# The Effect of Asymmetric Information on Dividend Policy

Sanjay Deshmukh
DePaul University

*We examine the effect of asymmetric information on dividend policy in light of an alternative explanation based on the pecking order theory. We present evidence that dividends are inversely related to the level of asymmetric information. This finding is consistent with the pecking order theory, but inconsistent with the signaling theory. We provide further support for the pecking order theory by documenting a negative relation between dividends and issue costs that derives from asymmetric information problems. We also find that the previous evidence on the relation between dividends and insider ownership appears to be more strongly related to asymmetric information than to agency costs.*

## Introduction

In spite of extensive empirical research on dividend policy, we know little about how firms set these policies. Several theories exist on why firms pay dividends. These theories can be categorized based on the market imperfection invoked to provide a rationale for dividends. The various explanations of dividend policy can be classified into at least three categories of market imperfections: agency costs, asymmetric information, and transaction costs.[1]

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[1] The evidence with respect to the tax issue is largely unresolved (Black and Scholes, 1974; Litzenberger and Ramaswamy, 1979, 1980; Miller and Scholes, 1978, 1982). In addition, the tax analysis does not provide any cross-sectional predictions pertaining to dividend policy. Smith and Watts (1992) argue that the lack of a cross-sectional hypothesis stems from the endogeneity of the personal tax rates. This endogeneity results from the fact that all firms have access to shareholders in the various tax brackets.


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For instance, Rozeff (1982) and Easterbrook (1984) argue that dividend payments may serve as a mechanism to reduce agency costs of external equity. The agency costs arise from costs associated with monitoring managers and/or from risk-aversion on the part of managers.[2] There is an extensive theoretical literature on asymmetric information that provides a signaling rationale for dividends (Bhattacharya, 1979; Miller and Rock, 1985; and John and Williams, 1985, among others). The signaling literature suggests that dividends convey information about current and future earnings. Several empirical studies have focused on the impact of dividend change announcements on share prices to analyze the information content of dividend changes. The evidence indicates a positive relation between the stock price response and the sign of the announced dividend change (Aharony and Swary, 1980; Asquith and Mullins, 1983, among others). The overall empirical evidence with respect to the signaling theory appears to be mixed.[3] The residual theory suggests that a firm can minimize transaction or issue costs associated with new capital issues by restricting dividends to funds not required for investment purposes (Higgins, 1972).[4]

In this paper, we empirically examine an alternative explanation of dividend policy based on asymmetric information. This alternative explanation is based on the implications of the pecking order theory (Myers, 1984; Myers and Majluf, 1984). The pecking order theory also provides implications for a firm's dividend policy

[2] The agency cost literature on dividend policy suggests that dividends should be positively related to agency costs of external equity. Rozeff (1982) tests this prediction and finds that the dividend payout ratio is i) inversely related to the fraction of equity owned by managers where a higher insider ownership implies lower agency costs and ii) positively related to the number of stockholders of a firm which acts as a proxy for the dispersion of ownership where a higher dispersion implies higher agency costs.

[3] For example, Healy and Palepu (1988) find that firms that initiate dividends experience abnormal increases in earnings while earnings decreases are associated with dividend omissions. Ofer and Seigel (1987) find that analysts revise their expectations of earnings in the direction of the dividend change. This evidence is consistent with the predictions of the signaling theory. Further support for the cash flow signaling hypothesis is provided in Denis, Denis, and Sarin (1994) and in Yoon and Starks (1995), among others. In contrast, Dhillon and Johnson (1994) find that stock and bond prices, at the announcement of dividend changes, react in a way that is consistent with wealth expropriation from the bondholders. They, however, do not rule out cash-flow signaling. More recently, Benartzi, Michaely, and Thaler (1997) examine the relationship between dividend changes and subsequent earnings changes and argue that their evidence does not provide support for the signaling hypothesis.

[4] The residual theory, therefore, predicts a negative relation between investment (or growth) opportunities and dividends. Rozeff (1982) tests this prediction and finds that the dividend payout ratio is negatively related to both past and expected growth rates in sales. Smith and Watts (1992) analyze dividend policy at the industry level and find an inverse relationship between dividend yield and growth opportunities. Gaver and Gaver (1993) follow Smith and Watts and perform the same analysis at the firm level and find evidence consistent with Smith and Watts.

which have been largely ignored in the empirical literature on dividend policy. Myers and Majluf (1984) argue that in the presence of asymmetric information, the firm may underinvest in certain states of nature. The underinvestment arises when the firm has inadequate funds for investment purposes and does not want to bear the lemons-premium associated with new capital issues. They suggest that a firm can reduce underinvestment by financing investments with slack that can be accumulated through retention (or by decreasing dividends). Their analysis implies that, other things equal, the need for slack increases with the level of asymmetric information between the firm and its outside investors. This reasoning suggests that the higher the level of asymmetric information, the lower the dividends. This prediction of the pecking order theory contrasts with that provided by the signaling models. For instance, Miller and Rock (1985) develop a model in which higher dividends are associated with higher earnings. Their model implies that, other things equal, the value of dividend payments as a signal increases with the level of asymmetric information between the firm and its investors. Thus, the prediction of the pecking order theory, with respect to the level of asymmetric information, is opposite to that provided by the dividend-signaling framework of Miller and Rock (1985) and thus provides a basis to distinguish between them.

Our second contribution stems from our inclusion of both dividend-paying and non-dividend-paying firms in our empirical analysis. Most empirical studies on dividend policy have ignored non-dividend-paying firms. If firms find it optimal not to pay dividends, their exclusion from any empirical analysis may create a selection bias in the sample resulting in biased and inconsistent estimates of the underlying parameters. In such cases, generalizations about corporate dividend policy may be inappropriate. To address the selection problem, we choose a sample of firms that consists of both dividend-paying and non-dividend-paying firms. The empirical framework is formulated as a censored regression or Tobit model and estimated via a maximum likelihood technique.

