Dividends, Share Repurchases, and the Substitution Hypothesis

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ABSTRACT

We show that repurchases have not only became an important form of payout for U.S. corporations, but also that firms finance their share repurchases with funds that otherwise would have been used to increase dividends. We find that young firms have a higher propensity to pay cash through repurchases than they did in the past and that repurchases have become the preferred form of initiating a cash payout. Although large, established firms have generally not cut their dividends, they also show a higher propensity to pay out cash through repurchases. These findings indicate that firms have gradually substituted repurchases for dividends. Our results also suggest that before 1983, regulatory constraints inhibited firms from aggressively repurchasing shares.

For decades, U.S. corporations have overwhelmingly preferred to pay out cash in the form of dividends rather than share repurchases, despite the relative tax advantage of capital gains over ordinary income. However, over the last 20 years or so, share repurchase activity has experienced an extraordinary growth. According to aggregate data from Compustat, expenditures on share repurchase programs (relative to total earnings) increased from 4.8 percent in 1980 to 41.8 percent in 2000.

Furthermore, while share repurchase expenditures grew at an average annual rate of 26.1 percent over the period 1980 to 2000, dividends only grew at an average annual rate of 6.8 percent. As a consequence of these large differences in growth rates, share repurchases as a percentage of total dividends increased from 13.1 percent in 1980 to 113.1 percent in 2000. In 1999 and 2000, industrial firms spent more money on share repurchases than on dividend payments. That is, for the first time in history, share repurchase programs have become more popular than dividends.

What are the reasons for this change in corporate payout policy? Are corporations buying back shares with funds that they would otherwise have used to pay dividends? And if so, why did this process not start much earlier? The answers to these questions are important because they will

enhance our understanding of corporate payout policy in the United States. Furthermore, they may shed some light on the long-standing issue of why firms have historically preferred dividends over share repurchases.

Our objectives in this paper are threefold. First, we analyze the recent trend in share repurchases. We show that in the last 15 years or so, the majority of firms initiate cash payouts to shareholders through repurchases rather than cash dividends. Although large, more established firms did not cut or reduce the nominal amount of dividends, the growth rate in dividend payments was (and remains) significantly lower than it used to be, and the amount that firms spend on repurchases is much larger after the mid-1980s.[1]

Second, we focus on the analysis of whether firms use share repurchases as a substitute for dividends. We directly investigate whether the increases in the number and dollar amount of repurchases have been used as a substitute for dividends. This is an important issue, especially in light of the recent evidence provided by Fama and French (2001) that the number of firms paying dividends has dramatically declined over the past 20 years.

From a tax perspective, there is an obvious incentive for corporations to substitute share repurchases for dividends because capital gains are taxed at more favorable rates than ordinary income. Although the Tax Reform Act (TRA) of 1986 greatly reduced the relative tax advantage of capital gains, the gap between the top marginal rate on ordinary income and the marginal rate on capital gains is still positive and significant. For example, by the end of 2001, the top marginal rate on long-term capital gains was only 20 percent, while the top marginal rate on ordinary income was 39.6 percent. Moreover, share repurchases have the advantage of allowing investors to postpone the realization of capital gains and thus the payment of taxes.

Knowing whether managers substitute repurchases for dividends will help us understand whether managers take into account their shareholders' tax status when they choose a payout method. Furthermore, understanding the motivation behind the recent surge in share repurchase activity will allow us to better understand whether corporations view dividends and repurchases as interchangeable payout methods, which would have implications for many of the payout theories. The predictions of the various payout theories are not uniform on the subject. For example, John and Williams (1985), Bernheim (1991), and Allen, Bernardo, and Welch (2000) conclude that management uses dividends, as opposed to share repurchases, to signal the firm's quality. Thus, according to these theories, dividends and repurchases are not interchangeable. On the other hand, Miller and Modigliani (1961), Bhattacharya (1979), Easterbrook (1984), Miller and Rock (1985), and Jensen (1986) imply that it is the payout (as either dividends or repurchases) that can be used to signal undervaluation or to reduce agency conflicts. Thus, substitution of repurchases for dividends would be consistent with those theories.

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[1] The average growth rate in dividend payments declined from 15 percent in the 1970s to 4.6 percent in the 1990s.

Our research provides a number of new results on the relation between repurchase and dividend policy. We highlight several of them here. First, consistent with the substitution hypothesis, the empirical evidence in this paper suggests that the marked increase in share repurchase activity in the United States has been financed with potential increases in dividends. We find that the share repurchase activity over the last two decades has helped the average total payout ratio of firms to stay relatively constant despite the decline in the average dividend payout ratio. We also find that as a percentage of the total number of firms distributing cash to their equityholders, the number of firms that repurchase shares increased from 31 percent in 1972 to 80 percent in 2000.

Moreover, since the mid-1980s many more firms have decided to initiate share repurchase programs rather than to initiate dividends. As a percentage of the total number of firms initiating a cash distribution to their shareholders, the number of firms that initiated a buyback program increased from 26.6 percent in 1972 to 84.2 percent in 2000. We also find that since the mid-1980s, corporations rely more on share repurchases than on dividends to increase their payout ratios.

It appears that share repurchase programs have become the preferred method of payout for many firms. This evidence is consistent with the recent findings in Fama and French (2001) that indicate that even after controlling for firm characteristics, firms now have a lower propensity to pay dividends than they did in the past. However, contrary to their conclusion, we find evidence that firms have been substituting share repurchase for dividends. As we explain later, we believe that our results differ from those of Fama and French because they use a measure for repurchases that may underestimate share repurchase activity relative to dividends (by measuring net repurchase activity and gross dividends) and that may include both financing activities (repurchases) and investment activities (payment to labor).

Second, our evidence suggests that large, established firms partially finance their repurchase programs with potential dividend increases. Using Lintner's (1956) dividend model to generate expected future dividend payments, we find that dividend forecast errors are negatively correlated with share repurchase activity. In other words, the difference between actual and expected dividend payments tends to become more negative as the firm spends more money on share repurchases. This result is consistent with the predictions of the substitution hypothesis.

Complementing the previous findings, we also report that the market reaction surrounding the announcement of dividend decreases is significantly less negative for repurchasing firms than for nonrepurchasing firms. We find that the market reaction to dividend decreases is not significantly different from zero for repurchasing firms, and that it is significantly negative for nonrepurchasing firms. These results further support the idea that share repurchases and dividends are close substitutes. We also find that the market reaction surrounding open market repurchase announcements was significantly more positive before the enactment of the 1986 TRA when the

benefits from substituting were larger. Overall, the evidence presented in this paper indicates that corporations are substituting share repurchases for dividends.

The paper's third objective is to understand why firms did not substitute repurchases for dividends earlier. That is, if share repurchases and dividends appear to be substitute payout methods, why did corporations not repurchase more intensely before the mid-1980s when the tax benefits of capital gains were much higher? One possibility is that corporations were "simply wrong" for paying so much in dividends (Grinblatt and Titman (1998, p. 529)). Another possibility is that the risk of violating the antimanipulative provisions of the Securities Exchange Act (SEA) of 1934 deterred most corporations from repurchasing shares. Indeed, after the Securities and Exchange Commission (SEC) adopted Rule 10b-18, which, under certain conditions, provides a safe harbor to repurchasing corporations, repurchase activity experienced an upward structural shift.[2]

Just one year after the approval of Rule 10b-18, the aggregate amount of cash spent on share repurchase programs tripled. Since then, the level of share repurchase activity in the United States has been at record highs. Even after controlling for the potential effects of other factors such as taxes and market conditions, the impact of the adoption of Rule 10b-18 on share repurchase activity remains economically and statistically significant.

The paper is organized as follows. Section I further develops the substitution hypothesis. Section II describes the data and Section III examines the recent trend in corporate payout policy in the United States. Section IV presents a direct examination of the substitution hypothesis. Section V investigates whether investors perceive that corporations are substituting share repurchases for dividends, and discusses the impact of tax changes. Section VI examines the effect of the adoption of Rule 10b-18 on share repurchase activity. Section VII concludes.

I. Payout Policy and the Substitution Hypothesis

What does corporate finance theory research say about the relation between dividends and share repurchases? At the most fundamental level, the dividend irrelevancy theory of Miller and Modigliani (1961) implies that share repurchases and dividends are perfect substitutes (given perfect and complete capital markets). That is, given investment policy, the residual cash can be paid to investors either through dividends or repurchases. The agency theories of Easterbrook (1984) and Jensen (1986) also imply that one can control managers' actions by taking excess cash out of the firm. Whether the excess cash is distributed through dividends or share repurchases will not affect the final outcome.

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[2] As we discuss later in the paper, there is evidence that the SEC was concerned with firms using share repurchase programs to illegally manipulate their stock prices.

Most of the signaling models imply that dividends and repurchases are perfect substitutes. For example, in Bhattacharya (1979), the signaling cost is the transaction cost associated with raising new capital, and in Miller and Rock (1985), it is the cost of reducing investments. Neither is related to the choice of payout. An exception is the John and Williams (1985) model, in which the higher taxes on dividend are the costs of the signal. This model suggests that share repurchases and dividends are not interchangeable.

Allen et al. (2000) develop a model in which share repurchases and dividends are not substitutes because the latter payout method attracts institutions. Allen et al. argue that institutional investors are more likely to discover whether a firm is overvalued or undervalued because institutions have better information-gathering abilities and are also better monitors. Since institutions prefer dividends, only undervalued firms want to be monitored (or signal they are undervalued); thus, these are the firms that will pay higher dividends. This signaling equilibrium is not achieved with share repurchases.

Investigating the extent of substitutability of dividends and repurchases, DeAngelo, DeAngelo, and Skinner (2000) examine the relation between the disappearance of special dividends and the appearance of repurchase programs. They do not find evidence that share repurchase programs have replaced special dividends and therefore no evidence for a substitution effect. Jagannathan, Stephens, and Weisbach (2000) find that firms that pay dividends have more stable earnings than do firms that use share repurchases. They conclude that share repurchases are used to pay out extraordinary transitory earnings and dividends are used to pay out permanent earnings.

We could argue that if we just look at the sources and uses of funds identity, share repurchases and dividends should be substitute payout methods. This argument is correct if all else is constant. However, firms can always adjust their sources of funds, and therefore it is possible that dividends and share repurchases are determined independently. For example, it is possible that dividends are determined together with investment, as Miller and Rock (1985) suggest, and that repurchases are determined independently. In summary, current theories do not provide a unique prediction on what the relation should be between dividends and share repurchases. It is clear that the question of the extent to which dividends and repurchases are substitutes is a central issue, and has important implications for many of the existing payout theories.

