with a strong need to mitigate the shareholder/manager agency conflict. However, this test upon the raw CMAS does not use any of the standard controls for interpreting micromarket results.

The nonparametric sign test, as reported in Table 14, produced significant results for several subsamples. Table 14 shows that, for this subsample of Table 1, Cell 1 events,

Table 14. Nonparametric Sign Test of H_O: P(+) = P(−) for Mean (Days −1, 0) Controlled Mean Abnormal Spreads for a Sample of 93 Matched Pairs and Partitions.

Partition	*T* = number of negative observations. (*p*-value in parenthesis)
Complete sample, *n* = 93 matched pairs.	*T* = 49 (0.605)

AGENCY1 events (Table 1, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonpositive CHGCF, *n* = 13 matched pairs.	*T* = 2 (0.022)
AGENCY2 events (Table 2, Cell 1) comprised of firms with 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR, *n* = 19 matched pairs.	*T* = 6 (0.167)
SIGNAL1 events (Table 1, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a positive CHGCF, *n* = 36 matched pairs.	*T* = 25 (0.020)
SIGNAL2 events (Table 2, Cell 4) comprised of firms with 1994 Tobin's Q above the sample median and a negative CHGCFVAR, *n* = 30 matched pairs.	*T* = 21 (0.029)
Note: Test statistic follows Conover (1980, 122-125).	

the probability of a negative CMAS is significantly different than the probability of a positive CMAS at the 0.05 level. The evidence indicates that initially spreads are more likely to widen than narrow after dividend increase announcements among firms without motivation to signal a change in the level of cash flows but with a strong need to mitigate the shareholder/manager agency problem. However, the results show that spreads are more likely to narrow than widen for firms in Cell 4 of both Tables 1 and 2 (*p*-value of 0.020). Again, the results in Table 14 do not utilize standard micromarket controls for inventory and holding cost.

The nonparametric sign test, as reported in Table 14, shows that the probability of a positive CMAS is not significantly different than the probability of a negative CMAS for sampled events with a 1994 Tobin's Q below or equal to the sample median and a nonnegative CHGCFVAR (Table 2, Cell 1 events). One cannot conclude that spreads are more likely to narrow than widen, or vice versa, after a dividend increase among firms without a strong motivation to signal a change in the stability of cash flows.

The regression results in Tables 15 and 16 indicate that none of the independent variables explain the (days −1, 0) CMASs. Hence, the model in Table 15 is unable to distinguish the bid-ask spread reaction to announcements by firms in Table 1, Cell 1 from firms in Table 1, Cell 4. Likewise, the model in Table 16 is not able to differentiate the bid-ask spread response to dividend increase announcements by firms in Table 2, Cell 1 from firms in Table 2, Cell 4. Hypotheses $HM1_0$ and $HM2_0$ are not rejected. It is not concluded that there is a significant difference between the bid-ask spread reaction to sampled dividend increase announcements of firms without motivation to signal a change in the level of cash flows but with a strong need to mitigate the shareholder/manager agency problem and firms with a motivation to signal a change an increase in the level of cash flows but without a strong need to mitigate the shareholder/manager agency problem. Neither is it concluded that there is a significant difference between the initial bid-ask

spread response to sampled dividend increase announcements of firms without motivation to signal a change in the stability of cash flows but with a strong need to mitigate the shareholder/manager agency problem and firms with a motivation to signal a change in the stability of cash flows but without a strong need to mitigate the shareholder/manager

Table 15. Test of Hypothesis HM1 (Table 1, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results for Event-Time Interval, Days −1 Through 0, Sampled Firms Include Those in Cells 1 and 4 Only.

$$CMAS_i = \beta_0 + \beta_1 DCL1T1_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 CHGVOL + \beta_6 CHGRVAR + \beta_7 CHGPRC + \epsilon_i$$

N: 49 Adjusted R^2: 0.1899 *F*-value: 1.37 Prob > F: 0.2427

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	−0.93562	−0.19	0.8524
DCL1T1[a]	0.47931	0.80	0.4277
DIVYLD	0.69311	1.25	0.2182
DIVCHG	5.50468	0.38	0.7092
FCF	9.19874	1.37	0.1768
CHGVOL	−0.46171	−0.95	0.3487
CHGRVAR	0.02544	0.95	0.3501
CHGPRC	−1.58438	−0.33	0.7462

[a]Binary variable is equal to 0 for events in Table 1 Cell 4, 1 for events in Table 1 Cell 1.

