FEDERAL RESERVE BANK OF ST. LOUIS
SUPERVISORY POLICY ANALYSIS WORKING PAPER

Working Paper No. 1998-01

DIVIDENDS, STOCK REPURCHASES AND SIGNALING: EVIDENCE FROM U.S. PANEL DATA

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May 1998
We thank Donald Allen, Stewart Myers, David Wheelock as well as seminar participants at the National Bureau of Economic Research Universities Research Conference, the Milken Institute for Job and Capital Formation, the Federal Reserve Bank of St. Louis, the University of Missouri at St. Louis, the University of Southern California, and Washington University in St. Louis for helpful comments. We are also grateful to Gina Franco, Tom King, Tim Wolfe, Selin Yalcindag, and Cindy Zoghi for excellent research assistance. All remaining errors and omissions are, of course, our own.

Abstract

This paper exploits yearly accounting data from 1977 to 1994 to test the relative signaling power of dividends and net stock repurchases. The specification controls for potential agency cost and asset dissipation effects. Specifically, we regress changes in future income before extraordinary items on changes in dividends, changes in net stock repurchases, and a host of control variables. We also split the sample at 1981 to measure the impact of changes in the relative taxation of distribution methods. For the full twenty-year sample, only dividend changes are correlated with changes in future income. Moreover, the dividend coefficient and the repurchases coefficient differ statistically different in every future income equation. Splitting the sample reveals that the pre-1981 subsample drives the full-sample results. Put another way, the empirical link between changes in dividends and changes in future income vanishes just as a revision of the tax law reduced the tax disadvantage of dividend distributions. This evidence supports the notion that, at least for a period in time, firms deliberately exposed shareholders to punitive taxation to signal favorable prospects.

Journal of Economic Literature Classification: G35, H32

I. Introduction

In a Miller-Modigliani world, the announcement of cash distributions to shareholders has no effect on firm value. In the real world, unanticipated increases in dividends or share repurchases correlate with jumps in the stock prices of announcing firms. Furthermore, although stock repurchases imply a lower tax burden for shareholders, many firms prefer to distribute cash with dividends.

These stylized facts suggest several puzzles. First, why does the market reward cash distributions, even when equity issues accompany such distributions? Second, why do firms rely heavily on dividends to distribute cash when repurchases offer a tax-favored alternative?

The literature offers two explanations for the distribution premium: agency cost minimization (moral hazard) and signaling (adverse selection). In the agency cost story, the market rewards firms for disgorging cash because managers waste free cash flow on negative net present value projects. Any device—dividends or repurchases—that strips firms of free cash and forces them to the capital market for funding enhances share value. In the signaling story, the market cannot distinguish between firms with good prospects and firms with poor prospects. Managers of undervalued firms use dividends or repurchases to disseminate private information. In some signaling models, dividends derive their attractiveness from tax disadvantages or commitment perceptions that make them more costly signals to mimic than repurchases. In other models, repurchases provide a stronger signal than dividends.

This paper exploits firm-level accounting data to distinguish among signaling theories for dividends and repurchases. Unlike other work, we offer a specification that tests for the relative signaling power of repurchases and dividends while controlling for other potential explanations of the distribution premium. Our evidence is important for two reasons. First, an implication of the signaling hypothesis—indeed, a necessary condition—is that expectations of future earnings increases follow unanticipated distributions. The evidence presented to date on the link between distributions and future earnings offers only weak for support the signaling story. At a general level, our results supply additional support for the notion that distributions are important as signals rather than as devices for disciplining management. Second, because our specification tests the relative signaling power of dividends and repurchases, our evidence addresses the question of whether one form of distribution dominates as a signaling device. Indeed, our findings suggest that, at least for a period of time, dividends were the stronger signal, thereby, offering support for the class of models that argues that dividends dominate repurchases as a vehicle for transmitting private information to the market.

Specifically, we regress changes in future income before extraordinary items on changes in dividends, changes in net stock repurchases, and a host of control variables. Including net stock repurchases along with dividends on the right-hand side tests whether the form of the distribution matters. Including net stock repurchases also controls for potential agency cost and asset dissipation effects that may accompany cash distributions in any form. Because the sample spans a 1981 change in tax law that reduced the relative tax disadvantage of dividends, our results offer support for the class of models that rely on tax arguments to motivate dividend signaling.

