Repurchases Have Changed*

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JEL Classification: G30, G32, G35
Keywords: Share repurchases, Payout policies

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Abstract

Using recent U.S. data, we find that the long-horizon abnormal returns following repurchase announcements made after 2001 are much smaller than those following earlier announcements. Other returns also differ: the mean abnormal return in the year prior to the announcement is only –6.0% for recent repurchases, in contrast to –13.3% for earlier repurchases, and the returns in a five-day window surrounding the announcement are smaller for recent repurchases. We explore possible explanations for these changes by examining differences in the characteristics of repurchasing firms. We find limited evidence of the risk changes documented using earlier data, but find that buyback firms' senior managers' equity-linked compensation exceeded that of matching firms for repurchases announced after 2001. In addition, transient institutional holdings drop significantly after buyback announcements in all subperiods but especially after 2001 consistent with transient investors selling shares after announcements to exploit the positive effects of buyback announcements.

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Dating to Ikenberry, Lakonishok, and Vermaelen (1995), the finding of positive abnormal returns following the announcements of open-market repurchases is one of the most established and well-known results in the empirical finance literature. Many subsequent papers have corroborated the finding of post-announcement abnormal performance using samples of repurchase announcements by both U.S. and non-U.S. repurchasers, with the U.S. samples used to document post-announcement abnormal performance generally consisting of firms that announced their repurchases prior to or during the late 1990's or early 2000's.[1] We use more recent U.S. data and find that the patterns of returns around open-market share repurchases have changed. Using the more recent data, we find that the performance of repurchasing firms during recent periods, especially the ones that repeatedly buy back shares, is inferior to their performance in earlier periods. In addition, some characteristics of recent repurchasing firms are different from those of earlier repurchasers.

The mean post-announcement three-year buy-and-hold abnormal returns (BHARs) of repurchasing firms in our 2002-2006 and 2007-2011 subsamples are less than half the magnitude of the mean three-year BHAR in the 1994-2001 subsample, with the mean BHAR in the 2002-2006 subsample being only 0.74% and not significantly different from zero. Only 44.9% and 51.6% of the BHARs from the 2002-2006 and 2007-2011 subsamples, respectively, are positive. The mean cumulative abnormal returns (CARs) based on Ibbotson's regression across time and securities (RATS) method in the 2002-2006 and 2007-2011 subsamples are less than one quarter of the mean RATS CAR from the 1994-2001 subsample. Four-factor alphas of equally-weighted calendar-time portfolios of firms in the 2002-2006 and 2007-2011 subsamples are also less than

[1] Studies using U.S. data include Dittmar (2000), Chan, Ikenberry, and Lee (2004), Grullon and Michaely (2004), Bonaime and Ryngaert (2009), Peyer and Vermaelen (2009), and Babenko, Tserlukevich, and Vedrashko (2012). The sample used in Peyer and Vermaelen (2009) ends in 2001, while that used in Grullon and Michaely (2004) ends in 1997. Dittmar and Field (2015) use recent data from 2004 to 2011 but focus on managers' ability to time repurchases and the returns on the shares actually repurchased rather than on the abnormal returns that have been the focus of much of the literature.

one-half of the four-factor alpha for the 1994-2001 subsample. Other returns also differ: the mean abnormal return in the year prior to the repurchase announcement is only −6.0% in both the 2002-2006 and 2007-2011 subsamples, in contrast to −13.3% in the 1994-2001 subsample, and the abnormal returns in the five-day window surrounding the announcement are also significantly smaller in the two more recent subsamples. We also find evidence of even poorer performance by firms that repeatedly buy back shares. Finally, in the 2002-2006 and 2007-2011 subsamples we find only mixed evidence of the risk changes documented in Grullon and Michaely (2004) using earlier data.

The prevalence of repurchases and some characteristics of repurchasing firms have also changed. Over the last 30 years, open market share repurchases have become popular not only in the U.S., but also throughout the world. For example, Grullon and Michaely (2004) show that between 1983 and 2000, repurchase amounts in the U.S. grew at a rate of about 20% per year, while dividends grew only at a rate of about 6%. Aggregate repurchases over this period were nearly three times greater than the proceeds raised from initial public offerings. In a more recent paper, Floyd, Li and Skinner (2015) show that share repurchases in the U.S. significantly increased from 1980 to 2012. According to their paper, total amount of dividends in 2012 U.S. dollars paid by Compustat industrial firms is $276 billion in 2012 as compared to $112 billion in 1983, while the corresponding amount of share repurchase is greater, $282 billion, as compared to only $11 billion in 1983. In addition, unlike earlier buyback firms that tended to announce repurchases after experiencing poor returns, a significant fraction of recent buyback firms announced buybacks after price run ups, especially during recent up markets.[2] During 2002 and 2006 more than 50% of buyback firms are repeat repurchasers, defined as firms that have

[2] The number of repurchases decreased following the burst of the internet bubble until 2003, and then increased until 2007 during the up market before the global financial crisis.

announced buybacks at least twice within the past five years or have outstanding buyback programs in more than 60% of the past five-year period. The percentage of repeat buyback firms was less than 10% at the beginning of our sample period in 1994. These changes in the prevalence of repurchase announcements suggest that the motivation or motivations for repurchases might also have changed. Changes in the motivations for open-market repurchases can potentially explain the changes in the patterns of returns around repurchases announcements that we find.