Note: The highest variance inflation factor among the independent variables is 13.18589 for CHGRVAR. The mean variance inflation factor is 5.09611.

Note: $CMAS_i$ is the controlled mean abnormal spread for firm/event i over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

agency problem. Thus, the sampled results utilizing the CMAS fail to support either the agency abatement theory or the cash flow signaling hypothesis.

Findings and Discussion Involving CHGSPDs

Table 17 reports that the dummy variable, DCL1T1, is insignificant (*p*-value of 0.1146). Whether the firm comes from Cell 1 or Cell 4 of Table 1 does not contribute to

Table 16. Test of Hypothesis HM2 (Table 2, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results for Event-Time Interval, Days −1 Through 0, Sampled Firms Include Those in Cells 1 and 4 Only.

$$CMAS_i = \beta_0 + \beta_1 DCL1T2_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 CHGVOL + \beta_6 CHGRVAR + \beta_7 CHGPRC + \epsilon_i$$

N: 49 Adjusted R^2: 0.1466 *F*-value: 1.01 Prob > F: 0.4408

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	−2.93736	−0.50	0.6205
DCL1T2[a]	0.62635	1.04	0.3030
DIVYLD	−0.28306	−0.56	0.5768
DIVCHG	25.23916	1.56	0.1267
FCF	16.21670	2.31	0.0262
CHGVOL	0.31706	0.55	0.5846
CHGRVAR	0.04803	1.29	0.2027
CHGPRC	−0.40826	−0.08	0.9403

[a]Binary variable is equal to 0 for events in Table 2 Cell 4, 1 for events in Table 2 Cell 1.

Note: The highest variance inflation factor among the independent variables is 3.06427 for DIVCHG. The mean variance inflation factor is 2.03795.

Note: $CMAS_i$ is the controlled mean abnormal spread for firm/event i over days −1 and 0, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

the explanation of CHGSPD, given the other explanatory variables included in the model. Hypothesis HI1 is not rejected. It is not concluded that there is a significant difference between the intermediate-term relative bid-ask spread reaction to sampled dividend increase announcements of firms without motivation to signal a change in the level of cash flows but with a strong need to mitigate the shareholder/manager agency problem and

Table 17. Test of Hypothesis HI1 (Table 1, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results, Sampled Firms Include Those in Cells 1 and 4 Only.

$CHGSPD_i = \beta_0 + \beta_1 DCL1T1_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 ICHGVOL + \beta_6 ICHGRVAR + \beta_7 ICHGPRC + \epsilon_i$

N: 51   Adjusted R^2: 0.4378   *F*-value: 4.78   Prob > F: 0.0005

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	0.16909	0.94	0.3543
DCL1T1[a]	−0.07019	−1.61	0.1146
DIVYLD	0.07218	2.26	0.0292
DIVCHG	−1.29431	−1.54	0.1314
FCF	−0.24465	−0.73	0.4678
ICHGVOL	−0.05017	−1.75	0.0880
ICHGRVAR	−0.00974	−0.86	0.3950
ICHGPRC	0.84576	4.64	<0.0001

[a]Binary variable is equal to 0 for events in Table 1 Cell 4, 1 for events in Table 1 Cell 1.

Note: The highest variance inflation factor among the independent variables is 2.67435 for DIVYLD. The mean variance inflation factor is 1.67619.

Note: CHGSPD is the ratio of mean relative spread from day 40 to day 20 (a 21 day period) over mean relative spread from day -20 to day -40, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

firms with a motivation to signal a change in the level of cash flows but without a strong need to mitigate the shareholder/manager agency problem. This result fails to support either the agency abatement theory or the cash flow signaling hypothesis.

The significantly negative coefficient on DCL1T2 reported in Table 18 indicates that the ratio of post-announcement relative bid-ask spread to pre-announcement spread is

Table 18. Test of Hypothesis HI2 (Table 2, Cell 1 versus Cell 4). Estimated Generalized Least Squares Results, Sampled Firms Include Those in Cells 1 and 4 Only.

$CHGSPD_i = \beta_0 + \beta_1 DCL1T2_i + \beta_2 DIVYLD_i + \beta_3 DIVCHG_i + \beta_4 FCF_i + \beta_5 ICHGVOL + \beta_6 ICHGRVAR + \beta_7 ICHGPRC + \epsilon_i$

N: 51 Adjusted R^2: 0.5232 *F*-value: 8.84 Prob > F: <0.0001

Variable	Parameter Estimate	*t*-statistic	Prob > *t*
Intercept	−0.02736	−0.16	0.8720
DCL1T2[a]	−0.13866	−3.90	0.0003
DIVYLD	0.10654	3.96	0.0003
DIVCHG	−0.27720	−0.58	0.5657
FCF	−1.07788	−3.27	0.0021
ICHGVOL	−0.00996	−0.38	0.7044
ICHGRVAR	−0.01941	−2.29	0.0270
ICHGPRC	1.05461	5.91	<0.0001

[a]Binary variable is equal to 0 for events in Table 2 Cell 4, 1 for events in Table 2 Cell 1.

