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The Information Content of Share Repurchase Programs

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ABSTRACT

Contrary to the implications of many payout theories, we find that announcements of open-market share repurchase programs are not followed by an increase in operating performance. However, we find that repurchasing firms experience a significant reduction in systematic risk and cost of capital relative to non-repurchasing firms. Further, consistent with the free cash-flow hypothesis, we find that the market reaction to share repurchase announcements is more positive among those firms that are more likely to overinvest. Finally, we find evidence to indicate that investors underreact to repurchase announcements because they initially underestimate the decline in cost of capital.

IN RECENT YEARS OPEN-MARKET share repurchase programs have become an important payout method for many U.S. firms. According to data from COMPUSTAT, between 1984 and 2000 corporations spent approximately 26 percent of their total annual earnings on repurchases. Over 90 percent of these repurchases were open-market repurchase programs. Also, in 1999 and 2000, for the first time in history, industrial corporations spent more money on share repurchases than they did on dividends. Our objective in this paper is to better understand the economic motivations behind the decision to repurchase shares.

Two major reasons for repurchasing shares are analyzed in the theoretical literature. The first is that management uses open-market share repurchases to signal better prospects (Bhattacharya (1979), Miller and Rock (1985), and Vermaelen (1984)).[1] These papers suggest that repurchases can be used as a costly signal about future cash flows when markets are incomplete. As demonstrated by these papers, the repurchase decision can reveal information about

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[1] See also Ofer and Thakor (1987), Constantinides and Grundy (1989), Hausch and Seward (1993), and Persons (1997).

future earnings and profitability to the market. This idea that repurchases (and dividends) have information content is a given in corporate finance.

The second rationale behind the decision to repurchase is that share buybacks can be used to reduce the amount of free cash flow at management's disposal. According to this explanation, firms repurchase their shares to mitigate potential over-investment by management (Jensen (1986)). This free cash-flow hypothesis implies that firms that have been experiencing a reduction in growth opportunities and in return on assets (ROA) will be more likely to pay out cash in the form of repurchases.

Our findings indicate that the cash-flow-signaling hypothesis cannot explain why firms repurchase their shares. The signaling hypothesis predicts that future earnings (and other profitability measures) should improve after share repurchase announcements. It also predicts that the information conveyed in the repurchase should also have an impact on the market's expectations of future profitability. We find no evidence that repurchasing firms experience an improvement in future profitability relative to their peer firms. In fact, some of the performance measures indicate that repurchasing firms underperform their peers. We also find that analysts revise their expectations downward after the announcement of a share repurchase program. Our findings regarding repurchasing firms' operating performance are also corroborated by Jagannathan and Stephens (2003), who examine open-market share repurchase announcements over the period 1991 to 1995 and find that earnings fall in the years after these events.[2]

Our empirical findings do provide support for Jensen's (1986) free cash-flow hypothesis. We find that repurchasing firms reduce their current level of capital expenditures and research and development (R&D) expenses. Furthermore, we find that the level of cash reserves on their balance sheets significantly declines. Finally, we find that the market reaction to share repurchase announcements is stronger among those firms that are more likely to overinvest. These findings, combined with the evidence on profitability, indicate that, as implied by the free cash-flow hypothesis, firms increase their cash payouts in response to a deterioration in their investment opportunity set.

When are agency problems of free cash flow likely to arise? We suggest that repurchases may be associated with a firm's transition from a higher growth phase to a lower growth phase. As firms become more mature, their investment opportunity set becomes smaller. These firms have fewer options to grow, and their assets in place play a bigger role in determining their value, which leads to a decline in systematic risk (see Berk, Green, and Naik (1999) for a thorough development of this idea). This transition manifests itself in a decline in risk, and by implication, in a decline in the cost of capital. The declining

[2] Using a sample of 185 open-market share repurchases during the period 1978 to 1986, Bartov (1991) reports mixed results on the relation between earnings changes and repurchases. He finds that relative to control firms, repurchasing firms experience an improvement in profitability in year 0 (year of the event) and year 2, but experience a decline in profitability in year 1. Perhaps those mixed results can be attributed to the small sample size used in this study.

reinvestment rate also generates free cash flows, thus increasing the likelihood of overinvestment by management. Indeed, at such a time it is more likely that managers give out cash under the pressure of shareholders. Thus repurchases may be associated with a reduction in risk and may convey that managers will reduce their firms' capital expenditures in response to the reduction in investment opportunities.

The evidence corroborates the free cash-flow hypothesis along these dimensions. In examining the 6-year period around the repurchase announcement, we find that repurchasing firms experience a significant reduction in systematic risk relative to non-repurchasing firms. The changes in systematic risk translate to an economically significant decline in risk premium of 1.5 percent a year. Moreover, we also find that those firms experiencing a larger decline in risk also experience a larger decline in capital expenditures and R&D expenses, consistent with the impact of a transition to a lower growth stage.

But then a question remains: if investment opportunities decline after share repurchase announcements, why would the market react positively to such events? Clearly, a reduction in investment opportunity set is not good news. Jensen (1986) explains the positive market reaction to such events by alluding to the notion that the market is already aware of the reduction in profitable investments, and it reacts positively to share repurchase announcements because these events reduce the amount of free cash flows at management's disposal. Thus, the news (about the repurchase in this case) is about the reduction in agency costs. Second, as argued in Grullon, Michaely, and Swaminathan (2002), it is quite possible that the market, at least to some degree, is more aware of the decline in profitability than of the decline in risk that is associated with the decline in investments. The repurchase announcement makes the market more aware of both the decline in agency costs and the decline in risk.[3] The evidence in this paper seems to support both explanations. While we find that the market reaction to share repurchases is stronger among those firms that are more likely to overinvest, we also find that this market reaction is negatively related to the change in the cost of capital.

Our results, combined with the findings in the prior literature, enable us to compare the changes in firms' characteristics around open-market repurchases with the changes in characteristics around other payout events such as dividends and repurchase tender offers. This comparison can shed light on whether firms use those forms of payout under the same circumstances, and whether they are motivated, at least to some extent, by similar factors.

This analysis indicates strong similarities between firms that increase dividends and those that use open-market share repurchases: both types of firms do not experience an increase in profitability, and at times, even see a decrease in profitability (e.g., Penman (1983), DeAngelo, DeAngelo, and Skinner (1996), and Benartzi, Michaely, and Thaler (1997)). Just like the evidence on dividend-increasing firms, we find that repurchasing firms experience an

[3] This notion is consistent with Lintner's (1956) and Brav et al. (2003) findings that managers increase payout when they feel that the firm's cash flows are less risky.

abnormal decline in risk and cost of capital (Boehme and Sorescu (2002) and Grullon, Michaely, and Swaminathan (2002)).

Finally, although the initial reaction to dividend increases is positive (e.g., Asquith and Mullins (1983) and Kalay and Loewenstein (1986)), empirical research shows that the market reaction to these events is incomplete (e.g., Charest (1978), Benartzi, Michaely, and Thaler (1997), and Boehme and Sorescu (2002)), and that prices continue to drift in the same direction, as they do in the case of open-market repurchases (e.g., Ikenberry, Lakonishok, and Vermaelen (1995, 2000)). This evidence suggests that, at least to some extent, similar factors motivate firms to repurchase shares in the open market and to increase dividends.

Comparing our results to the earlier literature on tender offers reveals that the similarities in firms' characteristics are not as striking as they are to the case of dividend increases. Vermaelen (1984) and Dann, Masulis, and Mayers (1991) document a significant increase in earnings per share (EPS) in the years following fixed-price repurchases.[4] Dann, Masulis, and Mayers and Hertzel and Jain (1991) find that the post-repurchase betas are lower than the pre-repurchase betas, but that the changes are small. Using daily data for 122 fixed-price tender offers, Denis and Kadlec (1994) report that after accounting for nonsynchronous data problems and changes in trading volume, post-repurchase betas are similar to pre-repurchase betas. Taken together, it is more likely that firms' motives for fixed price repurchases are different from the motives that dominate open-market repurchases and dividend increases decisions. For example, Bagwell (1991) suggests that tender offers may be used as a mechanism to counter a takeover threat.

Finally, we also investigate the relation between the change in the cost of capital and the long-term drift observed after share repurchase announcements (see Ikenberry, Lakonishok, and Vermaelen (1995, 2000)). We find that the long-term drift is positively associated with future changes in profitability and negatively associated with future changes in risk and the cost of capital. Thus, in the long run, stock prices of repurchasing firms increase with declining risk. This finding may suggest that prices impound the change in the cost of capital only gradually and that the risk changes associated with repurchases could also provide a partial explanation for the long-term drift in stock prices. This evidence provides an additional link between dividend-increasing firms and repurchasing firms: Charest (1978) and Benartzi, Michaely, and Thaler (1997) note a modest price drift following dividend increases, which can be partially explained by a reduction in the risk profile of the dividend-increasing firms. Thus, for both dividend-increasing firms and repurchasing firms, the evidence suggests that the market underestimates the risk changes: The post-repurchase drift is greater for firms with a larger decline in the cost of capital.

This paper proceeds as follows. Section I presents the implications of the signaling and the free cash-flow hypothesis. Section II describes the data sources

[4] Nohel and Tarhan (1998) argue that the improvement in earnings after fixed-price tender offers can be attributed to low-growth firms that sold unproductive assets.

we use in this study and presents several summary statistics. In Section III we present our findings on the operating performance of repurchasing firms and the revision in analysts' earnings forecasts around share repurchase announcements. In Section IV we analyze the relation between repurchases and changes in investment opportunities and cost of capital. Section V concludes.

