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# Are Dividends Smoothed Signals of Earnings Asymmetry? An Empirical Investigation

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This study tests the implication of the dividend signalling models that asymmetric information regarding expected future earnings leads to dividend signalling. The degree of asymmetry is measured, using the earnings estimates in the I/B/E/S expectational database. In the light of the empirical evidence that intertemporal dividend behavior differs from the implications of single-period models, we propose an asymmetric information scenario that may lead to the phenomenon of "dividend smoothing." We also address the problem of measurement error inherent in the tests of the signalling models. Our results show that both the dividend levels and changes are positively related to the degree of asymmetry observed by the manager. In addition, managers appear to signal promptly with providing valuable private information but tend to wait before cutting dividends. We also find weak empirical evidence that dividends are smoothed.

## I. INTRODUCTION

This study tests the implication of the dividend signalling models that asymmetric information regarding expected future earnings leads to signalling through dividends. Recent successes in constructing signalling equilibria with dividends have led to several explanations of "the dividend puzzle." A few examples of these models are Bhattacharya [4], Miller and Rock [15], and John and Williams [9]. These explanations are rooted in the assumption that information asymmetry regarding expected future earnings exists between the managers and the investors (viz, the managers have superior information about the firm compared to the outside investors)[1].

Early empirical tests of the signalling models (e.g., Aharony and Swary [1]) demonstrate that unexpected dividend and unexpected price changes are positively correlated. Asquith & Mullins [2] detect a similar phenomenon for

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the firms that initiate dividend payments. Ofer and Siegel [16] show that unexpected dividend changes lead the analysts rationally to revise the forecast of the firm's earnings per share (EPS). Healy and Palepu [8] find that dividend initiations/omissions predict changes in future earnings. Another stream of literature, beginning with Lintner's [14] partial adjustment model, studies the econometric behavior of dividends. Lee, Wu, and Djarraya [13] present an improvement by integrating elements of dividend signalling in it. However, all previous tests study the reactions of the market and the analysts to dividend changes or the time-series behavior of dividends, not to the manager's dividend decision. In this paper we investigate if managers base the dividend decision on the information asymmetry regarding future earnings of the firm. Thus, the study can be viewed as a direct test of dividend signalling theories.

A commonly accepted implication of the dividend signalling models (e.g., John and Williams [9] or Ambarish, John, and Williams [3]) is that, across firms, dividend level reflects the value of private information. Therefore, we measure the information asymmetry regarding expected future earnings between the manager and the analyst and use it to explain dividend levels. Also, as the models are typically single period, their implications are not quite clear in an intertemporal sense. For instance, a firm may have highly valuable private information in the first period, causing it to choose a high dividend level. In the next period, the firm may not have valuable private information. Should this cause the manager to declare no dividend in the second period? As Black [5] observes, "For one reason or another, managers and directors do not like to cut the dividend. So, they will raise the dividend only if they feel the company's prospects are good enough to support the higher dividend for some time." In such an intertemporal case, dividend changes may be more informative than the levels of dividends. Indeed, Black further states, "...dividend changes, or the fact that dividend doesn't change, may tell investors more about what the managers really think than they can find out from other sources." Therefore, we also study the relationship between private information and dividend changes. In the light of the above-described managerial aversion to cutting dividends, we also study if managers' informational motivation is different for dividend increases and decreases.

We also propose an asymmetric information scenario, which may lead to the phenomenon of "dividend smoothing."[2] Lintner [14], using aggregate data, demonstrated that the manager's behavior did not seem to be consistent with the existing single period models. This evidence was corroborated by the more