A rich literature discusses possible reasons to repurchase stock. These reasons include taking advantage of undervaluation (Ikenberry and Lakonishok (1995) and Chan, Ikenberry and Lee (2004)), which might possibly be due to investors' failure to recognize changes in risk (Grullon and Michaely (2004) and Kumar, Sorescu, Boehme and Danielsen (2008)), making adjustments to capital structure, either to move toward an optimal capital structure or to prevent dilution from employee stock option exercises (Jolls (1998), Fenn and Liang (2001) and Weisbenner (2000)), substituting repurchases for cash dividends (Grullon and Michaely (2002)), stock price manipulation (Chan, Ikenberry, Lee, and Wang (2010)), or helping antitakeover defenses.[3] We provide evidence relevant to these possible explanations by investigating whether and how the characteristics of firms that announce buybacks have changed in recent years.

The hypothesis that managers announce buybacks to take advantage of undervaluation is supported by studies documenting the long-run outperformance of buyback firms (Ikenberry and Lakonishok (1995) and Chan, Ikenberry and Lee (2004)) and survey results (Brav, Graham, Harvey, and Michaely (2004)). Consistent with the idea that the market might underreact to buyback announcements, Chan, Ikenberry and Lee (2004) present evidence of positive earnings

[3] Dittmar (2000) summarizes these various motivations behind buyback announcements and also points out that multiple motivations might be relevant in any one buyback program.

surprises following buyback announcements.[4] In a more recent study, Peyer and Vermaelen (2009) show that long-term outperformance is still found for buybacks announced between 1991 and 2001 and conclude that open market share repurchases are responses to overreaction to bad news. Both the changes in the average long-horizon abnormal returns that we document and the change in the mean abnormal return in the year prior to the repurchase announcement from –13.3% in the 1994-2001 subsample to only –6.0% in both the 2002-2006 and 2007-2011 subsamples suggest that this motivation for repurchases has become less important after 2001. The increased prevalence of buybacks in recent years is also consistent with undervaluation providing a motivation for a smaller proportion of repurchases.

Based on an analysis using 4,443 open market share repurchase announcements during the period 1980-1997, Grullon and Michaely (2004) propose a specific source of undervaluation that motivates buybacks. Specifically, they conclude that the long-term outperformance of buyback firms is primarily due to investors' underestimation of changes in risk and cost of capital following buyback announcements, as they find no evidence of significant improvements in operating performance but do find that systematic risk and cost of capital decrease. In a related study, Kumar, Sorescu, Boehme and Danielsen (2008) document that both beta and estimation risk of beta decline following initiations of dividends or share repurchases, explaining positive abnormal returns following those initiations.[5] We find mixed evidence of risk changes in the 2002-2006 and 2007-2011 subsamples, and, similar to Grullon and Michaely (2004), find

[4] Grullon (2000) finds a significant decline in operating income as a percentage of total assets, and also that investment analysts' forecasts of future earnings tend to decline after repurchase announcements. These findings are not inconsistent with the Chan, Ikenberry and Lee (2004) evidence of positive earnings surprises following buyback announcements because positive earnings surprises can coincide with declines in operating income, earnings, and analyst forecasts if investors and analysts overreact to information predicting the declines in operating performance and earnings.

[5] Kumar, Sorescu, Boehme and Danielsen (2008) show that uncertainties in estimating parameters of return generating processes (e.g., beta in the one-factor market model) can significantly explain cross-sectional differences in stock returns.

no convincing evidence of improvements in operating performance. The increased prevalence of buyback announcements is also consistent with the mixed evidence of risk changes in our recent subsamples if a smaller proportion of recent buybacks are motivated by changes in fundamentals that impact risk.