In equations estimated on the full sample (1977-1994), the form of the distribution matters statistically and economically; increases in current dividends forecast increases in income before extraordinary items one year and two years in the future. In contrast, increases in net stock repurchases do not foreshadow increases in future income. More importantly, the dividend and repurchases coefficients differ statistically, implying that dividends provided a much stronger signal. Splitting the sample at 1981 reveals that the full sample results are driven by the pre-1981 subsample. After 1981, when changes in tax law significantly reduced the tax disadvantage of dividends, neither changes in dividends nor repurchases are significantly correlated with changes in future income. This evidence supports the notion that firms deliberately expose shareholders to punitive taxation to signal favorable prospects when the tax differential between distribution methods is sufficiently large.

II. Related Literature

The modern treatment of dividends began with Miller and Modigliani (1961). In perfect capital markets, they reasoned, firm dividend policy has no effect on share value. In a world with large numbers of buyers and sellers, perfect information, zero transactions costs, no tax differentials and fully rational agents, investors should care only about a firm's future stream of earnings. Investors should care only about future earnings because they can privately create an optimal dividend policy. Because investors can privately create their own dividend policy, no one will pay a firm a premium for a specific payout policy.

Modern capital markets, of course, are not perfect. Hence, modern dividend research has sought to identify the specific Miller-Modigliani assumption that is key to the

irrelevance result. Much effort has focused on the differential treatment of dividends and capital gains in the tax code. Specifically, the individual tax code treats dividends more harshly. Not only do investors pay a higher tax rate on dividends, capital gains realization may be deferred until the most auspicious time. At the limit, investors may bequeath stock portfolios to heirs without surrendering any portion to the IRS. The tax consequences of dividends are so dramatic that, at first glance, it is puzzling that firms choose positive payouts.

Firms do, however, continue to pay dividends. In fact, in 1996 U.S. corporations paid out $218 billion in dividends (BEA 1997). Even stranger, many firms issued new equity while, at the same time, exposing their shareholders to punitive dividend taxes. Frustration over the failure of modern corporate finance to explain aggregate dividend levels, cross-sectional differences in payouts and the simultaneous existence of positive payouts and new equity issuance led Fisher Black to coin the term, "The Dividend Puzzle" (Black 1976).

Tax law does not represent the only departure from the Miller-Modigliani framework. Dividend payments may also serve as a partial solution to moral hazard problems in the firm. Separation of ownership from control allows managers to inefficiently deploy resources legally belonging to shareholders (Jensen and Meckling 1976; Jensen and Smith 1985). To combat waste, shareholders incur costs to monitor managers, and managers incur bonding costs. Yet, marginal analysis implies that residual losses are positive. Together, monitoring costs, bonding costs, and residual losses reduce firm value relative to the level that would obtain under owner-management.

Easterbrook (1984) and Rozeff (1982) employed agency costs to derive a rationale for positive dividend payouts. Commitment to dividends forces a firm to tap capital markets regularly to fund investment projects. Periodic review by capital markets, in turn, keeps managers honest and, thereby, reduces agency costs. Building on this literature, Jensen (1986) advanced a "free cash flow" hypothesis under which managers waste all free

cash flow under their discretion. In the free cash flow story, dividend payments enhance share value by preventing managers from wasting money on negative net-present-value projects. Dividends, of course, are not unique as a device for stripping free cash flow from managers or for forcing firms to submit to capital market scrutiny. Debt or stock repurchases can also perform these functions. Although direct evidence on the agency cost explanation of distributions is sparse, Lang and Litzenberger (1989) have shown that dividend changes provoke larger stock price responses for overinvesting firms—firms with Tobin's Q values less than unity—than for other firms. Christie and Nanda (1994) have also shown that firm value increased in response to the undistributed profits tax of 1936 and 1937.

Another line of research on the dividend puzzle pursues the implications of adverse selection. In the Miller-Modigliani framework, market participants possess complete information regarding all the variables important to share valuation. In the real world, however, corporate insiders know things that outsiders do not. Specifically, managers have knowledge about future earnings that does not appear in financial statements. This information gap causes firms with good prospects to trade at a discount from full information value unless managers can find some way to credibly signal the market.

Riley (1979) outlined conditions under which a signaling equilibrium will occur, that is, a market equilibrium using signals to partition good and bad quality items. For such an equilibrium to exist, the signal must have a cost and a benefit. To deter false signaling, the cost/benefit ratio of the signal must also rise with its level. Later, Bhattacharya (1979), John and Williams (1985) and Miller and Rock (1985) applied this framework to dividends. They established that positive payouts carry a cost—dividends subject recipients to relatively higher taxation or force firms to acquire costly external finance for new investment—as well as a benefit—firm value rises with the signal. Moreover, firms with poor prospects cannot afford dividend signals because they lack future slack in earnings.