I. The Information/Signaling Hypothesis, the Free Cash-Flow Hypotheses and Their Implications

A. The Information/Signaling Hypothesis

Miller and Modigliani (1961) suggest that when markets are incomplete, firms can convey information about future cash flows through changes in payout policy. Indeed, as demonstrated by Miller and Rock (1985), through the sources and uses of funds identity, the net payout decision could reveal information about current earnings to the market. Building on the notion of asymmetric information, Bhattacharya (1979), Miller and Rock (1985), Vermaelen (1981), and others theorize that payout decisions are not actions that just happen to have information content. Rather, these decisions are explicit signals about future earnings, sent intentionally and at some cost by the managers of the firm to their stockholders.[5]

The information/signaling hypothesis has three immediate implications: (1) repurchase announcements should be accompanied by positive price changes; (2) repurchase announcements should be followed (though not necessarily immediately) by positive news about profitability or cash flows; and (3) repurchase announcements should be immediately followed by positive changes in the market's expectation about future profitability.

Many studies show that repurchases are associated with a positive stock price reaction (e.g., Ikenberry, Lakonishok, and Vermaelen (1995)). Thus, the first implication is not the focus of this paper. Instead, we examine the implication of a positive association between repurchases and future changes in earnings or profitability. To perform this, we examine several measures of operating performance over the 3 years following the repurchase announcement. Finally, using IBES data, we test the third implication by examining the changes in analysts' EPS forecasts around the repurchase announcement.

B. The Free Cash-Flow Hypothesis

Agency theory suggests that firms with free cash flows in excess of its investment opportunities are likely to spend them on value-destroying projects that reduce the firm's value. As a partial solution to this problem, Grossman and Hart (1982), Easterbrook (1984), and Jensen (1986) argue that if equityholders can minimize the cash that management controls, then it will be much

[5] Several costs associated with repurchases and dividend payments have been proposed. Bhattacharya's (1979) model takes the cost of issuing new shares as the cost of the signal. Miller and Rock's (1985) model assumes that the signaling cost is the forgone investment.

harder for management to engage in (unmonitored) spending sprees (e.g., invest in negative NPV projects). One way to take excess cash from the firm is increasing the level of payout.

Thus, share repurchases and other payout methods are an integral feature of the process a firm undergoes as it moves from a growth phase to a more mature phase. Typically, in a growth phase, a firm has many positive NPV projects available, high capital expenditures, low free cash flows, and high earnings growth. At some point, the firm's growth slows down (e.g., competitors enter the industry), and its economic profit declines. In this phase, capital expenditures decline, and the firm generates larger amounts of free cash flows. As Berk, Green, and Naik (1999) show, when a firm has fewer options to grow and assets in place play a bigger role in determining its value, the firm's systematic risk declines.[6]

Along with the reduction in the firm's risk profile, the firm's return on investment (return on equity or ROA) declines and so do its economic profits. All else equal, a decline in the return on investment should reduce the earnings growth rate of the firm. As the investment opportunities decline, the need for resources to undertake new investments should also decline. This decline in investments would in turn lead to an increase in the firm's free cash flows. The potential for management to overinvest is higher when a firm is going through this change in its life cycle, and hence the incentive for an increase in payout. Therefore, repurchases may be associated with a reduction in investment opportunities and risk. At the same time, the decision to repurchase shares may convey information about management commitment to reduce capital expenditures in response to the reduction in investment opportunities.

In summary, the free cash-flow hypothesis predicts the following.

(1) Firms that repurchase their shares should experience a decline in their profitability.
(2) Firms that repurchase their shares should need less cash for investments. Therefore, the growth in capital expenditures and the need for cash reserves should decline.
(3) Firms that repurchase their shares should experience a decline in their systematic risk. Therefore, their cost of capital should also decline.

[6] For ease of exposition, let us assume that the CAPM beta is a good proxy of the firm's systematic risk and that the firm is an all-equity firm. Then, the firm's equity beta is a weighted average of the beta of its assets in place and the beta of its growth options where the weights are based on the relative values of assets in place and growth options. Since most growth options have call option characteristics, it follows that the growth option beta cannot be less than the beta of the underlying assets. As the firm matures, and the number of growth options in its portfolio decreases, the weight put on the growth option beta will also decline. This shift will result in a decline in its overall beta. If accompanied by a decline in the riskiness of the firm's assets in place, the firm's beta will decline even further. The decline in the assets' beta can happen if the assets underlying the growth options become progressively less risky as the time-to-maturity of the growth options decreases. In sum, this suggests that as a firm goes though this process it is likely to face investment opportunities that are less risky.

(4) The market reaction to share repurchase announcements should be stronger among those firms that are more likely to overinvest. Following Lie (2000), we examine whether firms with high cash levels and few investment opportunities (proxied by Tobin's Q) experience a stronger market reaction around share repurchase announcements than do other firms.

II. Data and Sample Selection

We collect data on open-market share repurchase programs from two sources. The main sample comes from announcements reported in the Securities Data Corporation's *U. S. Mergers and Acquisitions* database. This database contains the most comprehensive sample of open-market share repurchase programs available, 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* for 1980 through 1984. We include the 1980 through 1984 period in our sample because it allows us to compare the results in this paper with the results in earlier studies, and to check for robustness across data sources and time periods.

Our sample includes regulated firms (e.g., financial institutions and utilities). We include regulated firms because they represent a large proportion—nearly 34 percent—of the total sample. One possible explanation for this phenomenon is that many financial institutions have generated large amounts of excess cash over the last decade. According to industry reports, several factors have contributed to this accumulation of excess cash in the financial sector. First, the relative stability of interest rates during the last decade has helped financial institutions to generate record profits. Second, the deregulation of the financial system has forced many institutions to become more efficient. Third, investment opportunities for financial institutions are not growing at the same rate as capital. However, we note that our results are similar for regulated firms and nonregulated firms.

Our final sample satisfies the following criteria.

(1) Each firm is present on COMPUSTAT (Full-coverage, Primary, Secondary, Tertiary, and Research Files) at the beginning of the year in which the open-market share repurchase program is announced (year –1).
(2) Information on common stock returns is available on the Center for Research in Securities Prices (CRSP) files.
(3) The announcement of the share repurchase program does not coincide with the announcement of a dividend change. The purpose of this exclusion is to avoid confounding effects. (However, the inclusion of these events in the sample does not change any of our results.)
(4) The firm does not cut its dividends during the year of the announcement of the share repurchase program. The purpose of this exclusion is to

ensure that firms are not just substituting share repurchases for dividends (Grullon and Michaely (2002)).[7]

(5) The firm discloses the number (or the percentage) of shares sought during the duration of the share repurchase program. If the firm announces only the number of shares sought, then we calculate the percentage of shares sought by using the number of shares outstanding at the time the firm announces the share repurchase program.

(6) The announcement of the open-market share repurchase program is not made during the last quarter of 1987. Following Ikenberry, Lakonishok, and Vermaelen (1995), we exclude this period from the sample because at this time, many corporations were initiating open-market share repurchase programs to stabilize their stock prices after the market crash of October 1987. Furthermore, many companies did not announce the number of shares authorized for repurchase during this period.

These selection criteria create a sample of 4,443 open-market share repurchase announcements for the period 1980 to 1997.[8]

Table I reports the distribution of repurchasing firms by calendar year. Given the overall trend in repurchase activity, we are not surprised to find that most of the observations (approximately 79 percent) are concentrated in the 1990s. The average (median) market reaction around open-market share repurchases is 2.71 percent (1.82 percent), a finding that is consistent with previous empirical evidence (e.g., Vermaelen (1981), Comment and Jarrell (1991), and Ikenberry, Lakonishok, and Vermaelen (1995)).[9] These positive price effects confirm the notion that open-market share repurchases convey some type or types of good information to the market. Table I also shows that the average (median) proportion of shares sought by the corporation is 6.77 percent (5.00 percent).[10]

Summary statistics (not reported in a table) show that repurchasing firms are large. The firms in our sample are concentrated in the top three CRSP size deciles. The average (median) book value of assets of the sample firms is \$4,528.9 (\$354.8) million and the average (median) market-to-book ratio of repurchasing firms is equal to 1.53 (1.20). This average market-to-book ratio is similar to the one reported in Grullon, Michaely, and Swaminathan (2002) for dividend-increasing firms and in Fenn and Liang (2001) for a sample of S&P 1500 firms. The average (median) dividend and repurchase yields are equal to

[7] To further ensure that our findings are not driven by firms substituting repurchases for dividends, we also examine the total payout (dividends plus repurchases) of the firms in our sample. There is a substantial increase in the total payout level during year 0 (year of the event) and the 3 years after the event.

[8] We also perform all the empirical analyses using only first announcements. Our results are qualitatively the same.

[9] The market reaction or abnormal return is equal to the 3-day (−1, 0, 1) announcement period cumulative abnormal return (CAR). We use the CRSP value-weighted index as the benchmark portfolio.

[10] The proportion of shares sought by the corporation is equal to the amount of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement.

Table I

Distribution of Repurchasing Firms by Calendar Year

This table reports the distribution by calendar year for a sample of firms that announced open-market share repurchase programs over the period 1980 to 1997. To be included in the sample, the observation must satisfy the following criteria: The firm's financial data is available on COMPUSTAT and CRSP; the announcement of the share repurchase program does not coincide with the announcement of a cash dividend change; the firm does not cut its dividends during the year of the announcement of the share repurchase program; the firm discloses the number or the percentage of shares sought over the duration of the share repurchase program; and the announcement of the share repurchase program is not made during the last quarter of 1987. *VALUE* is the total market value of the open-market share repurchase programs in billions of dollars. *CAR* is the 3-day announcement period (−1, 0, 1) Cumulative Abnormal Return. The CRSP value-weighted index is the benchmark portfolio against which we calculate the 3-day *CAR*. *PSOUGHT* is the number of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement.