Surveys of corporate executives suggest that one reason to announce repurchases may be to support stock prices. For example, a 1998 Institutional Investor survey asked CFOs why they repurchase stock. Among the various choices offered, "to support the company's stock price" was selected by 3% of the respondents. Given that manipulation is frowned upon by the SEC rule 10b-5, the fact that this choice was selected by even a few respondents lends credence to the idea that some managers may be using repurchases in a way that deviates from the conventional explanations examined in the literature. Indeed, Chan, Ikenberry, Lee and Wang (2010) present evidence that a subset of buyback firms' managers seems to be using buyback announcements as a way to mislead investors. More generally, as more managers are aware of positive market responses to repurchase announcements despite their non-binding nature, more managers might use buyback announcements as a way to support stock prices in recent years. It is also possible that active investors who have shorter investment horizons might press managers to repurchase shares to impact stock prices, or managers may use buybacks to support stock prices hoping for greater compensation. These possibilities imply poorer long-horizon performance of recent buyback firms compared to earlier ones, and thus are consistent with our main finding of smaller long-horizon abnormal returns following the more recent repurchase announcements. The lack of evidence of changes in firm fundamentals is also consistent with this.

To further explore this possibility, we examine the equity-linked executive compensation and equity ownership of senior executives and find that executives of repurchasing firms have

more equity-based compensation than managers of matched firms that do not announce repurchases. In addition, the holdings of transient institutional investors significantly decrease after buyback announcements, more so during the 2002-2006 subperiod. We also check analysts' earnings per share (EPS) forecasts and EPS forecast errors over one- and three-year horizons before and after buyback announcements and find some evidence of negative changes in EPS forecasts and forecast errors, compared to changes experienced by matching firms during the corresponding period, only for those buybacks during 2002 and 2006. These findings are consistent with the hypotheses that firms repurchased shares due to the pressures from outside short-term oriented institutional investors even when managers did not perceive their shares to be undervalued or their investment opportunities to be significantly reduced.

We also consider other possible drivers behind the popularity of buybacks during recent up markets, such as leverage adjustments, changes in investment opportunities, and tax rule changes. Overall, the results indicate that recent buybacks are less likely to be driven by such considerations than earlier buybacks were.

In a contemporaneous paper, Fu and Huang (2015) also present evidence that abnormal returns following recent repurchase announcements are smaller than those following earlier repurchases; their results are actually stronger than ours, and they claim that the long-horizon post-announcement abnormal returns have disappeared.[6] However, their interpretation of their

[6] In their 2003-2012 sample, Fu and Huang (2015) estimate three-year average abnormal returns of –2.52%, –2.94%, –1.89%, and 5.32% using BHARs, RATS CARs, value-weighted calendar-time portfolio returns, and equal-weighted calendar-time portfolio returns, respectively (see their Table 1). The average RATS CAR of –2.94% is significantly different from zero at the 5% level. In contrast, our Tables 2 and 3 below report positive abnormal returns, some of which are significant, using all four methodologies in both our 2002-2006 and 2007-2011 subsamples. In the RATS and calendar-time results we benchmark using the Fama-French-Carhart four-factor model, while Fu and Huang (2015) benchmark using the Fama-French three-factor model; for the BHARs we match on size, B/M, and industry while Fu and Huang (2015) match on size, B/M, and momentum. In untabulated results, we try to reproduce the Fu and Huang (2015) RATS CARs and calendar-time portfolio results by benchmarking using the same three-factor model they use, and are unable to do so. Using repurchases announced during 2003-2011 and the three-factor model, we estimate a three-year average RATS CAR of 3.51% and equal and value-

results is quite different from our interpretation of ours. They conclude that the disappearance of long-run abnormal performance following stock repurchases (and seasoned equity offerings) is due to the fact that mispricing is less prevalent in later periods because of increases in price efficiency and that repurchases in recent years are motivated by fundamental reasons, rather than mispricing. In this paper, we conduct in depth analyses of changes in various characteristics of buyback firms around share repurchases, and obtain results that are consistent with the alternative explanations described above.

The remainder of the paper is organized as follows. In Section II, we describe the data, the characteristics of the sample firms, and the construction of the variables we use in later analyses. Section III presents the results regarding abnormal returns of buyback firms. Section IV provides evidence about the changes in risk, cost of capital, investments, leverage and operating performance following repurchase announcements. Section V discusses regression results exploring how the post-announcement abnormal returns are related to characteristics of repurchasing firms, while Section VI presents the results regarding equity-linked compensation, senior managers' equity ownership, changes in institutional ownership, and analysts' forecast revisions. Section VII concludes.

II. Data and Methodology

A. Data

Open market share repurchase announcement data are from the Securities Data Corporation (SDC) Platinum database for the period 1994-2011. The SDC Platinum database has complete coverage of share repurchases from 1994, and we end our sample in 2011 to allow

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weighted calendar-time portfolio returns of 0.158%, and 0.171% per month, equivalent to 36 × 0.158% = 1.90% and 36 × 0.171% = 2.05% over three years. Our average RATS CAR is significantly different from zero at the 1% level and our value and equal-weighted calendar time portfolio returns are significantly different from zero at the 5% level.

us to analyze the performance of our sample firms for three years after their repurchase announcements. As in most previous studies of open market share repurchases, we exclude firms whose share price at the time of the announcement is below $3 to avoid the potential extreme skewness in long-run performance measures (Loughran and Ritter (1996)). The return and accounting data are from the Center for Research in Security Prices (CRSP) and Compustat databases, respectively. Because we focus on common stocks, we include only securities with CRSP share codes of 10 or 11. The final sample with available CRSP and Compustat data includes 10,546 share repurchase announcements made between 1994 and 2011.