Several recent papers (Bernheim 1991; Bernheim and Wantz 1995; and Bernheim and Redding 1996) have argued that tax policy makes dividends relatively more attractive than repurchases as a signaling device. In these papers, dividends signal future earnings by "burning cash." Shifting from stock repurchases to dividends burns cash because, given tax disadvantages, dividends represent the most expensive way to distribute funds to shareholders. Managers of high-quality firms can burn cash with dividends because they anticipate healthy future earnings; managers of low-quality firms cannot afford to be so extravagant. Burning cash in other ways—by donating to the arts or by embarking on an expensive advertising campaign—is ineffective because the signals are muddy. For example, suppose a firm decides to burn cash by donating to the opera. The market might assume that the donation reflects agency behavior (i.e., the chief executive officer is an opera buff) rather than a signal of future earnings. Because a shift from stock repurchases to dividends does not enhance managerial utility or serve any other internal corporate purpose, managers have no incentive to do it other than to signal future earnings.

A limitation of many signaling models is that firms can use only one distribution method to signal. Ofer and Thakor (1987) and Williams (1996), in contrast, allow firms to signal with a combination of repurchases and dividends. In the Ofer/Thakor model, dividends impose costs on the firm by forcing it to tap the capital market for project funding. Repurchases impose costs on managers—assuming managers do not participate—by increasing their relative holdings of firm stock, thereby exposing them to higher risk. Managers rely on dividends to signal when the perceived gap between the intrinsic value of the firm and the market's valuation is small. When the firm is seriously undervalued, managers signal with stock repurchases. Between the two extremes, dividends and repurchases may both be used to signal future prospects. In the Williams model, agents believe that dividends reflect a level of commitment that stock repurchases do not. This perception, in turn, provides incentives for managers to rationally opt to signal with dividends rather than repurchases.

An important empirical implication of the signaling hypothesis—indeed, a necessary condition—is that stock prices move on the news of a share repurchase or dividend innovation. Research on capital market responses to share repurchases and dividend innovations has produced results consistent with signaling. Share repurchases correlate with jumps in the stock prices of announcing firms (Dann 1981; Vermaelen, 1981). Stock prices also vary directly with dividend innovations for announcing firms (Aharony and Swary 1980; Asquith and Mullins 1983; Brickley 1983; Charest 1978; Handjinicolaou and Kalay 1984; Healy and Palepu 1988; and Petit 1972). Finally, repurchases induce significantly higher average stock price movements than dividend hikes (Dann 1981; Masulis 1980; Vermaelen 1981). By itself, however, evidence that stock prices rise on the news of a surprise share repurchase or dividend is not sufficient to establish the case for signaling. Again, the premium could be a reward for removing free cash flow from managerial discretion or for forcing the firm to submit to capital market inspection. Also, the premium for stock repurchases could be explained by temporary pressures imposed on the market by repurchase activity, particularly if tender offers take place at prices significantly above the pre-tender level. In such cases, the premium does not represent the transmission of favorable information about the company to the market.

An additional necessary condition for the signaling hypothesis is that subsequent changes in earnings reflect dividend changes or stock repurchases. Indeed, Allen and Michaely (1994) note that this condition is crucial for any signaling model. Though the evidence on the link between repurchases and earnings is limited, Dann, Masulis, and Mayers (1991) have shown that positive earnings surprises follow tender offers. More evidence exists on dividends and earnings. Healy and Palepu (1988) demonstrated that significant changes in earnings follow dividend initiations and omissions. Ofer and Siegel (1987) found that analysts revised earnings forecasts following the announcement of an unanticipated dividend change and that the revision varied positively with the size of the dividend surprise. Olson and McCann (1994) employed a Granger causality test to show

that dividend data improved earnings predictions. Kao and Wu (1994) used a rational signaling model to show that dividends reflect past, current and future earnings information. Finally, Aharony and Dotan (1994) identified a strong link between dividend changes and future unexpected earnings even when current unexpected earnings also appeared as an explanatory variable.