formal econometric analyses of Fama and Babiak [6], using firm level data. More recently, Lee, Wu, and Djarraya [13] have provided similar evidence. This divergence of the intertemporal behavior of dividends from the theoretically accepted behavior in a single period environment is commonly known as "dividend smoothing." Lintner [14] suggested behavioral reasons as the cause of this phenomenon. John and Nachman [10] present a theoretical model in which smoothing emerges as a result of liquidity demand. Kumar and Spatt [11] present an intertemporal model in which firms have private information on their prospects and their systematic risk. They demonstrate that the firms, under certain conditions, will smooth dividends to signal low systematic risk. We propose that dividend smoothing may emerge as a result of adjustment costs and managerial caution as described in Black [5]. Upon observing an asymmetry, the manager may not immediately increase dividends as there are costs to frequently adjusting the level of dividends. He may wait for further resolution of uncertainty with the passage of time for both himself and the market. This would lead to signalling only in response to the asymmetry that persists over time. Also, the dividends will be smoother compared to those observed when the manager bases the dividends on the current asymmetry. We hypothesize that the manager will base the dividend decision on the persistent asymmetry. Therefore, we test if the persistent asymmetry explains dividend levels and changes. Finally, we also address the issue of measurement error in the estimation of the models.

The paper is organized as follows. The second section presents the empirical models. The third section describes the data, with the results reported in the fourth section. Finally, the conclusions are presented in the fifth section.

## II. THE EMPIRICAL MODELS

To develop the empirical models, we assume that there are two sets of participants, namely the managers (insiders) and the analysts (outsiders). At time t, the information set of the analyst is a proper subset of the manager's information set, i.e.,

$$\varphi_t^a \subset \varphi_t^m \subset \Omega, \tag{1}$$

where $\Omega$ is the complete information set, which contains all necessary information to know the time $t+\tau$ earnings. Thus, $\Omega$ contains the relevant

information that will arrive from time t to t+τ in addition to the relevant information available to the manager at time t (viz, $\varphi_t^m$). All participants make optimal forecasts with respect to their information sets. They define $X_{t+\tau}$ to be the time t+τ earnings per share.

We assume that the manager knows the analyst's expectation (publicly available information) whereas the converse is not true due to the confidential nature of inside information. The manager-observed current asymmetry ($O_t$), defined below, is essentially the difference in the conditional earnings expectations of the manager and the analyst.

$$O_t = E(X_{t+\tau} \left| \varphi_t^m \right.) - E(X_{t+\tau} \left| \varphi_t^a \right.). \qquad (2)$$

This observed earnings asymmetry provides the motivation for dividend signalling.[3] As expectations are assumed to be rational and the analyst's information set is a proper subset of the manager's information set, the manager's expectation will typically be closer to the ex-post value than the analyst's estimate. This makes dividend signalling meaningful despite the manager's lack of perfect information about ex-post earnings ($X_{t+\tau}$). Thus the ex-post earnings can be treated as a noisy ex-post observable estimator of the manager's expectation. This assumption is crucial as the manager's expectation is based on inside information and is not publicly available for corporations on a historical basis. Shareholder litigation presents a difficult obstacle for a company seeking to disseminate future projections.[4] The situation is typical of most economic settings, in which the econometrician has less information than the economic agent but does observe the ex-post realizations. We use ex-post earnings as a proxy for the manager's expectations. This leads to the problem of measurement error. The correction of this problem and its economic interpretations are discussed after the presentation of the models.

## A. Contemporaneous Model

Dividend signalling models suggest a cross-sectional relationship between the levels of dividends and the value of private information. In the signalling equilibrium of John and Williams [9], "... firms with more favorable inside information optimally pay higher dividends, other things equal, and receive appropriately higher prices for their stock." Thus a regression of the dividend level on the observed asymmetry should produce a significantly positive

coefficient. We also regress the change in dividends (current dividend less the previous dividend) on the observed asymmetry to see if the asymmetry can cross-sectionally explain changes in dividends.[5] Therefore,

$$D_{s,T} = \alpha + \beta * O_{s,T} + u_{s,T}, \quad s = 1,2,...N, \tag{3}$$

where, $D_{s,T}$ is the level of (or change in) dividends, $O_{s,T}$ is the manager-observed current asymmetry of the firm s at time T. Consistent with the dividend signalling hypothesis, we expect to see a positive coefficient on the manager-observed asymmetry.