Our results indicate that the inclusion of an asymmetric information variable allows us to draw a distinction between the two competing asymmetric information explanations of dividend policy that has not been drawn before. For instance, the empirical results indicate that firms with less asymmetric information pay higher dividends. This finding is consistent with the pecking order theory but inconsistent with the signaling theory. Our results also suggest that the previous findings on the role of insider ownership in determining dividend policy appear to be more strongly related to asymmetric information (and the pecking order theory) than to agency costs.

To provide further support for the pecking order theory, we examine the relation between dividend policy and issue costs that stems from asymmetric information problems. We believe that we provide new evidence on the relation between dividends and issue costs. The pecking order theory implies that issue (or transaction)

costs are adversely affected by asymmetric information problems. These issue costs can be minimized by financing investments with slack that can be accumulated by paying lower dividends. This link is empirically examined in this paper.

First, we examine the relation between asymmetric information and issue costs for a sample of seasoned equity offerings. The results confirm the prediction that issue costs increase with the level of asymmetric information. Next, we use the estimated empirical relation between issue costs and asymmetric information to compute predicted issue costs for the sample of firms used (in this paper) to analyze dividend policy. We then examine dividend policy in the presence of these predicted issue costs. The results indicate that, other things equal, dividends are negatively related to predicted issue costs and are consistent with the implications of the pecking order theory. In sum, the empirical results provide support for a pecking order explanation of dividend policy and also provide new evidence on the role of asymmetric information in determining dividend policy.

Next, we discuss the effect of asymmetric information on dividend policy and derive the corresponding testable hypotheses. We also identify several control variables used in the estimation of our empirical model. We then propose a simple empirical model of dividend policy followed by a discussion of the methodology and the measures used for the dependent variable.

## Asymmetric Information, Testable Hypotheses, and Control Variables

### Pecking Order Theory

Myers and Majluf (1984) argue that in the presence of asymmetric information, a firm may underinvest in certain states of nature. The likelihood of underinvestment, which results in an ex-ante loss in firm value, arises from the lemons problem associated with new issues of capital. Myers and Majluf suggest that a firm can reduce underinvestment and the resulting ex-ante loss in firm value by accumulating slack through retention. Therefore, a firm can accumulate slack by decreasing its dividends. Thus, dividend policy may be used to control the underinvestment problem that stems from asymmetric information. The above reasoning suggests that the higher the level of asymmetric information, the lower the dividends to control the underinvestment problem. Therefore, other things equal, the pecking order theory predicts that the higher the level of asymmetric information, the lower the dividends.

### Signaling Theory

A substantial part of the theoretical literature on asymmetric information and dividend policy provides a signaling rationale for dividends. One of the representative and most intuitive papers of this genre is that by Miller and Rock (1985) who develop a model in which higher dividends are associated with higher (current)

earnings. In their model, the information asymmetry pertains to current earnings and the level of investment. Dividends convey information about current earnings through the sources and uses identity. In the model, earnings are assumed to be correlated through time and once current earnings are revealed, future earnings can be inferred by the investors. Therefore, dividends indirectly serve as a signal of future earnings of the firm.

In equilibrium, a firm with higher current earnings pays a level of dividends that is high enough to separate itself from a firm with lower current earnings. In the model, the cost of signaling is underinvestment relative to the full information case. In addition, the dividend payout under asymmetric information is higher relative to that under full information.

The above arguments imply that, other things equal, a firm with a higher level of asymmetric information will have to pay a higher level of dividends to signal the same level of earnings as a firm with a lower level of asymmetric information. Therefore, other things equal, the signaling argument predicts that the higher the level of asymmetric information, the higher the dividends. Note that the pecking order theory and the signaling theory provide opposite predictions regarding the effect of the level of asymmetric information on dividend policy and thus provide a basis to distinguish between them.

We use the number of analysts following the firm as a proxy for the level of asymmetric information between a firm and its investors. Specifically, we use the logarithm of the number of analysts (LOGANAL) following the firm. There is support in the literature for the use of analyst following as a proxy for asymmetric information. For instance, Bhushan (1989) argues that the higher the number of analysts following a firm, the higher the amount of resources spent to acquire private information about the firm. Therefore, the higher the number of analysts following a firm, the less the asymmetric information between a firm and its investors. Brennan and Hughes (1991) use analyst following as a proxy for flow of information and argue that analysts play an important role in providing investors with information about firms. Lang and Lundholm (1996) find that more analysts follow firms with greater information disclosure practices which suggests that a higher analyst following is associated with less asymmetric information. Womack (1996) suggests that analysts appear to have market-timing and stock-picking abilities and finds evidence consistent with an information-providing role of analysts. D'Mello and Ferris (2000) suggest that analysts appear to serve as information intermediaries and that analyst following could be a superior measure for capturing the level of asymmetric information relative to other proxies.

We argue that even though an incremental analyst may contribute less than the previous one, the aggregate amount of information available should rise with the increase in analyst following. Therefore, a higher analyst following implies less asymmetric information about the firm. Using this proxy for asymmetric informa-

tion, the pecking order theory predicts that the higher the analyst following, the higher the dividends. In contrast, the signaling hypothesis predicts that the higher the analyst following, the lower the dividends.

## Control Variables

The potential importance of asymmetric information in determining dividend policy does not rule out other factors affecting dividend policy. In the following discussion, we identify several effects (and the corresponding control variables) from other models on dividend policy.