				CAR		*PSOUGHT*	
Year	Number of Observations	Fraction of Sample (%)	*VALUE* (billion $)	Mean (%)	Median (%)	Mean (%)	Median (%)
80	59	1.33	1.1	3.14	3.67	4.80	4.30
81	66	1.49	2.2	2.88	2.48	5.56	4.30
82	109	2.45	2.6	4.25	3.46	5.87	5.10
83	40	0.90	1.4	3.17	2.15	5.86	4.10
84	161	3.62	6.7	3.03	2.09	5.67	4.60
85	59	1.33	4.5	3.84	2.66	7.16	5.00
86	65	1.46	6.0	3.18	2.21	7.85	5.10
87	57	1.28	12.7	4.55	3.55	8.87	7.30
88	105	2.36	12.1	2.50	1.62	8.94	6.70
89	228	5.13	21.6	3.01	1.75	8.74	6.00
90	362	8.15	13.5	3.26	1.99	7.22	5.60
91	114	2.57	5.3	3.61	2.29	7.06	5.00
92	234	5.27	25.8	3.83	2.38	8.01	5.00
93	219	4.93	16.1	2.03	1.42	6.58	5.00
94	460	10.35	28.7	2.11	1.34	6.68	5.00
95	593	13.35	46.0	2.30	1.69	5.93	5.00
96	816	18.37	95.0	2.65	1.68	6.53	5.00
97	696	15.67	126.6	2.16	1.61	6.65	5.00
Entire Sample	4,443	100.00	427.6	2.71	1.82	6.77	5.00

1.69 percent (1.08 percent) and 3.59 percent (1.89 percent), respectively. Finally, the sample firms significantly increase their repurchase activity during the year of the announcement and the 3 years after.

III. The Operating Performance of Repurchasing Firms

If repurchase programs convey good news about future profitability, then operating performance should improve in the years after repurchase announcements. Following Barber and Lyon (1996) and Lie (2001), we use operating income before depreciation (EBITDA, COMPUSTAT item 13) scaled

by the average of beginning- and ending-period book value of assets (i.e., $\frac{EBITDA_t}{(Book\ Value_t + Book\ Value_{t-1})/2}$) as our primary measure of operating performance. An advantage to using the operating income before depreciation (rather than income before extraordinary items) is that this measure is not affected by changes in capital structure. Income before extraordinary items is sensitive to changes in interest payments, but the operating income is not. Another advantage is that operating income before depreciation is not affected by factors such as special items and income taxes that usually affect other measures of earnings.

However, to test the robustness of our results, we also examine the return on cash-adjusted assets, the return on sales (ROS), and the cash-flow return on assets (CFROA). We use these measures because they overcome some of the potential problems associated with ROA (see Barber and Lyon (1996) for a detailed discussion of this issue). The return on cash-adjusted assets is equal to the operating income before depreciation scaled by the average of beginning- and ending-period book value of cash-adjusted assets. The cash-adjusted assets are equal to the book value of total assets minus cash and marketable securities (item 1). The ROS is equal to the operating income before depreciation scaled by the average of beginning- and ending-period sales (item 12). The CFROA is equal to the operating cash flow scaled by the average of beginning- and ending-period book value of total assets. Following Barber and Lyon, we define cash flows as the operating income before depreciation (item 13) plus the decrease in receivables (item 2), the decrease in inventory (item 3), the increase in accounts payable (item 70), the increase in other current liabilities (item 72), and the decrease in other current assets (item 68).

To examine the postevent performance of repurchasing firms relative to their pre-event performance, we examine the changes in operating performance. Barber and Lyon (1996) recommend the use of changes instead of levels to examine unexpected or abnormal performance because the test statistics based on changes are more powerful than those based on levels.[11]

We estimate abnormal or unexpected changes in operating performance in two ways. First, we use a benchmark that assumes that the unexpected change in average operating performance is equal to the change in the repurchasing firm's operating performance. Second, we define the unexpected change in performance as the change in performance for the sample firm minus the change in performance for a matching firm. Following Lie (2001), we choose matching firms that closely resemble the sample firms in industry classification, level of performance in year –1 (OP_{-1}), change in performance in year –1 (ΔOP_{-1}), and market-to-book ratio in year –1 (M/B_{-1}). Specifically, we identify matching firms with the following characteristics: (1) a level of operating performance between 80 percent and 120 percent of the sample firm's level of operating performance in year –1; (2) a change in operating performance between 80 percent and 120 percent of the sample firm's change in operating performance from

[11] We also examine changes in growth rates and the results are qualitatively the same.

year –2 to year –1; and (3) a market-to-book ratio between 80 percent and 120 percent of the sample firm's market-to-book ratio in year –1.[12]

From this initial sample of matching firms, we select the firm that minimizes the following function:[13]

$$\begin{aligned} &|OP_{-1,\,sample\ firm} - OP_{-1,\,matching\ firm\ i}| \\ &\quad + |\Delta OP_{-1,\,sample\ firm} - \Delta OP_{-1,\,matching\ firm\ i}| \\ &\quad + |M/B_{-1,\,sample\ firm} - M/B_{-1,\,matching\ firm\ i}|. \end{aligned} \tag{1}$$

If we do not find any firms that meet these criteria, we repeat the process first for matching firms with the same one-digit SIC code as the sample firms, and then for all firms independently of their SIC code. If we still do not find any matching firms, we choose the matching firm that minimizes equation (1) independently of the filters. Lie (2001) shows that this performance-adjusted benchmark yields more powerful test statistics than do other benchmarks. To reduce confounding effects, we only consider matching firms that do not announce a repurchase program during the year of the event and during the 3 years after the event.[14]

Table II reports the changes in operating performance of repurchasing firms. The columns reporting the unadjusted changes in performance show a significant decline in operating performance during the 3 years (0 to 1, 1 to 2, and 2 to 3) following the announcement of the share repurchase program. The evidence in Table II also indicates that repurchasing firms experience an increase in operating performance in the year preceding the event (-2 to -1), which suggests that firms decide to repurchase shares when they face a reduction in profitability.

Table II also reports the performance-adjusted changes in operating performance. We do not find any evidence that the sample firms outperform the matching firms in the 3 years following the announcement of the share repurchase program. In fact, there is some evidence that the ROS and the CFROA experience abnormal declines (relative to the matching firms) in some of the years following the event. Interestingly, we find that the ROA and the CFROA experience an abnormal increase in the year of the announcement. As in the case

[12] If we cannot find a firm meeting condition (a), then we search for firms with a level of operating performance within ± 0.01 of the level of operating performance of the sample firm. If we cannot find a firm meeting condition (b), then we search for firms with a change in operating performance within ± 0.01 of the change in operating performance of the sample firm. If we cannot find a firm meeting condition (c), then we search for firms with a market-to-book ratio within ± 0.1 of the market-to-book ratio of the sample firm.

[13] As a robustness check, we employ two alternative minimizing functions: (1) a function that only includes the level of performance in year -1 and the change in performance in year -1, and (2) a function similar to equation (1) where the differences in level of performance, change in performance, and market-to-book ratio are scaled by their standard deviations. Our main results are insensitive to these changes.

[14] We also use alternative methods to find matching firms (e.g., matching on preannouncement earnings growth rates) and find similar results.

Table II
Changes in Operating Performance

This table reports several measures of operating performance for a sample of firms that announce open-market share repurchase programs over the period 1980 to 1997. Year 0 is the year in which firms announce the open-market share repurchase program. The return on assets (ROA) is equal to the operating income before depreciation (COMPUSTAT item 13) scaled by the average of beginning- and ending-period book value of total assets (item 6). The return on cash-adjusted assets (*ROCAA*) is equal to the operating income before depreciation scaled by the average of beginning- and ending-period book value of cash-adjusted assets. The cash-adjusted assets are equal to the book value of total assets minus cash and marketable securities (item 1). The return on sales (*ROS*) is equal to the operating income before depreciation scaled by the average of beginning- and ending-period sales (item 12). The cash-flow return on assets (*CFROA*) is equal to the operating cash flow scaled by the average of beginning- and ending-period book value of total assets. The operating cash flow is equal to the operating income before depreciation (item 13) plus the decrease in receivables (item 2), the decrease in inventory (item 3), the increase in accounts payable (item 70), the increase in other current liabilities (item 72), and the decrease in other current assets (item 68). The performance-adjusted change is equal to the unadjusted change minus the change in performance of a matching firm that closely resembles the sample firm in industry classification, level of performance in year −1, change in performance in year −1, and market-to-book ratio in year −1. We calculate the mean and median changes by using observations that have been Winsorized at the first and the 99th percentiles. The significance levels of the means (medians) are based on a two-tailed *t*-test (two-tailed Wilcoxon rank test). a, b, and c denote levels that are significantly different from zero at the 1 percent, 5 percent, and 10 percent, respectively. The number of observations in the performance-adjusted sample is smaller than in the unadjusted sample because some of the matching firms have missing data. All numbers are percentages.