Note: The highest variance inflation factor among the independent variables is 3.42037 for ICHGPRC. The mean variance inflation factor is 2.49510.

Note: CHGSPD is the ratio of mean relative spread from day 40 to day 20 (a 21 day period) over mean relative spread from day -20 to day -40, where day −1 is the dividend declaration date. Day 0 would normally be the *Wall Street Journal* dividend announcement date.

smaller for Cell 1, Table 2 firm/events than for Cell 2, Table 2 firm/events, after controlling for yield, price-standardized dividend change, free cash flow, and changes in inventory holding and order processing costs around the dividend announcement. Hypothesis HI2 is rejected. There is strong evidence (*p*-value of 0.0003 on the DCL1T2 coefficient) that there is a significant difference between the intermediate-term bid-ask response following sampled dividend increase announcements of firms without motivation to signal a change in the stability of cash flows but with a strong need to mitigate the shareholder/manager agency problem and firms with a motivation to signal a change in the stability of cash flows but without a strong need to mitigate the shareholder/manager agency problem. This result supports the agency abatement hypothesis over the cash flow signaling hypothesis in explaining CHGSPDs. The version of cash flow signaling not supported by this result is the version suggesting that dividends increases signal an increase in the stability of cash flows (see Eades 1982, Kale and Noe 1990, and Brick, Frierman, and Kim (1998).

Chapter Summary

Chapter IV presented the results of the statistical analysis of the sampled data and tests of the all of the research hypotheses presented in Chapter III. The (days −1, 0) CPEs, (days −1, 504) CPEs, and (days −1, 0) CMASs as well as their significance or lack of were reported. The nonparametric sign test was used to test for a difference between the probability that market makers will narrow bid-ask spreads and the probability that they widen them following dividend increase announcements. The results of estimated generalized least squares regression modeling the (days −1, 0) CPEs, (days −1, 504) CPEs, (days −1, 0) CMASs, and CHGSPDs are also given.

The research findings and discussions presented in this chapter were divided into four sections according to whether the hypothesis tests involved the (days −1, 0) CPEs, (days −1, 504) CPEs, (days −1, 0) MASs, or CHGSPD. A five percent criterion for significance level was used consistently to test all hypotheses tests. The following four null research hypotheses (out of the eight tested) are rejected: $HS1_0$, $HL1_0$, $HL2_0$, and HI2. Table 19 summarizes these results within the context of the motivation table.

Table 19–Summary of Significant Results

	STRONG AGENCY MOTIVATION	***WEAK AGENCY MOTIVATION***
WEAK SIGNALING MOTIVATION	Cell 1 response was shown to be stronger than Cell 4 response in tests of HS1, HL1, HL2, and HI2. (1)	(2)
STRONG SIGNALING MOTIVATION	(3)	(4)

Table 7 reports that the equally weighted market index (days −1, 0) CPEs for Cells 1 and 4 of Table 1 were 2.01% and −0.00% respectively. The multivariate EGLS results of Table 8 (*p*-value of 0.0039 for the coefficient on dummy variable DCL1T1) confirm that these raw values are different after controlling for yield, price-standardized dividend change, and free cash flow. Hence, hypothesis HS1 is rejected, supporting agency abatement theory over cash flow signaling of the Panel A Figure 2 form.

Table 10 reported that the equally weighted market index (days −1, 504) CPEs for Cells 1 and 4 of Table 1 were −0.98% and −13.17% respectively. The multivariate EGLS results of Table 11 (*p*-value of 0.0129 for the coefficient on dummy variable DCL1T1) confirmed that these raw values are different after controlling for yield, price-standardized dividend change, and free cash flow. Thus, hypothesis HL1 is rejected, supporting agency abatement theory over cash flow signaling of the Panel A Figure 2 form.