## Agency Costs of (External) Equity

Rozeff (1982) and Easterbrook (1984) argue that dividend payments may serve as a mechanism to reduce agency costs of external equity. Easterbrook (1984) identifies two forms of agency costs that arise from the monitoring of managers and from managerial risk-aversion. He argues that the problems associated with monitoring and risk-aversion will be less severe if managers make frequent trips to external capital markets to raise funds. The underlying reasoning is that managers who face the frequent scrutiny of capital markets are more likely to act in the interest of all claimants so as to elicit the best price on newly-issued securities. These frequent trips to capital markets are more likely to occur when the firm pays higher dividends and faces a shortfall of funds for investment purposes.

Rozeff (1982) also hypothesizes a monitoring role for dividends and views the dividend payment as a bonding device used to reduce agency costs. Rozeff (1982) and Easterbrook (1984) also indicate that the value of dividends in controlling agency costs is likely to be lower in the presence of some other control mechanism such as managerial ownership of shares. Note that a higher managerial or insider ownership implies lower agency costs. Therefore, other things equal, dividends should be inversely related to insider or managerial ownership. The fraction of equity (INSOWN) held by all officers and directors of the firm is used as a proxy for the agency costs of equity.

## Growth or Investment Opportunities

Myers and Majluf (1984) also argue that as the size of the investment increases, other things equal, the ex-ante loss resulting from underinvestment also increases as the firm now has to rely more on external sources for funds. The size of the investment required will be an increasing function of the firm's growth opportunities. The underinvestment problem, which is likely to arise from growth opportunities, can be controlled by increasing the amount of slack available. Therefore, a firm that expects rapid growth should lower its dividend payout to accumulate financial slack so as to reduce the likelihood of underinvestment.

Higgins (1972) suggests that, in the presence of transaction (or issue) costs associated with new equity issues, dividends should be restricted to funds that are not required for investment purposes. Therefore, both the pecking order theory and the residual theory suggest that the higher the growth opportunities of a firm, the lower the dividends. The growth measure (MTOB), defined as the ratio of the market value of assets to the book value of assets, is used as a proxy for growth opportunities. This measure of growth opportunities has been widely used in the literature and has been used, for example, by Smith and Watts (1992), Opler and Titman (1993), and D'Mello and Ferris (2000), among others. The market value of assets is calculated as the market value of equity plus the book value of total liabilities where the book value of total liabilities equals the book value of assets minus the book value of equity.

## Cash Flow

The residual theory implies that, given investment opportunities, a firm with higher current earnings (or cash flow) will pay higher dividends. The signaling argument also suggests that, other things equal, firms with higher (current) earnings are predicted to pay higher dividends. Similarly, the pecking order theory implies that, given investment needs, a higher cash flow from existing assets will translate into higher dividends as the need for slack is now lower. Therefore, other things equal, dividends should be positively related to some measure of cash flow. The cash flow measure (CFTOB), defined as the ratio of earnings before interest, depreciation, and taxes (EBIDT) to the book value of assets, is used as a proxy for cash flow.[5]

## Agency Costs of Debt and Financial Distress

Dividend payments are also a source of conflict between the stockholders and the debtholders of a firm and may give rise to agency costs of debt. The dividend restrictions found in debt covenants appear to alleviate this conflict (Smith and Warner, 1979; Kalay, 1982). Kalay (1982) suggests that the dividend restrictions found in debt covenants are imposed to control the agency costs of debt that arise from dividend payments financed by issuing debt and/or by forgoing investment. He also finds that debt covenants, that specify a maximum on dividend payout, usually impose a minimum level of investment. As a consequence of these restrictions, firms may face binding debt covenants when they are in financial distress in which case the minimum investment constraint is likely to translate into lower dividends.

DeAngelo and DeAngelo (1990) examine the impact of financial distress on dividend policy. They find that firms in their sample reduce dividends early during

[5] This measure of cash flow is similar to the one used by Opler and Titman (1993) where EBIDT is normalized by the market value of assets. This paper follows the arguments in Lang, Stulz, and Walkling (1991) and normalizes EBIDT by the book value of assets.

periods of financial distress. The findings also indicate that a number of these firms reduced dividends in the absence of binding debt covenants. The authors suggest that managers are more likely to cut dividends at the onset of financial trouble to avoid omitting them in the future. Therefore, in addition to binding debt covenants, managers' reluctance to omit dividends may be another determinant of dividend policy when firms are in financial distress. Because managers appear to be more reluctant to omit than reduce dividends, a firm with a higher likelihood of financial distress may pay lower dividends so as to maintain a stable dividend policy and avoid omitting dividends in the future. The costs of not doing so may be an early omission which is heavily penalized by capital markets.

The above arguments suggest that, other things equal, firms with a higher likelihood of financial distress may pay lower dividends. We argue that the sub-sample of firms with both low cash flow and low growth opportunities will have a higher likelihood of distress than the rest of the sample firms. To identify firms with a higher likelihood of distress, we construct a dummy variable, DIST, that assumes a value of one for firms that have both low cash flow (below sample median CFTOB) and low growth opportunities (below sample median MTOB) and zero otherwise.

## Empirical Specification, Methodology and Measures for the Dependent Variable

We propose the following empirical model of dividend policy that applies to both dividend-paying and non-dividend-paying firms:

$$Y_i^* = \beta' X + \varepsilon_i \tag{1}$$

$$Y_i = Y_i^*, \text{ if } Y_i^* > 0$$

$$Y_i = 0, \text{ if } Y_i^* \leq 0$$

where:

$Y_i^*$ = Optimum dividend level for firm i
$Y_i$ = Measured dependent variable (of the optimum dividend level)
$X$ = Vector of explanatory variables
$\varepsilon_i$ = Disturbance term

The vector of explanatory variables, X, contains the asymmetric information variable and the various control variables discussed earlier. The optimal dividend policy is determined by the firm-specific attributes represented in the vector of explanatory variables, X. The decision to not pay dividends derives from the fact that the optimum level of dividends is zero. Therefore, non-dividend-paying firms find it optimal not to pay dividends and should not be ignored in any analysis of corporate dividend policy.