Despite the cited papers on dividends and earnings, Allen and Michaely observed that "the overall accumulated evidence lends only weak support to the assertion that dividend changes convey information about future changes in earnings" (p. 42). Furthermore, because none of the cited papers controls for stock repurchases, the evidence is incapable of distinguishing between the various signaling models. The result can also be contaminated by agency and asset dissipation effects. The loss of future income resulting from the removal of net assets from the firm to fund the payout—the asset dissipation effect—is a particular concern since it could mask the presence of signaling. Similarly, the work on repurchases and earnings fails to control for dividends. Including both repurchases and dividends in equations forecasting changes in earnings, as this paper does, controls for potential agency cost or asset dissipation effects and ensures that a statistical relationship between, say, changes in dividends and changes in earnings results from signaling.

III. Data and Model Description

To test the relative signaling power of stock repurchases and dividends, we examine annual accounting data for firms selected from the COMPUSTAT data base. Our sample begins in 1977 and ends in 1994. (Data for 1976 as well as for 1995 and 1996 are used for leads and lags.) The model uses current changes in dividends and net stock repurchases as well as a host of control variables to predict future changes in earnings. Specifically, we estimate the following equation using ordinary least squares:

$$DInc_{i,t+n} = a + b_1(DDiv_{i,t}) + b_2(DRep_{i,t}) + b_3(DInc_{i,t}) + b_4(DLiab_{i,t}) + b_5[Log(assets_{i,t})] + b_6\,(D\text{-}SIC) + b_7(D\text{-}YEAR) + e_t$$

where:

$DInc_{i,t+n}$	=	*Change in future income before extraordinary items for firm i, normalized by total assets. Specifically, n = 1 and 2 years, i.e. income 1 and 2 years in the future.*
$DDiv_{i,t}$	=	*Current change in dividends for firm i, normalized by total assets.*
$DRep_{i,t}$	=	*Current change in net stock repurchases for firm i, normalized by total assets.*
$DInc_{i,t}$	=	*Current change in income before extraordinary items for firm i, normalized by total assets.*
$DLiab_{i,t}$	=	*Current change in book value of liabilities for firm i, normalized by total assets.*
$Log(assets_{i,t})$	=	*Natural log of current assets for firm i.*
D-SIC	=	*Dummy variable for four-digit SIC code.*
D-YEAR	=	*Dummy variable for year.*
e_t	=	*Idiosyncratic error term.*
$a,\ b_z$	=	*Parameters (z = 1, 2, 3,.....7) to be estimated.*

The sample reflects several adjustments to eliminate potential sources of noise. For example, we exclude financial firms and utilities because regulators play a large role in setting their dividend policies. Because a different signaling theory explains the behavior of firms with negative payouts (Myers and Majluf 1984), we consider only firms for whom the total of repurchases plus dividends minus stock sales exceed zero. Finally, to eliminate other outliers we exclude firms if their ratios of dividends to current assets, net stock repurchases to current assets, or income before extraordinary items to current assets lay outside the interval bounded by -0.5 and 0.5. After adjusting the sample as indicated, the regressions used between 11,026 and 32,078 observations. Table one contains summary statistics for the sample.

As always, model selection reflects a desire to reduce potential econometric problems. First, to correct for heteroskedasticity, we normalize all variables except the dummy variables and the natural log of assets by assets at the current date, and use White's standard errors (1980). Second, to guard against non-stationarity, we estimate the model using the first differences of all non-dummy variables except the natural log of assets.

We select the dependent and control variables to isolate the signaling power of changes in dividends and repurchases. Changes in future income before extraordinary items rather than changes in future net income serve as the dependent variable because extraordinary items are nonrecurring and, therefore, unforecastable. Changes in current income before extraordinary items act as a control variable because we anticipate income changes to mean revert. We include the change in liabilities on the right-hand side to control for the use of debt to control agency problems (Jensen 1986). The natural log of assets serves as an additional independent variable to control for firm size. Finally, we include year dummies and four-digit SIC code dummies to control for time and industry effects.

To test the relative signaling power of distribution methods, we include changes in net stock repurchases and dividends on the right-hand side. Including all forms of distributions on the right-hand side controls for potential agency cost and asset dissipation effects (i.e., reductions in assets available to generate future income). A dividend coefficient that is significantly greater than the repurchases coefficient would imply that dividends signal future income more strongly than repurchases. Similarly, a repurchases coefficient that is significantly greater than the dividends coefficient would imply that repurchases provide the stronger signal of future income. Since both dividends and repurchases result in asset dissipation effects, the individual coefficients are biased downward. Asset dissipation does not, however, bias the *difference* between the coefficients.