B. Smoothing Model

Lee and Wu [12] state that investors may pay more for a company with a smoother financial series. They also suggest that smoothing is believed to be a signal enhancing technique as it reduces the volatility of the series. We hypothesize that the manager will react to the asymmetry that persists over the long run as the manager-observed current asymmetry will often have a transient component. In other words, the manager, upon observing the asymmetry, will wait to see if the analyst can infer the private information through analysis and/or through revelation of further information over time. However, if the analyst is unable to infer that information and the manager's expectation remains unchanged, the manager will signal with dividends. This behavior will be observed in the presence of adjustment cost or managerial caution.

We propose that the dividends should be related to the persistent asymmetry over the long run. We choose four quarters (one year) as our definition of long run. The following regression is estimated.

$$D_{s,T} = \alpha + \beta * PO_{s,T} + u_{s,T}, \quad s = 1,2,...N, \tag{4}$$

where, $D_{s,T}$ is the level of (or change in) dividends, $PO_{s,T}$ is the manager-observed persistent asymmetry (the average of the current and the last three manager-observed asymmetries prior to dividend declarations) of the firm s at time T. We would like to point out that, although annual EPS is forecasted, analysts' forecasts are available on a monthly basis for the companies. So, averaging over the last year gives us an indication whether analysts are converging to the insiders' forecasts. We expect to see a positive coefficient on the manager-observed persistent asymmetry.

C. Measurement Error

An important factor that can potentially affect the Ordinary Least Squares (OLS) estimation of the above two models is the issue of measurement error. Ideally we would like to have a precise measure of the asymmetry between the analysts and the manager. Unfortunately, the manager's forecasts are unknown. So we are forced to use the ex-post earnings as a noisy estimator of the manager's expectations. Essentially, we employ the analysts' forecast error, which can be decomposed as follows:

$$\widetilde{O}_t = X_{t+\tau} - E(X_{t+\tau} \mid \varphi_t^a) = (E(X_{t+\tau} \mid \varphi_t^m) - E(X_{t+\tau} \mid \varphi_t^a)) + (X_{t+\tau} - E(X_{t+\tau} \mid \varphi_t^m)). \quad (5)$$

Therefore, the variable we use is based on the difference in the manager and analysts' expectations. However, it also contains a measurement error of the magnitude of the manager's forecast error (the second set of parentheses on the right-hand side). The proxy variable ($\widetilde{O}_t$) is related to the desired value as below.

$$\widetilde{O}_{s,T} = O_{s,T} + \varepsilon_{s,T}. \quad (6)$$

The error term ($\varepsilon_{s,T}$) is the deviation of the ex-post earnings from the manager's expectation.

In a single variable case, the error introduces a downward bias in the OLS estimate of the coefficient. The extent of the bias depends on the magnitude of the variance of the measurement error ($\sigma_\varepsilon^2$) relative to the variance of the manager-observed asymmetry ($\sigma_O^2$). If the true regressor has a large variance compared to the measurement error, the impact of the problem on OLS estimation will be negligible.

We perform instrumental variable (IV) estimation to determine whether the measurement error significantly affects our parameter estimates. If the manager chooses the dividend based on his earnings expectation, the market reaction would depend on the information conveyed (i.e. the manager-observed asymmetry). We used the same day return (basically the effect of the dividend announcement) as an instrument to the manager-observed asymmetry (the explanatory variable), which is observed with an error by us (the econometricians). The premise is that the market reaction to the announcement

will be dependent on the asymmetry between the manager and the analysts (therefore, the market). This follows from the dividend signaling hypothesis as the manager will only signal if there exists an asymmetry with the market expectations. Also, the greater the asymmetry, the larger the dividend change and the announcement effect. Therefore, the same-day return should serve us well as an instrument to the manager-observed asymmetry, which we measure with an error. Hence, under the null hypothesis of dividend signaling, we do have a well identified instrument.[6] Also, using ex-post earnings does not permit the manager's expectations to change within a year.[7] That is because we use forecasts for annual EPS and there are four dividend decisions in a year. Therefore, in a given year of dividend decision-making, our proxy for the manager's expectation is essentially the ex-post EPS. Using the instrument permits the manager's expectation to be dynamic.