The formulation in equation (1) is a censored regression or Tobit model and applies to both dividend-paying and non-dividend-paying firms (Maddala, 1983; Amemiya, 1984). The data are censored because values for the dependent and the independent variables are observable for firms that pay dividends whereas only values for the independent variables are known for non-dividend-paying firms. The dependent variable for non-dividend-paying firms is censored at zero in that the optimum dividend level is zero. If selection is important (i.e., firms find it optimal not to pay dividends), the ordinary least squares (OLS) framework will yield biased, inconsistent, and inefficient estimates of the underlying parameters even when the sample contains non-dividend-paying firms. On the other hand, the maximum likelihood estimation of the Tobit model will yield both consistent and efficient estimates.

## Dependent Variable Measures

We use the conventional dividend yield (DIVYLD) that equals the ratio of dividends per share to price per share as our measure of the dependent variable. The dependent variable equals the measured dividend yield for dividend-paying firms and equals zero for non-dividend-paying firms. We report all our results using this measure for the dependent variable. We could not use the dividend payout ratio (ratio of dividends per share to earnings per share) as a measure of the dependent variable because the sample contains several firms with negative earnings. The Tobit model would have ascribed a payout of zero to dividend-paying firms with negative earnings. To test for robustness, we focus on the sub-sample of firms with positive earnings and estimate our model with the dividend payout ratio as the dependent variable.

## Data

The data on all the variables (except analyst following and insider ownership) were obtained from the industrial annual COMPUSTAT database for the period 1988-1992. The sample consists of manufacturing firms (SIC 2000-3999) that trade on either the NYSE or the AMEX.[6] Data on each variable that is not a ratio were obtained by averaging all the available values for that variable over the period 1988-1992. A five-year period was chosen to smooth out any short-term fluctuations in the values of the variables and to obtain a representative value for the underlying variable. To check for robustness, however, we estimate the model on data that are averaged over the three-year period, 1990-1992. In addition, we also estimate the

[6] The data on insider ownership were manually collected from annual issues of Spectrum 6 for each year in the sample period. To minimize data collection costs and to ensure availability of data (on both analyst following and insider ownership), we restrict our sample to manufacturing firms (SIC 2000-3999) that trade on the NYSE or the AMEX.

model for each year in the sample period and on data pooled over the five-year period.

The values for variables denoted as ratios were computed by dividing the average value of the numerator by the average value of the denominator. For instance, the dividend yield (DIVYLD) was computed by dividing the average dividends per share (over 1988-1992) by the average price per share. The available annual values of insider ownership (from Spectrum 6) were averaged over the sample period to obtain the final estimate. The data on analyst following were obtained from the Institutional Brokers Estimate System (I/B/E/S) database. Specifically, the number of analysts providing the one-year earnings forecast was obtained for each sample firm for each month. The available values were averaged over the sample period to obtain the final estimate. Firms that had no data on either insider ownership and/or analyst following were dropped from the initial sample. Firms initiating or omitting dividends in the sample period were also dropped, as the emphasis in this paper is on dividend-paying versus non-dividend-paying firms. The final sample consists of 446 firms, 158 of which are non-dividend-paying firms.

In Table 1, some relevant descriptive statistics are provided for the variables discussed above. The average dividend yield for the sample is 1.84 percent, while the median is 1.85 percent. The mean and median dividend yield are calculated over both dividend-paying and non-dividend-paying firms. The median number of analysts following a firm is 8.34, while the mean is about 12. The firms in the sample range from $3.08 million in book value of assets to $178.6 billion. The mean insider ownership is 6.31 percent, and the median ownership is 2.14 percent. All values represent averages over the sample period, 1988-1992.

**Table 1—Descriptive Statistics**

The number of observations for each variable is 446. The sample consists of manufacturing firms (SIC 2000-3999) that trade either on the NYSE or the AMEX over the period, 1988-1992. DIVYLD is the ratio of dividends per share to price per share. The sample includes 158 non-dividend-paying firms. INSOWN is the fraction of equity held by all officers and directors of the firm. ANAL is the number of analysts following the firm. CFTOB is the ratio of earnings before interest, depreciation and taxes to book value of assets. MTOB is the ratio of market value to book value of assets. The market value of assets equals the market value of equity plus the book value of total liabilities. BVA is the book value of assets

| Variable | Mean | Median | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| DIVYLD | 1.84% | 1.85% | 1.73% | 0 | 8.6% |
| INSOWN | 0.0631 | 0.0214 | 0.0939 | 0 | 0.5772 |
| ANAL | 11.9 | 8.34 | 10.68 | 1 | 43.7 |
| Log (ANAL) | 1.964 | 2.12 | 1.118 | 0 | 3.78 |
| MTOB | 1.895 | 1.358 | 1.647 | 0.7114 | 16.94 |
| CFTOB | 0.138 | 0.1418 | 0.0948 | -0.7922 | 0.4054 |
| BVA ($ mill.) | 4154 | 577.63 | 15500 | 3.080 | 178600 |
| Log (BVA) | 20.28 | 20.17 | 1.916 | 14.94 | 25.91 |