II. Sample Selection and Definitions

Using the Industrial Compustat files (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files), we create an initial sample of all the companies that appear on the files for at least one year over the period 1972 to 2000. To remain in the final sample, each firm-year observation must have information available on the following variables:

1. Earnings (*EARN*). Defined as total earnings before extraordinary items (Compustat item #18).
2. Market value (*MV*). Defined as market value of common stock at the end of the year (Compustat item #24 times Compustat item #25).
3. Dividends (*DIV*). Defined as total dollar amount of dividends declared on the common stock of the firm during the year (Compustat item #21).
4. Repurchases (*REPO*). Defined as total expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value, Compustat item #56) of the net number of preferred stocks outstanding. (This variable is not available for banks, utilities, and insurance companies. Therefore, these types of firms are not included in our final sample.) Our measure of repurchase activity is similar to the one used by Jagannathan et al. (2000). While we measure the repurchase activity only for common stocks, their measure uses the entire repurchase activity, which also includes preferred stocks. This difference, however, does not affect the results in this paper. We also compare our measure to the amount of repurchase activity reported by SDC (amount of repurchases announced). The correlation coefficient between these two measures is 0.97 and the dollar amounts are similar.

For each observation in the final sample, we create the following variables using data from Compustat: *MB* is equal to the book value of the total assets plus the market value of equity minus the book value of equity, scaled by the book value of the total assets. *CASH* is the book value of cash and short-term investments (Compustat item #1) scaled by the book value of the total assets. *ROA* is the operating income before depreciation (Compustat item #13) scaled by the book value of the total assets. The $\sigma(ROA)$ is the standard deviation of *ROA*. *NOPER* is the nonoperating income before depreciation (Compustat item #61) scaled by the book value of the total assets. *DEBT* is the book value of total long-term debt (Compustat item #9) plus the book value of total short-term debt (Compustat item #44) scaled by the book value of the total assets.

The final sample contains 15,843 firms, and an overall total of 134,646 firm-year observations over the period 1972 to 2000.

III. Trends in Corporate Payout Policy

To examine the recent trends in corporate payout policy, we generate aggregate data by calendar year on share repurchase expenditures, cash dividend expenditures, total earnings, and total market value of equity. We use the data described in Section II above.

Throughout most of the 20th century, the predominant form of payout for most U.S. corporations has been the payment of dividends rather than the repurchase of common stocks (see, e.g., Bagwell and Shoven (1989) and Allen and Michaely (2002)). This pattern is confirmed in Table I. In the 1970s and

Table I

Aggregate Cash Distributions to Equityholders

This table reports annual information on aggregate cash distributions to equityholders for a sample of U.S. firms. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The data sample contains 134,646 firm-year observations and excludes banks, utilities, and insurance companies. Σ_i represents the aggregation of data by calendar year. $\Sigma_i EARN$, $\Sigma_i DIV$, and $\Sigma_i REPO$ are expressed in millions of dollars.

Year	$\Sigma_i EARN$	$\Sigma_i DIV$	$\Sigma_i REPO$	$\Sigma_i DIV/$ $\Sigma_i EARN$ (%)	$\Sigma_i REPO/$ $\Sigma_i EARN$ (%)	$\Sigma_i DIV/$ $\Sigma_i MV$ (%)	$\Sigma_i REPO/$ $\Sigma_i MV$ (%)	$\Sigma_i REPO/$ $\Sigma_i DIV$ (%)
1972	41,437	17,633	1,488	42.55	3.59	2.19	0.19	8.44
1973	57,511	20,472	3,105	35.60	5.40	3.04	0.46	15.17
1974	70,185	26,010	1,575	37.06	2.24	5.20	0.31	6.06
1975	65,913	27,431	848	41.62	1.29	3.97	0.12	3.09
1976	84,540	32,014	1,592	37.87	1.88	3.70	0.18	4.97
1977	95,224	38,243	3,615	40.16	3.80	4.63	0.44	9.45
1978	106,423	40,255	4,311	37.83	4.05	4.81	0.52	10.71
1979	135,059	46,154	5,446	34.17	4.03	4.62	0.54	11.80
1980	136,682	50,555	6,599	36.99	4.83	3.87	0.50	13.05
1981	132,963	51,898	6,269	39.03	4.71	4.54	0.55	12.08
1982	104,009	52,889	10,561	50.85	10.15	4.02	0.80	19.97
1983	130,466	59,641	9,195	45.71	7.05	3.62	0.56	15.42
1984	151,854	61,508	28,625	40.50	18.85	3.95	1.84	46.54
1985	144,720	72,996	44,104	50.44	30.48	3.49	2.11	60.42
1986	133,920	76,337	39,371	57.00	29.40	3.13	1.61	51.58
1987	185,145	88,784	55,039	47.95	29.73	3.44	2.13	61.99
1988	219,724	108,954	53,640	49.59	24.41	3.79	1.87	49.23
1989	226,501	108,963	59,845	48.11	26.42	3.03	1.66	54.92
1990	211,826	114,215	46,759	53.92	22.07	3.45	1.41	40.94
1991	168,838	115,949	26,126	68.67	15.47	2.72	0.61	22.53
1992	171,498	111,320	33,296	64.91	19.42	2.54	0.76	29.91
1993	210,036	116,668	36,378	55.55	17.32	2.27	0.71	31.18
1994	303,136	135,911	46,589	44.83	15.37	2.46	0.84	34.28
1995	355,534	156,669	72,467	44.07	20.38	2.13	0.98	46.26
1996	438,505	176,019	103,337	40.14	23.57	1.94	1.14	58.71
1997	461,392	181,113	146,753	39.25	31.81	1.55	1.26	81.03
1998	438,693	208,103	199,190	47.44	45.41	1.48	1.41	95.72
1999	516,174	197,782	202,844	38.32	39.30	1.06	1.09	102.56
2000	464,851	171,750	194,263	36.95	41.79	1.20	1.36	113.11

early 1980s, share repurchases were a small fraction of total earnings and total dividends. For example, between 1972 and 1983, repurchases amounted to an average of 10.9 percent of dividend payments. However, since the mid-
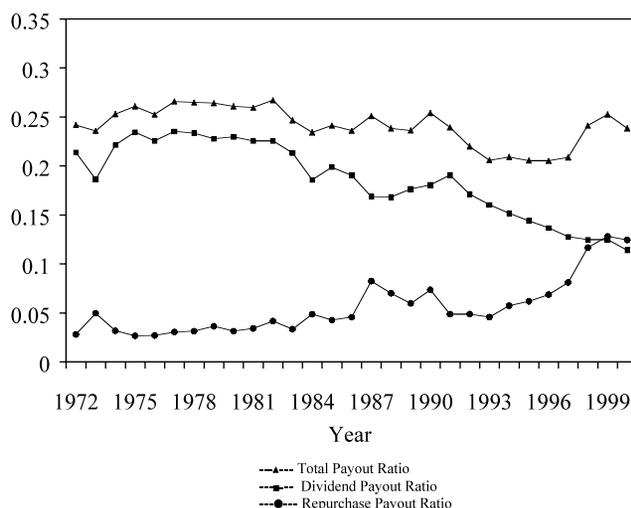
Figure 1. Cash distributions to equityholders. This figure depicts the equally weighted average total payout ratio, dividend payout ratio, and repurchase payout ratio for a sample of U.S. firms. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The sample used in this analysis only includes firms with positive earnings. To mitigate the effect of outliers, we eliminate observations with a total payout ratio greater than one.

1980s, share repurchase programs have become a significant payout ratios. On average, between 1984 and 2000, the dollar amount distributed through repurchases relative to dividends was 57.7 percent, and it reached a high of 113.11 percent in 2000.

In Figure 1 we present the equally weighted averages of payout activities throughout the sample period. We first find the payout ratio for each firm and then calculate the average for each year in the sample. (By construction, only firm-years with positive earnings are included in this calculation.) Consistent with the results in Fama and French (2001), Figure 1 shows that the average dividend payout ratio has declined from 21.4 percent in 1972 to 11.4 percent in 2000. Figure 1 also shows that the average repurchase ratio increased from 2.8 percent in 1972 to 12.4 percent in 2000. This increase in repurchase activity helped the total payout ratio to stay relatively constant despite the decline in the average dividend payout ratio.

Table II reports the characteristics of the firms in our sample by payout policy. We determine the payout policy of a firm by observing the cash disbursements of the firm over the following periods: 1972 to 1975, 1976 to

Table II
Firm Characteristics by Payout Policy

This table reports descriptive statistics by payout policy for a sample of U.S. firms. We determine the payout policy of a firm by observing the cash disbursements of the firm over the following time periods:: 1972–1975, 1976–1979, 1980–1983, 1984–1987, 1988–1991, 1992–1995, and 1996–2000. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO, DIV, EARN,* and *MV. REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The data sample contains 134,646 firm-year observations and excludes banks, utilities, and insurance companies. *ASSETS* is the book value of assets (Compustat item #6). *MB* is the market-to-book ratio [(book value of assets + market value of equity − book value of equity)/book value of assets]. *CASH* is the book value of cash and short-term investments (Compustat item #1) scaled by the book value of the total assets. *ROA* is the operating income before depreciation (Compustat item #13) scaled by the book value of the total assets. *σ(ROA)* is the standard deviation of *ROA*. *σ(ROA)* is calculated over the same time periods used to determine the payout policy of a firm. *NOPER* is the nonoperating income before depreciation (Compustat item #61) scaled by the book value of the total assets. *MB, CASH,* and *NOPER* have been truncated at the 1st and 99th percentiles. *AGE > 8* is the proportion of dividends in each group scaled by the aggregate amount of *ROA* has been truncated at the 99th percentile. *ROA* has been truncated at the 99th percentile. *DIV/TOTAL* is the total amount of dividends in each group scaled by the aggregate amount of firms that have been traded in a major exchange for more than eight years. *DIV/TOTAL* is the total amount of share repurchases in each group scaled by the aggregate amount of share repurchases.

	DIV = 0, REPO = 0			DIV > 0, REPO = 0			DIV = 0, REPO > 0			DIV > 0, REPO > 0		
	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median	N
MV	167.5	16.3	15,461	1,076.2	102.8	8,340	359.0	28.2	8,202	1,803.6	144.9	10,307
ASSETS	162.3	20.3	15,456	1,723.4	166.9	8,340	311.3	41.5	8,202	2,962.1	235.7	10,307
MB	1.94	1.38	14,089	1.36	1.11	8,278	1.65	1.23	7,996	1.35	1.13	10,279
CASH	15.0%	7.6%	15,272	9.3%	5.5%	8,310	15.8%	9.2%	8,158	9.2%	5.5%	10,302
ROA	−3.8%	3.9%	15,029	14.1%	13.8%	8,043	5.0%	9.1%	8,122	14.5%	14.1%	10,046
σ(ROA)	9.4%	6.1%	5,398	3.6%	2.6%	5,224	7.5%	4.9%	4,629	3.4%	2.5%	7,712
NOPER	1.8%	1.1%	14,555	1.3%	0.9%	8,092	1.7%	1.2%	7,930	1.3%	0.9%	10,094
AGE > 8	26.5%	—	12,255	56.1%	—	5,018	34.1%	—	6,796	68.4%	—	7,313
DIV/TOTAL	0%	—	—	31.0%	—	—	0%	—	—	69.0%	—	—
REPO/TOTAL	0%	—	—	0%	—	—	12.1%	—	—	87.9%	—	—

1979, 1980 to 1983, 1984 to 1987, 1988 to 1991, 1992 to 1995, and 1996 to 2000. For example, if a firm pays dividends in 1981 and repurchases shares in 1982, then we classify this firm as a dividend-paying and repurchasing firm ($DIV > 0$, $REPO > 0$) during the period 1980 to 1983. (We repeat all analyses when we define a subperiod as one year. The results are qualitatively the same.)