In the first stage, we regress our estimate of asymmetry on the declaration day return ($R_{s,T}$) to orthogonalize the error term as below:

$$\tilde{O}_{s,T} = b_0 + b_1 * R_{s,T} + \eta_{s,T}. \quad (7)$$

Using this regression model, we form the following estimate of the manager-observed asymmetry.

$$\hat{O}_{s,T} = \hat{b}_0 + \hat{b}_1 * R_{s,T}. \quad (8)$$

Next we use $\hat{O}_{s,T}$ and estimate equation (3). An identical methodology is used in the smoothing model (equation (4)) with the persistent asymmetry substituted for the current asymmetry. Our methodology is analogous to that of Ofer and Siegel [16] where they use a three-day price change to instrument the unexpected dividend change.

## III. DATA

The analysts' forecasts were extracted from Investment Brokers Estimate System (I/B/E/S) data base. Since the dividend signaling hypothesis implies that managers use long-term earnings in setting the dividends, we chose the longest horizon that is available. The data base available to us contains forecasts of the EPS for the current and the subsequent fiscal year for the 1976-1986 period on a monthly basis. The theory and extant empirical work suggest

that if current term earnings experience a transient increase (not expected to persist in the future), the managers do not signal with quarterly dividends. They often choose a bonus dividend (year-end dividend), which the market does not expect will recur. As the IBES database only has the current and the next year earnings forecast, we chose the next year forecasts as that would form the long-term earnings expectation. The date when the forecast was made was not known. However, the date of the addition of the record was available. We employed this date to ensure that the analysts' forecasts preceded the dividend declaration. So we picked the forecast from a date which preceded the dividend announcement and was closest to it.

The ex-post EPS was retrieved from COMPUSTAT. The dividend declaration dates and the type of distribution were obtained from CRSP Monthly Master Tape. We chose the quarterly dividends to be the subject of our study. The declaration date returns were obtained from the CRSP Daily Returns File. Our sample contains 20,994 dividend declarations across 903 companies out of which 4,416 observations represent non-zero dividend changes over the previous dividend (including 3,720 dividend increases and 696 dividend decreases).

## IV. RESULTS

We estimate the above-mentioned models for the entire sample period as a cross-section. In this case, each company contributes more than one observation, as there are multiple dividend declarations for most companies in our sample. It may be noted that there is a possibility of correlation in the dividend policies across firms and over time.[8] This still keeps the estimators unbiased but could affect the efficiency of the estimates. However, since we obtain strong significance of the slope coefficients in the pooling case below, it seems that the loss of efficiency is not too serious. The upper panel of Table 1 presents the results of cross-sectional regressions of dividend levels and changes on the current manager-observed asymmetry (equation (3)). The dividend levels are strongly related to the asymmetry supporting the theoretical assertion that managers choose the level of dividends based on their private information. Thus, we support the cross-sectional implication of the dividend signalling models that companies with more valuable inside information declare higher dividends. The changes in dividends are similarly related to the asymmetry, implying that the greater the asymmetry observed by the manager,

the larger the dividend change. For the non-zero dividend change sample, we find similar results with modestly superior R-squared values.

Next, we regress the dividend levels and changes on the persistent asymmetry as shown in equation (4). The persistent asymmetry is the average of asymmetries immediately preceding the current and previous three quarterly dividend announcements. Like before, the asymmetries are based on forecasts *preceding* the dividend announcements. These results are presented in the lower panel of Table 1. The coefficients on persistent asymmetry are significant as well. Although the r-squared values are generally very small, the values are clearly larger than the ones obtained for the contemporaneous model. Thus the persistent asymmetry appears to explain the cross-sectional variations in dividend levels and changes better than the current asymmetry does.