	Unadjusted Changes					Performance-adjusted Changes				
	−2 to −1	−1 to 0	0 to 1	1 to 2	2 to 3	−2 to −1	−1 to 0	0 to 1	1 to 2	2 to 3
Return on assets										
Mean	0.127	−1.399^{a}	−0.985^{a}	−0.527^{a}	−0.641^{a}	−0.026	0.309^{c}	0.091	−0.382	−0.207
Median	0.089^{b}	−0.121^{a}	−0.065^{a}	−0.020^{b}	−0.043^{a}	0.000	−0.001	0.062	0.084	−0.042
N	3,257	3,544	3,506	3,279	2,998	3,228	3,155	2,799	2,446	2,096
Return on cash-adjusted assets										
Mean	0.263	−2.058^{a}	−1.545^{a}	−0.527^{b}	−0.696^{a}	−0.062	−0.031	−0.493	0.325	0.354
Median	0.111^{b}	−0.160^{a}	−0.109^{a}	−0.049^{a}	−0.095^{a}	0.000	0.075	0.025	−0.014	−0.026
N	3,241	3,530	3,501	3,276	2,996	3,212	3,140	2,791	2,416	2,078
Return on sales										
Mean	0.712^{a}	−1.285^{a}	−1.152^{a}	0.008	−0.101	0.036	0.466	−0.219	0.663	0.029
Median	0.178^{b}	−0.386^{a}	−0.111^{a}	0.058	−0.006^{b}	0.000	−0.114	0.078	0.011	−0.192^{b}
N	3,213	3,502	3,477	3,259	2,982	3,185	3,109	2,753	2,379	2,020
Cash-flow return on assets										
Mean	0.893^{a}	−0.198	−0.756^{a}	−0.252	−0.078	−0.051	1.076^{a}	−0.534	−0.746^{c}	0.418
Median	0.365^{a}	−0.138	−0.447^{a}	−0.270	−0.183	0.000	0.447^{a}	−0.212^{c}	−0.108	0.000
N	2,684	2,838	2,773	2,611	2,418	2,657	2,594	2,328	2,037	1,755

of dividend changes (see Benartzi, Michaely, and Thaler (1997)), this evidence suggests that if share repurchases contain any information about profitability, it is about the past (or present) and not about the future.

According to the cash-flow-signaling hypothesis, the dissipative cost of share repurchase programs should be directly related to the magnitude of the cash

distribution. If this is true, then we should expect larger repurchase programs to be associated with better future performance. To investigate this issue, we estimate regressions relating the future changes in operating performance on the magnitude of the share repurchase program and other control variables. Since prior empirical evidence indicates that the mean reversion process of profitability and earnings is highly nonlinear (Brooks and Buckmaster (1976), Elgers and Lo (1994), and Fama and French (2000)), we use a modified partial adjustment model suggested by Fama and French as a control for the nonlinearities in the relation between future changes in operating performance and lagged levels and changes in operating performance. The model is the following:

$$\begin{aligned} OP_{\tau} - OP_{\tau-1} = {} & \beta_0 + \beta_1 PSOUGHT_0 + (\gamma_1 + \gamma_2 NDFED_{-1} + \gamma_3 NDFED_{-1} \\ & \times DFE_{-1} + \gamma_4 PDFED_{-1} \times DFE_{-1}) \times DFE_{-1} \\ & + (\lambda_1 + \lambda_2 NCED_{-1} + \lambda_3 NCED_{-1} \times CE_{-1} \\ & + \lambda_4 PCED_{-1} \times CE_{-1}) \times CE_{-1} + \varepsilon_{\tau} \end{aligned} \tag{2}$$

where OP_{τ} is the level of operating performance in year τ, DFE_{-1} is equal to the level of operating performance in year -1 (year 0 is the year of the event) minus the expected level of operating performance in year -1, where the expected level is the fitted value from the cross-sectional regression of the level of operating performance in year -1 on the log of total assets in year -1, the log of the market value of equity in year -1, the market-to-book ratio of equity in year -1, and the level of operating performance in year -2. CE_{-1} is equal to the change in operating performance in year -1. $NDFED_{-1}$ is a dummy variable that takes the value of one if DFE_{-1} is negative, and zero otherwise. $PDFED_{-1}$ is a dummy variable that takes the value of one if DFE_{-1} is positive, and zero otherwise. $NCED_{-1}$ is a dummy variable that takes the value of one if CE_{-1} is negative, and zero otherwise. $PCED_{-1}$ is a dummy variable that takes the value of one if CE_{-1} is positive, and zero otherwise. To mitigate the problems associated with residual cross-correlation, we use the Fama and MacBeth (1973) procedure to estimate the regression coefficients. In the first stage, we estimate cross-sectional regression coefficients each year using all the observations in that year. In the second-stage, we compute time-series means of the cross-sectional regression coefficients. The sample in this analysis consists of the repurchasing firms plus all the firms in COMPUSTAT that have the same two-digit SIC code as the sample firms but did not announce a repurchase program during the year of the event and the 3 years after the event.

Table III reports the results from this analysis. The evidence does not support the prediction that firms that announce larger repurchase programs (the amount of shares to be repurchased relative to the total number of outstanding shares) have a larger improvement in operating performance. The regression coefficient of *PSOUGHT* is insignificantly different from zero in all regressions. Table III also shows that the coefficient on the level of operating performance in year -1, DFE_{-1}, is negative and significant in most specifications. Consistent with the evidence in Fama and French (2000), this result indicates that

Table III

The Magnitude of Share Repurchase Programs and Changes in Operating Performance

This table reports estimates of regressions relating changes in operating performance to the magnitude of the share repurchase program and other control variables. The return on assets (ROA) is equal to the operating income before depreciation (COMPUSTAT item 13) scaled by the average of beginning- and ending-period book value of total assets (item 6). The return on cash-adjusted assets (*ROCAA*) is equal to the operating income before depreciation scaled by the average of beginning- and ending-period book value of cash-adjusted assets. The cash-adjusted assets are equal to the book value of total assets minus cash and marketable securities (item 1). The return on sales (*ROS*) is equal to the operating income before depreciation scaled by the average of beginning- and ending-period sales (item 12). The cash-flow return on assets (*CFROA*) is equal to the operating cash flow scaled by the average of beginning- and ending-period book value of total assets. The operating cash flow is equal to the operating income before depreciation (item 13) plus the decrease in receivables (item 2), the decrease in inventory (item 3), the increase in accounts payable (item 70), the increase in other current liabilities (item 72), and the decrease in other current assets (item 68). *PSOUGHT* is the number of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement (magnitude of share repurchase program). DFE_{-1} is equal to the level of operating performance in year -1 (Year 0 is the year of the event) minus the expected level of operating performance in year -1, where the expected level is the fitted value from the cross-sectional regression of the level of operating performance in year -1 on the log of total assets in year -1, the log of the market value of equity in year -1, the market-to-book ratio of equity in year -1, and the level of operating performance in year -2. CE_{-1} is equal to the change in operating performance in year -1. $NDFED_{-1}$ is a dummy variable that takes the value of one if DFE_{-1} is negative, and zero otherwise. $PDFED_{-1}$ is a dummy variable that takes the value of one if DFE_{-1} is positive, and zero otherwise. $NCED_{-1}$ is a dummy variable that takes the value of one if CE_{-1} is negative, and zero otherwise. $PCED_{-1}$ is a dummy variable that takes the value of one if CE_{-1} is positive, and zero otherwise. We use the Fama-MacBeth procedure to estimate the regression coefficients. In the first stage, we estimate cross-sectional regression coefficients each year using all the observations in that year. In the second-stage, we compute time-series means of the cross-sectional regression coefficients. The standard deviations for these averages are estimated using the Hansen-Hodrick (1980) standard error correction method. a, b, and c denote significantly different from zero at the 1 percent, 5 percent, and 10 percent level, respectively.

Year		β_0	β_1	γ_1	γ_2	γ_3	γ_4	λ_1	λ_2	λ_3	λ_4
Panel A											
$ROA_\tau - ROA_{\tau-1} = \beta_0 + \beta_1 PSOUGHT_0 + (\gamma_1 + \gamma_2 NDFED_{-1} + \gamma_3 NDFED_{-1} \times DFE_{-1} + \gamma_4 PDFED_{-1} \times DFE_{-1}) \times DFE_{-1}$ $+ (\lambda_1 + \lambda_2 NCED_{-1} + \lambda_3 NCED_{-1} \times CE_{-1} + \lambda_4 PCED_{-1} \times CE_{-1}) \times CE_{-1} + \varepsilon_\tau$										
$\tau = 1$	Mean	−0.00153	−0.01594	−0.41428[a]	0.155606[a]	−0.003	0.234156[c]	0.143487[a]	0.051364	0.167141[c]	0.002073
	Wald-statistic	0.98	0.39	152.86	9.71	0.00	2.75	18.79	1.00	3.76	0.00
$\tau = 2$	Mean	−0.0004	0.019073	−0.2967[a]	0.17725[b]	0.060276	0.242856[c]	0.075295[c]	0.02874	−0.01594	0.069864
	Wald-statistic	0.03	0.74	44.38	5.29	0.35	2.91	3.76	0.23	0.02	0.34
$\tau = 3$	Mean	−0.00138	−0.02668	−0.20503[a]	0.160387[c]	−0.06418	0.22983[b]	0.094613[a]	−0.0436	0.079112	−0.05757
	Wald-statistic	0.87	1.13	31.34	3.62	0.38	4.87	6.69	0.36	0.22	0.31

Panel B

$$ROCAA_{\tau} - ROCAA_{\tau-1} = \beta_0 + \beta_1 PSOUGHT_0 + (\gamma_1 + \gamma_2 NDFED_{-1} + \gamma_3 NDFED_{-1} \times DFE_{-1} + \gamma_4 PDFED_{-1} \times DFE_{-1}) \times DFE_{-1}$$
$$+ (\lambda_1 + \lambda_2 NCED_{-1} + \lambda_3 NCED_{-1} \times CE_{-1} + \lambda_4 PCED_{-1} \times CE_{-1}) \times CE_{-1} + \varepsilon_{\tau}$$

