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When a buyback isn't a buyback: Open market repurchases and employee options

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Abstract

This paper examines how stock options affect the decision to repurchase shares. Firms announce repurchases when executives have large numbers of options outstanding ***and*** when employees have large numbers of options currently ***exercisable***. Once the decision to repurchase is made, the amount repurchased is positively related to total options exercisable by all employees but independent of managerial options. These results are consistent with managers repurchasing both to maximize their own wealth and to fund employee stock option exercises. The market appears to recognize this motive, however, and reacts less positively to repurchases announced by firms with high levels of nonmanagerial options.

JEL Classification:G30, G32

Key Words: share repurchase, executive stock options, employee stock options

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1. Introduction

Early studies of open market stock repurchases document positive abnormal returns of 3-4% at the announcement (Vermaelen, 1981; Dann, 1981). The two most commonly accepted interpretations of this reaction are the signaling theory and the free cash flow theory. The signaling theory posits that the repurchase constitutes a revelation by management of favorable new information about the value of the firm's future prospects. Several empirical studies find evidence consistent with this theory. Comment and Jarrell (1991) find that the announcement- day return is positively associated with the percent of outstanding shares repurchased and negatively associated with the firm's recent stock returns. Ikenberry, Lakonishok, and Vermaelen (1995) examine the long-run performance of companies following open market repurchases, and find that firms that are more likely to be repurchasing shares because of undervaluation exhibit positive abnormal returns of 45.3% in the four years after the announcement. Further support for the signaling theory comes from the companies themselves, who often cite 'undervaluation' as the motive for their open market repurchases (*The Wall Street Journal*, April 1, 1998, p. T2, and Sept. 9, 1998, p. NE2).

A second explanation for the positive market reaction to repurchase announcements is the free cash flow hypothesis. According to this theory, open market repurchases mitigate agency conflicts by returning free cash flow to shareholders. Other methods of distributing cash, such as debt-for-equity swaps, leveraged recapitalizations, and dividends also alleviate agency problems. Repurchases, however, are more flexible and efficient than major leverage-increasing transactions such as debt-for-equity swaps and leveraged recapitalizations. Compared to dividends, repurchases are tax

advantageous to shareholders and do not imply the future commitment to returning cash to shareholders that is commonly associated with dividend increases. Special dividends would also not imply a future commitment, but DeAngelo, DeAngelo, and Skinner (2000) document that special dividends have been rare in recent years; in 1995, only 1.4% of NYSE firms paid special dividends. However, there is no evidence that specials have been displaced by common stock repurchases.

While these traditional motives for repurchases still exist, neither the signaling nor the free cash flow hypotheses explains the surge in buybacks during the 1990s. During this period, the number of firms repurchasing stock, as well as the dollars spent on repurchases, increased drastically. Fig. 1 shows the total dollar value and number of open market repurchases reported by Securities Data Corporation (SDC) from 1980 through 1997. In 1996, a record 1,475 companies announced plans to buy back $177 billion in stock. In contrast, 600 companies announced repurchases totaling less than $40 billion in 1992 and 1993 combined.

One explanation for the increasing popularity of buybacks in the 1990s is that recent innovations in compensation policy, in particular the growing use of stock options by companies, have caused changes in payout policy. ShareData, a California-based research firm, reports that the number of companies granting stock options to all employees has increased substantially in recent years. They find that 45% of companies with 5,000 or more employees have option plans, while in smaller companies, 74% offer option plans to all employees. The value of stock options and grants grew from $8.9 billion to $45.6 billion between 1992 and 1997 (Strege, 1999). Further, according to Executive Compensation Reports, "mega" option grants of 250,000 shares or more are now doled out by one of four companies (*The Wall Street Journal*, Mar. 27, 1997, p. C1). Fig. 2 graphs the average number of executive options outstanding and exercisable from 1992 through 1997 by firms on Standard and

Poor's Execucomp database. Consistent with the increase in repurchases, the average number of options outstanding and exercisable by top executives has tripled during this time period.

I examine open market share repurchases from 1993-1996 to determine the effect of options on the firm's decision to repurchase stock, the actual repurchases made, and the market reaction to the announcement of a repurchase. I begin by examining firms' motives for repurchasing. Consistent with the signaling and free cash flow hypotheses, I find that firms are more likely to repurchase shares than to increase dividends when recent stock performance has been poor or when free cash flow is high. I also examine two hypotheses relating growth in stock options to the increasing popularity of buybacks: the option-funding hypothesis and the substitution hypothesis. The option-funding hypothesis predicts that repurchases are intended to fund the exercise of employee stock options. Thus, the decision to repurchase should be related to options recently exercised and to options expected to be exercised in the near future. Since the latter variable is not available, I use outstanding and exercisable options as proxies.

The substitution hypothesis predicts that executive options create different incentives than do employee options. While employee options provide firms with incentives to repurchase shares to avoid the earnings dilution that could be caused by option exercise, executive options create an incentive not to pay dividends, since payment of dividends reduces the value of both exercisable and unexercisable options held by managers.

My results support both the option-funding and the substitution hypothesis. Consistent with the hypothesis that in the 1990s firms repurchase shares to fund the exercise of employee stock options, I find that firms are more likely to announce a repurchase when total options exercisable, as a percentage of shares outstanding, are high and when many options have recently been exercised. However, the

decision to repurchase is positively related to the number of executive options outstanding, even after controlling for total options outstanding. When options outstanding are divided into exercisable and unexercisable options, the repurchase decision is positively related to total options exercisable, but unrelated to total unexercisable options. Unexercisable executive options, however, have a positive effect on the repurchase decision. Overall, my results provide evidence that firms repurchase shares to fund employee option exercises, but beyond that, firms are more likely to repurchase if managerial wealth would be negatively impacted by the payment of dividends.

For firms that announce a repurchase, I also examine the determinants of the number of shares actually repurchased. I find that repurchases are more likely in large firms with low market-to-book ratios, high free cash flow, and low capital expenditures. Executive options increase the likelihood of repurchasing, but once that decision is made, the fraction of the market value of equity repurchased depends only on total options exercisable. Executive options and unexercisable options have no additional explanatory power. Likewise, the decrease in shares outstanding after the repurchase announcement is positively related to total exercisable options. These results are consistent with managers substituting repurchases for dividends. However, once the decision to repurchase is made, managerial options provide no additional incentive beyond that of employee options in determining the number of shares repurchased.

The option-funding hypothesis also provides an explanation as to why many companies have more shares outstanding months after announcing buybacks than they had before the announcement (*The Wall Street Journal*, Feb. 10, 1997, p. C1). Repurchases are widely publicized by companies, whereas offsetting dilutive actions, such as option exercises and halts in buyback programs, are not. Stephens and Weisbach (1998) show that managers take advantage of the flexibility inherent in

repurchases, and are more likely to follow through with a repurchase under two situations: (1) after poor stock performance, which is consistent with the undervaluation motive, and (2) after positive cash flows, which is consistent with the free cash flow argument. They propose several alternative measures of actual shares repurchased, and show that only a fraction of announced open-market repurchases ever take place. My results suggest that the method used to estimate actual share repurchases should be considered in light of whether the firm has large numbers of stock options. In addition, the results indicate that the notion that stock buybacks are a signal of undervaluation could be overstated in recent years, so it is important for investors to determine the reasons behind individual buybacks before deciding whether a repurchase is a positive sign.

Finally, the option-funding hypothesis predicts a different market reaction to the announcement of a repurchase than does the signaling hypothesis. If companies are repurchasing shares to fund employee stock option exercises, then in an efficient market, the announcement- period return should not be as positive as if the repurchase were due to undervaluation or free cash flow considerations. For my sample of firms, I find an abnormal announcement-period return of 1.6%, which is lower than the 3-4% abnormal return found in previous studies. I also find that the announcement return is negatively related to nonexecutive options outstanding. This finding holds even after controlling for other factors that affect returns, such as firm size, the percent of shares sought in the repurchase, prior stock returns, payment of dividends, and measures of free cash flow. Further, although both repurchases and stock options are endogenous variables, my results are robust to several methods to control for endogeneity. Overall, my results indicate that although the motives for repurchases have changed in the 1990s, the market recognizes this change and adjusts its reaction accordingly.