## Empirical Results

In Table 2, the specification in (1) is estimated using a Tobit model. The dependent variable is dividend yield (DIVYLD) which assumes a value of zero for non-dividend-paying firms and equals the measured dividend yield otherwise. The independent variables used are the insider ownership variable, analyst following, growth opportunities (MTOB), the cash flow measure (CFTOB), and the dummy variable, DIST, that identifies firms with a higher likelihood of distress. The results indicate that the coefficient on both analyst following (LOGANAL) and cash flow (CFTOB) are positive and significant at the 1 percent level as indicated by the asymptotic t statistics. The coefficient on growth opportunities (MTOB) is negative and also significant at the 1 percent level. The coefficient on the distress variable is positive and significant at the 10 percent level. As stated earlier, the sample contains several firms with negative earnings. The Tobit model would have ascribed a dividend payout ratio (ratio of dividends to earnings) of zero to dividend-paying firms with negative earnings. To test for robustness, the sample is restricted to firms with positive earnings (364 firms) and the specification in equation (1) is estimated using a Tobit model with the dividend payout ratio as the dependent variable. Except for the insignificance of the cash flow variable, the results are qualitatively similar to those in Table 2.

**Table 2—A Tobit Analysis Dividend Policy and Asymmetric Information**

The dependent variable, DIVYLD, is the ratio of dividends per share to price per share of common stock. It equals the measured dividend yield for dividend-paying firms and zero for non-dividend-paying firms. INSOWN is the fraction of equity held by all officers and directors of the firm. LOGANAL is the logarithm of the number of analysts following the firm. CFTOB is the ratio of earnings before interest, depreciation, and taxes to book value of assets. MTOB is the ratio of market value to book value of assets. The market value of assets equals the market value of equity plus the book value of total liabilities. DIST is a dummy variable whose value equals one for firms whose CFTOB and MTOB simultaneously lie below their corresponding sample median values. The sample consists of 446 manufacturing firms (SIC 2000-3999) that trade either on the NYSE or the AMEX over the period, 1988-1992

| Variable | Coefficient (t stat) |
|---|---|
| Intercept | -0.001 |
| | (-0.219) |
| INSOWN | -0.0185 |
| | (-1.313) |
| LOGANAL | 0.0074*** |
| | (6.228) |
| CFTOB | 0.1202*** |
| | (4.621) |
| MTOB | -0.011*** |
| | (-6.406) |
| DIST | 0.0051* |
| | (1.777) |
| Sample size | 446 |
| Chi squared | 156.47*** |

***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively

The positive coefficient on analyst following (LOGANAL) suggests that firms with less asymmetric information pay higher dividends. This finding is consistent with the pecking order theory, but inconsistent with the signaling theory. This result with respect to the relation between dividends and asymmetric information is robust to other proxies (for asymmetric information) such as the ratio of R&D to assets, the ratio of property, plant, and equipment to assets, and the ratio of intangibles to assets. The negative coefficient on the growth measure (MTOB) and the positive coefficient on the cash flow measure (CFTOB) are also consistent with the predictions of the pecking order theory.[7] The positive coefficient on DIST suggests that, other things equal, firms with both low cash flow and low growth opportunities pay higher dividends than the rest of the sample firms. The evidence in support of this conjecture is weak.[8] The overall results in Table 2 are thus consistent with the predictions of the pecking order theory.[9]

A variant of the standard Tobit model was estimated on the data. This model produces the same point estimates as the standard model, but provides standard errors that are robust to heteroscedasticity. The results from this alternative specification are qualitatively similar to those from the standard model (Table 2). To check for robustness, a Tobit model was estimated using data that were averaged over the three-year period, 1990-1992. The results, not reported here for brevity, are qualitatively similar to those in Table 2. A Tobit model also was estimated for each year in the sample period, 1988-1992. Again, the results are qualitatively similar to those in Table 2. The results are also robust when a Tobit model was estimated on the pooled data over the sample period, 1988-1992.

## Dividend Policy and Insider Ownership

After controlling for the effects of asymmetric information (with analyst following), the results from the Tobit model (Table 2) indicate that dividends are unrelated to the insider ownership variable. This finding does not provide support for the monitoring role of dividends in reducing agency costs of equity. Previous studies document a negative relation between dividends and insider ownership; they inter-

[7] The variable MTOB may be viewed as a proxy for asymmetric information if firms with higher growth opportunities are harder to value. The negative coefficient on MTOB indicates that firms with higher growth opportunities (which implies higher asymmetric information) pay lower dividends. This result is consistent with the pecking order theory.

[8] The positive coefficient in the Tobit regression also may stem from the fact that, other things equal, distressed firms have lower prices (or market values), implying a higher dividend yield (for these firms) even when dividend policy is invariant to financial distress.

[9] The causality between dividends and slack is unclear. Despite the lack of causality, the specification in equation (1) was estimated using a Tobit model while controlling for slack. Slack is calculated as the ratio of cash and short-term investments to book value of assets, and the model was estimated on a sub-sample (374 firms) for which the data on slack were available. The results obtained are qualitatively similar to those in Table 2.

pret this result as providing support for the agency cost argument. In contrast, we do not find any relation between dividends and insider ownership. This inconsistency between our finding and the previous evidence may be explained as follows.

Bhushan (1989) finds that, other things equal, analyst following is negatively related to insider ownership. Bhushan argues that the demand for analyst services, and consequently analyst following, stems from outsiders to the firm. Therefore, other things equal, analyst following will be higher for firms with a lower insider ownership, implying a negative relation between the two. A lower analyst following implies higher asymmetric information. Therefore, a higher insider ownership also indicates higher asymmetric information. The pecking order theory predicts an inverse relation between dividends and the level of asymmetric information. Alternatively, the pecking order theory predicts a positive relation between dividends and analyst following. Therefore, a positive relation between dividends and analyst following also implies an inverse relation between dividends and insider ownership given the inverse relation between analyst following and insider ownership.