Table II reveals several interesting facts about the relation between firms' characteristics and payout policy. First, dividend-paying firms ($DIV > 0$) are much larger and more profitable than firms that do not pay dividends ($DIV = 0$). For example, the average (median) market value of firms that pay dividends and do not use repurchases is $1,076.2 million ($102.8 million) and $1,803.6 million ($144.9 million) for firms that both pay dividends and repurchase. The average (median) market value of firms that do not pay dividends and do not repurchase is $167.5 million ($16.3 million) and $359.0 million ($28.2 million) for firms that only repurchase. In addition, firms that pay dividends have a lower variability of return on assets [$\sigma(ROA)$] than firms that do not pay dividends (regardless of their repurchase policy). The mean (median) standard deviation of the return on assets is 3.6 percent (2.6 percent) for firms that only pay dividends ($DIV > 0$, $REPO = 0$), and 3.4 percent (2.5 percent) for firms that pay dividends and repurchase shares ($DIV > 0$, $REPO > 0$). Overall, it seems that the firms that pay dividends but do not repurchase shares ($DIV > 0$, $REPO = 0$) are similar to those that pay dividends and repurchase shares ($DIV > 0$, $REPO > 0$).

Firms that repurchase shares but do not pay dividends ($DIV = 0$, $REPO > 0$) appear to have similar characteristics to firms that do not pay out any cash ($DIV = 0$, $REPO = 0$). These are small, high market-to-book firms with high earnings volatility. The average (median) standard deviation of the return on assets is 7.5 percent (4.9 percent) for repurchasing non-dividend-paying firms and 9.4 percent (6.1 percent) for nonpayers. There is a big difference in earnings volatility between firms that pay dividends and those that do not pay dividends.

The relation between earnings volatility and payout method is important given the possibility that firms with higher earnings volatility may tend to pay out more in the form of repurchases rather than dividends. A relevant comparison is the findings of Jagannathan et al. (2000). Like them, we find that firms that only repurchase have higher earnings volatility than do firms that only pay dividends. Moreover, we find that repurchasing firms are younger than dividend-paying firms: Only 34.1 percent of the repurchasing firms ($DIV = 0$, $REPO > 0$) in our sample have been traded for more than eight years. In contrast, we find that 63.4 percent of the dividend paying firms ($DIV > 0$) in our sample have been traded for more than eight years.[3]

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[3] CRSP started to report data on Nasdaq stocks only in 1972. Restricting our sample to the period 1980 to 2000, we can classify firms to "young" and "old" using eight years of trading as the cutoff.

Table II also shows that if we condition on a firm paying dividends, there is no difference between firms that do or do not repurchase shares. We do not find that firms that pay dividends and repurchase shares have more volatile earnings, on average, than firms that only pay dividends (Jagannathan et al. (2000) find similar results in their paper). This result is important, because firms that pay dividends and repurchase shares (earnings volatility equal to 3.4 percent) account for 87.9 percent of the total aggregate expenditures on share repurchases. On the other hand, firms that only repurchase shares (earnings volatility equal to 7.5 percent) account for only 12.1 percent of the repurchase activity.

Thus, comparing firms that only repurchase to firms that only pay dividends may not reveal the entire picture concerning the relation between payout method and earnings volatility. It seems that young firms are those who prefer to pay in the form of repurchases, which could be a reason for the findings that repurchases are associated with higher volatility of earnings.

To control for the age differences, we investigate the dividend and repurchase policies of established firms (i.e., those firms that have been on the Compustat files over the entire period 1972 to 2000). Our objective is to examine whether changes in the variability of earnings can account for the increase in the propensity to repurchase. We report the results in Table III. For each of the firms, we calculate the standard deviation of ROA, the non-operating income scaled by assets, the dividend payout ratio, and the repurchase payout ratio for three distinct subperiods: (1) 1972–1979, (2) 1980–1991, and (3) 1992–2000. Table III shows that although the average (median) volatility of the return on assets slightly declined from 3.35 percent (2.35 percent) in the period 1972 to 1979 to 3.15 percent (2.33 percent) in the period 1992 to 2000, the average (median) repurchase payout ratio increased from 5.98 percent (0 percent) to 22.8 percent (11.48 percent). That is, for a sample of mature, well-established firms, we do not find positive relation between share repurchase activity and earnings volatility.

We also estimate a cross-sectional regression of the change in the share repurchase payout ratio from period 1972 to 1979 to period 1992 to 2000 on the change in the standard deviation of ROA over the same time period. Although not reported in a table, we find that the coefficient of the standard deviation of ROA is insignificant. Consistent with the univariate analysis, this result does not suggest that firms that experience higher earnings volatility tend to use more repurchases relative to dividends.

Another dimension of the change in the way firms distribute cash to their shareholders can be seen in Figure 2. The figure depicts the distribution of firms by payout method over the period 1972 to 2000. We determine the payout policy of a firm by observing the cash disbursements of the firm over a period of a year. The most striking result from this figure is the declining trend in the proportion of firms that only pay dividends. In the 1970s and early 1980s, most firms relied almost exclusively on dividend payments to distribute cash to their equityholders. This situation changed in the mid-1980s, when corporations started to rely more on share repurchase pro-

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Table III

Relation between Cash Flow Volatility and Payout Policy

</div>

This table examines the effects of cash flow volatility on payout policy for a sample of U.S. firms that have been on the Compustat files over the entire period 1972 to 2000 and which have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). *ROA* is the operating income before depreciation (Compustat item #13) scaled by the book value of the total assets. $\sigma(ROA)$ is the standard deviation of *ROA*. $\sigma(ROA)$ is calculated over the following time periods: 1972–1975, 1976–1979, 1980–1983, 1984–1987, 1988–1991, 1992–1995, and 1996–2000. *NOPER* is the nonoperating income before depreciation (Compustat item #61) scaled by the book value of the total assets. *DIV/EARN* is the dividend payout ratio. *REPO/EARN* is the repurchase payout ratio. *DIV/EARN*, *REPO/EARN*, and *NOPER* have been truncated at the 99th percentile. *ROA* has been truncated at the 1st and 99th percentiles. The data sample contains 452 firms.

	$\sigma(ROA)$	*NOPER*	*DIV/EARN*	*REPO/EARN*
		Panel A: Period 1972–1979		
Mean	3.35%	1.25%	26.57%	5.98%
Median	2.35%	0.93%	25.59%	0.00%
		Panel B: Period 1980–1991		
Mean	3.57%	1.73%	36.46%	16.41%
Median	2.69%	1.35%	32.56%	3.43%
		Panel C: Period 1992–2000		
Mean	3.15%	1.10%	35.15%	22.80%
Median	2.33%	0.73%	31.15%	11.48%

grams. As a percentage of the total number of firms distributing cash to their shareholders, the number of repurchasing firms increased from 31 percent in 1972 to 80 percent in 2000. This increase means that the number of firms only paying dividends as a percentage of the total number of firms distributing cash to their shareholders declined from 69.0 percent in 1972 to 20 percent in 2000. Since the number of firms distributing cash has been almost constant over time, this evidence suggests that repurchases have been displacing dividends. This evidence is also consistent with the recent findings of Fama and French (2001) that the proportion of dividend-paying firms has declined over time. However, contrary to their results, we find evidence consistent with substitution.

Figure 3 shows the proportion of cash distribution initiations by payout method over the period 1974 to 2000. We define a cash distribution initiation as the first time that a firm pays dividends and/or repurchases shares after 1972. This figure shows that the proportion of firms that initiate a cash distribution using only share repurchases increased from less than 27 per-
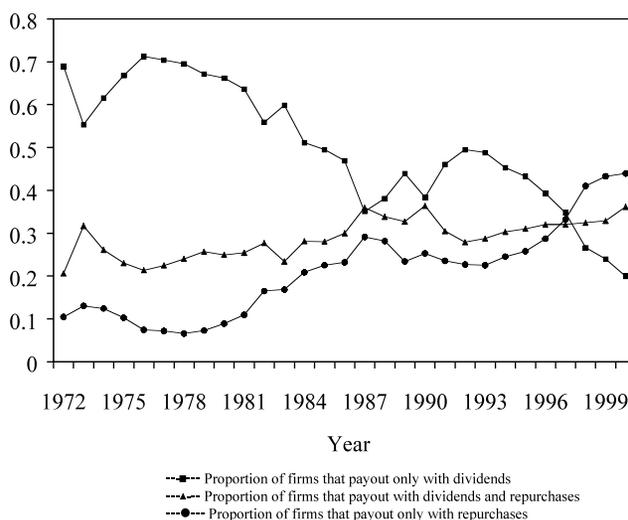
Figure 2. Distribution of firms by payout method. This figure depicts the distribution of firms by payout method for a sample of U.S. firms. We determine the payout policy of a firm by observing the cash disbursements of the firm over a period of a year. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The data sample contains 136,646 firm-year observations and excludes banks, utilities, and insurance companies.

cent in 1974 to more than 84 percent in 2000. This evidence indicates that share repurchases have become the preferred method of payout among firms initiating cash distributions to their equityholders.

Finally, we can draw a more complete picture by examining the dynamics of firms' payout methods during this time period. Table IV reports the transition probabilities of changing from payout policy i at time $T - 1$ to payout policy j at time T. As before, we determine the payout policy of a firm by observing the cash disbursements of the firm over the following time periods: 1972 to 1975, 1976 to 1979, 1980 to 1983, 1984 to 1987, 1988 to 1991, 1992 to 1995, and 1996 to 2000. The firm's payout policy can fall into one of four categories in each period: (1) no cash distribution, (2) only dividends, (3) only repurchases, and (4) both dividends and repurchases. The transitions probabilities are equal to the number of firms changing their payout policy from i to j divided by the total number of firms with payout policy i at time $T - 1$.
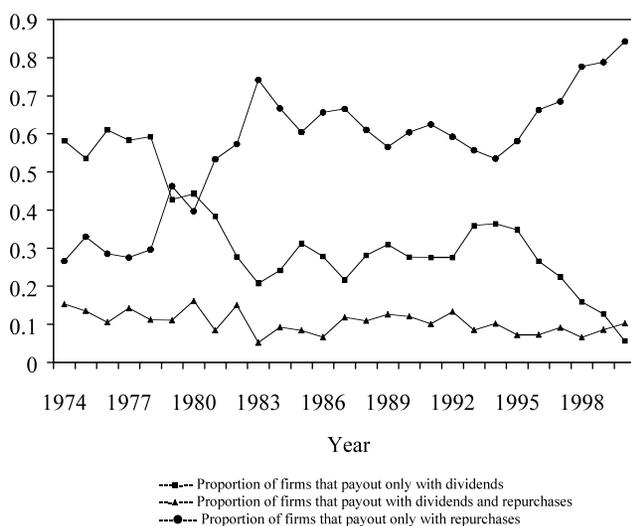
Figure 3. Cash distribution initiations. This figure depicts the proportion of cash distribution initiations by payout method for a sample of U.S. firms. We define a cash distribution initiation as the first time that a firm pays dividends and/or repurchases shares after 1973. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The data sample contains 134,646 firm-year observations and excludes banks, utilities, and insurance companies.