IV. Evidence: Full Sample (1977-1994)

Table two contains regression results for the full sample (1977 to 1994). Column one displays the regression coefficients for the model with income changes one year ahead as the dependent variable. The standard errors appear below the coefficients in parentheses. The model explains 21% of the variation in income changes one year in the future. The coefficient on changes in current dividends is positive and statistically significant at the 5% level. No other coefficient—on stock repurchases or any of the control variables—is significant. More importantly, the difference between the dividend and repurchases coefficient is statistically significant at the 5% level. This evidence is consistent with the notion that changes in current dividends "signal" changes in income one year out. Moreover, the size of the dividend coefficient, which implies that a one dollar increase in dividends today signals a 42 cent increase in income in one year, is economically significant as well.

Full sample evidence for the equation with income two years out as the dependent variable is also consistent with dividend signaling. Column two four in table two contains the regression coefficients and accompanying standard errors for this model. The regression accounts for 4% of the variation in income changes two years in the future. Unlike the one year ahead model, some of the control variables are statistically significant (changes in current income at the 1% level and the natural log of assets at the 10% level). Again, changes in current dividends are statistically significant at 5% level; changes in net stock repurchases are not statistically significant in the model. Again, the difference in the

two coefficients is statistically significant at the 5% level. Finally, the dividend coefficient is economically significant—a $1 increase in dividends today signals a 17 cent increase in income two years in the future.

V. Evidence: Split Sample

We next split the sample at 1981 to examine the impact of a change in tax law that materially reduced the relative tax disadvantage of dividend distributions. Effective January 1, 1982, the top marginal individual income rate, which applies to dividend income, dropped from 70% to 50%. The maximum capital gains tax rate, which applies to profits on stock repurchases, also dropped but by a much smaller amount (28% to 20%). If the justification for dividend signaling lies in the relative tax disadvantage, then dividends would be a less effective signal of future income in the post-1981 environment.

The split sample evidence suggests that the pre-1981 subsample drove the full sample results. Table three contains regression equations for income changes one year and two years ahead for the pre-1981 subsample. The regression accounts for roughly 7% of the variation in income changes one year out. Of the control variables, only the change in current income is statistically significant (at the 1% level). Both changes in dividends and stock repurchases are significant. The dividend coefficient is positive and significant at the 1% level; the repurchases coefficient is negative and significant at the 5% level. More importantly, the hypothesis that the coefficients are the same can be rejected at the 1% level of significance. The magnitude of the dividends coefficient suggests that a one dollar increase in current dividends signals a 26 cent increase in income in one year.

Results for the two year ahead equation appear, as before, in columns four, five and six. The model accounts for roughly 9 percent of the variation in income changes two years out. Two of the three control variables are statistically significant: changes in current income (at the 1% level) and the natural log of assets (at the 10% level). As in the one-year ahead equation, dividend changes are positive and significant at the 1% level. The repurchases coefficient, however, does not differ from zero statistically. Again, the hypothesis that the dividends and repurchases coefficient are equal can be rejected at the 1% level of significance. The size of the dividends coefficient implies that a one dollar increase in dividends today signals a 41 cent increase in income in two years. Overall, the pre-1981 evidence is consistent with the full sample evidence. Dividends provide a stronger signal of future income than stock repurchases.

Regressions estimated on the 1982 to 1994 subsample, however, tell a different story. Results from these regressions appear in table four. The one-year ahead equation explains 35% of the variation in income changes, and two of the three control variables are statistically significant (changes in income at the 1% level and changes in liabilities at the 5% level). Neither the dividends nor the repurchases coefficient, however, differs from zero statistically. More importantly, the hypothesis that the coefficients are equal can not be rejected. The two year ahead equation yields similar results. The adjusted R^2 for the model is roughly 5%, and one of the control variables—changes in current income—is significant (at the 1% level). Again, neither the dividends nor the repurchases coefficient is statistically significant. Moreover, the hypothesis of coefficient equality can not be rejected at conventional levels. Taken together, the evidence implies that the signaling power of dividends faded after the tax penalty on dividends declined. This evidence

supports the notion that firms deliberately expose shareholders to punitive taxation to signal favorable prospects when the tax wedge is sufficiently large—consistent with the Bernheim model.