Hence, the inverse relation between dividends and insider ownership found in earlier studies may be manifesting an asymmetric information effect when the level of asymmetric information is not explicitly controlled. In this paper, we explicitly control for the level of asymmetric information (with analyst following) and find that the insider ownership variable is insignificant. The insignificance of the insider ownership variable seems to suggest that the insider ownership variable contains no additional information when the level of asymmetric information is explicitly controlled with analyst following. The implication is that the insider ownership variable (in earlier studies) may have served as a proxy for an asymmetric information effect, and not an agency cost effect, when the level of asymmetric information is not explicitly controlled.

In other words, the previous findings on the role of insider ownership in determining dividend policy appear to be more strongly related to asymmetric information than to agency costs. In addition, the negative relation between dividends and insider ownership documented in previous studies is also consistent with the pecking order theory insofar as the insider ownership variable serves as a proxy for the level of asymmetric information.

## Dividend Policy and Equity Issues: A Further Test of the Pecking Order Theory

The pecking order theory suggests that firms should exhaust their internal funds before resorting to external financing. In other words, firms that raise funds through external sources, other things equal, must use a higher amount of internal funds (or pay lower dividends). To test this hypothesis and to provide additional support for the pecking order theory, we examine dividend policy while controlling for common equity issues over the sample period, 1988-1992. The data on equity issues were

obtained from the Securities Data Company (SDC) database and indicate that 77 of the sample firms issued common equity at least once in the sample period, 1988-1992. The pecking order theory implies that, other things equal, firms that issue equity should pay lower dividends. A dummy variable, ISSUE, is constructed that assumes a value of one for equity-issuing firms and zero otherwise. The results in Table 3 (Model 1) indicate that, other things equal, firms that issue equity pay lower dividends. We also examine the impact of the amount raised through the equity offering on the level of dividends paid. We find that the amount paid as dividends is negatively related to the amount raised (RELAMT) through the equity offering (Model 2). These results suggest that firms that resort to external sources for funds attempt to first exhaust their internal funds by paying lower dividends. The rest of the results are qualitatively similar to those in Table 2.

**Table 3—Dividend Policy, Pecking Order Theory and Equity Issues**

The dependent variable, DIVYLD, is the ratio of dividends per share to price per share of common stock and equals the measured dividend yield for dividend-paying firms and zero otherwise. INSOWN is the fraction of equity held by all officers and directors of the firm. LOGANAL is the logarithm of the number of analysts following the firm. CFTOB is the ratio of earnings before interest, depreciation, and taxes to book value of assets. MTOB is the ratio of market value to book value of assets. The market value of assets equals the market value of equity plus the book value of total liabilities. DIST is a dummy variable whose value equals one for firms whose CFTOB and MTOB simultaneously lie below their corresponding sample median values. ISSUE is a dummy variable that assumes a value of one for those firms that have issued common equity at least once in the sample period 1988-1992 and zero otherwise. RELAMT is the ratio of the amount raised to the book value of assets. The sample consists of 446 manufacturing firms (SIC 2000-3999) that trade either on the NYSE or the AMEX over the period, 1988-1992. 77 firms issued common equity at least once in the sample period

| Variable | (Model 1)<br>Coefficient<br>(t stat) | (Model 2)<br>Coefficient<br>(t stat) |
|---|---|---|
| Intercept | 0.00093 | 0.0018 |
| | (0.202) | (0.391) |
| INSOWN | -0.0162 | -0.0105 |
| | (-1.153) | (-0.748) |
| LOGANAL | 0.00742*** | 0.0068*** |
| | (6.302) | (5.806) |
| CFTOB | 0.11380*** | .11206*** |
| | (4.429) | (4.423) |
| MTOB | -0.01099*** | -0.0105*** |
| | (-6.420) | (-6.19) |
| DIST | 0.00483* | 0.00372 |
| | (1.717) | (1.327) |
| ISSUE | -0.0076** | 0.0042 |
| | (-2.522) | (0.949) |
| RELAMT | | -0.0815*** |
| | | (-3.331) |
| Sample size | 446 | 446 |
| Chi squared | 162.86*** | 176.20*** |

***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively

## Dividend Policy and Firm Size

Smith and Watts (1992) and Gaver and Gaver (1993) find a positive relationship between dividend yield and size. They do not provide any explanation for this relation. Firm size may serve as a proxy for asymmetric information where larger firms have less asymmetric information (Atiase, 1983; Shores, 1990; among others).[10] In Table 4 (Model 1), firm size is used as a proxy for asymmetric information and the specification in (1) is estimated using a Tobit model with analyst following replaced by firm size. Firm size is calculated as the logarithm of the book value of assets. The results confirm the relation found between dividends and analyst following. Specifically, we find that larger firms, which have less asymmetric information, pay higher dividends. This result is consistent with the pecking order theory and also confirms the finding in Smith and Watts (1992) and in Gaver and Gaver (1993). The rest of the results are qualitatively similar to those obtained in Table 2. A Tobit model is also estimated by including both size and analyst following along with the other explanatory variables. The results (Model 2) indicate that while size is positive and significant, analyst following is insignificant. The insignificance of analyst following in the presence of size may be attributable to the fact that size and analyst following are highly correlated (as indicated by a correlation coefficient of about 0.82), resulting in a substantial overlap between the explanatory powers of these two variables. This is borne out by the collinearity diagnostics performed on the data.[11] The collinearity diagnostics provide a more powerful way to detect linear dependencies among the explanatory variables than simple pairwise correlations (Belsley, 1991).[12]

The collinearity diagnostics indicate the presence of a high degree of collinearity (when size is introduced into the model) which appears to be degrading the estimate of the coefficient on analyst following and hence its insignificance. It is also possible that analyst following may be proxying firm size and firm size, in turn, may serve as

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[10] For instance, Shores (1990) examines the relation between the information content of earnings announcements and several variables that proxy for interim information. A higher level of interim information implies less asymmetric information. Specifically, the author uses firm size and analyst following in addition to five other variables as proxies for interim information. The results indicate that the relation between the information content of earnings announcements and interim information is qualitatively similar across all the seven proxies. The results also indicate a substantial overlap in the explanatory power of the proxy variables. Shores suggests that the results support the information interpretation of firm size.