The rest of the paper proceeds as follows. Section 2 provides further detail on the substitution and option-funding hypotheses, and discusses previous literature on repurchases and stock options. Section 3 discusses the sample collection procedure and methodology. Results on the determinants of repurchases, the market reaction to their announcement, and endogeneity issues are examined in Section 4. Section 5 concludes.

2. Hypotheses and literature review

2.1. The substitution and option-funding hypotheses

During the 1990s, the popularity of repurchases drastically increased, but shares outstanding in many of these companies did not correspondingly decrease. One potential explanation for this surprising fact is the growing use of stock options as a method of compensation. Growth in stock options could increase the popularity of buybacks for two non-mutually exclusive reasons: the option-funding hypothesis and the substitution hypothesis.

The first way in which an increase in stock options can affect repurchases is through the need for firms to have shares available to fund employee option exercises, which I refer to as the option-funding hypothesis. This hypothesis has several implications. First, firms are more likely to repurchase shares than to pay dividends if there are many employee options outstanding that could be exercised in the near future. Previous studies show that open market repurchases give management the option to repurchase if the stock is undervalued (Ikenberry and Vermaelen, 1996). They also give management the flexibility to adjust the number of shares repurchased, depending on the number of options exercised by employees. Second, once the decision to repurchase is made, the amount repurchased should be

positively related to options recently exercised and options currently exercisable. Finally, a greater number of exercisable options makes it more likely that firms are repurchasing to fund these options and less likely that a repurchase is a signal of undervaluation. In an efficient market, repurchases to fund employee options do not provide the positive signal that repurchases for undervaluation do. Thus, the announcement-period return should be less positive for firms that are more likely to be repurchasing to fund options, i.e., for firms with more exercisable options.

The economic rationale for the option-funding hypothesis is unclear. One potential explanation is dilution. A repurchase reduces shares outstanding, while the cash used to repurchase the shares reduces paid-in capital, but is not deducted from earnings. Thus, by repurchasing shares in conjunction with option exercises, firms are able to avoid the dilution of basic EPS that would occur if shares outstanding increased.[1] In a traditional corporate finance framework, of course, earnings dilution should not be important. Only cash flow should matter, and "cosmetic" changes in reported earnings should be irrelevant. However, the common view among practitioners is that reported earnings do matter, even above and beyond cash flow. Anecdotal and empirical evidence tends to support this view:

a. One commonly cited reason for the concern about EPS is that managers believe that analysts and investors focus on EPS and EPS growth. If these individuals blindly apply multiples, such as P/E ratios, to the reported earnings of growth stocks, EPS dilution is important. In fact, Microsoft recently announced that, at the urging of analysts, it would resume buying back its stock to provide for the company's huge pool of employee stock options and to counteract potential dilution of its shares (*The Wall Street Journal*, Aug. 8, 2000, p. B6).

[1] Firms also report fully diluted EPS, which adds interest payments that would not have been made upon conversion back to earnings, and increases the denominator to reflect the effect of dilutive securities such as stock options and convertible securities. Options are considered dilutive if their exercise price is below the market price. If firms are worried about diluted EPS, then they would likely buy back shares as options come in-the-money rather than as they are exercised.

b. In addressing merger accounting methods, Bruce Wasserstein states that, "with many investors focused on earnings, companies often hesitate to take on dilutive transactions." (Wasserstein, 1998)
c. After the SEC issued a guideline stating that companies involved in stock repurchase programs would not qualify for pooling treatment if they acquired another company, several large corporations, including Cisco Systems, 3Com Systems, and Gillette, canceled their repurchase programs.
d. Andrade (1999) finds that EPS accretion has a positive and significant effect on acquirer abnormal performance, both at the announcement and for 18 months following completion of the deal. The magnitude of this effect is higher for firms with a larger percentage of unsophisticated investors.
e. Burgstahler and Dichev (1999) and Kang (1999) show that firms manipulate both cash flows from operations and changes in working capital to avoid earnings decreases and losses.

It is true that by repurchasing shares, managers give up financial assets that could be put to work elsewhere in the firm, so repurchasing can affect the firm's ability to generate future earnings. However, if the funds used to repurchase stock would have been distributed to shareholders in another form, such as dividends, then the level of earnings will not be changed. Alternatively, if the share repurchase is financed by a reduction in cash holdings or other liquid assets, the interest forgone should be minimal.

There are other possible explanations as to why firms fund employee stock option exercises by repurchasing rather than by issuing new shares. For example, management might not want to dilute its ownership stake. The firm could have a target capital structure, and issuing new shares would move them away from this target. Issuing new shares might require an increase in authorized shares, which (a) requires a shareholders' vote and (b) has tax implications in some states.

Regardless of the motive, I show that a strong correlation exists between stock options and both the decision to repurchase and the amount repurchased. Moreover, my research indicates that the market realizes that shares repurchased as a result of stock options do not have the signaling impact of

other repurchases: the announcement-period return is lower for firms with high levels of nonmanagerial stock options.

The second hypothesis relating growth in stock options to an increase in buybacks is the substitution hypothesis. The substitution hypothesis predicts that managers have excess cash flow that they want to return to shareholders. They can accomplish this goal through either a stock repurchase or a dividend increase. If the excess cash is transitory, a repurchase is preferable since there is no future commitment involved. Guay and Harford (2000) demonstrate empirically that the choice between a dividend increase and a repurchase depends on the permanence of the cash flow shock. The post-distribution cash flows of dividend-increasing firms do not revert back to pre-distribution levels, whereas those of repurchasing firms tend to settle below the pre-distribution levels. However, managers who hold options on their company's stock have further reasons for preferring repurchases. Unlike dividends, repurchases do not dilute the per-share value of the firm since the cash outflow is matched by a proportionate reduction in shares outstanding. Since the value of stock options is negatively related to future dividend payments (unless the options are dividend protected), managers maximize the value of their options by substituting repurchases for dividend growth.[2] Managers could also choose to retain earnings, which would not affect the value of their options as long as agency problems did not increase as a result. However, if managers plan to exercise options in the near future, the positive announcement return associated with repurchases could further increase managerial wealth,

[2] Murphy (1998) reports that only 1% of CEOs with options have dividend protection. Firms have incentives not to offer dividend-protected options due to their accounting treatment. Under current accounting standards, dividend-protected options are considered variable-plan options because the strike price is contingent upon future events. According to FASB rules, the cost of these options must be recognized on the income statement as compensation expense. Fixed-plan options do not result in a compensation expense as long as the option is granted with an exercise price greater than or equal to the current market price.

resulting in a preference for repurchases rather than retention. Since the main focus of this paper is how options affect the decision to repurchase, I am interested in why a firm chooses to increase its dividend rather than repurchase, not why a firm chooses to pay out rather than retain earnings.

The substitution hypothesis has several testable implications. First, if the substitution hypothesis is true, then managerial options provide additional incentives beyond employee options for firms to repurchase. Managers will be more likely to choose a repurchase over a dividend increase when the decision has a greater effect on their wealth, i.e., when there are more managerial options outstanding. The more options managers hold, the more likely they will be to choose a repurchase over a dividend increase. This relation should hold for both exercisable and unexercisable options held by management, since dividends decrease the value of both. Second, once the decision to repurchase is made, managerial options provide no additional incentive beyond that of employee options in determining the number of shares actually repurchased. Finally, the announcement return to the repurchase could be positively related to managerial options if options align managers' incentives with those of shareholders in such a way that the repurchase creates value for shareholders.

2.2. Literature review

Several other studies examine stock options and the payout policies of firms. Their conclusions as to the effect of options on payout are mixed. Bartov, Krinsky, and Lee (1998) examine management's decision to repurchase stock versus increase dividends. Using Compustat's common shares reserved for conversion of stock options (data item #215) as a proxy for management options, they find that managers choose a repurchase over a dividend increase when (a) management views

shares as undervalued, (b) management has options that are not dividend protected, and (c) institutions own a large fraction of equity.