Panel A of Table IV shows the average transition probabilities over the entire period (1972 to 2000). Panels B, C, and D show the results for three subperiods.

Several interesting results emerge from Panel A (the entire time period). Firms tend not to change their payout policies. Those that did not pay any cash out in a given four-year period ($T - 1$) are most likely to follow the same policy in the next four-year period (64.01 percent). We also see that 54.88 percent of firms that only paid dividends will continue to do so. And we see that 51.15 percent of firms that repurchase will follow the same policy and 68.20 percent of firms that use both dividends and repurchases in a given period will do the same in the following period.

When we compare the earlier subsample (1972 to 1979, Panel B) to the more recent one (1992 to 2000, Panel D) we observe several significant trends: First, a much higher proportion of firms initiates a cash payment as dividends in earlier periods (22.96 percent in Panel A and 2.43 percent in Panel D). Second, more firms initiate their cash payment in the form of repurchases in

Table IV
Transition Probabilities of Changing Payout Policy

This table reports the transition probabilities of changing from payout policy i at time $T - 1$ to payout policy j at time T for a sample of U.S. firms. We determine the payout policy of a firm by observing the cash disbursements of the firm over the following time periods: 1972–1975, 1976–1979, 1980–1983, 1984–1987, 1988–1991, 1992–1995, and 1996–2000. The transition probabilities are equal to the number of firms changing their payout policy from i to j scaled by the total number of firms with payout policy i at time $T - 1$. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item # 56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25).

		T			
		DIV = 0, *REPO* = 0	*DIV* > 0, *REPO* = 0	*DIV* = 0, *REPO* > 0	*DIV* > 0, *REPO* > 0
	Panel A: Period 1972–2000				
T − 1	*DIV* = 0, *REPO* = 0	64.01%	4.62%	27.14%	4.23%
	DIV > 0, *REPO* = 0	8.28%	54.88%	3.11%	33.73%
	DIV = 0, *REPO* > 0	36.37%	2.96%	51.15%	9.53%
	DIV > 0, *REPO* > 0	4.91%	22.65%	4.24%	68.20%
	Panel B: Period 1972–1979				
T − 1	*DIV* = 0, *REPO* = 0	49.02%	22.96%	14.33%	13.68%
	DIV > 0, *REPO* = 0	5.99%	64.44%	0.86%	28.72%
	DIV = 0, *REPO* > 0	25.17%	15.10%	30.66%	29.06%
	DIV > 0, *REPO* > 0	3.14%	37.52%	1.82%	57.52%
	Panel C: Period 1980–1991				
T − 1	*DIV* = 0, *REPO* = 0	65.18%	3.96%	26.43%	4.43%
	DIV > 0, *REPO* = 0	8.95%	53.68%	3.18%	34.20%
	DIV = 0, *REPO* > 0	38.34%	1.98%	51.21%	8.47%
	DIV > 0, *REPO* > 0	5.50%	22.04%	4.56%	67.90%
	Panel D: Period 1992–2000				
T − 1	*DIV* = 0, *REPO* = 0	65.30%	2.43%	29.62%	2.65%
	DIV > 0, *REPO* = 0	8.72%	49.94%	4.69%	36.65%
	DIV = 0, *REPO* > 0	36.98%	1.24%	55.51%	6.28%
	DIV > 0, *REPO* > 0	4.92%	16.38%	4.96%	73.74%

the 1990s (29.62 percent) than in the 1970s (14.33 percent). Third, in recent periods, more firms that have been repurchasing their shares continue to do so. In the 1972 to 1979 period, about 38 percent of the firms switched from paying both dividends and repurchasing shares to only dividends, compared

with 16.38 percent in the later period (Panel D). Firms that have been re-purchasing (but not paying dividends) continue to do so at a higher propor-tion in the later period (55.51 percent vs. 30.66 percent). Fourth, that during the period 1972 to 1979, of the firms that only repurchased in a given pe-riod, 15.1 percent switched to only paying dividends in the following period and 29.06 percent switched to using both methods of payments. Only 1.24 percent and 6.28 percent, respectively, of the firms follow this strategy in the later period. Finally, firms that use both methods of payment are less likely to switch to only dividends in the later periods. In the earlier period (Panel B), 37.52 percent of firms that have been using both methods to dis-tribute cash to equityholders in period $t - 1$ switch to only dividends in period t. In the later period (Panel D), the proportion drops to 16.38 percent. In the 1972 to 1979 period, 57.52 percent of firms that paid in the form of dividend and repurchases continue to do so, compared with 73.74 percent in the 1990s. (Using a binomial test, we find that all the differences discussed above are significantly different from zero at the one percent level.)

Overall, the results in Table IV indicate that relative to the 1970s, U.S. corporations are more likely to use share repurchase programs and less likely to use dividends. It seems that corporations have been changing their pref-erences on the form of payout they use to distribute cash.

Using a different measure of share repurchases, a recent paper by Fama and French (2001) does not detect a strong relation between share repur-chase activity and changes in dividends. The Fama and French measure may cloud the relation between dividends and repurchases, since their mea-sure of repurchases (either the change in Treasury stocks or the amount repurchased minus amount issued by the firm) involves not only repurchase activity, but also equity issuance and payment to labor in the form of stock options.

This measure may pose two problems. First, since our objective is to com-pare dividends to repurchases, we do not want to subtract another financing activity of the firm (equity issuance) from repurchases and not from divi-dends. Otherwise, we would be comparing net repurchase activity to gross dividends. Second, the exercise of stock options decreases the amount of Treasury stocks, and therefore results in an underestimate of the true amount that was repurchased (see also Stephens and Weisbach, 1998). Moreover, stock options are a form of payment to labor and should be viewed as such. Thus, by calculating the net change in Treasury stocks, we might be mea-suring a net impact of financing (repurchases and equity issuance) and in-vestment decisions (payment to labor).

For example, imagine a firm that repurchases 1,000 shares, say for $10,000, and then a few months later the firm turns around and gives these shares to its CEO as part of her compensation. The firm is involved in two distinct actions. The first is a financing action (repurchase shares), and the second is an investment decision (to pay the manager). In this example, the net change in Treasury stocks is zero. Thus, this measure of repurchase could underestimate the extent of repurchase activity since it combines payment

to labor through stocks and repurchase of shares. Indeed, Stephens and Weisbach (1998) show that measuring repurchase activity through changes in Treasury stocks results in estimates that are 60 percent lower than the measures that use the cash amount spent on repurchases (as we do) or the amount firms announce they will repurchase.

IV. Share Repurchases, Dividends, and the Substitution Hypothesis

To investigate on a firm level whether dividend-paying firms treat dividends and repurchases as alternative payout methods, we use Lintner's (1956) analysis of how firms determine their dividend policy. Lintner's observations suggest that firms' dividend policy is a function of their targeted payout ratio and the speed of adjustment of current dividends. Using this model, we calculate the expected dividend payment for a firm based on its past dividend behavior and determine whether actual dividend payments are above or below the expected dividend payment. By doing so, we can observe whether firms are deviating from their past dividend policies. If firms are substituting repurchases for dividends, then we should find a negative correlation between the dividend forecast error (actual minus expected) and share repurchase activity. In other words, finding a negative correlation between these two variables would indicate that share repurchases have been partially financed with potential dividend increases. Alternatively, finding a positive (zero) correlation between these two variables would indicate that dividends and share repurchases are complementary (independent) payout methods.

We examine the effect of share repurchase activity on the dividend forecast error by using a sample of firms that have continuously paid dividends over the entire preforecast period.[4] We use two preforecast periods to estimate the parameters of the Lintner (1956) model: 1973 to 1983 and 1973 to 1990.

For each firm, we define the dividend-forecast error as

$$ERROR_{t,i} = [\Delta DIV_{t,i} - (\beta_{1,i} + \beta_{2,i} EARN_{t,i} + \beta_{3,i} DIV_{t-1,i})]/MV_{t-1,i} \qquad (1)$$

where $\Delta DIV_{t,i}$ is the actual change in dividends in year t, $EARN_{t,i}$ is the earnings in year t, $DIV_{t-1,i}$ is the dividend level at year $t-1$, and $MV_{t-1,i}$ is the market value of equity in year $t-1$. The coefficients $\beta_{2,i}$ and $\beta_{3,i}$ are the parameters of earnings and lagged dividends, respectively, from Lintner's (1956) model, which we have estimated over a preforecast period. (Scaling

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[4] Using such firms results in more precise parameters for the Lintner (1956) model. We repeat the analysis by using portfolios of firms instead of individual firms. The results are qualitatively the same.

by the market value of equity reduces the effects of heteroskedasticity and enables us to directly compare the forecast error to the repurchase and dividend yield.)

On average, our estimates of the parameters of the Lintner (1956) model are consistent with the estimates reported in Fama (1974) over the period 1946 to 1968. The average estimate for the coefficient of earnings is 0.092 when we estimate the model over the period 1973 to 1983. The average estimate for the coefficient of lagged dividends is −0.208 and the average adjusted R^2 is 45.7 percent.

Table V shows the empirical relation between the dividend forecast error (*ERROR*) and the share repurchase yield (*RYIELD*). Consistent with the substitution hypothesis, the evidence indicates that the dividend forecast error is negatively correlated with the share repurchase yield.[5] The forecast error becomes more negative (monotonically) as the share-repurchase yield increases.[6] That is, as firms repurchase more (i.e., a higher repurchase yield), the actual dividend is lower than the expected dividend. For example, the mean (median) dividend forecast error when there is no repurchase activity (Group 1) is equal to 0.044 percent (0.012 percent) when the preforecast period is 1973 to 1983 and −0.060 percent (−0.001 percent) when the preforecast period is 1973 to 1990. This small forecast error is an indication that the model works well in the absence of repurchase activity. On the other hand, the mean (median) dividend forecast error when share repurchase is high (Group 5) is equal to −0.144 percent (−0.177 percent) when the preforecast period is 1973 to 1983 and −0.326 percent (−0.221 percent) when the preforecast period is 1973 to 1990. The differences in forecast errors between Group 5 and Group 1 are negative and significantly different from zero. Although not reported in the table, we also find that the difference in forecast errors between repurchasing firms and nonrepurchasing firms is negative and statistically significant.