[11] The procedure on collinearity diagnostics, suggested by Belsley, Kuh, and Welsch (1980), is followed to compute the condition indexes for the data. The highest condition index for the model without size is about 8 which may indicate the presence of weak linear dependencies. When analyst following is replaced with size, however, the highest condition index jumps to about 35. When the model includes both size and analyst following, the highest condition index for the model is about 63. These diagnostics indicate the presence of stronger linear dependencies when size is introduced into the model.

[12] A pairwise correlation matrix, not reported here, is available upon request.

a proxy for other effects in addition to asymmetric information. Therefore, to rule out a simple size-based explanation of dividend policy and to provide evidence that analyst following (a proxy for asymmetric information) has a separate effect on dividend policy apart from firm size, we perform the following test.

**Table 4—Dividend Policy, Asymmetric Information and Firm Size**

The dependent variable, DIVYLD, is the ratio of dividends per share to price per share of common stock. It equals the measured dividend yield for dividend-paying firms and zero for non-dividend-paying firms. INSOWN is the fraction of equity held by all officers and directors of the firm. LOGANAL is the logarithm of the number of analysts following the firm. CFTOB is the ratio of earnings before interest, depreciation, and taxes to book value of assets. MTOB is the ratio of market value to book value of assets. The market value of assets equals the market value of equity plus the book value of total liabilities. SIZE is the logarithm of the book value of assets. DIST is a dummy variable whose value equals one for firms whose CFTOB and MTOB simultaneously lie below their corresponding sample median values. The sample consists of 446 manufacturing firms (SIC 2000-3999) that trade either on the NYSE /AMEX over the period, 1988-1992

| Variable | (Model 1)<br>Coefficient<br>(t stat) | (Model 2)<br>Coefficient<br>(t stat) |
|---|---|---|
| Intercept | -0.11220*** | -0.12604*** |
| | (-7.972) | (-6.388) |
| INSOWN | 0.0027 | 0.0013 |
| | (0.201) | (0.098) |
| LOGANAL | | -0.0018 |
| | | (-1.007) |
| CFTOB | 0.11445*** | 0.11709*** |
| | (4.77) | (4.865) |
| MTOB | -0.0084*** | -0.0081*** |
| | (-5.241) | (-5.000) |
| SIZE | 0.0059*** | 0.0068*** |
| | (8.944) | (6.411) |
| DIST | 0.0048* | 0.0045* |
| | (1.812) | (1.691) |
| Sample size | 446 | 446 |
| Chi squared | 199.30*** | 200.30*** |

***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively

## Dividend Policy, Asymmetric Information, and Issue Costs

The pecking order theory suggests that asymmetric information problems exacerbate the underpricing (magnitude of price decrease) associated with new capital issues. Consequently, firms may be reluctant to issue equity when their stock is undervalued and may forgo positive net present value investments. The underpricing that results from the asymmetric information problem may be viewed as one component of issue costs associated with raising capital through external sources. Issue costs can be controlled by financing investments with slack which can be accumulated by paying lower dividends. Therefore, the relation between asymmetric information and dividends subsumes the argument that asymmetric information

problems adversely affect issue costs which can be controlled by paying lower dividends.

To establish the link between asymmetric information and issue costs, we examine the relation between issue costs and analyst following (and a host of firm-specific variables) for a sample of seasoned equity offerings. The firm-specific variables (which includes firm size) used are the ones identified by the issue cost literature as being relevant in explaining issue costs (Guo and Mech, 1995). To maintain consistency with our dividend sample, we restrict the sample of seasoned equity offerings to those that were made by firms that trade either on the NYSE or the AMEX over the period, 1986-1992.

We regress issue costs on analyst following, firm size, the systematic risk, and the unsystematic risk of the firm. The systematic risk and the unsystematic risk correspond to the beta and the standard error of the regression from the market model regressions for each firm. The dependent variable, issue costs, equals the sum of underpricing (magnitude of price decrease), gross spread paid to the underwriter, and other expenses divided by issue proceeds. The results (not reported here) indicate that only analyst following and unsystematic risk are significant in this regression. The results also indicate that, after controlling for firm size, issue costs are negatively related to analyst following. A higher analyst following implies less asymmetric information. Therefore, this finding suggests that issue costs increase with the level of asymmetric information between the firm and its investors. The relation between issue costs and analyst following holds true after controlling for firm size. Therefore, issue costs appear to be affected by the level of asymmetric information given firm size.