VI. Discussion

Our evidence is particularly important in light of a recent spate of empirical articles about the dividend puzzle. These articles offer evidence both in favor of and against the adverse selection solution to the dividend puzzle. DeAngelo, DeAngelo, and Skinner (1992) and Howe, He, and Kao (1992) support the information content interpretation of dividend policy. Specifically, DeAngelo, DeAngelo, and Skinner examined a sample of 167 firms traded on the New York Stock Exchange that also suffered at least one annual loss between 1980 and 1985. They concluded that dividend reductions did, indeed, signal poor earnings prospects. Howe, He, and Kao, meanwhile, extended Lang and Litzenberger's (1989) work on the "free cash flow interpretation of dividend policy by examining a broader set of transactions, namely share repurchases and special dividends. Unlike Lang and Litzenberger, they found no difference in excess returns on announcement between high-Q and low-Q firms. Moreover, adding a cash flow measure did not improve the explanatory value of cross-sectional regressions designed to account for differences in returns. Howe, He, and Kao interpret their results as evidence against the moral hazard resolution and in favor of the adverse selection resolution of the dividend puzzle.

Recent empirical papers have also undermined support for the signaling interpretation of dividend policy. Smith and Watts (1992) examine cross-sectional differences in corporate financing-, dividend-, and compensation-policy choices and conclude that contracting theories are a more plausible explanation for dividend policy than signaling theories. Dhillon and Johnson (1994) extend the Handjinicolaou and Kalay

(1984) work on the wealth expropriation interpretation of the dividend announcement effect. Unlike Handjinicolaou and Kalay, they found that the bond price reaction to a large dividend change was the opposite of the stock price reaction. Dhillon and Johnson interpret this finding as evidence that large dividends transfer wealth from bondholders to stockholders rather than signal favorable earnings prospects. Finally, and most importantly, Amihud and Murgia (1997) investigate the reaction of German equities to dividend announcements using an event study framework. They document a stock price reaction to dividend changes similar to the one observed in American equity markets. Since German tax policy does not disadvantage dividends, Amihud and Murgia interpret their result as evidence against the class of tax-based signaling models.

As noted earlier in the paper, our work differs from other empirical signaling papers because we explicitly control for total distributions, thereby holding agency cost and asset dissipation effects in abeyance (at least on tests of the difference between dividend and repurchase coefficients). Moreover, we explicitly compare the relative signaling power of repurchases and dividends, establishing at least for our sample, that dividend changes alone signal changes in future income. Finally, we show that the relative signaling power of dividends declined dramatically in the wake of a change in tax policy that reduced the penalty association with dividend distributions. Amihud and Murgia are certainly correct that previous empirical research on payout policy is "U.S. centric" (p. 397), and by documenting a positive reaction to dividends in a country without a dividend penalty, they make a strong case for agency costs and non-tax signaling explanations of the dividend puzzle. Their evidence does not, however, imply that tax-based signaling will not occur under the appropriate circumstances.

V. Conclusion

Signaling models suggest that firms use cash distributions to tip the market about future income prospects. These models take one of three forms: models in which dividends are the dominant signaling device, models in which repurchases are the dominant signaling device, and models in which the two distribution methods are close substitutes. We attempt to discriminate among the three classes of models by regressing future income changes on changes in stock repurchases and dividends as well as a host of control variables. We find that, for the 1977-1994 sample period, dividend changes provide the stronger signal about changes in future income. Moreover, we split our sample to examine the impact of a change in tax policy that significantly reduced the tax disadvantage of dividends. We find that dividend changes no longer effectively signaled changes in future income after the reduction in the tax penalty on dividends. We interpret the full sample and split sample results as evidence that firms engage in tax-based signaling when the tax wedge between distribution methods is sufficiently high. Moreover, we find no evidence that repurchases effectively signal future income change. Finally, our evidence does not allow strong condasset dissipation effects confound our attempt to on the right-hand side in an income forecasting equation, our specification allows we ensure that the strong, statistically significant correlation between current dividends and future earnings reflects signaling and relates to attributes unique to dividends as a distribution method. Our evidence suggests that firms deliberately expose shareholders to excessive taxation to signal favorable prospects. Myers (1986) has observed that some combination of moral hazard and adverse selection probably accounts for corporate dividend policy. We hope this paper, by offering strong evidence of dividend signaling, has helped resolve the dividend puzzle in favor of adverse selection.