Jolls (1998) also examines the dividend increase versus repurchase decision. Using option grants in the preceding year as a measure of employee options outstanding, and collecting executive options outstanding from proxy statements, she finds that executive options, rather than employee options, play a role in repurchase behavior. Her results support the substitution hypothesis, but not the option-funding hypothesis.

Fenn and Liang (2000) examine the payout policy of firms in the 1990s. Using Execucomp data on executive stock and options, they find that firms with the greatest potential agency problems (as proxied by high free cash flow and a low market-to-book ratio or low managerial ownership) have the highest payouts. Further, managerial stock options are associated with a lower probability of using dividends to return cash to shareholders and a higher probability of using repurchases. Consistent with the substitution hypothesis, they conclude that growth in managerial options could explain the shift towards repurchases in recent years.

Weisbenner (1999) finds that the size of a firm's option program and the number of option exercises during the year are strong predictors of actual share repurchases. Unlike previous papers, Weisbenner collects data on both total and managerial options outstanding. However, after controlling for the overall size of a firm's option program, he finds no correlation between the option holdings of executives and stock buybacks. Weisbenner does find that executive options increase the probability of a firm retaining earnings versus paying them out.

My paper differs from previous research in several respects. First, rather than using proxies, I collect data on both total and executive options, which provides more accurate measures. Bartov,

Krinsky, and Lee (1998) use Compustat data to proxy for managerial options. Using the same variable they do, I find that the correlation between this variable and executive options outstanding or exercisable is less than 0.30 for my sample of firms. Similarly, Jolls (1998) uses option grants to proxy for employee options outstanding. However, options granted in the previous year might not be a good measure of exercisable options since there is often a multiyear vesting period associated with grants.

Second, I collect data not only on options exercised in the year of the repurchase but also on the total number of options outstanding and exercisable in the year before, the year of, and the year after the repurchase for all employees of the firm. I collect the same data for the top management of each firm, so that I know the fraction of total options held by the firm's decision makers. Previous work, such as Jolls (1998) and Fenn and Liang (2000), has trouble separating the option-funding hypothesis from the substitution hypothesis. By collecting data on total options and options held by executives, and by further separating each into exercisable and unexercisable options, I am better able to disentangle the substitution effect from the option-funding effect.

Finally, unlike Fenn and Liang (2000) and Weisbenner (1999), I am interested in how stock options affect the initial repurchase decision and the market reaction to the announcement of a repurchase. Consequently, I examine repurchase announcements reported in SDC, as well as actual repurchases that take place during the year. Using this information, I study not only the effect of total and executive options on a firm's decision to repurchase versus increase dividends, but also the effect of stock options on the market's reaction to the repurchase announcement.

3. Data and methodology

The sample of repurchases is from Securities Data Corporation's Mergers and Acquisitions database. I begin by collecting all open market repurchases with original announcement dates between January 1, 1991 and December 31, 1996, resulting in a sample of 5,147 repurchases. Restricting the sample to firms on the Center for Research in Security Prices (CRSP) NYSE, Amex, or Nasdaq tapes with returns available over the period of interest reduces the sample size to 4,661. Standard and Poor's Execucomp database contains 1,792 of the repurchasing sample. However, data on managerial options outstanding and exercisable for the year before, the year of, and the year after the repurchase announcement are only available on the Execucomp database for 1,063 observations. Compustat data availability on book equity, free cash flow, and total assets further reduces the sample to 755 repurchases. For these 755 observations, I collect data from the firm's annual report on options exercised, total options outstanding, and total options exercisable held by all employees in the year before, the year of, and the year after the repurchase announcement. For 43 of the observations, I am unable to obtain 10-Ks. Thus, the final sample consists of 712 repurchases.

To examine the characteristics that lead a firm to choose one payout method over the other, I also collect a sample of firms that increase their dividends during this time period. I begin with 1,104 firms listed in the Execucomp database that are not part of my repurchase sample. For these firms, I collect data from CRSP on regular quarterly dividends paid during fiscal years 1992-1996. If the firm increases its dividend during the year, I retain that observation. This results in a total of 1,038 firm-years with dividend increases. Since data collection is time-intensive, I select a random sample of one-fifth of these observations, for a final dividend-increasing sample of 205. For this sample, the announcement day is considered to be the date on which the board of directors declares the increased dividend.

Executive stock option data are from Standard and Poor's Execucomp database. This database contains information on executive compensation and ownership for the S&P 1500 companies, beginning in 1992. Using these data, I calculate the total number of options held, the number of exercisable and unexercisable options held, and the shares owned by top executives. By combining the Execucomp data with the data on options held by all employees collected from the annual reports, I separate options outstanding (exercisable and unexercisable) into executive versus nonexecutive options by subtracting options held by management from total options held by all employees. Due to different report dates (the Execucomp data are from proxy statements rather than annual reports), a handful of companies have more executive options outstanding than total options outstanding. For these companies, I assume that executive options must account for almost all of total options, and set executive options equal to total options. The results are not affected if I assume that nonexecutive options are missing, however.

The number of repurchases increases steadily during the sample period, with 72 occurring in 1993, 177 in 1994, 208 in 1995, and 255 in 1996. However, the sample size in 1993 is potentially reduced due to my requirement that Execucomp data be available in the year prior to the repurchase announcement. The dividend-increasing sample is relatively evenly divided across the sample period, with 60 occurring in 1993, 50 in 1994, 43 in 1995, and 52 in 1996.

4. Results

4.1. Characteristics of repurchasing versus dividend-increasing firms

Panel A of Table 1 provides summary statistics for the dividend-increasing and repurchasing firms. The focus is on variables intended to control for other motivations for repurchases, such as to signal undervaluation or to alleviate free cash flow problems. The average dividend-increasing firm increases its dividend by 9.8% (measured by the dividend increase as a percent of the last dividend paid), and earns an abnormal return of 0.5% over the three-day announcement period. Repurchasing firms announce that they will buy back an average of 6.4% of shares outstanding, with an abnormal announcement-period return of 1.6%.[3] This return is lower than that found in earlier studies, which is consistent with the market recognizing that repurchases in the 1990s are less likely to signal undervaluation.

If undervaluation is a motive for repurchases, then repurchase announcements should follow poor stock returns. Management is less likely to consider firms with large recent runups to be undervalued. On the other hand, positive stock returns increase the number of in-the-money options, which increases the likelihood of option exercise and the dilution of EPS. In the 40 days prior to the announcement, dividend-increasing firms experience no abnormal price movements. Repurchasers exhibit a –3.6% abnormal return, consistent with undervaluation. Note, however, that although the average performance of repurchasing firms is poor immediately prior to the repurchase announcement, long-run performance must be such that the stock price is above the exercise price of the firms' options, since most of these firms exercise options in the year they in which announce the repurchase.

Size has been used in previous studies as a proxy for financing costs and information asymmetry. Larger firms should have lower financing costs, more stable cash flows, and less

[3] SDC contains information on the total dollar value of the transaction and the percent of shares outstanding sought by the firm. In some instances, the dollar value of the repurchase is reported, but the percent sought is missing. In

information asymmetry. Lower financing costs enable a firm to distribute more cash to shareholders, since if they need to raise money in the future, the funds will be relatively inexpensive. The repurchasing sample is larger than the dividend-increasing sample, with an average market value of equity of $5,847 million, compared to $2,632 million. The medians are smaller, at $1,391 and $1,114, respectively. These numbers are larger than reported by Guay and Harford (2000). However, my sample comes from a more recent time period, and restricting my sample to firms on Execucomp results in larger firms.

Market-to-book asset ratios proxy for investment opportunities. Agency costs of payouts predict a negative relation between payouts and market-to-book, since firms with good investment opportunities maximize shareholder value by using cash flow to finance investment, rather than distributing cash flow to shareholders. The repurchasing sample has market-to-book asset ratios similar to those reported by Guay and Harford (2000), and higher than those of the dividend increasers.