$\tau = 1$	Mean	−0.00185	−0.04403	−0.36988[a]	0.025813	−0.1412[a]	0.044837	0.145678[b]	0.150498[b]	0.421644[a]	0.066742
	Wald-statistic	1.07	1.42	42.05	0.21	11.66	0.26	6.20	4.19	31.37	0.98
$\tau = 2$	Mean	−0.00069	0.041115	−0.24567[a]	0.131497[b]	0.09602	0.127169	0.049971	0.119146[c]	0.162336	0.074638
	Wald-statistic	0.08	2.63	21.87	4.06	1.91	1.59	1.06	3.56	1.93	0.71
$\tau = 3$	Mean	−0.00263	−0.02527	−0.15678[b]	0.128674	0.002783	0.021089	0.021784	0.010458	0.077761	0.127583
	Wald-statistic	1.66	0.93	5.39	1.32	0.00	0.06	0.10	0.01	0.43	2.05

Panel C

$$ROS_{\tau} - ROS_{\tau-1} = \beta_0 + \beta_1 PSOUGHT_0 + (\gamma_1 + \gamma_2 NDFED_{-1} + \gamma_3 NDFED_{-1} \times DFE_{-1} + \gamma_4 PDFED_{-1} \times DFE_{-1}) \times DFE_{-1}$$
$$+ (\lambda_1 + \lambda_2 NCED_{-1} + \lambda_3 NCED_{-1} \times CE_{-1} + \lambda_4 PCED_{-1} \times CE_{-1}) \times CE_{-1} + \varepsilon_{\tau}$$

$\tau = 1$	Mean	0.000867	−0.01454	−0.34096[a]	−0.14179[c]	−0.06262[a]	0.08575[b]	0.097943	0.42616[a]	0.344028[a]	0.022558
	Wald-statistic	0.16	0.24	51.74	2.74	7.21	5.51	2.55	19.46	15.95	0.29
$\tau = 2$	Mean	−0.00017	0.068914	−0.17306[a]	0.04612	0.013992	0.016384	0.099605	0.220113	0.311001[a]	−0.00986
	Wald-statistic	0.00	2.64	8.13	0.07	0.20	0.43	2.51	2.14	9.36	0.06
$\tau = 3$	Mean	−0.00031	−0.00853	−0.10397	0.07932	−0.01268	0.091	−0.00665	0.178941	0.288584[a]	−0.01392
	Wald-statistic	0.01	0.05	1.22	0.14	0.25	1.10	0.01	1.00	16.39	0.02

Panel D

$$CFROA_{\tau} - CFROA_{\tau-1} = \beta_0 + \beta_1 PSOUGHT_0 + (\gamma_1 + \gamma_2 NDFED_{-1} + \gamma_3 NDFED_{-1} \times DFE_{-1} + \gamma_4 PDFED_{-1} \times DFE_{-1}) \times DFE_{-1}$$
$$+ (\lambda_1 + \lambda_2 NCED_{-1} + \lambda_3 NCED_{-1} \times CE_{-1} + \lambda_4 PCED_{-1} \times CE_{-1}) \times CE_{-1} + \varepsilon_{\tau}$$

$\tau = 1$	Mean	0.000963	−0.03247	−0.15984[a]	0.075071[c]	−0.03582	0.105453	0.05163[b]	0.024273	0.067698	0.021301
	Wald-statistic	0.31	0.36	27.68	3.22	0.51	0.99	4.78	0.31	0.69	0.26
$\tau = 2$	Mean	−0.00157	−0.03548	−0.10174[a]	0.013794	−0.04239	0.021893	0.078085[b]	−0.03676	−0.00685	−0.05406
	Wald-statistic	1.06	0.61	6.78	0.04	0.67	0.03	5.39	0.43	0.01	0.48
$\tau = 3$	Mean	0.000282	−0.0109	−0.06998[b]	0.007587	−0.04947	0.053206	0.00465	0.091224[c]	0.182329[a]	0.05525
	Wald-statistic	0.02	0.25	4.87	0.02	0.28	0.27	0.02	3.47	7.07	0.92

profitability tends to mean revert. Further, the evidence in Table III indicates that the behavior of profitability is highly nonlinear. In some of the specifications, the nonlinear independent variables are more important than the linear independent variables. We also repeat this analysis substituting the market reaction surrounding the share repurchase announcement for *PSOUGHT*, and the results are qualitatively the same. These findings suggest that share repurchase announcements do not contain positive information content about either abnormal future earnings or operating performance beyond that provided by other factors.

In addition to the adjusted and unadjusted changes in operating cash flows, we also use changes in analysts' forecasts of future EPS around the event. There are at least two advantages in expanding our analysis by using this measure. First, revisions in forecasts can be used as another measure of unexpected changes in earnings. Second, if payout policy, and in particular repurchase policy, is being used as a signal, then the revision in analysts' forecasts can be used as another indication on whether the signal was received by the market. That is, we can see if the signal changed expectations in the right direction.

We examine the changes in annual EPS forecasts from month $t - 1$ to t. Following Brous and Kini (1993), we define the unexpected revision in the EPS forecast (ΔEF_t) in month t as

$$\Delta EF_t = [MEF_t - E(\Delta EF_t)]/PRICE. \tag{3}$$

In this equation, MEF_t is the median change in analysts' earnings forecast from month $t - 1$ to t. $E[\Delta EF_t]$ is the average change in analysts' earnings forecasts during all the months for which earnings forecasts are available on IBES, excluding the period -6 to $+6$. Month 0 is the month in which the firm announces the open-market share repurchase program. *PRICE* is the stock price at the beginning of the year in which the open-market share repurchase program is announced. We use *PRICE* as a deflator of the forecast error.

Table IV reports the unexpected changes in analysts' earnings forecasts around share repurchase announcements. The evidence indicates that analysts revise their earnings forecasts downward during the month of the share repurchase announcement, a finding that is contrary to the predictions of the cash-flow-signaling hypothesis. The mean change in analysts' earnings forecasts during the month of the announcement is equal to -0.10 percent. This change is statistically different from zero at the 1 percent significance level.[15] Table IV also shows that firms that announce large repurchase programs (i.e.,

[15] To ensure that our results are not driven by changes in capital structure, we replicate the analysis in Table IV excluding those firms that increase their leverage (debt-to-assets ratio) during the year of the announcement (year 0). Consistent with the results in Table IV, we find that analysts revise their earnings forecasts downward during the month of the share repurchase announcement. We also replicate this analysis excluding those firms that increase their leverage during year 1, and the results are qualitatively the same. These results suggest that the reduction in analysts' earnings forecasts documented in Table IV is not caused by an increase in the use of leverage. (It should be mentioned that this robustness test rests on the assumption that analysts can forecast with reasonable accuracy which firms will increase leverage.)

Table IV
Revisions in Analysts' Earnings Forecasts around Share Repurchase Announcements

This table reports unexpected revisions in analysts' EPS forecasts for a sample of firms that announce open-market share repurchase programs over the period 1980 to 1997. We examine the changes in annual EPS forecasts from month $t-1$ to t. We define the unexpected revision in the EPS forecast (ΔEF) in month t as

$$\Delta EF_t = (MEF_t - E[\Delta EF_t])/PRICE,$$

where MEF_t is the median change in analysts' EPS forecast from month $t-1$ to t, *PRICE* is the stock price at the beginning of the year in which the open-market share repurchase program was announced, and $E[\Delta EF_t]$ is the average change in analysts' EPS forecasts during all the months for which EPS forecasts are available on IBES, excluding the period -6 to 6. Month 0 is the month in which the open-market share repurchase program was announced. We use *PRICE* as a deflator of the forecast error. We calculate the mean changes by using Winsorized observations at the first and the 99th percentiles. The significance levels of the means are based on a two-tailed t-test. a, b, and c denote level significantly different from zero at the 1 percent, 5 percent, and 10 percent, respectively. All numbers are percentages.

			Magnitude of Share Repurchase Program Groups	
Month		Entire Sample	Below Median	Above Median
−6	Mean	0.12[a]	0.09[a]	0.15[a]
	N	1,303	687	616
−5	Mean	0.05[c]	0.07[b]	0.02
	N	1,311	676	635
−4	Mean	−0.01	0.05	−0.08[b]
	N	1,277	665	612
−3	Mean	−0.01	0.05	−0.07[c]
	N	1,329	670	659
−2	Mean	−0.03	0.01	−0.06[c]
	N	1,324	684	640
−1	Mean	−0.04	0.02	−0.10[a]
	N	1,288	677	611
0	Mean	−0.10[a]	−0.07[b]	−0.14[a]
	N	1,523	769	754
1	Mean	−0.09[a]	−0.02	−0.16[a]
	N	1,533	795	738
2	Mean	−0.04[c]	−0.06[b]	−0.02
	N	1,293	686	607
3	Mean	−0.07[a]	−0.05	−0.08[b]
	N	1,326	692	634
4	Mean	−0.05[b]	0.00	−0.11[a]
	N	1,302	685	617
5	Mean	−0.09[a]	−0.04	−0.13[a]
	N	1,280	648	632
6	Mean	−0.05[b]	−0.09[a]	−0.01
	N	1,327	693	634

above the median) experience a larger downward revision in earnings forecasts than do the firms that announce small programs (i.e., below the median).

Overall, the results in Tables II, III, and IV do not support the idea that share repurchases are followed by improvements in profitability or operating

performance. Nor does the evidence suggest that the market revises its expectation of earnings upward following repurchase announcements.