Table 10 reports that the equally weighted market index (days −1, 504) CPEs for Cells 1 and 4 of Table 2 were 14.00% and −12.89% respectively. The multivariate EGLS results of Table 12 (*p*-value of 0.0084 for the coefficient on dummy variable DCL1T2) confirm that these raw values are different after controlling for yield, price-standardized dividend change, and free cash flow. Hence, hypothesis HL2 is rejected, supporting agency abatement theory over cash flow signaling of the Panel B Figure 2 form.

The multivariate EGLS results of Table 18 (*p*-value of 0.0003 for the coefficient on dummy variable DCL1T2) show that CHGSPDs of Cell 1 and Cell 4 of Table 2 are different after controlling for yield, price-standardized dividend change, free cash flow, and market maker inventory and holding cost. Therefore, hypothesis HL2 is rejected, supporting agency abatement theory over cash flow signaling of the Panel B Figure 2 form.

Chapter I posed the research question, “Which of two hypotheses, the cash flow signaling hypothesis or the agency abatement hypothesis, better explains the response of stock market participants to large dividend announcements?” EGLS modeling supports the agency abatement hypothesis over the hypothesis that dividend increases indicate an increase in the level of cash flows in explaining (days −1, 0) CPEs. EGLS modeling was unable to differentiate between the agency abatement hypothesis and the hypothesis that dividend increases indicate a decrease in the volatility of cash flows in explaining (days −1, 0) CPEs. EGLS results indicate that agency abatement explains (days −1, 504) CPEs better than either of the two versions of cash flow signaling. EGLS modeling was unable to distinguish between the agency abatement and cash flow signaling hypothesis in explaining (−1, 0) CMASs. EGLS modeling was unable to differentiate between the agency abatement hypothesis and the hypothesis that dividend increases indicate an increase in the level of cash flows in explaining CHGSPDs. EGLS modeling supports the agency abatement hypothesis over the hypothesis that dividend increases which indicate a decrease in the volatility of cash flows help explain CHGSPDs. The implications of these results are discussed further in Chapter V which concludes this work.

CHAPTER V

CONCLUSION

This chapter summarizes the results, considers the broader implications of the study, discusses the limitations of the research, and includes suggestions for further work.

Summary of Results

This work investigates the agency abatement and cash flow signaling explanations for the positive association between the announcement of dividend increases and the responses of stock market participants. Evidence presented from the EGLS procedure is consistent with the hypothesis that dividend increases are considered better news for shareholders of firms motived by a significant agency problem than for firms believed to be motivated by cash flow signaling. Additionally, EGLS results using CHGSPD are consistent with the hypothesis that dividend increases result in a relatively “more favorable” shift in informational asymmetry between market makers and insiders when the dividend increase is motivated by a reduction in the shareholder/ manager agency problem than when the increases are motivated by signaling a decrease in the volatility of cash flows. As used here, “more favorable” means either a larger decrease in informational asymmetry as reflection in the adverse information component of the spreads or a smaller increase in informational asymmetry.

Specifically, the significantly positive coefficient (*p*-value of 0.0039) on the binary variable used to distinguish between Cell 1 and Cell 4 firm/events from Table 1 indicates that Cell 1 firm/events (SIGNAL1 firms) have higher two-day cumulative prediction errors around the dividend increase announcement. The well documented positive stock price response to dividend increases appears to be driven primarily by those firms with significant shareholder/manager agency conflict. These results support the agency abatement hypothesis (illustrated in Figure 1 of Chapter III) over the cash flow signaling hypothesis of the form proposed by Pettit (1972), Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985) (illustrated in Panel A Figure 2 of Chapter III). The results are also consistent with the results of Lang and Litzenberger (1989). However, the EGLS procedure using (days −1, 0) CPEs is not able to distinguish between the agency abatement hypothesis and the cash flow signaling hypothesis of the form proposed by Eades (1982), Kale and Noe (1990), Brick, Frierman, and Kim (1998) and illustrated in Panel B Figure 2 of Chapter III.

Results from the EGLS procedures employing (days −1, 504) CPEs as the dependent variable support the agency abatement hypothesis over both versions of the cash flow signaling hypothesis (both Panels A and B of Figure 2). The results indicate a systematic pattern of long-term reevaluation of the dividend increase announcement. This is indicated by the *p*-values of 0.0129 for the coefficient on dummy variable DCL1T1 in Table 11 and 0.0084 for the coefficient on dummy variable DCL1T2 in Table 12. The nature of this long-term reevaluation depends upon the apparent motive behind the dividend increase. The mean (days −1, 504) CPE is higher for the firms motivated by reducing the shareholder/manager agency conflict than for firms motived by cash flow signaling even after controlling for yield, price-standardized dividend change, and free cash flow.