Debt can also influence a firm's payout decision. High debt levels can proxy for financial distress. Debt is also a substitute for payouts to shareholders, since it alleviates free cash flow problems. Firms with high debt are thus less likely to distribute cash. Bagwell and Shoven (1988) show that highly leveraged firms are less likely to repurchase. I find that dividend-increasing firms have more debt than repurchasing firms, when measured as total debt to assets or long-term debt to assets. These numbers are consistent with leverage proxying for financing costs. Firms with high leverage have high financing costs, and would be expected to repurchase fewer shares. It is also consistent with dividend-paying firms having more stable cash flows, and thus being able to take on more debt.

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these cases, I define the percent sought as the total dollar value divided by closing stock price four days prior to the announcement, divided by shares outstanding (Comment and Jarrell, 1991).

Firms with high capital expenditures should have both better investment opportunities and less free cash flow, and thus should pay out less. Capital expenditures do not differ significantly between repurchasing and dividend-increasing firms. Finally, firms with high levels of free cash flow derive greater benefits from distributing cash to shareholders, since they are at greater risk of overinvesting. The repurchasing firms have higher ratios of free cash flow to assets than do the dividend-increasing firms.

Since I am interested in the effects of stock options on repurchases, Panel B of Table 1 provides statistics on total and executive options outstanding and exercisable in the year after the announcement, as well as total options exercised in the year of the announcement. Both the substitution hypothesis and the option-funding hypothesis predict that repurchasers should have more options outstanding and exercisable than dividend-increasing firms. Panel B confirms this hypothesis. Compared to dividend increasers, repurchasing firms have almost twice the number of executive and employee options outstanding and exercisable in the year of and the year after the event. Similarly, repurchasers have significantly more options exercised in the year of the announcement.

Table 2 contains the industry distribution of the dividend-increasing and repurchasing firms, relative to the universe of all firms on the Compustat tapes during 1992-1996. A variety of industries are represented. Repurchases occur most often in high-tech industries such as chemicals (81), machinery and computer equipment (59), finance & insurance (58), and electronics (47), and in service and retail-related industries. As a percentage of the total number of firms in each industry available on Compustat, however, repurchases occur predominantly in tobacco products (31%), printing and publishing (21%), food and kindred products (16%), and wood and paper products (16%). In the

dividend-increasing sample, the utilities industry accounts for the greatest number of observations and for the greatest percentage of observations relative to the size of the industry (8%).

4.2. The decision to repurchase versus increase dividends

I first examine motives for repurchases. In particular, do stock options appear to influence a firm's decision to repurchase stock rather than increase dividends? Table 3 provides a logit model of the decision to repurchase shares versus increase dividends. Consistent with the univariate results, larger firms with higher ratios of free cash flow to assets are more likely to repurchase than to increase dividends. Likewise, the probability of a repurchase is negatively related to a firm's stock price appreciation prior to the announcement. The first regression also indicates that repurchases are more likely both when more options have been exercised in the year of the repurchase and when the firm has more total options outstanding in the year after the repurchase.[4] These results are consistent with the option-funding hypothesis.

The second regression examines whether executive options have explanatory power beyond total options. If firms are buying back stock to fund employee options, repurchases should be positively related to the number of options outstanding. However, managerial options provide an additional incentive, since paying dividends will decrease the value of unprotected options. Consequently, if managers are acting in their own best interests, executive options could have additional explanatory value beyond total options. Consistent with this hypothesis, in the second regression, the coefficients on both total options outstanding and executive options outstanding are positive and significant. Similar

[4] The correlation between options exercised in year 0 and options exercisable (outstanding) in year +1 is 0.366 (0.417). The mean (median) ratio of options exercised during the year to options exercisable at the beginning of the year is

results are obtained if I decompose total options outstanding into executive and nonexecutive options. Here, the positive coefficient on executive options is consistent with both the substitution hypothesis and the option-funding hypothesis. The positive coefficient on employee options, however, is only consistent with firms buying back stock to fund employee option exercise.

The third regression decomposes options outstanding into exercisable and unexercisable options. In this specification, repurchases are significantly positively related to total exercisable options, but not to total unexercisable options. This result is consistent with firms buying back stock to fund options that they expect to be exercised in the near future. Exercisable executive options have no explanatory power beyond that of total exercisable options. Unexercisable executive options, however, are significantly positively related to the decision to repurchase. This result is consistent with the managerial wealth hypothesis. Total exercisable options determine whether a firm needs to repurchase stock to fund upcoming option exercises. Paying out dividends, however, decreases the value of all managerial options, whether they are currently exercisable or not. Consequently, if managers own large numbers of unexercisable options, they will be more likely to repurchase shares than increase dividends, even if they do not need to fund employee option exercises. Overall, my results support both the option-funding and the substitution hypotheses. Firms announce repurchase programs when they need shares to fund option exercises among employees and when managerial wealth would be negatively impacted by a dividend increase.

The parameters of the logistic models developed in Table 3 reflect only a subsample (205) of the population of 1,038 dividend increasers that could have been included in the study. As a result, the

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50% (30%). However, excluding options exercised during the year from this and later regressions does not affect the sign or significance of other independent variables.

population probability of a repurchase (p) cannot be used to compute the likelihood function associated with the sample. Instead, as shown in Palepu (1986), the logistic regression should be estimated using the conditional probability of observing a repurchase given that a dividend increase is included in the sample (p'). Because the sample includes 19.7% of the dividend increasers, the conditional probability (p') of observing a repurchase is

$$p' = \frac{(1)(p)}{(1)(p) + (0.197)(1-p)}. \tag{1}$$

For a logistic specification,

$$p = \frac{1}{(1+e^{-bx})}. \tag{2}$$

Therefore,

$$p' = \frac{1}{(1+e^{\ln(0.197)-bx})}. \tag{3}$$

Because the likelihood function maximized in the regressions in Table 3 uses the above expression p', all of the parameters associated with p are unaffected other than the constant term. The constant term differs by ln (0.197) or –1.625. Thus, if the purpose of the model is only to determine whether the set of variables has a significant statistical relation to the repurchase probability, the bias is unimportant. However, to classify firms that announce a repurchase into those predicted to repurchase and those predicted to increase their dividend, I make the above correction to the intercept to account for the subsample of dividend increasers that were excluded from the logistic regression. Using regression 3 of Table 3 with this correction, the threshold value of p that minimizes the sum of the probabilities of type I and type II errors is 0.42. At this threshold, 35 firms repurchase when expected to increase their

dividend. These firms have a mean (median) announcement return of 2.58% (1.92%). Firms that regression 3 predicts to repurchase, and that do repurchase, have a mean (median) announcement return of 1.56% (1.25%). The medians are significantly different from each other at the 10% level. The results are consistent with the market already partially impounding the good news of a repurchase into the price of firms it expects to repurchase. Firms that are not predicted to repurchase, based on the model, have an additional surprise component. Alternatively, news of a repurchase for firms predicted to increase their dividend could be positive due to tax differences between repurchases and dividends.

4.3. Determinants of the amount repurchased

The results in Table 3 indicate that options influence a firm's decision to repurchase its stock. As documented in Stephens and Weisbach (1998), however, a firm that announces a repurchase does not always follow through with it. Table 4 examines the determinants of the dollar amount actually repurchased by firms announcing a repurchase program. The dependent variable is equal to the dollars spent on repurchases in the year of and the year after the announcement, defined as Compustat's dollars spent on repurchases (annual data item #115) minus any decrease in the par value of preferred stock (annual data item #130), divided by the market value of equity.[5] Jagannathan, Stephens, and Weisbach (2000) state that the Compustat measure overstates open market repurchases because (a) it includes Dutch auctions, privately negotiated deals, and self-tender offers and (b) it includes repurchases of other securities and conversions of other securities into stock. Since I focus only on firms that have announced repurchase programs, the first problem is minimized, and Jagannathan et al. show that this

[5] I measure actual repurchases over a two-year window since Stephens and Weisbach (1998) show that firms acquire 67-79% of shares announced within a two-year period. In unreported results, I also examine the determinants of the percent sought in the repurchase announcement. The results of those regressions are similar.

measure is relatively accurate. To minimize overstatements of repurchases caused by the second problem, I subtract decreases in the par value of preferred stock. This correction should make the repurchase measure more reflective of repurchases of common stock only. The control variables used in this table are the same as those used in Table 3, and the interpretations are similar. The exception is the measure of stock returns. In Table 3, I use the excess returns in the 40 days prior to the announcement. In Table 4, I measure the buy-and-hold return in the one year after the announcement in order to determine if the firms' actual stock returns after the announcement determine the amount actually repurchased.