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TABLE ONE

Summary Statistics

Full Sample: 1977-1994

Nonbinary Regression Variables	Obs.	Mean	Std. Dev.	Min.	Max.
$\frac{\text{Dividends}}{\text{Assets}}$	32078	0.022	0.029	0.000	0.495
$\frac{\text{Net Stock Repurchases}}{\text{Assets}}$	32078	0.008	0.033	-0.381	0.496
$\frac{\text{Income before Extraordinary Items}}{\text{Assets}}$	32078	0.057	0.064	-0.487	0.497
$\frac{\text{Liabilities}}{\text{Assets}}$	32078	0.507	0.180	0.000	1.000
Asset size (in millions of $)	32078	21,125.4	8,295.627	10.006	245,133

The sample reflects several adjustments to eliminate potential sources of noise. We exclude financial firms and utilities because regulators play a large role in setting their dividend policies. Because a different signaling theory explains the behavior of firms with negative payouts, we consider only firms for whom the total of repurchases plus dividends minus stock sales exceed zero. Finally, to eliminate other outliers we exclude firms if their ratios of dividends to current assets, net stock repurchases to current assets, or income before extraordinary items to current assets lay outside the interval bounded by -0.5 and 0.5. Of the 32,078 observations, 4,490 represent net stock repurchases with no dividends; 10,761 represent dividend payments with a net sale of stock; 8,370 represent dividend payments with no net repurchase or sale; and 8,457 represent dividend payments with net repurchases of stock.

TABLE TWO

Relative Signaling Power of Dividends and Net Stock Repurchases

Model: $DInc_{i,t+n} = a + b_1(DDiv_{i,t}) + b_2(DRep_{i,t}) + b_3(DInc_{i,t}) + b_4(DLiab_{i,t}) + b_5[Log(assets_{i,t})] + b_6\,(D\text{-}SIC) + b_7(D\text{-}YEAR) + e_t$

Full Sample: 1977-1994

This table shows the relative signaling power of changes in net repurchases and dividends for the entire sample. Formally, the model regresses changes in income before extraordinary items one year and two years in the future on changes in current dividends, changes in current net stock repurchases and a host of control variables. In both the one year ahead model and the two year ahead model, the dividend coefficient is positive and statistically significant at the 5% level. More importantly, the dividend coefficient is statistically different from the repurchases coefficient, also at the 5% level. This evidence suggests that dividends provided the stronger signal about future income changes for the sample period.

	Dependent Variable	
	Change in Future Income One Year Ahead $DInc_{i,t+1}$	Change in Future Income Two Years Ahead $DInc_{i,t+2}$
Independent Variable	(1)	(2)
Change in current dividends $DDiv_{i,t}$	0.423 ** (0.210)	0.168 ** (0.067)
Change in current net repurchases $DRep_{i,t}$	0.016 (0.020)	0.017 (0.021)
Change in current income $DInc_{i,t}$	0.002 (0.065)	-0.114 *** (0.033)
Change in current liabilities $DLiab_{i,t}$	-0.090 (0.060)	0.001 (0.013)
Natural log of assets $Log(assets_{i,t})$	0.000 (0.000)	-0.001 * (0.000)
Observations	32,078	32,078
Adjusted R^2	0.209	0.039
H_0: $DDiv_{i,t} = DRep_{i,t}$	F(1;31,680) = 4.24**	F(1;31,680) = 4.72**

To correct for heteroskedasticity, we use White's standard errors and normalize changes in dividends, repurchases, income, and liabilities by assets at the current date. To guard against non-stationarity, we estimate the model using first differences of all non-dummy variables except the natural log of assets. OLS Regressions include year dummies and 4-digit SIC code dummies. Standard errors appear in parentheses below regression coefficients. Three asterisks (***) denote statistical significance at the 1% level. Two asterisks (**) denote statistical significance at the 5% level. One asterisk (*) denotes statistical significance at the 10% level.

TABLE THREE

Relative Signaling Power of Dividends and Net Stock Repurchases

Model: $DInc_{i,t+n} = a + b_1(DDiv_{i,t}) + b_2(DRep_{i,t}) + b_3(DInc_{i,t}) + b_4(DLiab_{i,t}) + b_5[Log(assets_{i,t})] + b_6\,(D\text{-}SIC) + b_7(D\text{-}YEAR) + e_t$

Split Sample: 1977-1981

This table shows the relative signaling power of changes in net repurchases and dividends for the pre-1981 subsample. Formally, the model regresses changes in income before extraordinary items one year and two years in the future on changes in current dividends, changes in current net stock repurchases and a host of control variables. In both the one year ahead model and the two year ahead model, the dividend coefficient is positive and statistically significant at the 1% level. More importantly, the dividend coefficient is statistically different from the repurchases coefficient at the 1% level. This evidence suggests that dividends provided the stronger signal about future income changes for this sample period.