**Table 1**
The estimates, standard errors, and $R^2$s of the OLS estimation
of the contemporaneous and the smoothing models

**Contemporaneous Model (Equation 3)**

| Level of Dividends | | | Change in Dividends | | |
|---|---|---|---|---|---|
| $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| All Dividend Announcements | | | | | |
| 0.3124 | 0.0004* | 0.0004 | 0.0013 | 0.00011* | 0.0005 |
| 0.0014 | 0.0001 | | 0.0003 | 0.00004 | |
| Announcements with non-zero dividend changes | | | | | |
| 0.3311 | 0.0124* | 0.0199 | 0.0025 | 0.0073* | 0.0287 |
| 0.0032 | 0.0013 | | 0.0016 | 0.0006 | |

**Table 1 (continued)**

| Smoothing Model (Equation 4) | | | | | |
|---|---|---|---|---|---|
| Level of Dividends | | | Change in Dividends | | |
| $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| All Dividend Announcements | | | | | |
| 0.3160 | 0.0031* | 0.0048 | 0.0011 | 0.0006* | 0.0029 |
| 0.0014 | 0.0003 | | 0.0004 | 0.0001 | |
| Announcements with non-zero dividend changes | | | | | |
| 0.3249 | 0.0203* | 0.0471 | -.0002 | 0.0099* | 0.0468 |
| 0.0032 | 0.0013 | | 0.0016 | 0.0007 | |

All announcements and non-zero change announcements contain 20,994 and 4616 observations respectively.
The second line for each case contains the standard error.
* indicates significance at five percent based on a one-tail test of the null hypothesis that the coefficient is greater than zero.

Table 2 presents the results of the IV estimation to correct the measurement error problem. Once again, we find that coefficients on the observed asymmetry are positive and significant at conventional levels for the contemporaneous model for all as well as for non-zero dividend change observations. The results are also similar for the smoothing model. Overall, the results of the IV estimation are quite similar to those of the OLS estimation (Table 1), in that the impact of the measurement error is almost negligible, since all beta coefficients are significant. It is still worth noting that the beta coefficients in Table 1 are quite different in magnitude from those in Table 2. However, the critical issue is their significance, rather than the magnitude.

We perform OLS estimation in annual and quarterly cross-sections to check the consistency of our results. The estimates for annual cross-sections are presented in Table 3. These estimates corroborate the results for the entire period as the levels are mostly positively related to the asymmetry (current or persistent). For dividend levels, the smoothing model appears somewhat superior than the contemporaneous model with significant coefficients in eight

out of ten years. The results are somewhat weaker for dividend changes with six coefficients being significant out of ten for either model. The quarterly results, not presented for the sake of brevity, are similar.

Finally, we partitioned the non-zero dividend changes into dividend increases and dividend decreases. This resulted in 3,720 dividend increase observations and 696 dividend decrease observations. Next, we estimated the contemporaneous and smoothing models for each subset. The results are presented in Table 4. For dividend increases, we find that the coefficient on the asymmetries (current or persistent) is significant at the 5 percent level, irrespective of the estimation method (OLS or IV). Thus the dividend levels and changes appear to be strongly related to the current and persistent asymmetries. Again, the r-squared values are mostly larger for the smoothing model compared to the contemporaneous model, suggesting that the manager's signal based on the persistent asymmetry.

The results are markedly different for dividend decreases. In OLS estimation, the coefficient is not significantly greater than zero for dividend levels in the contemporaneous model. For the smoothing model, dividend changes produce a similarly insignificant coefficient. In IV estimation, the coefficients on asymmetries (current or persistent) are never significantly greater than zero. This appears strongly to suggest that the dividend decreases occurred at a time when there appeared to be no significant asymmetry (current or persistent) of information regarding the expected future earnings. As managers dislike cutting dividends 5, we hypothesize that they keep postponing the dividend cut as long as they can afford to finance dividend payments from some source. For example, a company may be able to arrange financing to pay the dividends in the interim. Another company may simply reduce its investment in the present and new business ventures. Over time, analysts can observe these actions. A typical case is the EPS announcement effect, which moves the market these days. They can also obtain the financial reports, the borrowing or liquidation information, or the sales loss information from various sources. In this manner, analysts come to the conclusion that the future earnings will not be attractive without any dividend changes, and the stock price gets bid down. In such a scenario, a dividend cut may only serve to prevent a cash drain and does not really carry a signal for the market as the market has already inferred the information from other sources. Thus, by the time the dividends are reduced, the market may already have inferred the adverse information from other sources. Our results support such a hypothesis.