Regression 1 of Table 4 indicates that the amount actually repurchased is positively correlated with firm size and with the percentage of shares outstanding that firms initially announce that they are buying back. As discussed earlier, if larger firms have lower financing costs or information asymmetry, and more stable cash flows, these firms can afford to pay more out to shareholders. The coefficient on free cash flow, standardized by book assets, is positive and significant, consistent with firms with high free cash flow having more money available for repurchases. Firms with high market-to-book asset ratios or high capital expenditures repurchase a lower percentage of shares. If these variables proxy for investment opportunities, then this result is consistent with agency considerations. Large levels of debt result in lower repurchases, consistent with free cash flow arguments or financial distress costs. Finally, high post-announcement returns lead to lower levels of repurchasing, consistent with the firm no longer being undervalued. However, when I interact the post-announcement return with a dummy equal to one if the firm's exercisable options are above the sample mean, the coefficient is positive and significant. Stock price increases generally reduce the amount repurchased, consistent with the signaling theory.

However, if the price increases result in more exercisable options, the firm repurchases more, which is consistent with the option-funding hypothesis. After controlling for these factors, the coefficient on total options outstanding is positive and significant. This indicates that firms with more options outstanding repurchase more shares, which further supports the option-funding hypothesis.

Regression 2 of Table 4 examines whether executive options have explanatory power beyond total options outstanding. The coefficients on the control variables are similar to those in regression 1. The coefficient on total options outstanding is positive and highly significant in this regression, but executive options have no additional explanatory power. Combined with Table 3, this regression provides evidence that while executive options influence the decision to repurchase, actual repurchases following the decision depend only on total options outstanding. Regression 3 replicates regression 2, but includes industry dummies, with the result that the coefficient on debt levels loses its significance. The coefficient on total options outstanding remains positive and significant.

Regression 4 is similar to regression 2, but divides total options into exercisable and unexercisable options. The coefficients on the control variables are similar to the previous regressions. The coefficient on total options exercisable is positive and significant, while unexercisable options are positive but insignificant. Executive options, whether exercisable or unexercisable, are not significant.

In summary, firms repurchase more shares when they are large, have low growth opportunities (proxied by the market-to-book ratio), and are undervalued (proxied by one-year post-announcement returns). As free cash flow increases, the amount repurchased also increases. The key results in Tables 3 and 4, however, indicate that executive options influence the decision to repurchase rather than pay dividends, but once the decision to repurchase is made, the amount actually repurchased depends only on the number of exercisable options held by all employees.

While Table 4 examines the actual repurchases of firms, it does not show the net effect of option exercises versus repurchases. To measure this effect, I examine the change in shares outstanding in the year after the repurchase announcement in Table 5. Shares outstanding are obtained from CRSP, and adjusted for any stock splits or dividends that occur during this period. The dependent variable is the change in shares outstanding in the year after the repurchase announcement, divided by the number of shares outstanding at the time of the announcement. A positive (negative) number indicates that shares increased (decreased). The independent variables are the same ones used in Table 4. Consistent with size proxying for financing costs or information asymmetry, larger firms repurchase more and thus have a greater decrease in shares outstanding. Higher debt levels are associated with greater share dilution (i.e., a greater increase in shares). This relation is consistent with firms with a higher chance of financial distress not wanting to distribute cash through a repurchase. It is also consistent with debt substituting for payouts, since firms with more debt having lower agency costs. Higher capital expenditures and high post-announcement stock returns are also associated with greater share dilution. However, the interaction of the post-announcement return with a dummy equal to one if exercisable options are above the sample mean has a negative and significant coefficient, indicating that when positive returns result in more exercisable options, the firm repurchases more stock.

After controlling for the above factors, the coefficient on total options exercised during the year is close to one, indicating that for every option exercised, shares outstanding increase by almost one. If firms were repurchasing shares at the same time option exercises were occurring, this coefficient should be close to zero; however, if firms repurchased last year in anticipation of this year's exercise, shares outstanding would have decreased last year and the coefficient on exercises this year would be one. Thus, my results provide evidence that firms are repurchasing stock in anticipation of future exercises.

The results also support the idea that firms are repurchasing to avoid earnings dilution. Since options are considered dilutive if their exercise price is below the market price, firms worried about dilution should buy back shares as options come in the money rather than waiting until they are exercised. In contrast to the coefficient on options exercised, total options outstanding and exercisable in the year after the repurchase announcement are significantly negatively related to the change in shares outstanding. Thus, while there is a one-to-one correspondence between options exercised and the increase in shares outstanding in the year of the repurchase, firms that have more options outstanding, and in particular more exercisable options, are more likely to repurchase to fund upcoming exercises and prevent dilution. As in Table 4, executive options do not provide additional explanatory power beyond total options.

These results have implications for the best method to use to calculate actual shares repurchased. Jagannathan, Stephens, and Weisbach (2000) propose that examining monthly decreases in CRSP shares outstanding, adjusted for new stock issues, provides a lower bound on shares repurchased since this measure does not adjust for shares reissued to employee benefit plans or through the exercise of stock options. Alternatively, using purchases of common and preferred stock from Compustat overstates common stock repurchases since it includes conversions of other classes of stock into common stock, purchases of Treasury stock, and redemptions of preferred stock. The problems with the Compustat data can be minimized by focusing on firms with announced repurchase programs and subtracting decreases in the par value of preferred stock, and Jagannathan et al. suggest that this measure is likely to be the most accurate. My results support this conclusion, providing evidence that option exercises have a significant effect on the CRSP measure of the change in shares outstanding, which could seriously bias this estimate of actual share repurchases.

4.4. Announcement returns and employee options

The results so far indicate that options affect both the decision to repurchase and the amount repurchased. Further, the univariate results in Section 4.1 show that the announcement-period return to repurchases is lower in the 1990s than it is in earlier periods. If some firms in the 1990s are repurchasing to fund employee option exercises rather than to signal undervaluation or to return free cash flow to shareholders, then the announcement return should be less positive for firms for which this motive is more likely. Table 6 examines this hypothesis by regressing announcement-period returns on firm and repurchase characteristics.

Consistent with the signaling hypothesis and with Comment and Jarrell (1991), regression 1 shows that the announcement return is significantly negatively related to stock price increases in the 40 days prior to the event and positively related to the percent of shares the firm seeks to buy back. The return is also negatively related to a dummy equal to one if the firm pays a dividend, which is consistent with a repurchase announcement being more of a surprise or sending a stronger signal for firms that historically have not returned cash to shareholders through dividends. It is also positively related to the ratio of free cash flow to assets, again indicating that the repurchase is better news if the firm is also performing well. After controlling for these factors, the announcement return is significantly negatively related to total options outstanding. The market appears to recognize that the firm is buying back shares to fund employee stock option programs. However, the coefficient on executive options outstanding is positive and significant. Since the result that announcement returns are lower for firms with many exercisable options could also be driven by the market anticipating and pricing the repurchase

announcement, I include a dummy for firms expected to repurchase (based on the logit model in Table 3) and interact this dummy with the options variable. The variable is not significant.

Since large numbers of executive options could align managers' incentives with those of other shareholders, and thus have a positive effect on the announcement return, regressions 2 and 3 divide options into executive and nonexecutive options outstanding and exercisable to more clearly separate the two effects. In these regressions, the coefficients on nonexecutive options are still negative and significant, but the coefficients on executive options, while positive, are insignificant.

The final regression shows that the announcement-day return is significantly negatively related to the increase in total options exercisable from year –1 to year +1.[6] The change in executive options has no additional explanatory component. In unreported results, the regressions are repeated with industry dummies included. The results are similar.