IV. Repurchases, Changes in Investment Opportunity Set, and Cost of Capital

A. *Changes in Capital Expenditures, Research and Development Expenses, and Cash Reserves*

The analysis in the previous section indicates that earnings and profitability do not increase in the years after open-market repurchase announcements. In fact, some of our measures even show a decrease in earnings and profitability. This evidence does not support the predictions of the information/signaling hypothesis. However, despite the fact that profitability decreases in the 3 years after the repurchase announcement, it is possible that a repurchasing firm is attempting to convey information about the good investments it is undertaking (and the cash flows from those investments that will occur in the distant future). In this scenario, the firm increases its capital expenditure and R&D expenses, and at the same time signals its good prospects through a repurchase program. If that is the case, we should find an increase in capital expenditure and R&D in the years after the repurchase is announced.

Another explanation for the positive market reaction around share repurchase announcements is that repurchase programs mitigate the agency costs associated with the possible overinvestment of free cash flows (free cash-flow hypothesis) (Easterbrook (1984) and Jensen (1986)). Thus, share repurchase announcements also convey information to the market. However, the information that the announcement reveals is not about the firm's prospects (which are already known to the market), but about managers' commitment to reduce the potential agency costs of free cash flow.[16] The free cash-flow hypothesis suggests that corporations should pay out cash to their shareholders when agency conflicts are more likely to induce managers to overinvest. Firms should increase their payout when they experience a contraction in their investment opportunity set and an increase in their free cash flows. Therefore, one prediction of the free cash-flow hypothesis is that capital expenditures and cash reserves will decline following repurchases. As the investment opportunities shrink, more cash will be paid out to shareholders. Thus, the good news is the lower likelihood of overinvestment.

We therefore examine changes in capital expenditures and R&D (capital expenditures (COMPUSTAT item 128) plus R&D expenses (item 46)) and cash reserves (cash and short-term investments (item 1)) relative to the average of beginning- and ending-period book value of total assets. We use two benchmarks to measure abnormal changes in capital expenditures and R&D (*INVESTMENTS*) and cash reserves (*CASH*). First, we use a benchmark that

[16] Recent studies by Nohel and Tarhan (1998) and Lie (2000) find empirical evidence supporting the predictions of this hypothesis during the announcement of fixed-price tender offers.

Table V

Changes in Capital Expenditures, R&D, and Cash Reserves

This table reports the changes in capital expenditures and R&D (capital expenditures (COMPUSTAT item 128) plus R&D expenses (item 46) scaled by the average of beginning- and ending-period book value of total assets (item 6)), and the changes in cash reserves (cash and short-term investments (item 1) scaled by the average of beginning- and ending-period book value of total assets) for a sample of firms that announce open-market share repurchase programs over the period 1980 to 1997. Year 0 is the year in which the open-market repurchase program is announced. The adjusted change in capital expenditures and R&D (cash) is equal to the unadjusted change minus the change for a matching firm that has the same two-digit SIC code as the sample firm and the closest change in capital expenditures and R&D (cash) to that of the repurchasing firm from year −2 to year −1. We calculate the mean and median changes by using Winsorized observations at the first and the 99th percentiles. The significance levels of the means (medians) are based on a two-tailed *t*-test (two-tailed Wilcoxon rank test). a, b, and c denote levels significantly different from zero at the 1 percent, 5 percent, and 10 percent, respectively. All numbers are percentages.

	Unadjusted Changes			Adjusted Changes		
	−2 to −1	−1 to 0	0 to 3	−2 to −1	−1 to 0	0 to 3
Panel A. Changes in Capital Expenditures and R&D						
Mean	−0.11	−0.46[a]	−0.56[a]	0.02	−0.44[c]	0.16
Median	0.00	0.04	−0.23[a]	0.00	0.00	0.00
N	1,499	1,565	1,298	1,491	1,421	925
Panel B. Changes in Cash Reserves						
Mean	−0.61[a]	−2.34[a]	−1.97[a]	0.01	−0.87[a]	−0.36
Median	−0.10[a]	−0.39[a]	−0.48[a]	0.00	−0.18[a]	−0.26[c]
N	3,344	3,627	3,032	3,315	3,256	2,153

assumes that the unexpected change is equal to the change in *INVESTMENTS* and *CASH*. Second, we define the unexpected change as the change in *INVESTMENTS* (*CASH*) for the sample firm minus the change in *INVESTMENTS* (*CASH*) for a matching firm that has the same two-digit SIC code as the sample firm and the closest change in *INVESTMENTS* (*CASH*) to that of the repurchasing firm from year −2 to year −1.

Panel A of Table V reports the changes in *INVESTMENTS* relative to total assets. Our evidence indicates that repurchasing firms reduce their capital expenditures and R&D during the year of the event (−1 to 0) and the 3 years after the event (0 to 3), a finding that supports the free cash-flow hypothesis. This reduction in capital expenditure suggests that these firms have been experiencing a contraction in their investment opportunity set. When we compare the sample firms to the matched sample, we find some evidence that the reduction in investment opportunities for the repurchasing firms during the year of the event is significantly different than the one for similar firms in their industry. Overall, the evidence suggests that repurchasing firms do not invest more than their peers.

If repurchases are being used to reduce free cash flows in times when cash is least needed (when investment opportunities are scarce), then we should

also observe a reduction in financial slack. Therefore, we examine the changes in cash reserves of these firms. The results, reported in Panel B of Table V, show that repurchasing firms significantly reduce their cash reserves over the 3 years following these announcements, supporting the idea that repurchasing firms face a shrinking investment opportunity set. Even after controlling for pre-event changes in *CASH* and industry effects, the changes in *CASH* are negative and statistically significant during the year of, and during the 3 years after, the event. This evidence supports the predictions of the free cash-flow hypothesis that suggest that firms repurchase shares or increase dividends to reduce excess cash.

B. Risk Changes

The evidence appears to indicate that corporations repurchase shares when positive NPV projects are scarcer than they were in the past for these firms. This finding might explain why firms' profitability declines after this significant increase in payout. If a firm experiences a contraction in its investment opportunity set, then it may also experience a decline in risk and in its cost of capital. (The growth options of the firm are likely to be riskier than the assets in place. Hence, when the value of growth opportunities represents a lower portion of the firm's value, the overall risk of the firm declines). This potential change in the cost of capital is important because it is another piece of relevant information that affects valuation.

We measure changes in the systematic risk of equity based on the market model and the Fama and French (1993) three-factor model. We let "t^*" be the month of the repurchase announcement. Then for each firm announcing a repurchase, we estimate the following monthly regressions for months $t^* - 36$ to $t^* + 36$ (73 monthly observations) around the repurchase announcement:

$$r_{it} - r_{ft} = \alpha_{-i} + \alpha_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) + e_t, \tag{4}$$

and

$$\begin{aligned} r_{it} - r_{ft} = {} & \alpha_{-i} + \alpha_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) \\ & + s_{-i} SMB_t + s_{\Delta i} D_t SMB_t + h_{-i} HML_t + h_{\Delta i} D_t HML_t + e_t, \end{aligned} \tag{5}$$

where r_{it} is the monthly return on stock i, r_{ft} is the monthly return on 1-month U.S. Treasury bills, and r_{mt} is the monthly return on the NYSE/AMEX/Nasdaq value-weighted index. SMB_t is the difference between the monthly return on a portfolio of small firms and the monthly return on a portfolio of large firms. HML_t is the difference between the monthly return on a portfolio of high book-to-market stocks and the monthly return on a portfolio of low book-to-market stocks. D_t is a dummy variable that is equal to one if $t \geq t^*$, where t^* is the month in which the share repurchase program is announced. We use a window of 73 months (-36 to $+36$) to estimate the parameters of the regression model.

By calculating an adjusted measure of risk, we also control for any systematic trend or evolution in the risk factors that might generally happen to firms with similar characteristics. This adjusted measure is equal to the estimated factor loading for the sample firm minus the estimated factor loading for a matching firm. We select a matching firm by screening the COMPUSTAT database for all nonrepurchasing firms with a market value of equity between 80 percent and 120 percent of the market value of the sample firm at the end of year −1; and a book-to-market ratio between 80 percent and 120 percent of the book-to-market ratio of the sample firm at the end of year −1. Then, the firm with the closest stock return during the 3 years prior to the share repurchase announcement (to control for any momentum effects) is selected as the control firm.

Panel A of Table VI reports the estimated coefficients of equations (4) and (5). The results suggest that after the announcement of a repurchase program, repurchasing firms experience a significant decline in their factor loadings. For the market model, the unadjusted average (median) change in market beta is equal to −0.16 (−0.10).[17] For the three-factor model, the unadjusted average (median) estimated changes in market beta, SMB beta, and book-to-market beta are equal to −0.14 (−0.09), −0.15 (−0.13), and −0.03 (0.05), respectively. These findings suggest that repurchasing firms decide to repurchase their shares just around the time they experience a decline in systematic risk.

Panel B of Table VI presents the adjusted measures of risk. The panel shows that the adjusted changes in the market beta and SMB beta are negative and significantly different from zero. The change in the SMB beta suggests that after a repurchase announcement, firms behave more like large firms and less like small firms, consistent with the idea that firms increase their payouts when they move from a growth phase to a more mature phase. As indicated in both Panels, the reduction in risk is stronger for firms that repurchase more shares.