**Table 2**
The estimates, standard errors, and $R^2$s of cross-sectional instrumental variable estimation of the contemporaneous and the smoothing models

**Contemporaneous Model (Equation 3)**

| Level of Dividends | | | Change in Dividends | | |
|---|---|---|---|---|---|
| $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| All Dividend Announcements | | | | | |
| 0.3287 | 0.0345* | 0.0003 | 0.0129 | 0.0313* | 0.0044 |
| 0.0053 | 0.0134 | | 0.0013 | 0.0033 | |
| Announcements with non-zero dividend changes | | | | | |
| 0.3141 | 0.0712* | 0.0062 | -0.0106 | 0.0527* | 0.0141 |
| 0.0050 | 0.0133 | | 0.0025 | 0.0065 | |

**Smoothing Model (Equation 4)**

| Level of Dividends | | | Change in Dividends | | |
|---|---|---|---|---|---|
| $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| All Dividend Announcements | | | | | |
| 0.3188 | 0.0209* | 0.0003 | 0.0040 | 0.0192* | 0.0044 |
| 0.0019 | 0.0082 | | 0.0005 | 0.0020 | |
| Announcements with non-zero dividend changes | | | | | |
| 0.3087 | 0.0536* | 0.0062 | -0.0146 | 0.0396* | 0.0141 |
| 0.0058 | 0.0100 | | 0.0029 | 0.0049 | |

All announcements and non-zero change announcements contain 20,991 and 4616 observations respectively.
The second line for each case contains the standard error.
* indicates significance at five percent based on a one-tail test of the null hypothesis that the coefficient is greater than zero.

**Table 3**
OLS estimation in annual cross-sections

| Year | Level of Dividend | | | Change in Dividend | | |
|---|---|---|---|---|---|---|
| | $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| **Contemporaneous Model (Equation 3)** | | | | | | |
| 1976 | 0.2877 | 0.0243* | | 0.0053 | 0.0008 | |
| | 0.0138 | 0.0051 | 0.0844 | 0.0030 | 0.0011 | 0.0021 |
| 1977 | 0.2775 | 0.0360* | | 0.0037 | 0.0022* | |
| | 0.0057 | 0.0023 | 0.1418 | 0.0014 | 0.0006 | 0.0100 |
| 1978 | 0.3050 | 0.0186* | | 0.0052 | 0.0018* | |
| | 0.0057 | 0.0021 | 0.0394 | 0.0011 | 0.0004 | 0.0107 |
| 1979 | 0.3194 | 0.0135* | | 0.0015 | 0.0013* | |
| | 0.0042 | 0.0015 | 0.0337 | 0.0016 | 0.0006 | 0.0021 |
| 1980 | 0.3337 | 0.0090* | | 0.0030 | 0.0017* | |
| | 0.0039 | 0.0015 | 0.0137 | 0.0010 | 0.0004 | 0.0071 |
| 1981 | 0.3317 | 0.0011 | | 0.0005 | 0.0010* | |
| | 0.0039 | 0.0012 | 0.0003 | 0.0010 | 0.0003 | 0.0043 |
| 1982 | 0.3173 | 0.0019 | | -0.0001 | 0.0014* | |
| | 0.0042 | 0.0014 | 0.0007 | 0.0008 | 0.0003 | 0.0119 |
| 1983 | 0.3047 | 0.0050* | | -0.0040 | 0.0003 | |
| | 0.0042 | 0.0015 | 0.0046 | 0.0010 | 0.0003 | 0.0003 |
| 1984 | 0.2824 | -0.0027 | | -0.0017 | 0.0001 | |
| | 0.0045 | 0.0013 | 0.0016 | 0.0011 | 0.0003 | 0.0001 |
| 1985 | 0.2968 | -0.0002 | | 0.0000 | 0.0000 | |
| | 0.0054 | 0.0002 | 0.0011 | 0.0010 | 0.0000 | 0.0000 |
| **Smoothing Model (Equation 4)** | | | | | | |
| 1976 | 0.2779 | 0.0307* | | 0.0045 | 0.0014 | |
| | 0.0141 | 0.0055 | 0.1118 | 0.0031 | 0.0012 | 0.0056 |
| 1977 | 0.2797 | 0.0362* | | 0.0031 | 0.0030* | |
| | 0.0057 | 0.0023 | 0.1347 | 0.0014 | 0.0006 | 0.0166 |
| 1978 | 0.2921 | 0.0306* | | 0.0049 | 0.0021* | |
| | 0.0056 | 0.0024 | 0.0820 | 0.0011 | 0.0005 | 0.0118 |
| 1979 | 0.3060 | 0.0224* | | -0.0002 | 0.0025* | |
| | 0.0044 | 0.0017 | 0.0675 | 0.0017 | 0.0007 | 0.0059 |
| 1980 | 0.3282 | 0.0157* | | 0.0020 | 0.0029* | |
| | 0.0039 | 0.0016 | 0.0355 | 0.0010 | 0.0004 | 0.0178 |
| 1981 | 0.3318 | 0.0061* | | 0.0000 | 0.0014* | |
| | 0.0039 | 0.0015 | 0.0062 | 0.0010 | 0.0004 | 0.0048 |
| 1982 | 0.3178 | 0.0024* | | 0.0008 | 0.0023* | |
| | 0.0042 | 0.0014 | 0.0012 | 0.0008 | 0.0003 | 0.0330 |