If the option-funding hypothesis is true, then firms with many options outstanding will repurchase more frequently to avoid dilution. The end result could be that repurchases by these firms are more anticipated and thus create less of a price reaction. To address this issue, I reestimate the above regressions (a) for only those repurchases that are the first repurchase the company makes in the 1990s, and (b) including a dummy variable equal to one if it is the first repurchase. The sign and significance of the coefficients on the option variables do not change.

If firms are repurchasing shares in the 1990s to fund employee stock option exercises, then firms should begin repurchasing at the same time employees begin exercising options. In my sample,

[6] In collecting the data on options, I find no cases in which firms grant options that are immediately exercisable. The typical option grant is made with an exercise price equal to the fair market value on the date of the grant. The option becomes exercisable in regular installments, commencing one to two years after the date of the grant, and unless exercised, the options terminate ten years after the date of the grant. Consequently, this change in options exercisable is due to new vesting over time and increases in stock prices.

there are nine firms that had no options exercisable in the year prior to the repurchase, but for which options became exercisable in the year of or the year after the repurchase announcement. For seven of the nine firms, the repurchase was the first undertaken in the 1990s. An additional 17 firms had options exercisable in the year prior to the repurchase, but the first exercise took place in the year of or the year after the repurchase. For 13 of these 17 firms, this was the first repurchase of the 1990s. These results provide additional evidence that firms time repurchases to fund employee option exercises.

4.5. Endogeneity/causality

It should be noted that both repurchases and stock options are endogenous variables. Consequently, caution must be used when interpreting any relation between the two. Both options and repurchases can be affected by external factors such as increased cash flow, positive stock returns, etc., and I attempt to control for these factors in the regression analysis.

In an attempt to control for possible endogeneity issues in the regressions in Tables 3, 4, and 5, I examine the subset of firms in which endogeneity should be less of an issue. Certain types of firms, such as young, high-tech firms that do not pay dividends, are more suited to using stock options as part of their compensation scheme. If these firms have investment opportunity sets and cash flow characteristics that make repurchasing the most valuable or efficient way to distribute cash, there will be a natural relation between exercisable options and repurchase activity for these firms. For example, a period of good performance will result in stock price increases, in which case more of a firm's options are likely to be in-the-money and exercisable. This same period of good performance is also when the firm is generating sufficient cash flow to warrant a repurchase. Consequently, I rerun the regressions in Tables 3, 4, and 5 for only those firms that do pay dividends. The results are virtually identical.

Endogeneity can affect the announcement-period return regressions of Table 6 in two ways. First, firms with more stock options tend to be young, high-tech firms, and information asymmetry is higher for these firms than for firms with low levels of stock options. Repurchases should alleviate the information asymmetry, and thus firms with more stock options should have higher announcement-period returns. This relation would bias against finding a negative relation between stock options and announcement returns, as predicted by the option-funding hypothesis. Second, firms with more stock options should tend to have high growth opportunities. In this case, a repurchase could signal reduced growth opportunities, which would lead to a negative relation between stock options and announcement returns. If this relation holds, there could be a negative relation between stock options and announcement returns, regardless of whether the option-funding hypothesis is true. Consequently, I examine capital expenditures and research and development expenses for the repurchase sample. For the entire sample, capital expenditures and R&D increase from the year before to the year after the repurchase. The increase is insignificant, however. I also examine the subset of repurchasers whose options outstanding or options exercisable are greater than the sample mean. For this subsample, the increase in capital expenditures and R&D is positive and significant. The results indicate that the repurchase is not a signal of decreased growth opportunities, and that the negative relation between stock options and announcement returns is consistent with the option-funding hypothesis.

Finally, payout and leverage are also endogenous variables. Since leverage is largely a predetermined variable relative to the decision to repurchase in a particular year, there should not be a problem. However, I rerun all regressions after removing leverage from the equation to make sure the inferences are not sensitive to its inclusion. The magnitude and significance of the coefficients on the independent variables do not change as a result.

5. Conclusion

I study open market share repurchases from 1993-1996 to examine the effect of total and executive options on the firm's decision to repurchase stock, the actual repurchases made, and on the initial market reaction to the announcement of an open market repurchase program. Previous studies have found that repurchase programs are undertaken both to signal undervaluation to investors and to return free cash flow to shareholders. However, these theories do not explain the sudden and drastic increase in repurchases in the 1990s. One possible explanation for the increased popularity of stock options is the concurrent increase in the use of stock options to compensate not just management but all employees in a firm.

My results support the notion that changes in compensation policy have caused changes in payout policy. While I find evidence consistent with the signaling and free cash flow theories, I also find that in the 1990s, stock options have encouraged firms to repurchase shares both to maximize managerial wealth, since repurchases do not affect the value of managerial options but dividends do, and to fund increasingly prevalent employee stock option programs. Executive options increase the likelihood that a firm will repurchase, but once the decision to repurchase has been made, the number of shares actually repurchased depends only on total options exercisable. Executive options have no additional explanatory power. The market appears to recognize this new motive for repurchasing, however. The announcement return to repurchasing firms is significantly lower for firms with large numbers of employee stock options.

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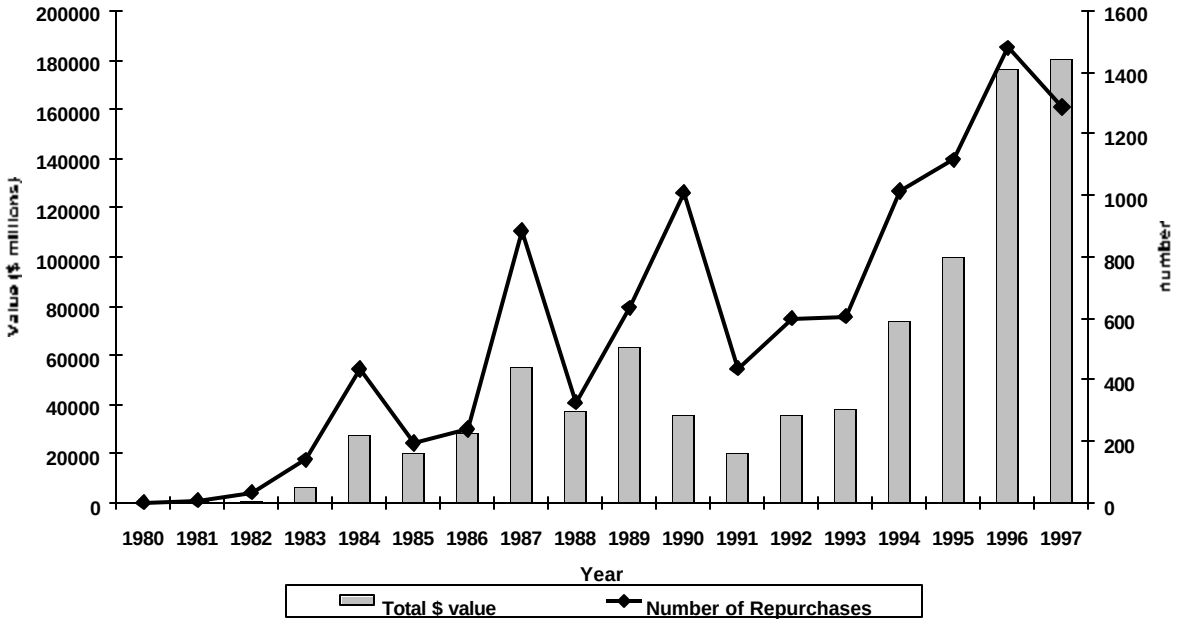

Fig. 1. Yearly number and dollar value of all repurchases announced between 1980 and 1997, as reported by Securities Data Corporation.