To examine the economic significance of the dividend forecast error, we estimate how large the average forecast error is relative to the average dividend yield. We find that a forecasting error of −0.144 percent (Group 5 when the preforecast period is 1972 to 1983) implies a deviation of 5.11 percent from the average dividend yield. A forecasting error of −0.326 percent (Group 5 when the preforecast period is 1972 to 1990) implies a deviation of 14.05 percent from the average dividend yield. These comparisons indicate that the magnitudes of the forecast errors are not trivial.

We could argue that the correlation between the dividend forecast error and share repurchase activity is driven by differences in the firm characteristics. For example, a firm might decide to repurchase shares after experiencing an increase in earnings volatility. This situation could create

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[5] We note that the number of observations varies across groups. The reason for this is that *RYIELD* is not uniformly distributed.

[6] We also ran a simple regression of the *ERROR* on *RYIELD*, and found that the coefficient of *RYIELD* is negative and significantly different from zero at the one percent level.

Table V

**Relation between Dividend Forecast Errors
and Share Repurchase Yield**

This table examines the empirical relation between dividend forecast errors and share repur-
chase yield for a sample of U.S. firms. We define the dividend forecast error as

$$ERROR_{t,i} = [\Delta DIV_{t,i} - (\beta_{1,i} + \beta_{2,i}EARN_{t,i} + \beta_{3,i}DIV_{t-1,i})]/MV_{t-1,i}$$

where $\Delta DIV_{t,i}$ is the actual change in dividends at time t, $EARN_{t,i}$ is the earnings at time t,
$DIV_{t-1,i}$ is the dividend level at $t - 1$, and $MV_{t-1,i}$ is the market value of equity at time $t - 1$.
The coefficients $\beta_{1,i}$, $\beta_{2,i}$, and $\beta_{3,i}$ are the parameters of Lintner's (1956) model that have been
estimated for each firm over a preforecast period. To be included in the sample, each firm must
have paid dividends continuously over the entire preforecast period. If the absolute value of the
forecasting error is greater than five percent, then the observation is eliminated to reduce the
effect of extreme values. *RYIELD* is the total expenditure on share repurchases at time t scaled
by the market value of equity at time $t - 1$. *DYIELD* is the total expenditure on dividends at
time t scaled by the market value of equity at time $t - 1$. The number of observations varies
across groups because *RYIELD* is not uniformly distributed. *RYIELD* and *DYIELD* have been
truncated at the 99th percentile.

Preforecast Period	Entire Sample	Groups Ranked by Share Repurchase Yield					
		1 (Low)	2	3	4	5 (High)	(5–1)
1973–1983							
ERROR							
Mean	0.017%[b]	0.044%[a]	0.030%[b]	−0.034%	−0.149%[a]	−0.144%[a]	−0.188%[a]
Median	−0.009%	0.012%[a]	−0.005%[b]	−0.041%[a]	−0.108%[a]	−0.177%[a]	−0.189%[a]
N	9,521	4,354	3,558	896	342	371	—
RYIELD							
Mean	1.61%[a]	0.00%	1.01%[a]	4.29%[a]	7.27%[a]	14.61%[a]	14.61%[a]
Median	0.06%[a]	0.00%	0.81%[a]	4.19%[a]	7.06%[a]	12.70%[a]	12.70%[a]
N	9,521	4,354	3,558	896	342	371	—
DYIELD							
Mean	2.82%[a]	3.00%[a]	2.66%[a]	2.68%[a]	2.52%[a]	2.82%[a]	−0.18%[b]
Median	2.70%[a]	2.86%[a]	2.56%[a]	2.57%[a]	2.41%[a]	2.79%[a]	−0.07%
N	9,521	4,354	3,558	896	342	371	—
1973–1990							
ERROR							
Mean	−0.088%[a]	−0.060%[a]	−0.079%[a]	−0.119%[a]	−0.237%[a]	−0.326%[a]	−0.266%[a]
Median	−0.026%[a]	−0.001%	−0.021%[a]	−0.072%[a]	−0.117%[a]	−0.221%[a]	−0.220%[a]
N	4,116	1,713	1,712	429	154	108	—
RYIELD							
Mean	1.47%[a]	0.00%	1.04%[a]	4.23%[a]	7.21%[a]	12.31%[a]	12.31%[a]
Median	0.16%[a]	0.00%	0.86%[a]	4.11%[a]	7.00%[a]	11.34%[a]	11.34%[a]
N	4,116	1,713	1,712	429	154	108	—
DYIELD							
Mean	2.64%[a]	2.88%[a]	2.53%[a]	2.41%[a]	2.06%[a]	2.32%[a]	−0.56%[a]
Median	2.48%[a]	2.75%[a]	2.39%[a]	2.28%[a]	1.99%[a]	2.23%[a]	−0.52%[a]
N	4,116	1,713	1,712	429	154	108	—

[a,b] Significantly different from zero at the one percent and five percent levels, respectively.

a spurious correlation between the dividend forecast error and the share repurchase yield, because the increase in earnings volatility could be causing both the decline in dividends and the increase in share repurchases. That is, it is possible that firms with high-repurchase yields have different characteristics than firms with low-repurchase yields. Therefore, the apparent substitution effect could be caused only by differences in firm characteristics.

Therefore, we control for several factors that might affect the decision of the method of payment. In Table VI, we report the results of cross-sectional regressions of the dividend forecast error on the repurchase yield, the logarithm of size, the return on assets, the volatility of return on assets, the nonoperating income scaled by total assets, and the debt-to-total assets ratio. To reduce the effect of cross-correlated residuals, we use Fama and Macbeth (1973) type regressions to estimate the coefficients and standard errors. First, we estimate year-by-year annual average coefficients. Then, we estimate time-series averages for each coefficient. We estimate the standard errors by using the Hansen–Hodrick standard error correction method.

Our results indicate that the repurchase yield has a negative effect on the dividend forecast error even after we control for firm characteristics. The average regression coefficient of *RYIELD* is equal to -0.01312 when the preforecast period is 1973 to 1983 and -0.01766 when the preforecast period is 1973 to 1990. These coefficients are significantly different from zero at the one percent confidence level.

The evidence in this section seems to suggest that dividend-paying firms have been substituting dividends with share repurchases.

V. Does the Market Perceive Dividends and Repurchases as Substitutes?

Presumably, corporations substitute share repurchases for dividends because it increases the value of the firm. Therefore, a relevant question is how investors perceive this change in corporate policy. Answering this question is important, because it will allow us to test the substitution hypothesis from a different perspective. All else constant, if investors believe that it is more likely that corporations are substituting share repurchases for dividends, then the market reaction to dividend cuts should be significantly less negative for repurchasing firms than for nonrepurchasing firms. If there is no substitution between dividends and repurchases, then the market reaction to dividend cuts should be the same for all types of firms.

Testing this hypothesis is not a trivial task because it is very rare for firms to simultaneously announce a share repurchase program and a dividend reduction. (One likely reason for the rarity of this event is that it makes it all too clear to the Internal Revenue Service (IRS) that the announced repurchase is a perfect substitute to a dividend distribution.) However, what we can observe is the market reaction to firms' announcements of dividend

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Table VI

Cross-Sectional Regressions of the Dividend Forecast Error on Several Factors

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This table reports average estimates of cross-sectional regressions of the dividend forecast error on several factors for a sample of U.S. firms. We define the dividend forecast error as

$$ERROR_{t,i} = [\Delta DIV_{t,i} - (\beta_{1,i} + \beta_{2,i} EARN_{t,i} + \beta_{3,i} DIV_{t-1,i})]/MV_{t-1,i}$$

where $\Delta DIV_{t,i}$ is the actual change in dividends at time t, $EARN_{t,i}$ is the earnings at time t, $DIV_{t-1,i}$ is the dividend level at $t-1$, and $MV_{t-1,i}$ is the market value of equity at time $t-1$. The coefficients $\beta_{1,i}$, $\beta_{2,i}$, and $\beta_{3,i}$ are the parameters of Lintner's (1956) model that have been estimated for each firm over a preforecast period. To be included in the sample, each firm must have paid dividends continuously over the entire preforecast period. If the absolute value of the forecasting error is greater than 5 percent, then the observation is eliminated to reduce the effect of extreme values. *RYIELD* is the total expenditure on share repurchases at time t scaled by the market value of equity at time $t-1$. Log(*MV*) is the logarithm of the market value of equity. *ROA* is the operating income before depreciation scaled by the book value of the total assets. $\sigma(ROA)$ is the standard deviation of *ROA* over the three years surrounding the firm-year observation. *NOPER* is the nonoperating income before depreciation scaled by the book value of the total assets. *DEBT* is the book value of total long-term debt plus the book value of total short-term debt scaled by the book value of the total assets. *RYIELD*, *NOPER*, and *DEBT* have been truncated at the 99th percentile. *ROA* has been truncated at the 1st and 99th percentiles. We use Fama–MacBeth type regressions to estimate the coefficients and standard errors. First, we estimate year-by-year annual average coefficients. Then, we estimate time-series averages for each coefficient. We estimate the standard errors using the Hansen–Hodrick standard error correction method.

	Dependent Variable: *ERROR*	
	Preforecast Period	
	1973–1983	1973–1990
Intercept	−0.00001	−0.00397[a]
	(0.00)	(75.01)
RYIELD	−0.01312[a]	−0.01766[a]
	(11.44)	(14.50)
log(*MV*)	0.00027[a]	0.00042[a]
	(9.57)	(29.19)
ROA	−0.00894[a]	0.00033
	(37.62)	(0.03)
$\sigma(ROA)$	−0.00228	0.00419
	(0.25)	(0.23)
NOPER	0.02358[a]	0.02488
	(8.17)	(2.33)
DEBT	−0.00158[a]	0.00060
	(7.56)	(0.66)

[a] Significantly different from zero at the one percent level. Wald statistics are reported in parentheses.

reduction. Although it is well documented that stock prices react negatively to the announcement of dividend decreases (see Asquith and Mullins (1983), Brickley (1983), Healy and Palepu (1988), Michaely, Thaler, and Womack (1995)), it is still unclear whether the market reacts differently to this news as a function of the firm's repurchase policy. We investigate this issue in Section V.A.

If dividends and repurchases are substitutes and differential taxes play a role in this issue, then the market reaction to a share repurchase announcement should be a function of the relative taxation as well. In other words, the market reaction to these corporate events should be positively correlated with the marginal benefit of substituting share repurchases for dividends. We investigate this issue in Section V.B.

A. The Effect of Share Repurchases on the Market Reaction Surrounding Dividend Decreases

To assess the effect of share repurchase programs on the market reaction around the announcement of dividend decreases, we collect a sample consisting of firms that reduced their cash dividends during the period 1974 to 1996. Each observation in the sample satisfies the following criteria: (1) the firm's financial data is available on CRSP and Compustat, (2) its dividend is paid quarterly, (3) the dividend is taxable, (4) the cash dividend change is greater than 10 percent, and (5) the cash dividend is not an omission. The resulting sample contains 1,255 announcements of dividend decreases. We classify the firms in our sample of dividend decreases as repurchasing firms or nonrepurchasing firms. To be classified as a repurchasing firm, a firm must have repurchased shares over the two years prior to the announcement of the dividend decrease.