**Table 3 (continued)**

| Year | Level of Dividend | | | Change in Dividend | | |
|---|---|---|---|---|---|---|
| | $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| 1983 | 0.3062 | 0.0077* | | -0.0038 | 0.0006 | |
| | 0.0042 | 0.0017 | 0.0082 | 0.0010 | 0.0004 | 0.0009 |
| 1984 | 0.2877 | 0.0007 | | -0.0015 | 0.0003 | |
| | 0.0045 | 0.0016 | 0.0001 | 0.0010 | 0.0004 | 0.0002 |
| 1985 | 0.2959 | -0.0007 | | 0.0001 | 0.0000 | |
| | 0.0054 | 0.0004 | 0.0015 | 0.0010 | 0.0001 | 0.0000 |

The second line contains the standard errors of the coefficients and the r-squared values.
* indicates significance at five percent based on a one-tail test of the null hypothesis that the coefficient is greater than zero.

**Table 4**
Estimation for dividend increases and decreases

**OLS Estimation**

| Level of Dividends | | | Change in Dividends | | |
|---|---|---|---|---|---|
| $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| Contemporaneous Model, Dividend Increases | | | | | |
| 0.3631 | 0.0106* | | 0.0421 | 0.0024* | |
| 0.0037 | 0.0015 | 0.0133 | 0.0006 | 0.0003 | 0.0234 |
| Contemporaneous Model, Dividend Decreases | | | | | |
| 0.1964 | 0.0009 | | -0.1543 | 0.0032* | |
| 0.0044 | 0.0016 | 0.0003 | 0.0051 | 0.0019 | 0.0032 |
| Smoothing Model, Dividend Increases | | | | | |
| 0.3535 | 0.0206* | | 0.0404 | 0.0040* | |
| 0.0038 | 0.0017 | 0.0381 | 0.0007 | 0.0003 | 0.0473 |
| Smoothing Model, Dividend Decreases | | | | | |
| 0.1976 | 0.0035* | | -0.1547 | 0.0026 | |
| 0.0044 | 0.0015 | 0.0065 | 0.0050 | 0.0017 | 0.0026 |