To assess the effect of the changes in factor loadings on the cost of capital, Table VII reports the cost capital before and after the share repurchase announcement. The cost of capital is estimated using the market model or the three-factor model and historical average monthly returns on the market, SMB, and HML portfolios over the sample period. The average (median) cost of capital declines from 15.75 percent (15.28 percent) before the announcement to 14.43 percent (14.03 percent) after the announcement when we use the market model (Panel A). For the three-factor model, Panel B shows that the average (median) cost of capital declines from 18.01 percent (16.94 percent) before the announcement to 16.53 percent (16.04 percent) after the announcement. These changes in the cost of capital are significantly different from zero at the 1 percent confidence level. The adjusted measures of cost of capital are reported in Panels C and D. These panels show that before the announcement of the share repurchase program the cost of capital of the sample firms was significantly higher than the cost of capital of the matching firms. However, notice that after the announcement, there is no significant difference between the cost of capital

[17] Using a different methodological approach, Lie (2003) also finds that repurchasing firms experience a decline in beta relative to nonrepurchasing firms.

Table VI
Changes in Risk Characteristics

This table reports the cross-sectional mean and median values of the estimated coefficients of the market model

$$r_{it} - r_{ft} = \alpha_{-i} + \alpha_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) + e_t,$$

and the three-factor model

$$r_{it} - r_{ft} = \alpha_{-i} + \alpha_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) + s_{-i} SMB_t + s_{\Delta i} D_t SMB_t + h_{-i} HML_t + h_{\Delta i} D_t HML_t + e_t,$$

where r_{it} is the monthly return on stock i, r_{ft} is the monthly return on one-month U.S. Treasury bills, r_{mt} is the monthly return on the NYSE/AMEX/Nasdaq value-weighted index, SMB_t is the difference between the monthly return on a portfolio of small firms and the monthly return on a portfolio of large firms, HML_t is the difference between the monthly return on a portfolio of high book-to-market stocks and the monthly return on a portfolio of low book-to-market stocks, and D_t is a dummy variable that is equal to one if $t \geq t^*$, where t^* is the month in which the share repurchase program was announced. We use a window of 73 months (-36 to $+36$) to estimate the parameters of the regression model. b_{-i}, s_{-i}, and h_{-i} are the factor loadings (betas) of firm i during the 3 years prior to the share repurchase announcement. $b_{\Delta i}$, $s_{\Delta i}$, and $h_{\Delta i}$ are the changes in the factor loadings after the share repurchase announcement. α_{-i} is the abnormal return of firm i before the share repurchase announcement, and $\alpha_{\Delta i}$ is the change in abnormal return after the announcement of the share repurchase program. The adjusted regression coefficient is equal to the unadjusted coefficient minus the regression coefficient of a matching firm with market value of equity and market-to-book ratio between 80 percent and 120 percent of the market value and the market-to-book ratio of the repurchasing firm at the end of year -1, respectively, and the closest stock price performance to that of the repurchasing firm during the 3 years prior to the announcement of the share repurchase program. To reduce the effect of estimation errors and eliminate the possibility of negative values for the cost of capital, we exclude from the sample all observations in which the absolute value of the change in cost of capital is greater than the cost of capital before the share repurchase announcement. We also exclude from the sample all observations in which the cost of capital before the share repurchase announcement is negative. The significance levels of the means (medians) are based on a two-tailed t-test (two-tailed Wilcoxon rank test). a, b, and c denote levels significantly different from zero at the 1 percent, 5 percent, and 10 percent, respectively.

Panel A. Unadjusted Changes in Risk Characteristics

			Magnitude of Share Repurchase Program Groups	
		Entire Sample	Below Median	Above Median
Market model				
$b_{\Delta i}$(Δ in Market Beta)	Mean	−0.16[a]	−0.14[a]	−0.19[a]
	Median	−0.10[a]	−0.08[a]	−0.14[a]
	N	2,759	1,404	1,355
Three-factor model				
$b_{\Delta i}$(Δ in Market Beta)	Mean	−0.14[a]	−0.11[a]	−0.16[a]
	Median	−0.09[a]	−0.06[a]	−0.11[a]
$s_{\Delta i}$(Δ in Small Firm Beta)	Mean	−0.15[a]	−0.15[a]	−0.16[a]
	Median	−0.13[a]	−0.15[a]	−0.10[a]
$h_{\Delta i}$(Δ in B/M Beta)	Mean	−0.03	−0.04	−0.02
	Median	0.05	0.07	0.04
	N	2,439	1,243	1,196

Table VI—*Continued*

Panel B. Adjusted Changes in Risk Characteristics				
			Magnitude of Share Repurchase Program Groups	
		Entire Sample	Below Median	Above Median
Market model				
$b_{\Delta i}$(Δ in Market Beta)	Mean	−0.11[a]	−0.07[a]	−0.16[a]
	Median	−0.10[a]	−0.03[b]	−0.16[a]
	N	1,973	1,021	952
Three-factor model				
$b_{\Delta i}$(Δ in Market Beta)	Mean	−0.05[b]	0.00	−0.10[a]
	Median	−0.04[b]	0.01	−0.10[a]
$s_{\Delta i}$(Δ in Small Firm Beta)	Mean	−0.09[a]	−0.07[c]	−0.10[c]
	Median	−0.10[b]	−0.08[c]	−0.12[c]
$h_{\Delta i}$(Δ in B/M Beta)	Mean	0.02	−0.01	0.07
	Median	0.04	0.01	0.05
	N	1,767	922	845

of the sample firms and the matching firms. This evidence indicates that the cost of capital of repurchasing firms moves toward the cost of capital of similar firms.

Our results indicate that repurchasing firms experience a significant decline in systematic risk and cost of capital relative to their peer firms, and that these changes are both economically and statistically significant. These results, combined with the findings of a decline in capital expenditures and in profitability, support the idea that corporations decide to repurchase shares when they face a decline in investment opportunities.

C. Profitability, Risk Changes, and Stock Price Reactions

In this subsection, we examine the relation between the short- and long-term stock price reaction surrounding the repurchase announcement and the changes in risk and profitability. Given the nature of our investigation, the two main variables of interest are the changes in risk and profitability. We use $\Delta ROA(0)$ and $\Delta ROA(3)$ as proxies for the change in operating performance. $\Delta ROA(0)$ is the change in ROA from year −1 to year 0. $\Delta ROA(3)$ is the change in ROA from year 0 to year 3. We obtain the change in the cost of capital after the announcement of the share repurchase program ($\Delta RISK$) by evaluating the three-factor model (equation 5) at the historical average monthly returns on the market, SMB, and HML portfolios over the sample period. We also use the market-to-book ratio (M/B), the assets of the firm (*ASSETS*), the magnitude of the share repurchase program (*PSOUGHT*), and year dummy variables as control variables.[18]

[18] In an auxiliary analysis (not reported), we also include the prior stock price run-up (average stock return over the 3 years prior to the share repurchase announcement) as an independent variable. We find that the inclusion of this variable does not affect any of our results.

Table VII
Change in Cost of Capital

This table reports the change in cost of capital for a sample of firms that announce open-market share repurchase programs over the period 1980 to 1997. The cost of capital is obtained by evaluating the market model (equation 4) and the three-factor model (equation 5) at the average market, SMB, and HML risk premia over the period 1977 to 2000. The adjusted cost of capital is equal to the unadjusted cost of capital minus the cost of capital of a matching firm with market value of equity and market-to-book ratio between 80 percent and 120 percent of the market value and the market-to-book ratio of the repurchasing firm at the end of year −1, respectively, and the closest stock price performance to that of the repurchasing firm during the 3 years prior to the announcement of the share repurchase program. The significance levels of the means (medians) are based on a two-tailed *t*-test (two-tailed Wilcoxon rank test). a, b, and c denote significantly different from zero at the 1 percent, 5 percent, and 10 percent levels, respectively. All numbers are percentages.

			Magnitude of Share Repurchase Program Groups	
		Entire Sample	Below Median	Above Median
Panel A. Unadjusted Cost of Capital (Market Model)				
Before announcement	Mean	15.75[a]	15.55[a]	15.96[a]
	Median	15.28[a]	14.99[a]	15.54[a]
Change	Mean	−1.32[a]	−1.12[a]	−1.52[a]
	Median	−0.81[a]	−0.65[a]	−1.15[a]
After announcement	Mean	14.43[a]	14.43[a]	14.44[a]
	Median	14.03[a]	14.02[a]	14.08[a]
	N	2,759	1,404	1,355
Panel B. Unadjusted Cost of Capital (Three-factor Model)				
Before announcement	Mean	18.01[a]	17.71[a]	18.33[a]
	Median	16.94[a]	16.67[a]	17.23[a]
Change	Mean	−1.48[a]	−1.32[a]	−1.65[a]
	Median	−0.52[a]	−0.31[a]	−0.81[a]
After announcement	Mean	16.53[a]	16.39[a]	16.67[a]
	Median	16.04[a]	15.99[a]	16.06[a]
	N	2,439	1,243	1,196
Panel C. Adjusted Cost of Capital (Market Model)				
Before announcement	Mean	1.02[a]	0.83[a]	1.22[a]
	Median	0.86[a]	0.75[a]	1.07[a]
Change	Mean	−0.93[a]	−0.58[a]	−1.30[a]
	Median	−0.79[a]	0.25[b]	−1.32[a]
After announcement	Mean	0.12	0.23	0.01
	Median	0.15	0.21	0.06
	N	1,973	1,021	952
Panel D. Adjusted Cost of Capital (Three-factor Model)				
Before announcement	Mean	0.65[a]	0.50[c]	0.82[a]
	Median	0.66[a]	0.39[c]	0.95[a]
Change	Mean	−0.45[c]	−0.19	−0.74[b]
	Median	0.08	0.16	0.00
After announcement	Mean	0.18	0.29	0.06
	Median	0.21	0.32	0.15
	N	1,767	922	845

To investigate the predictions of the free cash-flow hypothesis, we examine whether firms with high cash levels and few investment opportunities (proxied by Tobin's Q) experience a stronger market reaction around share repurchase announcements than do other firms. Following Lie (2000), we include in our regressions the level of cash and short-term investments relative to the book value of total assets (*CASH*) and an interaction variable that is equal to the value of *CASH* if the market-to-book ratio is less than 1, and 0 otherwise. The free cash-flow hypothesis implies that the coefficients of these two variables should be positive.