Table VII presents the results of this analysis. The three-day cumulative abnormal return around the announcement of dividend decreases is significantly less negative for nonrepurchasing firms than for repurchasing firms. On average, the market reaction to dividend decreases is not significantly different from zero for nonrepurchasing firms. Although the mean (median) market reaction around the announcements made by nonrepurchasing firms is −1.93 percent (−0.72 percent), the mean (median) market reaction around the announcements made by repurchasing firms is only −0.45 percent (0.10 percent). The differences between the two means (1.48 percent) and the two medians (0.82 percent) are significantly different from zero at the 1 percent level. Table VII also shows that the mean and median percentage changes in the cash dividend. Since the difference between these values is relatively small, we cannot attribute the difference in market reaction to differences in the magnitude of the dividend changes.[7]

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[7] Conditioning on the firm repurchasing shares in only the prior year (rather than in the two years before the announcement of dividend reduction), we find similar results.

Table VII

The Effect of Share Repurchases on the Market Reaction to Dividend Decreases: Univariate Analysis

This table examines the effect of share repurchases on the market reaction around the announcement of dividend decreases for firms that reduce their cash dividends during the period 1974 to 1996. Each observation in the sample satisfies the following criteria: (1) the firm's financial data is available on CRSP and Compustat, (2) its dividend is paid quarterly, (3) the dividend is taxable, (4) the cash dividend change is greater than 10 percent, and (5) the cash dividend is not an omission. To assess the effect of share repurchase programs on the market reaction around the announcement of dividend decreases, we classify firms as repurchasing firms or nonrepurchasing firms. To be classified as a repurchasing firm, a firm must have repurchased shares over the two years prior to the announcement of the dividend decrease. *CAR* is the three-day cumulative abnormal return around the announcement of the dividend change. *CHGDIV* is the percentage change in the cash dividend payment. The significance levels of the means (medians) are based on a two-tailed *t*-test (two-tailed Wilcoxon rank test).

	Entire Sample	Nonrepurchasing Firms	Repurchasing Firms	Difference (Repurchasing − Nonrepurchasing)
CAR				
Mean	−1.59%[a]	−1.93%[a]	−0.45%	1.48%[a]
Median	−0.58%[a]	−0.72%[a]	0.10%	0.82%[a]
N	1,253	965	288	—
CHGDIV				
Mean	−43.42%[a]	−43.91%[a]	−41.78%[a]	2.13%[b]
Median	−44.44%[a]	−44.44%[a]	−43.54%[a]	0.90%[b]
N	1,255	967	288	—

[a,b] Significantly different from zero at the one percent and five percent levels, respectively.

To control for other factors that may affect the market reaction around the announcement of dividend decreases, we estimate the following cross-sectional regression using the Fama-MacBeth methodology:

$$CAR_{it} = \beta_0 + \beta_1 DUMREPO_{it} + \beta_2 CHGDIV_{it} + \beta_3 SIZE_{it}$$

$$+ \beta_4 DYIELD_{it} + \beta_5 DROA0_{it} + \epsilon_{it}, \qquad (2)$$

where *CAR* is the three-day cumulative abnormal return around the announcement of the dividend change; *DUMREPO* is a dummy variable that is equal to one if the firm has repurchased shares in the two years prior to the announcement of the dividend decrease, zero otherwise; *CHGDIV* is the percentage change in the cash dividend payment; *SIZE* is the logarithm of the book value of the total assets at the time of the announcement of the cash dividend decrease; *DYIELD* is the dividend yield at the time of the announcement of the cash dividend decrease; and *DROA*0 is the change in ROA from year −1 to year 0 (year of the event). Consistent with the results from the univariate analysis, Table VIII shows that repurchasing firms experience a

The Effect of Share Repurchases on the Market Reaction
to Dividend Decreases: Multivariate Analysis

This table reports the average estimated coefficients of the following cross-sectional regression:

$$CAR_{it} = \beta_0 + \beta_1 DUMREPO_{it} + \beta_2 CHGDIV_{it} + \beta_3 SIZE_{it} + \beta_4 DYIELD_{it} + \beta_5 DROA0_{it} + \epsilon_{it}.$$

The sample consists of firms that reduce their cash dividends during the period 1974 to 1996. Each observation in the sample satisfies the following criteria: (1) the firm's financial data is available on CRSP and Compustat, (2) its dividend is paid quarterly, (3) the dividend is taxable, (4) the cash dividend change is greater than 10 percent, and (5) the cash dividend is not an omission. *CAR* is the three-day cumulative abnormal return around the announcement of the dividend decrease. *DUMREPO* is a dummy variable that is equal to one if the firm has repurchased shares over the two years prior to the announcement of the dividend decrease, zero otherwise. *CHGDIV* is the percentage change in the cash dividend payment. *SIZE* is the logarithm of the book value of the total assets at the time of the announcement of the cash dividend decrease. *DYIELD* is the dividend yield at the time of the announcement of the cash dividend decrease. *ROA* is the operating income before depreciation scaled by the book value of the total assets. *DROA0* is the change in *ROA* from year -1 to year 0 (year of the event). *DYIELD* has been truncated at the 99th percentile. *ROA* has been truncated at the 1st and 99th percentiles. We use Fama–MacBeth type regressions to estimate the coefficients and standard errors. First, we estimate year-by-year annual average coefficients. Then, we estimate time-series averages for each coefficient. We estimate the standard errors using the Hansen-Hodrick standard error correction method.

Dependent Variable: *CAR*	
Intercept	3.6402^a
	(6.48)
DUMREPO	1.1423^a
	(7.45)
CHGDIV	0.0640^a
	(15.56)
SIZE	0.10927
	(0.58)
DYIELD	-67.1891^a
	(58.46)
DROA0	12.0684^a
	(6.08)

[a] Significantly different from zero at the 1 percent level. Wald statistics are reported in parentheses.

less negative market reaction to dividend decreases than nonrepurchasing firms. The coefficient of *DUMREPO* is positive (1.1423) and significantly different from zero at the one percent level. Overall, the evidence presented in this subsection suggests that investors perceive that corporations substitute share repurchases for dividends and therefore penalize a firm less for a reduction of dividends when they perceive that those dividends are being substituted by share repurchases.

B. Share Repurchases, Dividends, and Taxes

If we assume that investors' dividend tax rates are higher than their capital gains tax rates, then every dollar the firm pays its shareholders through a repurchase and not through a dividend should be more valuable to investors by the differential taxes between dividends and capital gains. If, on the other hand, firms are paying repurchases from retained earnings for example, and are not using repurchases as a substitute for dividends, then differential taxes should not affect investors' reaction to repurchases.

We test this prediction by examining the effect of the Tax Reform Act of 1986 on the market reaction surrounding share repurchase announcements. Since the Tax Reform Act of 1986 drastically reduced the difference between dividends and capital gains, the substitution hypothesis predicts a reduction in the market reaction around share repurchase announcements after this tax reform.

With this objective in mind, we form a sample of firms that announce open market share repurchase programs over the period 1980 to 1997. We gather data on open market share repurchase announcements from two different sources. Our main sample comes from announcements reported in the Securities Data Corporation's *U.S. Mergers and Acquisitions* database over the period 1985 to 1997. This database contains a comprehensive sample of open market share repurchase announcements and covers most of the share repurchase programs announced after 1984. We supplement this sample with announcements of open market share repurchase programs reported in the *Wall Street Journal Index* over the period 1980 to 1984.

The final sample satisfies the following criteria. (1) The firm's financial data is available on CRSP and Compustat. (2) The announcement of the share repurchase program does not coincide with the announcement of a dividend change. (3) The firm discloses the number or the percentage of shares sought during the duration of the share repurchase program. If the firm only announces the number of shares sought, then we calculate the percentage of shares sought by using the number of shares outstanding at the announcement of the share repurchase program. (4) The announcement of the open market share repurchase program is not made during the last quarter of 1987.[8] These selection criteria produce a sample of 3,935 open-market share repurchase announcements over the period 1980 to 1997.

We divide our sample of share repurchase announcements into two subsamples, firms that announced open-market share repurchase programs prior to the approval of the tax reform, and firms that announced open-market share repurchase programs after the approval of the tax reform. Consistent with the predictions of the substitution hypothesis, the results in Panel A of

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[8] Following Ikenberry, Lakonishok, and Vermaelen (1995), we exclude this period from the sample because many corporations established open-market share repurchase programs during this period to stabilize their stock prices after the market crash of October 1987. Furthermore, during this period, many companies did not announce the number of shares to repurchase over the duration of the program.

Table IX

The Effect of Taxes on the Market Reaction to Share Repurchase Announcements: Univariate Analysis

This table examines the effect of the Tax Reform Act of 1986 on the market reaction around the announcement of open market share repurchases for a sample of firms that establish open market share repurchase programs over the period 1980 to 1997 and that satisfy the following criteria: (1) the firm's financial data is available on CRSP and Compustat, (2) the share repurchase announcement does not coincide with the announcement of a dividend change, (3) the firm discloses the number or the percentage of shares sought during the duration of the share repurchase program, and (4) the announcement of the share repurchase program is not made during the last quarter of 1987. To assess the effect of the Tax Reform Act of 1986 on the market reaction around the announcement of share repurchase programs, we divide the sample into two subsamples: (1) firms that announced open-market share repurchase programs prior to the Tax Reform Act of 1986 (pretax reform) and (2) firms that announced open-market share repurchase programs after the Tax Reform Act of 1986 (posttax reform). *CAR* is the three-day cumulative abnormal return around the announcement of the share repurchase announcement. *PSOUGHT* is equal to the amount of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement. We define a first-time announcement as the first announcement made by a particular firm over the period 1980 to 1997. The significance levels of the means (medians) are based on a two-tailed t-test (two-tailed Wilcoxon rank test).

	Entire Period	Pretax Reform	Posttax Reform	Difference (Post − Pre)
		Panel A: Entire Sample		
CAR				
Mean	2.57%[a]	3.49%[a]	2.42%[a]	−1.07%[a]
Median	1.77%[a]	2.56%[a]	1.65%[a]	−0.91%[a]
N	3,935	540	3,395	—
PSOUGHT				
Mean	6.52%[a]	5.88%[a]	6.62%[a]	0.74%[a]
Median	5.00%[a]	4.60%[a]	5.00%[a]	0.40%[a]
N	3,935	540	3,395	—
		Panel B: First-Time Announcements		
CAR				
Mean	3.13%[a]	4.03%[a]	2.94%[a]	−1.09%[b]
Median	2.19%[a]	3.09%[a]	1.89%[a]	−1.20%[a]
N	2,331	416	1,915	—
PSOUGHT				
Mean	6.70%[a]	5.87%[a]	6.88%[a]	1.01%[a]
Median	5.00%[a]	4.60%[a]	5.00%[a]	0.40%[a]
N	2,331	416	1,915	—

[a,b] Significantly different from zero at the one percent and five percent levels, respectively.