**Table 4 (continued)**

| Level of Dividends | | | Change in Dividends | | |
|---|---|---|---|---|---|
| $\alpha$ | $\beta$ | $R^2$ | $\alpha$ | $\beta$ | $R^2$ |
| **Instrumental Variable Estimation** | | | | | |
| Contemporaneous Model, Dividend Increases | | | | | |
| 0.3358 | 0.0678* | | 0.0372 | 0.0126* | |
| 0.0137 | 0.0276 | 0.0016 | 0.0024 | 0.0048 | 0.0019 |
| Contemporaneous Model, Dividend Decreases | | | | | |
| 0.2028 | 0.0140 | | -0.1535 | 0.0049 | |
| 0.0073 | 0.0121 | 0.0015 | 0.0084 | 0.0139 | 0.0001 |
| Smoothing Model, Dividend Increases | | | | | |
| 0.3131 | 0.0773* | | 0.0330 | 0.0144* | |
| 0.0227 | 0.0315 | 0.0016 | 0.0039 | 0.0055 | 0.0019 |
| Smoothing Model, Dividend Decreases | | | | | |
| 0.1995 | 0.0076 | | -0.1547 | 0.0026 | |
| 0.0053 | 0.0066 | 0.0015 | 0.0061 | 0.0076 | 0.0001 |

* indicates significance at five percent based on a one-tail test of the null hypothesis that the coefficient is greater than zero.

## V. CONCLUSIONS

The test of the implication of the dividend signalling models that there exists a systematic relationship between the degree of asymmetry regarding expected future earnings and dividend levels yields strongly positive results. The dividend changes also appear to be related to the degree of asymmetry, indicating that the dividend changes are prompted by the manager-observed asymmetry.

We hypothesize that the manager would tend to signal in the presence of persistent asymmetry rather than current asymmetry, which may well be transient. The smoothing model of persistent asymmetry appears to perform

somewhat better than the contemporaneous model. Therefore, there is some empirical evidence of dividend smoothing.

We also find strong evidence that the managers' motivation is quite different for dividend increases compared to decreases. Dividend increases, consistent with signalling models, are preceded with a strong asymmetry regarding expected future earnings. Dividend decreases are not preceded by such an asymmetry, suggesting that the market may already have inferred and assimilated the negative information from other sources. This could be consistent with delay by managers in reducing dividends. Alternatively, there may be another preferred signal for signalling lower future earnings.

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## NOTES

1. Miller and Rock (1985) is based on the asymmetry about firm's current earnings. However, in their words the " ... estimate of current earnings contributes in turn to the estimate of the expected future earnings on which the firm's market value largely hinges." In John and Williams (1985), information regarding the present value of the future cash inflows is asymmetric which leads to the selection of a dividend level contingent upon the present value if the liquidity demand exceeds the internally available cash. Ambarisha, John and Williams (1987) endogenize the investment decision which was treated as exogenously given in John and Williams (1985) and choose an efficient equilibrium. Bhattacharya (1979) demonstrates that transaction costs incurred by firms in raising capital can lead to equilibrium where the signal is based on the future cash-flows.
2. For instance, in Miller and Rock (1985) dividends are paid in the residual fashion after the optimal investment decision. This would result in great variation in dividends of a firm over time.

3. There are other forms of signalling activity available. However, in this study, we assume that the only tool available to the manager is dividend signalling.
4. Harlan (1994) reports that the Securities and Exchange Commission (SEC) seeks to strengthen the 'safe harbor' provision which "would make it harder for shareholders' lawyers to press lawsuits against companies whose projections have proved wrong, according to Linda Quinn, director of the SEC's corporation finance division." This may influence the signalling behavior of corporations in the future. Nevertheless, "shareholder litigation has become the most prevalent concern for companies deciding what to disclose..."
5. We are implicitly assuming that all dividend changes are unexpected. This can be considered as a naive model where the next period's expected dividend is the same as the current dividend. A refinement would be to try and model expected dividend as a time-series and use the predicted dividend to construct unexpected changes. We thank the referee for pointing this out.
6. We tested several alternatives for the window (two, three and ten days) and found our results to be robust to the choice of the window.
7. We are grateful to the referee for pointing out this problem.
8. We thank the referee for pointing out the correlation problem.

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