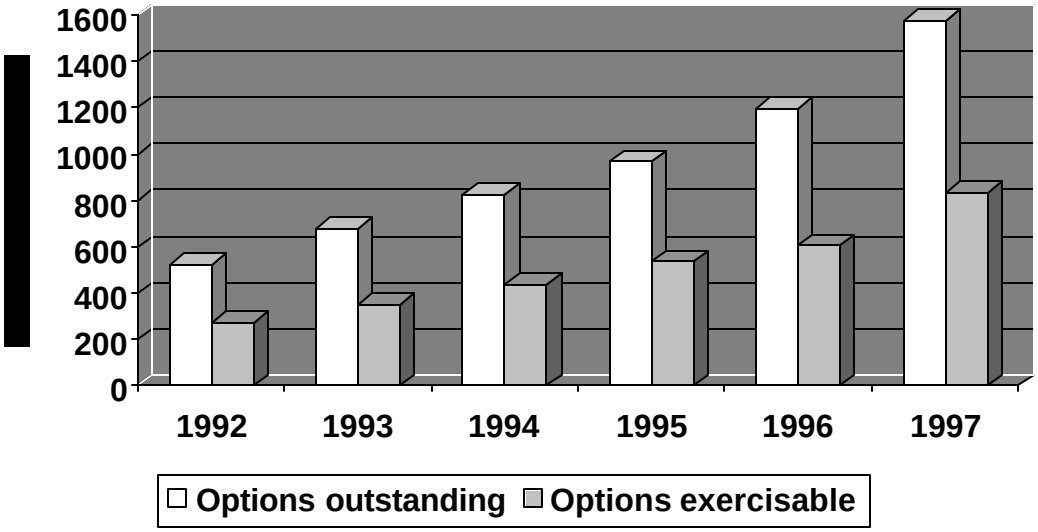

Fig. 2. Average number of managerial options outstanding, exercisable, and exercised (in thousands) from 1992-1997 by firms listed on Standard and Poor's Execucomp database.

Table 1: Descriptive statistics

Mean (median) statistics are provided for the sample of 712 firms that announce repurchases and 205 firms that increase dividends from 1993-1996. Abnormal return is the market model abnormal return during the window (-1, +1) relative to the announcement date. Percent increase (sought) is the percentage increase in dividends for the dividend sample and the percent of total shares outstanding sought for the repurchase sample. Runup is the abnormal stock price return from day –43 to day –4 relative to the announcement, calculated using the market model. Market capitalization is calculated as price per share multiplied by shares outstanding at the year-end prior to the issue, adjusted to 1996 dollars. The market-to-book asset ratio is calculated as market equity plus long-term debt plus debt in current liabilities plus preferred stock, divided by the book value of assets. Free cash flow is calculated as in Lehn and Poulsen (1989). Total (executive) options outstanding and exercisable are measured in the year after the event. Total options exercised are measured in the year of the event.

Panel A: Firm characteristics

	Dividend increase	**Repurchase**	**t-test for difference**
Abnormal return (-1,+1)	0.47% (0.30%)	1.61% (1.30%)	0.0001
Percent increase (sought)	9.75% (8.16%)	6.43% (5.00%)	N/A
Runup (prior 40 days)	0.00% (0.30%)	-3.64% (-2.24%)	0.0001
Market capitalization (millions)	2,801.5 (1,173.1)	6,167.8 (1,472.9)	0.0001
Market-to-book asset ratio	1.42 (1.11)	1.71 (1.38)	0.0005
Long-term debt / assets	0.178 (0.150)	0.137 (0.100)	0.0006
Capital expenditures / assets	0.064 (0.051)	0.073 (0.061)	0.2253
Free cash flow / assets	0.084 (0.081)	0.106 (0.101)	0.0001

Panel B: Option holdings

Total options outstanding / shares outstanding	0.0409 (0.0352)	0.0778 (0.0655)	0.0001
Total options exercisable / shares outstanding	0.0209 (0.0165)	0.0401 (0.0308)	0.0001
Executive options outstanding / shares outstanding	0.0051 (0.0031)	0.0108 (0.0067)	0.0001
Executive options exercisable / shares outstanding	0.0128 (0.0092)	0.0241 (0.0158)	0.0001
Total options exercised / shares outstanding	0.0073 (0.0047)	0.0136 (0.0074)	0.0001

Table 2: Industry distribution of repurchases and dividend increases

Industries are classified by two-digit SIC codes using the classifications listed in SDC's manual. N is the number of sample firms in a given industry; % is the number of sample firms in the industry, divided by the total number of firms available on Compustat in that industry. The last column gives the number of firms in each industry that exist on the Compustat tapes during 1992-1996.

Industry name	2-digit SIC	Dividend increase		Repurchase		Compustat
		N	%	N	%	N
Advertising and business services	73, 87, 89	7	0.5	49	3.3	1,467
Agriculture, forestry, & fishing	01-09	2	4.3	0	0	46
Chemicals, drugs, personal care products	28	14	1.9	81	10.9	740
Electronics and communications	36	9	1.2	47	6.4	739
Finance & insurance	60-67	24	1.0	58	2.3	2,500
Food and kindred products	20	9	3.7	40	16.3	246
Leather, stone, clay, glass, concrete	31, 32	1	1.0	4	4.0	100
Machinery, computer equipment	35	12	1.7	59	8.1	727
Medical and photo equipment	38	5	0.7	39	5.7	680
Metal products	33, 34	15	4.5	29	8.8	330
Mining/ construction	10-17	8	1.1	11	1.5	752
Miscellaneous	99	1	1.1	0	0	87
Miscellaneous manufacturing	39	2	1.5	8	6.0	134
Motion picture/ entertainment services	78, 79	0	0	7	2.7	262
Oil/gas	29	2	3.1	9	13.8	65
Personal services	70-72,80-86,88	2	0.4	5	1.1	450
Printing, publishing, and allied service	27	5	3.3	32	20.9	153
Repair services	75, 76	0	0	3	8.3	36
Retail trade	52-59	11	1.4	63	8.1	774
Rubber/plastic products	30	1	0.8	12	9.0	133
Telecommunications, radio, and TV	48	2	0.4	16	3.5	455
Textiles and apparel products	22, 23	1	0.6	12	6.7	178
Tobacco products	21	0	0	5	31.2	16
Transportation and shipping	40-47	8	2.7	18	6.1	294
Transportation equipment, aerospace	37	13	5.5	27	11.4	236
Utilities	49	29	7.8	12	3.2	371
Wholesale trade	50, 51	12	2.3	26	5.1	513
Wood & paper products	24-26	10	4.1	40	16.3	246
Total		**205**		**712**		**12,730**

Table 3: Determinants of dividend increase vs. repurchase

This table shows the results of a logit estimation of the determinants of whether a firm increases its dividend or repurchases shares. The dependent variable takes the value one if the firm repurchases and zero if it increases the dividend. Runup is the abnormal stock price return from day –43 to day –4 relative to the announcement, calculated using the market model. Market capitalization is calculated as price per share multiplied by shares outstanding at the year-end prior to the issue, adjusted to 1996 dollars. Free cash flow is calculated as in Lehn and Poulsen (1989). The first number in each cell is the parameter coefficient estimate; the second is the marginal effect. The number in parenthesis is the maximum likelihood p-value.

	(1)	(2)	(3)
Intercept	-3.211	-2.731	-2.953
	(0.000)	*(0.000)*	*(0.000)*
Logarithm of market capitalization	0.376	0.347	0.361
(financing costs)	0.044	0.033	0.034
	(0.000)	*(0.000)*	*(0.000)*
Free cash flow / assets	4.258	3.743	4.343
(free cash flow)	0.500	0.361	0.413
	(0.050)	*(0.113)*	*(0.068)*
Long-term debt / assets	-0.733	-1.149	-1.192
(financing costs)	-0.086	-0.111	-0.113
	(0.301)	*(0.136)*	*(0.125)*
Runup (prior 40 days)	-1.796	-1.539	-1.569
(overvaluation)	-0.211	-0.149	-0.149
	(0.032)	*(0.092)*	*(0.086)*
Total options exercised in year 0	35.468	53.408	52.220
	4.1625	5.156	4.961
	(0.017)	*(0.004)*	*(0.005)*
Total options outstanding (year +1)/	22.222	13.462	
shares outstanding	2.608	1.300	
	(0.000)	*(0.003)*	
Total options exercisable (year +1)/			30.435
shares outstanding			2.891
			(0.000)
Total options unexercisable (year +1)/			-2.546
shares outstanding			-0.242
			(0.686)
Executive options outstanding (year +1)/		23.445	
shares outstanding		2.264	
		(0.022)	
Executive options exercisable (year +1)/			-6.633
shares outstanding			-0.630
			(0.642)
Executive options unexercisable (year +1)/			65.342
shares outstanding			6.207
			(0.002)
Pseudo. R^2	0.25	0.23	0.25

Table 4: Determinants of the level of actual repurchases

The dependent variable is equal to dollars spent on repurchases in the year of and the year after the announcement, defined as Compustat's dollars spent on repurchases (annual data item #115) minus any decrease in the par value of preferred stock (annual data item #130), divided by the market value of equity. Percent sought is the percent of total shares outstanding sought in the repurchase. Market capitalization is calculated as price per share multiplied by shares outstanding at the year-end prior to the issue, adjusted to 1996 dollars. Free cash flow is calculated as in Lehn and Poulsen (1989). The market-to-book asset ratio is calculated as market equity plus long-term debt plus debt in current liabilities plus preferred stock, divided by the book value of assets. Option dummy takes the value of one if the firm's exercisable options are above the sample mean, and zero otherwise. The number in parentheses is the p-value.