Table IX indicate that the mean (median) market reaction around the announcement of share repurchase programs declined after the Tax Reform Act of 1986, from 3.49 percent (2.56 percent) to 2.42 percent (1.65 percent). The difference in the market reaction is significantly different at the 1 percent level. Since the average magnitude of share repurchase programs

(*PSOUGHT*) increased slightly after the Tax Reform Act of 1986, we cannot attribute the decline in the average market reaction after the tax reform to differences in the magnitude of the programs.

Since many repurchase programs that were authorized after the TRA of 1986 were announced by firms with previous announcements, we could argue that the decline in the average market reaction after 1986 is related to the fact that share repurchase programs became more predictable. To investigate this possibility, Panel B of Table IX reports the market reaction for only first-time announcements. We define a first-time announcement as the first announcement made by a particular firm over the period 1980 to 1997. Consistent with our previous findings, the average (median) market reaction declined after the TRA of 1986, from 4.03 percent (3.09 percent) to 2.94 percent (1.89 percent).

To control for other factors that might affect the market reaction around share repurchase programs, we estimate the following cross-sectional regression:

$$CAR_{it} = \beta_0 + \beta_1 TAX_t + \beta_2 \mathrm{Log}(PSOUGHT_{it}) + \beta_3 SIZE_{it} + \beta_4 DYIELD_{it} + \epsilon_{it}.$$

(3)

where *CAR* is the three-day cumulative abnormal return around the announcement of the open market share repurchase program, TAX_t is the tax differential between the top marginal tax rate on ordinary income and the top marginal tax rate on capital gains, Log(*PSOUGHT*) is the logarithm of the amount of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement, *SIZE* is the logarithm of the book value of the total assets at the time of the announcement of the repurchase program, and *DYIELD* is the dividend yield at the time of the announcement of the repurchase program.

Table X presents the estimated coefficients from this cross-sectional regression. It shows that the differential tax variable is positively related to the market reaction surrounding open market share repurchase programs (and significant at the five percent level). We obtain similar results when we include only first-time announcers in the sample (last column of the table). Not surprisingly, the regression also indicates that the market reaction is inversely related to the market value of equity (i.e., larger firms experience a small market reaction to announced repurchases), and it is positively related to the amount of the announced repurchase.[9]

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[9] We also estimate a regression in which, for each year, the ordinary income and the capital gains income tax rates are two separate variables. We find that only the coefficient of the ordinary income tax rate is positive and significant, indicating that the source of tax savings comes from the variation in the ordinary income tax rate.

<div align="center">

Table X

The Effect of Taxes on the Market Reaction to Share Repurchase Announcements: Multivariate Analysis

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This table reports the estimated coefficients of the following cross-sectional regression:

$$CAR_{it} = \beta_0 + \beta_1 TAX_t + \beta_2 \text{Log}(PSOUGHT_{it}) + \beta_3 SIZE_{it} + \beta_4 DYIELD_{it} + \epsilon_i.$$

The sample consists of firms that establish open-market share repurchase programs over the period 1980 to 1997 and that satisfy the following criteria: (1) the firm's financial data is available on CRSP and COMPUSTAT, (2) the share repurchase announcement does not coincide with the announcement of a dividend change, (3) the firm discloses the number or the percentage of shares sought during the duration of the share repurchase program, and (4) the announcement of the share repurchase program is not made during the last quarter of 1987. *CAR* is the three-day cumulative abnormal return around the announcement of the share repurchase announcement. *TAX* is the tax differential between the top marginal tax rate on ordinary income and the top marginal tax rate on capital gains. Log(*PSOUGHT*) is the logarithm of the amount of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement. *SIZE* is the logarithm of the book value of the total assets at the time of the announcement of the repurchase program. *DYIELD* is the dividend yield at the time of the announcement of the repurchase program. *DYIELD* has been truncated at the 99th percentile. We define a first-time announcement as the first announcement made by a particular firm over the period 1980 to 1997. The standard errors of the coefficients have been adjusted for heteroskedasticity using White's (1980) procedure. The significance levels of the estimated coefficients are based on a two-tailed *t*-test.

	Dependent Variable = *CAR*	
	Entire Sample	First-Time Announcements
Intercept	0.077835[a]	0.091661[a]
	(9.21)	(7.74)
TAX	0.022787[b]	0.030039[b]
	(1.98)	(2.14)
Log(*PSOUGHT*)	0.006323[a]	0.00761[a]
	(3.23)	(2.72)
SIZE	−0.00607[a]	−0.00760[a]
	(−7.15)	(−6.02)
DYIELD	−0.00777	0.010623
	(−0.14)	(0.15)
R^2-Adjusted	3.46%	3.65%
N	3,658	2,120

[a,b] Significantly different from zero at the one percent and five percent levels, respectively. *T*-statistics are reported in parentheses.

VI. The Effect of Rule 10b-18 on Share Repurchase Activity

The evidence indicates that corporations substitute share repurchases for dividends. But why did it take so long? Why did corporations rely primarily on dividend payments prior to the mid-1980s? This is especially puzzling

given the heavier tax burden on dividends relative to capital gains. It is possible that dividends have historically been the predominant form of cash distribution, because, due to the potential risk of violating the antimanipulative provisions of the Securities Exchange Act of 1934, corporations were reluctant to repurchase shares on the open market

In some countries, such as Austria, Norway, and Israel, open-market share repurchases are prohibited and are considered price manipulation. Although share repurchase programs have never been explicitly prohibited in the United States, there is reason to believe that regulatory agencies have been concerned with the potential impact of these programs on stock prices. This concern is reflected in the following statement made by a Senate Committee in 1967:

> Corporate repurchases of their own securities may serve a number of legitimate purposes. For example, they may result from a desire to reduce outstanding capital stock following the cash sale of operating divisions or subsidiaries, or to have shares available for options, acquisitions, employee or stock purchase plans, and the like, without increasing the total number of shares outstanding. Repurchase programs, however, may also be utilized by management to preserve or strengthen their control by counteracting tender offers or other attempted takeovers, or may be made in order to increase the market price of the company's shares. Whatever the motive behind the repurchase program, if the repurchases are substantial they will have a significant impact on the market. (Senate Report No. 550, 90th Congress; 1967).

Indeed, for decades, the SEC has occasionally charged companies with illegally manipulating their stock prices during share repurchase programs.[10] Due to the unique nature of stock buybacks, the SEC has been concerned that repurchasing firms might be engaging in certain types of activities that might disrupt the natural order of financial markets. But until 1982, there were no explicit rules directly regulating share repurchase activity in the United States. This situation exposed repurchasing firms to the risk of triggering a SEC investigation and being charged with illegal market manipulation. Since the direct and indirect costs of a regulatory inquiry can be very large (see Feroz, Park, and Pastena (1991), Karpoff and Lott (1993), Nourayi (1994), and Beatty, Bunsis, and Hand (1998)), it seems that firms were indeed deterred from repurchasing shares.[11]

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[10] See, for example, Genesco, Inc., (1964–66 Transfer Binder) Fed. Sec. L. Rep. (CCH) ¶77,354 (May 10, 1966); SEC *v*. Georgia-Pacific Corporation, (1964–66 Transfer Binder) Fed. Sec. L. Rep. (CCH) ¶91,680, (S.D.N.Y. 1960) (complaint); and Atlantic Research Corp., Sec. Exch. Act Release No. 4657 (December 6, 1963), (1961–64 Transfer Binder) Fed. Sec. L. Rep. (CCH) ¶76,949.

[11] Since the antimanipulative provisions of the SEA of 1934 apply to all participants involved in an illegal manipulation scheme, this situation may have also deterred brokers and specialists from participating in share repurchase programs as well.

Aware of this problem, the SEC started to design guidelines for corporations on how to carry out share repurchase programs without raising suspicions of manipulative behavior. In 1967, the SEC proposed Rule 10b-10, which, if it had been approved, would have required repurchasing firms to disclose information and to comply with certain mandatory rules on the price, time, volume, and manner of share repurchases.[12] In 1970, the SEC proposed Rule 13e-2, which in essence was very similar to Rule 10b-10.[13] Other versions of Rule 13e-2 were proposed in 1973 and 1980.[14] However, the SEC did not adopt any of these rules.

As part of the deregulation wave of the early 1980s, the SEC finally approved legislation to regulate open-market share repurchases. In 1982, the SEC adopted Rule 10b-18, which provides a safe harbor for repurchasing firms against the antimanipulative provisions of the Securities Exchange Act (SEA) of 1934.[15] Rule 10b-18 was adopted to establish guidelines for repurchasing shares on the open market without violating Sections 9 (a) (2) or 10 (b) of the SEA of 1934.[16] In general, Rule 10b-18 requires that firms repurchasing shares on the open market should only use one broker or dealer on any single day, avoid trading on an uptick or during opening or the last half-hour before the closing of the market, and limit the daily volume of purchases to a specified amount.

After the adoption of Rule 10b-18 in 1982, the chairman of the SEC at that time, John Shad, expressed that "without the change, companies are inhibited from making big open-market buys" (*Wall Street Journal* (1982, p. 2)). Apparently, the adoption of this rule represented a major change in the SEC's regulatory policy. John Evans, a SEC commissioner at that time, said "this is much-reduced regulation from what we had before" (*Wall Street Journal* (1982, p. 2)), suggesting that share repurchases were heavily regulated before the adoption of Rule 10b-18.

Thus if managers were reluctant to repurchase shares because of the potential risk of being charged with illegal market manipulation, then share repurchase activity should have increased significantly after the adoption of Rule 10b-18 in 1982.

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[12] See Pub. L. No. 90-439, 82 Stat. 454 (July 29, 1968).

[13] SEC Release No. 34-8930 (July 13, 1970), 35 Fed. Reg. 11410 (1970).

[14] SEC Release No. 34-10539 (December 6, 1973), 38 Fed. Reg. 34341 (1973); SEC Release No. 34-17222 (October 17, 1980) 45 Fed. Reg. 70890 (1980).

[15] 47 Fed. Reg. 53333 (November 26, 1982).

[16] Section 9 (a) (2) establishes that it will be illegal "to effect, alone or with one or more other persons, a series of transactions in any security registered on a national securities exchange creating actual or apparent active trading in such security, or raising or depressing the price of such security, for the purpose of inducing the purchase or sale of such securities by others." Similarly, Section 10 (b) establishes that it will be unlawful "to use or employ, in connection with the purchase or sale of any security registered on a national securities exchange or any security not so registered, any manipulative or deceptive or contrivance in contravention of such rules and regulations as the Commission may prescribe as necessary or appropriate in the public interest or for the protection of investors."