To establish the link between issue costs and dividends, we compute predicted issue costs for our sample of firms (used to analyze dividend policy). The predicted issue costs provide an estimate of issue costs for the sample firm if it were to issue equity and are computed as follows. First, we use the estimates from the regression (of issue costs on the various variables) to obtain the relation between issue costs and analyst following, firm size, systematic risk, and unsystematic risk. Next, we use this estimated relation (provided in Table 5) to compute the predicted issue costs for the sample of firms used in this paper to analyze dividend policy.[13]

In Table 5, a Tobit model, with the dividend yield as a dependent variable, is estimated for each year in the sample period, 1988-1992. The independent variables include the insider ownership variable, growth opportunities (MTOB), the cash flow variable (CFTOB), predicted issue costs (PRED), and the distress variable (DIST). The results (Table 5) indicate that the coefficient on predicted issue costs is negative and significant, implying a negative relation between dividends and issue costs. This

[13] Even though only analyst following and unsystematic risk were significant, all the variables were used to compute the predicted issue costs.

negative relation between dividends and issue costs holds true (not reported here for brevity), even after controlling for firm size. Therefore, these results provide support for the link between asymmetric information and dividends that obtains through issue costs. The significance of analyst following in the issue cost regressions, after controlling for firm size, suggests that the level of asymmetric information adversely affects issue costs, which in turn are negatively related to dividends. In addition, the results also establish that analyst following appears to have a separate effect on dividend policy apart from firm size and thus rule out a simple size-based explanation of dividend policy. The signaling explanation is not relevant in the context of the issue cost argument, as it has already been eliminated by the positive sign of the coefficient on the asymmetric information variable (analyst following) in Table 2.

**Table 5—Dividend Policy and Issue Costs**

DIVYLD is the ratio of dividends per share to price per share of common stock. It equals the measured dividend yield for dividend-paying firms and zero for non-dividend-paying firms. INSOWN is the fraction of equity held by all officers and directors of the firm. MTOB is the ratio of market value to book value of assets. The market value of assets equals the market value of equity plus the book value of total liabilities. CFTOB is the ratio of earnings before interest, depreciation, and taxes to book value of assets. DIST is a dummy variable whose value equals one for firms whose CFTOB and MTOB simultaneously lie below their corresponding sample median values. PRED is the predicted issue costs for the sample firms and is computed using the following specification:

PRED = 0.091018 - 0.013195 * LOGANAL + 0.003104 * BETA + 1.570256 * SER
- 0.001948 * LOGMVE

Specifically, PRED is the predicted value of the sum of underpricing, gross spread and other expenses divided by issue proceeds if the sample firm were to issue equity. LOGANAL is the number of analysts following the firm. BETA and SER are the market model beta and the standard error of the market model regressions, respectively. LOGMVE is the logarithm of the market value of equity. The sample consists of manufacturing firms (SIC 2000-3999) that trade either on the NYSE/ AMEX over the period, 1988-1992

| Variable | 1988 Coeff. (t stat) | 1989 Coeff. (t stat) | 1990 Coeff. (t stat) | 1991 Coeff. (t stat) | 1992 Coeff. (t stat) |
|---|---|---|---|---|---|
| Intercept | 0.0416*** | 0.0695*** | 0.024 | 0.0551*** | 0.0482*** |
| | (2.927) | (4.732) | (0.672) | (7.917) | (6.839) |
| INSOWN | -0.0132 | 0.0123 | -0.0256 | 0.0518*** | 0.0373** |
| | (-0.511) | (0.369) | (-0.321) | (3.005) | (1.965) |
| MTOB | -0.01723*** | -0.0101** | -0.0035 | -0.00597*** | -0.00684*** |
| | (-2.691) | (-2.259) | (-0.316) | (-3.666) | (-3.309) |
| CFTOB | 0.20594*** | 0.0685 | 0.1965 | 0.00596 | 0.0309 |
| | (3.719) | (1.164) | (1.502) | (0.205) | (1.042) |
| DIST | 0.0066 | 0.0025 | 0.0179 | 0.0123*** | 0.0075* |
| | (0.955) | (0.307) | (0.907) | (3.162) | (1.867) |
| PRED | -0.60298*** | -0.96472*** | -0.77923** | -0.59982*** | -0.53151*** |
| | (-4.547) | (-5.976) | (-2.294) | (-8.709) | (-7.200) |
| Sample size | 218 | 244 | 253 | 258 | 267 |
| Chi squared | 59.02*** | 60.4*** | 13.076** | 113.44*** | 85.22*** |

***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively

## Conclusion

The empirical results above indicate that dividends are positively related to both analyst following and cash flow, but negatively related to growth opportunities. A higher analyst following implies less asymmetric information. The positive relation between dividends and analyst following is consistent with the pecking order theory and inconsistent with the signaling theory. In addition, the positive relation between dividends and cash flow and the negative relation between dividends and growth opportunities are also consistent with the pecking order theory. The results also indicate that dividends are unrelated to the insider ownership variable when the level of asymmetric information is explicitly controlled. This finding suggests that the previous results on the relation between insider ownership and dividend policy appears to be more strongly related to asymmetric information than to agency costs. The negative relation between dividends and the amount raised through equity issues provides further support for the pecking order theory.

The evidence with respect to analyst following and issue costs suggests that asymmetric information problems adversely affect issue costs. This result holds true after controlling for firm size. The negative relation between predicted issue costs and dividends provides support for the link between asymmetric information and dividends that obtains through the impact of issue costs on dividend policy. This relation among dividends, asymmetric information, and issue costs also rules out a size-based explanation of dividend policy and establishes that analyst following has a separate effect on dividend policy apart from firm size.

In sum, our results provide support for a pecking order explanation of dividend policy and offer new evidence on the effect of asymmetric information on dividend policy. The overall nature of the results is also consistent with Allen and Michaely (1995, p. 833) who suggest

> At this stage, we cannot recommend an optimal dividend policy. There are, however, several general (and, admittedly, somewhat speculative) suggestions we can come up with:
>
> 1. To the greatest extent possible, firms that are associated with a high degree of information asymmetry and large growth opportunities should avoid paying dividends. The significant costs associated with raising equity capital for these firms makes payment of dividends even more costly.

In this paper, we provide direct evidence on the above suggestions made by Allen and Michaely. Even though the implications of the pecking order theory for dividend policy are often discussed, the dividend policy literature lacks a complete empirical analysis of these implications. Our paper serves to fill this gap.

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