	(1)	(2)	(3)	(4)
Intercept	-0.002	-0.006	0.002	-0.002
	(0.872)	*(0.700)*	*(0.926)*	*(0.907)*
Percent sought	0.004	0.003	0.004	0.004
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*
Log of market capitalization	0.007	0.007	0.005	0.005
	(0.000)	*(0.000)*	*(0.002)*	*(0.003)*
Free cash flow / assets	0.110	0.116	0.147	0.165
	(0.048)	*(0.038)*	*(0.012)*	*(0.005)*
Market-to-book asset ratio	-0.011	-0.011	-0.010	-0.010
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*
Capital Expenditures / assets	-0.107	-0.106	-0.077	-0.089
	(0.005)	*(0.005)*	*(0.070)*	*(0.038)*
Long-term debt / assets	-0.042	-0.042	-0.013	-0.014
	(0.029)	*(0.032)*	*(0.534)*	*(0.515)*
1-year raw post-announcement buy-and-hold return	-0.029	-0.029	-0.024	-0.021
	(0.000)	*(0.000)*	*(0.002)*	*(0.012)*
Option dummy * 1-year post-announcement return	0.023	0.023	0.020	0.016
	(0.016)	*(0.015)*	*(0.036)*	*(0.075)*
Executive options outstanding (year +1)/ shares outstanding		0.084	0.068	
		(0.527)	*(0.620)*	
Total options outstanding (year +1)/ shares outstanding	0.249	0.236	0.218	
	(0.000)	*(0.000)*	*(0.001)*	
Executive options exercisable (year +1)/ shares outstanding				0.065
				(0.725)
Executive options unexercisable (year +1)/ shares outstanding				-0.108
				(0.702)
Total options exercisable (year +1)/ shares outstanding				0.371
				(0.001)
Total options unexercisable (year +1)/ shares outstanding				0.148
				(0.137)
Total options exercised (year 0)	-0.089	-0.117	-0.070	-0.119
	(0.571)	*(0.464)*	*(0.669)*	*(0.472)*
Industry controls	No	No	Yes	Yes
Adjusted R^2	0.175	0.174	0.204	0.212

Table 5: Change in shares outstanding

The dependent variable is the change in shares outstanding in the year after the repurchase announcement, divided by the number of shares outstanding at the time of the announcement. A positive (negative) number indicates that shares increased (decreased). Market capitalization is calculated as price per share multiplied by shares outstanding at the year-end prior to the issue, adjusted to 1996 dollars. Free cash flow is calculated as in Lehn and Poulsen (1989). The market-to-book asset ratio is calculated as market equity plus long-term debt plus debt in current liabilities plus preferred stock, divided by the book value of assets. Option dummy takes the value one if the firm's exercisable options are above the sample mean, and zero otherwise. The number in parentheses is the p-value.

	(1)	(2)	(3)
Intercept	0.032	0.036	0.045
	(0.192)	(0.164)	(0.095)
Log of market capitalization	-0.007	-0.008	-0.009
	(0.005)	(0.004)	(0.002)
Free cash flow / assets	-0.061	-0.068	-0.073
	(0.521)	(0.476)	(0.446)
Market-to-book asset ratio	0.005	0.005	0.005
	(0.176)	(0.180)	(0.178)
Capital expenditures / assets	0.117	0.114	0.110
	(0.057)	(0.063)	(0.074)
Long-term debt / assets	0.058	0.060	0.062
	(0.073)	(0.062)	(0.057)
1-year raw post-announcement buy-and-hold return	0.061	0.058	0.058
	(0.000)	(0.000)	(0.000)
Option dummy * 1-year post-announcement return	-0.039	-0.034	-0.035
	(0.014)	(0.033)	(0.030)
Total options exercised in year 0	0.855	0.884	0.856
	(0.002)	(0.002)	(0.003)
Total options outstanding (year +1)/ shares outstanding	-0.187		
	(0.035)		
Total options exercisable (year +1)/ shares outstanding		-0.316	-0.350
		(0.029)	(0.010)
Total options unexercisable (year +1)/ shares outstanding		-0.091	0.036
		(0.463)	(0.824)
Executive options exercisable (year +1)/ shares outstanding			0.045
			(0.883)
Executive options unexercisable (year +1)/ shares outstanding			-0.580
			(0.223)
Adjusted R^2	0.063	0.063	0.062

Table 6: Announcement-day returns and firm and repurchase characteristics

The dependent variable is the market model abnormal return during the window (-1, +1) relative to the announcement date. Runup is the abnormal stock price return from day –43 to day –4 prior to the announcement, calculated using the market model. Market assets are calculated as market equity plus long-term debt plus debt in current liabilities plus preferred stock. Free cash flow is calculated as in Lehn and Poulsen (1989). Percent sought is the percent of total shares outstanding that the repurchaser announces it is repurchasing. The dividend dummy takes the value of one for firms that pay a dividend. Executive (nonexecutive) options outstanding (x)/ shares outstanding is the total number of options held by top executives (nonexecutives) divided by the number of shares outstanding in year x relative to the repurchase. The number in parentheses is the p-value.

	(1)	(2)	(3)	(4)
Intercept	0.016	0.016	0.018	0.020
	(0.165)	(0.164)	(0.116)	(0.059)
Control variables				
Runup (prior 40 days)	-0.040	-0.040	-0.039	-0.041
	(0.001)	(0.001)	(0.001)	(0.001)
Market-to-book asset ratio	-0.001	-0.001	-0.000	-0.000
	(0.752)	(0.760)	(0.725)	(0.896)
Log (book assets in 1996 $)	-0.001	-0.001	-0.001	-0.001
	(0.558)	(0.550)	(0.412)	(0.295)
Long-term debt / assets	0.023	0.023	0.025	0.027
	(0.110)	(0.109)	(0.073)	(0.057)
Free cash flow / assets	0.095	0.096	0.094	0.082
	(0.015)	(0.015)	(0.016)	(0.034)
Percent sought	0.001	0.001	0.001	0.001
	(0.079)	(0.080)	(0.081)	(0.064)
Dividend dummy	-0.011	-0.011	-0.010	-0.012
	(0.010)	(0.010)	(0.016)	(0.005)
Option variables				
Executive options outstanding (+1)/ shares outstanding	0.152	0.081		
	(0.093)	(0.262)		
Nonexecutive options outstanding (+1)/ shares outstanding		-0.071		
		(0.084)		
Total options outstanding (+1)/ shares outstanding	-0.071			
	(0.084)			
Executive options exercisable (+1)/ shares outstanding			0.088	
			(0.302)	
Nonexecutive options exercisable (+1)/ shares outstanding			-0.115	
			(0.090)	
Change in executive options exercisable from year –1 to year +1				-0.099
				(0.496)
Change in nonexecutive options exercisable from year –1 to year +1				-0.162
				(0.039)
Adjusted R^2	0.073	0.073	0.073	0.075