Is there an alternative explanation? Bagwell and Shoven (1989, p. 135) offer the following explanation: "There are some aspects of share acquisition which are learned only by experience. For repurchases there has been learning through time. . . ." Grinblatt and Titman (1998, p. 529) state: "While we can only speculate on why U.S. firms paid out so much in tax-disadvantage dividends at that time, our best guess is that the decisions of financial managers at that time were simply wrong." However, these alternative explanations do not make any predictions concerning when the change in payout policy should have come.

To conduct empirical tests, we divide the sample into the pre-Rule 10b-18 period (1972 to 1982) and the post-Rule 10-b18 period (1983 to 2000). Since the variances of the different measures of share repurchase activity do not appear to be constant through time, we test the null hypothesis that share repurchase activity is similar over these two subperiods by using the Wald statistic:

$$W = (\mu_{\mathrm{I}} - \mu_{\mathrm{II}})^2/(\sigma_{\mathrm{I}}^2 + \sigma_{\mathrm{II}}^2), \tag{4}$$

where μ_{I} (μ_{II}) is the mean value of the variable of interest over the period 1972 to 1983 (1984 to 2000) and σ_{I}^2 (σ_{II}^2) is the sample variance of μ_{I} (μ_{II}). Since the sample size is relatively small, we use the bounds test proposed by Ohtani and Kobayashi (1986) to determine the significance levels of the Wald statistics.

Consistent with the idea that share repurchase activity was constrained before the adoption of Rule 10b-18, Table XI shows that all the changes in the measures of share repurchase activity are positive and statistically significant. Before the adoption of Rule 10b-18 (prerule period), the average annual expenditure on share repurchase programs (adjusted for inflation) was only $5.5 billion. In contrast, after the adoption of Rule 10b-18 (postrule period), the average annual expenditure on share repurchase programs was $62 billion. This change represents an increase of almost 1,000 percent in the average annual expenditure. Other measures of share repurchase activity experienced similar increases. In general, the evidence presented in Table XI suggests that share repurchase activity drastically increased after the adoption of Rule 10b-18.

However, these differences may be due to some other factors such as stock market activity, tax changes, or learning by the market. To control for the effect of taxes, we use the tax differential between the top marginal tax rate on ordinary income and the top marginal tax rate on capital gains (*TAX*). If managers are trying to minimize dividend taxation by buying back shares, then this variable should have a positive coefficient. Finding that the tax benefit of capital gains has had a positive effect on share repurchase activity would reinforce the idea that managers were deterred from repurchasing shares in the past because the tax benefit of capital gains was much larger before the adoption of Rule 10b-18. To control for the effect of the stock

Table XI

The Effect of Rule 10b-18 on Share Repurchase Activity

This table examines the effect of Rule 10b-18 on several measures of share repurchase activity. To assess the effect of this regulatory change, we divide the sample into two subperiods: (1) 1972–1982 (prerule) and (2) 1983–2000 (postrule). We test the null hypothesis that share repurchase activity is similar over these two subperiods by using the Wald statistic:

$$W = (\mu_{\mathrm{I}} - \mu_{\mathrm{II}})^2/(\sigma_{\mathrm{I}}^2 + \sigma_{\mathrm{II}}^2),$$

where μ_{I} (μ_{II}) is the sample mean of the variable of interest over the period 1972 to 1982 (1983 to 2000) and σ_{I}^2 (σ_{II}^2) is the sample variance of μ_{I} (μ_{II}). The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item # 56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The data sample contains 134,646 firm-year observations and excludes banks, utilities, and insurance companies. *ADREPO* is *REPO* adjusted for inflation using the producer price index (PPI). *PAY* is the total payout (*REPO* + *DIV*). Σ_i represents the aggregation of data by calendar year. We use the bounds test proposed by Ohtani and Kobiyashi (1986) to determine the significance levels of the Wald statistics.

	Entire Sample (1972–2000)	Prerule (1972–1982)	Postrule (1983–2000)	Difference (Post − Pre)	Wald Test Statistic
$\Sigma_i ADREPO$ (millions of \$)					
Mean	40,575	5,528	61,993	56,465	16.6[a]
$\Sigma_i REPO/\Sigma_i DIV$					
Mean	38.31%	10.44%	55.35%	44.91%	28.7[a]
$\Sigma_i REPO/\Sigma_i PAY$					
Mean	24.53%	9.29%	33.85%	24.56%	51.0[a]
$\Sigma_i REPO/\Sigma_i EARN$					
Mean	17.39%	4.18%	25.46%	21.28%	47.9[a]
$\Sigma_i REPO/\Sigma_i MV$					
Mean	0.96%	0.42%	1.30%	0.88%	30.4[a]

[a] Significantly different from zero at the one percent level.

market activity, we use the one-year return on the market value of equity of the firms in our main sample (*MRET*). We also include a time trend variable to control for any learning effect (*TIME*).

To examine the effect of the different factors on the time-series behavior of share repurchase programs, we estimate the following time-series regression:

$$\Delta(\Sigma_i REPO/\Sigma_i MV)_t = \beta_0 + \beta_1 REG_t + \beta_2 TAX_t + \beta_3 TIME_t + \beta_4 MRET_t + \epsilon_t.$$

$$(5)$$

Repurchase Activity and the Enactment of Rule 10b-18: A Time-Series Regression

This table reports the estimated coefficients of the following time-series regression:

$$\Delta(\Sigma_i REPO/\Sigma_i MV)_t = \beta_0 + \beta_1 REG_t + \beta_2 TAX_t + \beta_3 TIME_t + \beta_4 MRET_t + \epsilon_t,$$

where ϵ_t is assumed to follow an MA(1) process,

$$\epsilon_t = \mu_t + \theta\mu_{t-1}.$$

The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972 to 2000 that have available information on the following variables: *REPO*, *DIV*, *EARN*, and *MV*. *REPO* is the expenditure on the purchase of common and preferred stocks (Compustat item #115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item #56). *DIV* is the total dollar amount of dividends declared on the common stock (Compustat item #21). *EARN* is the earnings before extraordinary items (Compustat item #18). *MV* is the market value of common stock (Compustat item #24 times Compustat item #25). The data sample contains 136,646 firm-year observations and excludes banks, utilities, and insurance companies. *REG* is a dummy variable that is equal to one if the year is greater than or equal to 1983, zero otherwise. *TAX* is the tax differential between the top marginal tax rate on ordinary income and the top marginal tax rate on capital gains. *TIME* is a time trend variable. *MRET* is the one-year return on the aggregate market value of common stock. Σ_i represents the aggregation of data by calendar year.

	Equation 1	Equation 2
β_0	−0.006143[a]	−0.006664[a]
	(−5.26)	(−5.79)
β_1	0.003778[a]	0.003918[a]
	(3.76)	(3.98)
β_2	0.018707[a]	0.019725[a]
	(6.70)	(7.31)
β_3	0.000008	0.000014
	(0.15)	(0.32)
β_4	−0.000879	
	(−0.19)	
R^2-Adjusted	38.65%	40.28%

[a] Significantly different from zero at the one percent level. *T*-statistics are reported in parentheses.

Since preliminary tests indicate that the residuals of this model seem to follow a MA(1) process, we assume that

$$\epsilon_t = \mu_t + \theta\mu_{t-1}. \tag{6}$$

Table XII reports the results from this regression. The coefficient of the dummy that captures the effect of Rule 10b-18 (*REG*) is positive and significantly different from zero at the one percent level. So even after we control

for other factors, the effect of Rule 10b-18 on share repurchase activity appears to be highly significant. Moreover, we note that the coefficient of the tax differential, *TAX*, is positive and statistically significant, which indicates that share repurchase activity is positively correlated with the relative tax benefit of capital gains (after controlling for the change in regulation). This result suggests that taxes are a significant determinant of share repurchase activity. This evidence is consistent with the recent findings in Lie and Lie (1999) and Sarig (2000), which indicate that the propensity to repurchase shares increases with the relative tax benefit of capital gains.

Overall, the evidence in this section suggests that the adoption of Rule 10b-18 had a positive and significant impact on share repurchase activity. It seems that corporations were deterred from repurchasing shares before the adoption of Rule 10b-18. However, with the adoption of this safe-harbor rule and thus no longer being threatened with being charged with stock manipulation, corporations have begun substituting repurchases for dividends.

VII. Conclusion

In a recent survey conducted by CFO Forum in 1997 (a sample of 1,600 chief financial officers), among the CFOs who responded that they will pay out cash to their shareholders, 5.5 percent of the CFOs said that they will raise dividends and 95.5 percent of the CFOs said they will buy back shares (*Institutional Investor* (1997, p. 31)). Comments such as those of Glenn Davenport, President and CEO of Marrison Health (in 1998) are also consistent with this view: "In our opinion, the reduction in long-term capital gains tax rate makes it more efficient to return capital to our shareowner through a stock repurchase program instead of dividends."

The main contribution of our paper is that it provides evidence that indeed corporations have been substituting share repurchases for dividends. We show that the majority of firms that initiate cash payments do so through share repurchases and that many firms that have been paying dividends have also started to repurchase shares as well. The propensity of firms to initiate a dividend payment in the 1990s is by order of magnitudes smaller than it was in the 1970s. Established corporations distribute more of their cash flows through repurchases and less through dividends.

Using Lintner's (1956) dividend model to generate expected future dividend payments, we find that dividend forecast errors are negatively correlated with share repurchase activity. This result implies that the difference between actual and expected dividend payments tends to become more negative as the firm spends more money on share repurchases. This evidence supports the idea that share repurchases and dividends are substitutes.

We also show that when firms are engaged in repurchase programs, the market reaction to dividend decreases is not significantly different from zero. Firms that cut their dividends and do not repurchase experience a significantly negative price drop to the announced dividend cut. When investors perceive that dividends are being replaced by repurchases, they view the

reduction in dividends as less negative. We also show that differential taxes between dividends and capital gains seem to matter in that the market reaction to repurchases is more positive when the tax gains from repurchases relative to dividends are larger.

So if taxes seem to matter and corporations have been repurchasing more and more since the mid-1980s, why did corporations not repurchase more intensively in the past? One alternative is that it simply took a long time for corporations to learn that paying out cash through repurchases would not result in the IRS taxing repurchases at the ordinary income tax rates (like dividends), nor would it bring manipulation charges by the SEC. This is certainly possible, but we argue in this paper that at the minimum, this process was enhanced by the introduction of Rule 10b-18. This rule provides a safe harbor for repurchasing firms and makes the danger of being charged with manipulation much less severe. Empirically, we find that share repurchase activity experienced an upward structural shift after the adoption of Rule 10b-18, consistent with the idea that share repurchases were more restricted in the past.

Finally, the combined trend of a decreasing reliance on dividend payment and the increasing reliance on repurchases also implies that nowadays, a more appropriate tool of valuation is total payout rather than dividend payout. For example, some researchers argue that the historically low level of dividend yield is another indication of stock market overvaluation. The evidence here indicates that if we examine the total payout yield, this conclusion may be premature.

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