The results using CMASs fail to indicate that any immediate resolution of information asymmetry between market makers and insiders from dividend increase announcements differs between firms motivated by agency abatement and firms motivated by cash flow signaling. The results indicate that the dummy variables used for distinguishing between firms motivated by agency abatement and cash flow signaling do not explain (−1, 0) CMASs.

In contrast to results using CMASs, results using CHGSPDs indicate a difference in reaction by market makers to dividend increases between firms motivated by agency abatement and firms motivated by signaling a decrease in the volatility of cash flows. This is indicated by the *p*-value of 0.0003 for the coefficient on dummy variable DCL1T2 in Table 18. This result supports the agency abatement hypothesis over the cash flow signaling hypothesis of the form proposed by Eades (1982), Kale and Noe (1990), Brick, Frierman, and Kim (1998) and illustrated in Panel B Figure 2 of Chapter III.

Limitations of the Research

This study tests the agency abatement and cash flow signaling hypotheses. The study has yielded some statistically significant associations; causal interpretations, however, cannot be proven. Conclusions drawn from this study should be tempered by the limitations in the theories, the proxies for agency and signaling, the sample selection process, the time period chosen, and the assumptions utilized. For example, the "event study" methodologies used in this study can be viewed as "joint tests" in that they also test both the estimation methodologies and the assumptions behind the methodologies.

The proxy for the unobservable Tobin's Q is particularly limited in that the replacement cost of assets is not observable and must be approximated. The proxy used follows Lewellen and Badrinath (1997) who illustrate that their methodology is superior to previous Tobin's Q procedures. This study cannot determine whether the Tobin's Q variable that was used is the appropriate variable to detect agency costs. However, the results do indicate that investor response to large dividend increase announcements depends, in part, upon the underlying characteristic that the Tobin's Q measure captures.

Additionally, the sample selection process used may yield large firm and healthy firm biases. The sampling process outlined in Chapter 3 dictated the availability of data from *Compustat PC Plus*. This requirement may eliminate some smaller firms and firms that do not report financial results on a timely basis (which tend to be unhealthy firms).

Suggestions for Further Research

As discussed in Chapter 2, Howe and Lin (1992) found an inverse relationship between dividend yield and bid-ask spreads after controlling for other determinants of the spread. They did not attempt to distinguish between the agency abatement and cash flow signaling hypothesis. One line of potentially valuable research would be to see if this inverse relationship holds equally for sample partitions similar to the partitions based upon the agency and signaling proxies used in this work.

The empirical results of this work suggest that the market greets dividend increases by firms whose cash flow distribution is poised to improve as a nonevent. That is, they don't appear to gain economically significant insight from these events. These results suggest a need for theoretical work that can explain the observations better than existing signaling theory. A promising direction for this thrust may be to combine the insight of traditional cash flow signaling theory with the spirit of Rozeff (1982) and Smith and Watts (1992) who provide evidence that there is a negative relationship between growth options and dividends. Their work suggests that firms who are beginning to face limited growth options (mature firms) will increase their payout ratio, to signal maturity and the return of cash rather than rising earnings and cash flow. It may be that this is the type of cash flow signal that the market takes to be good news.

In addition to bid and ask price quotes, market makers post bid and ask depth. The depth postings specify the maximum quantities for which the price quotes apply. Additional information concerning the possible reduction in informational asymmetry by dividend increases may be gained by studying the depth responses among event partitions similar in nature to those used in this study.

As an alternative to the controlled mean abnormal spread (CMAS) and post-event spread to pre-event spread ratio (CHGSP) methodologies used in this study, spread decomposition techniques of the nature of Huang and Stoll (1997) may be used to measure the spread reaction to dividend increases. Partitions similar to those used in this study may provide additional incite into the agency abatement and cash flow signaling hypotheses within a micromarket context.

Another possible avenue for further research would be to apply the methodology and partitioning scheme used in this work to a sample of dividend initiations. Dividend initiations may be less anticipated than dividend increases and thus may contain more information.

Conclusions

This study has investigated the reaction of market participants to dividend increases. This study contributes to the growing literature on dividend policy. It also has important implications for managers and their decision to place a portion of shareholder wealth outside the firm. The sampled short-term stock price responses suggest that managers of firms with high levels of shareholder/manager agency conflict can increase value for shareholders by increasing dividends. The micromarket results provide some support for the notion that dividend increases might increase value for shareholders in firms with significant manager/shareholder agency problems by reducing the bid-ask spread and therefore reduce the cost of capital.

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