	Dependent Variable	
	Change in Future Income One Year Ahead $DInc_{i,t+1}$	Change in Future Income Two Years Ahead $DInc_{i,t+2}$
Independent Variable	(1)	(2)
Change in current dividends $DDiv_{i,t}$	0.260 *** (0.053)	0.414 *** (0.061)
Change in current net repurchases $DRep_{i,t}$	-0.028 ** (0.013)	-0.037 (0.026)
Change in current income $DInc_{i,t}$	-0.142 *** (0.026)	-0.244 *** (0.032)
Change in current liabilities $DLiab_{i,t}$	0.001 (0.006)	0.005 (0.007)
Natural log of assets $Log(assets_{i,t})$	0.000 (0.000)	-0.001 * (0.000)
Observations	11,026	11,026
Adjusted R^2	0.068	0.094
H_0: $DDiv_{i,t} = DRep_{i,t}$	F(1;10,659) = 29.03***	F(1;10,659) = 48.20***

To correct for heteroskedasticity, we use White's standard errors and normalize changes in dividends, repurchases, income, and liabilities by assets at the current date. To guard against non-stationarity, we estimate the model using first differences of all non-dummy variables except the natural log of assets. OLS Regressions include year dummies and 4-digit SIC code dummies. Standard errors appear in parentheses below regression coefficients. Three asterisks (***) denote statistical significance at the 1% level. Two asterisks (**) denote statistical significance at the 5% level. One asterisk (*) denotes statistical significance at the 10% level.

TABLE FOUR

Relative Signaling Power of Dividends and Net Stock Repurchases

Model: $DInc_{i,t+n} = a + b_1(DDiv_{i,t}) + b_2(DRep_{i,t}) + b_3(DInc_{i,t}) + b_4(DLiab_{i,t}) + b_5[Log(assets_{i,t})] + b_6\,(D\text{-}SIC) + b_7(D\text{-}YEAR) + e_t$

Split Sample: 1982-1994

This table shows the relative signaling power of changes in net repurchases and dividends for the post-1981 subsample. Formally, the model regresses changes in income before extraordinary items one year and two years in the future on changes in current dividends, changes in current net stock repurchases and a host of control variables. In both the one year ahead model and the two year ahead model, neither the dividend coefficient nor the repurchases coefficient differs statistically from zero. Moreover, the difference between the dividend and repurchases coefficient is not statistically significant. Finally, the change in the magnitude of the dividends coefficient between the 1977-1981 and 1982-1994 samples is significant at the 1% level in both future income models. This evidence suggests that the 1981 reduction in the relative tax penalty on dividends eliminated the signaling properties of dividends.

	Dependent Variable	
	Change in Future Income One Year Ahead $DInc_{i,t+1}$	Change in Future Income Two Years Ahead $DInc_{i,t+2}$
Independent Variable	(1)	(2)
Change in current dividends $DDiv_{i,t}$	-0.160 (0.105)	-0.022 (0.040)
Change in current net repurchases $DRep_{i,t}$	0.013 (0.017)	0.023 (0.023)
Change in current income $DInc_{i,t}$	-0.184 *** (0.071)	-0.163 *** (0.056)
Change in current liabilities $DLiab_{i,t}$	-0.097 ** (0.048)	-0.002 (0.011)
Natural log of assets $Log(assets_{i,t})$	0.000 (0.000)	0.000 (0.000)
Observations	21,052	21,052
Adjusted R^2	0.351	0.046
H_0: $DDiv_{i,t} = DRep_{i,t}$	F(1;20,664) = 2.21	F(1;20,664) = 0.93
H_0: $DDiv_{i,t}$ (pre-1981)= $DDiv_{i,t}$ (post-1981)	t(32,076) = 3.583***	t(32,076) = 5.978***
H_0: $DRep_{i,t}$ (pre-1981)= $DRep_{i,t}$ (post-1981)	t(32,076) = 1.860**	t(32,076) = 1.755**

To correct for heteroskedasticity, we use White's standard errors and normalize changes in dividends, repurchases, income, and liabilities by assets at the current date. To guard against non-stationarity, we estimate the model using first differences of all non-dummy variables except the natural log of assets. OLS Regressions include year dummies and 4-digit SIC code dummies. Standard errors appear in parentheses below regression coefficients. Three asterisks (***) denote statistical significance at the 1% level. Two asterisks (**) denote statistical significance at the 5% level. One asterisk (*) denotes statistical significance at the 10% level.