Table VIII reports the results from this analysis. The dependent variable is either the immediate market reaction to the repurchase announcement (*CAR*, which is calculated as the 3-day announcement period return minus the CRSP value-weighted index return during those 3 days) or the 3-year abnormal return after the announcement (*DRIFT*). We calculate the *DRIFT* by using the postannouncement alpha obtained from estimating the three-factor market model (equation 5).

The first column in Table VIII shows that the initial market response to the repurchase announcement (*CAR*) has no relation to the changes in profitability. The coefficients of $\Delta ROA(0)$ and $\Delta ROA(3)$ are insignificantly different from zero. However, the negative and significant coefficient of the change in the cost of capital, $\Delta RISK$, implies that the market reacts more positively to firms with a larger decline in systematic risk. This evidence seems to indicate that investors have been aware of the (negative) earnings news even prior to the repurchase announcement, but less so about the risk reduction as they seem to be more affected by the news about risk than by the news about earnings.

We also find that the initial market response to the repurchase announcement is positively related to the level of cash in the firm. More importantly, we find that the relation between the market reaction and the level of cash is stronger among those firms with low M/B. Consistent with the predictions of the free cash-flow hypothesis, these results suggest that the market reaction to share repurchase announcements is stronger among those firms that are more likely to overinvest.

The postannouncement long-run price drift (column 2, Table VIII) is negatively related to the change in the cost of capital. Thus, the larger the reduction in the cost of capital, the larger the drift. This evidence, combined with the impact of risk on the initial market reaction (column 1, Table VIII), suggests that investors do not fully account for the positive impact of the risk changes in the years after the repurchase announcement. The price drift is also positively related to the current and future change in profitability, which indicates that more profitable firms experience a more pronounced drift.

Finally, if the reduction in risk is indeed the result of contracting investment opportunities, we expect to find that firms that experience the largest reduction in investments would also experience the largest reduction in risk. Table IX reports the results from this analysis. The dependent variable is the change in the firm's cost of capital ($\Delta RISK$). The independent variable is the firm's change in *INVESTMENTS* (CAPEX plus R&D) from year 0 to year 3. We

Table VIII

Profitability Changes, Risk Changes, and Short- and Long-term Market Reaction

This table reports regressions that relate the *CAR* surrounding the share repurchase announcement and the long-term abnormal return (*DRIFT*) to several factors for a sample of firms that announced open-market share repurchase programs over the period 1980 to 1997. *CAR* is equal to the 3-day announcement period (−1, 0, 1) Cumulative Abnormal Return (relative to the CRSP value-weighted index). *DRIFT* is the cumulative postannouncement alpha obtained from the three-factor model (equation 5). $\Delta ROA(0)$ is the change in ROA from year −1 to year 0. $\Delta ROA(3)$ is the change in ROA from year 0 to year 3. $\Delta RISK$ is the change in the cost of capital after the announcement of the share repurchase program. We obtain the cost of capital by evaluating the three-factor model (equation 5) at the average market, SMB, and HML risk premia over the period 1977 to 2000. M/B is the market-to-book ratio of equity. *ASSETS* is the book value of total assets. *PSOUGHT* is the number of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement (magnitude of share repurchase program). *CASH* is the cash and short-term investments (COMPUSTAT item 1) scaled by the book value of total assets. *Low M/B* is a dummy variable that takes the value of one if M/B is less than one, and zero otherwise. We measure all financial variables at the beginning of the year in which the firm announces the open-market share repurchase program. $\Delta ROA(0)$, $\Delta ROA(3)$, $\Delta RISK$, M/B, *DRIFT*, and *CASH* have been winsorized at the first and the 99th percentiles. a, b, and c denote levels significantly different from zero at the 1 percent, 5 percent, and 10 percent, respectively. The standard errors of the coefficients have been adjusted for heteroskedasticity using White's (1980) procedure. Numbers within parentheses are *t*-statistics.

	Dependent Variable	
	CAR	*DRIFT*
Intercept	0.01429[a]	−0.00265[c]
	(2.75)	(−1.93)
$\Delta ROA(0)$	−0.01955	0.03831[a]
	(−0.53)	(4.50)
$\Delta ROA(3)$	−0.02889	0.05439[a]
	(−1.44)	(7.47)
$\Delta RISK$	−0.08571[a]	−0.05124[a]
	(−3.93)	(−8.58)
M/B_{-1}	−0.00398[c]	0.00078
	(−1.94)	(1.43)
$ASSETS_{-1}$	−0.0000001[a]	−0.00000002
	(−3.96)	(−1.62)
PSOUGHT	0.07795[a]	−0.00603
	(3.71)	(−1.15)
$CASH_{-1}$	0.0233[c]	0.00657[c]
	(1.65)	(1.90)
$CASH_{-1} \times Low\ M/B_{-1}$	0.07091[b]	0.00476
	(2.10)	(0.67)
Year-indicator variables	Yes	Yes
Adjusted R^2	3.96%	16.44%
N	2,101	2,101

also include the level of cost of capital before the announcement of the share repurchase program (*RISK(0)), the market-to-book ratio (M/B), the assets of the firm (ASSETS), the magnitude of the share repurchase program (PSOUGHT), and year dummy variables as control variables. The results in Table IX indicate*

Table IX

The Impact of Changes in Investments on Cost of Capital

This table reports regressions that relate the change in the cost of capital (ΔRISK) to several factors for a sample of firms that announced open-market share repurchase programs over the period 1980 to 1997. Δ*RISK* is the change in the cost of capital after the announcement of the share repurchase program. We obtain the cost of capital from the three-factor model (equation 5) at the average market, SMB, and HML risk premia over the period 1977 to 2000. Δ*INVESTMENTS* is the change in CAPEX and R&D from year 0 to year 3. *RISK*(0) is the cost of capital before the announcement of the share repurchase program. We obtain the cost of capital by evaluating the three-factor model (equation 5) at the average market, SMB, and HML risk premia over the period 1977 to 2000. M/B is the market-to-book ratio of equity. *ASSETS* is the book value of total assets. *PSOUGHT* is the number of shares authorized for repurchase scaled by the number of shares outstanding at the time of the announcement (magnitude of share repurchase program). We measure all financial variables at the beginning of the year in which the firm announces the open-market share repurchase program. Δ*INVESTMENTS*, M/B, Δ*RISK*, and *RISK*(0) have been winsorized at the first and the 99th percentiles. a, b, and c denote levels significantly different from zero at the 1 percent, 5 percent, and 10 percent, respectively. The standard errors of the coefficients have been adjusted for heteroskedasticity using White's (1980) procedure. Numbers within parentheses are *t*-statistics.

	Dependent Variable: Δ*RISK*	
Intercept	0.12706[a]	0.14423[a]
	(14.67)	(13.85)
Δ*INVESTMENTS*	0.11424[a]	0.09552[a]
	(3.24)	(2.61)
RISK(0)	−0.7767[a]	−0.78806[a]
	(−23.88)	(−24.68)
M/B_{-1}		−0.00676[a]
		(−3.41)
$ASSETS_{-1}$		−0.0000002[a]
		(−2.98)
PSOUGHT		0.01457
		(0.47)
Year-indicator variables	Yes	Yes
Adjusted R^2	44.39%	45.30%
N	948	947

a positive and significant relation between changes in INVESTMENTS and risk changes. This relation suggests that firms that experience a larger decline in INVESTMENTS also experience a larger decline in risk and in their cost of capital.

V. Conclusion

One of the advantages of using share repurchase programs to examine the predictions of payout theories is that such programs are often much greater in size than dividend changes. Thus, we should be able to better evaluate the empirical predictions of the payout theories by using share repurchase programs rather than dividend changes. In this paper, we examine whether firms pay out cash to their shareholders to mitigate potential overinvestment by management or to signal good news about the firm's prospects.

We perform a systematic investigation to uncover whether the information content of repurchases is about growth in future earnings (and other profitability measures), or whether it is related to a reduction in agency conflicts. We cannot find any evidence that repurchasing firms experience a growth in profitability. If anything, the evidence indicates that profitability declines in the years after the repurchase. We also find that repurchasing firms decrease their investments. This finding precludes the possibility that earnings are likely to recover in the long run.

Our evidence suggests that the reduction in free cash flows and systematic risk are sources of the positive market reaction to the repurchase announcement. We also find that the market reaction to share repurchase announcements is stronger among those firms that are more likely to overinvest. Thus, when agency conflicts of overinvestment are likely to arise, these firms increase their payout to shareholders in the form of repurchases. The potential reduction in agency costs and the information about the reduction in the cost of capital could explain why the market views these acts positively.

Overall, when we combine our results with the evidence concerning dividend-increasing firms, it appears that repurchases and dividends are motivated by similar factors. When future investment opportunities are contracting, an increase in cash payouts conveys important information about management commitment to reduce the agency costs of free cash flow when those costs are potentially more pronounced. An increase in cash payouts also conveys information about changes in the risk profile and the cost of capital of the firm.

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