To measure the abnormal performance of buyback firms, for each announcing firm we select five matching firms among non-initial public offering (IPO) firms in the same industry and same size, and book-to-market equity ratio (B/M) quintiles at the end of the month prior to the buyback announcement, excluding those that made a buyback announcement within the previous three years. Specifically, at the end of June of each year, we form size quintiles based on the market capitalization at the end of June and B/M quintiles using the book equity value at the fiscal year end that is at least four month prior to the formation month and the market capitalization at the end of December of the previous year.[7] Then, for each announcing firm we identify the non-IPO firms[8] in the same size and B/M quintiles and same industry, based on the 12-industry classification available on Kenneth French's website.[9] Among these firms, we select the five with market capitalizations closest to that of the announcing firm at the end of the month prior to the buyback announcement.

[7] As in Fama and French (1993), NYSE size and B/M quintiles cutoff points are used to form portfolios.
[8] IPO firms are defined as those with the first available date in the CRSP database being less than a year prior to the repurchase announcement date.
[9] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

If there are fewer than five non-IPO firms in the repurchasing firm's industry and size and book to market quintiles, we complete the set of five matching firms by choosing additional non-IPO firms from the same industry with market capitalizations closest to that of the repurchasing firm. If any of the matching firms later announce buybacks or are delisted, the matching firms' returns are replaced with the CRSP value-weighted market returns with dividends (VWRETD) from the date of the buyback announcement or the delisting date, respectively. Similar to Lee (1997), we use five matching firms' equally-weighted average returns, instead of matching portfolio returns, to lessen the skewness bias existing in long-term abnormal performance measures based on a matching portfolio approach, which is pointed out in Barber and Lyon (1997).

B. Summary Statistics

Figure 1 shows the number of buyback announcements in each year and the S&P 500 index level at the end of each year during our sample period of 1994 to 2011. Different from the expectation that more firms buy back shares following poor performance, the number of buyback announcements moves closely with the performance of the S&P 500, peaking in 1998 and 2007. There are significantly fewer buybacks during down markets, inconsistent with the notion that there are more undervalued stocks in down markets and buybacks are mainly motivated by undervaluation. The figure also shows the percentage of buyback firms that are repeaters, defined as firms that either announced at least two repurchase programs during the previous five years or had a repurchase program in place during at least 60% of the previous five year period. The percentage of repeaters increased during our sample period and exceeded 50% in 2002, 2003, 2009 and 2010. For our buyback sample firms, the amount of cash dividends paid each year as a

percentage of buyback amounts announced each year decreased over the sample period from above 60% in 1994 to below 40% in 2010.

Table 1 reports the characteristics of the full sample of buyback firms and also those in subsamples of firms that announced buybacks during three subperiods, 1994-2001, 2002-2006 and 2007-2011. The first subperiod covers most of the sample period used in Peyer and Vermaelen (2009), 1991-2001. We divide the remaining sample period into an additional two subperiods, 2002-2006 and 2007-2011, to examine whether the performance of firms that announced buybacks during and after the global financial crisis differed from the performance of firms announcing buybacks at other times, while keeping similar numbers of years in the two later subperiods.[10] Panel A reports the summary statistics for all repurchasers who announce during the various periods, Panels B and C report the statistics for non-repeat and repeat purchases, respectively, and Panel D presents the differences between the characteristics of non-repeat and repeat repurchasers.

In Panel A the average five-day announcement period abnormal return is significantly different from zero in the full sample and all three subperiods, largest (2.01%) in the first subperiod, and of similar size (1.20% and 1.37%) during the second and third subperiods. As expected, the average industry, size and B/M-adjusted 1-year abnormal return prior to the buyback announcements is significantly negative in the full sample and all three subperiods. Similar to the announcement returns, the magnitude is largest (–13.32%) during the first subperiod and of similar magnitudes (–6.01% and –6.03%) during the second and third subperiods.

[10] It is obviously possible to start our second subperiod from 2003 so that the period covers the one following the 2003 tax regulation change. We instead choose to start the second subperiod from 2002 so that the first period corresponds to the period used by Peyer and Vermaelen (2009). The alternative definition of the second subperiod yields similar results.

Sample firms in the first subperiod announce plans to buy back 6.71% of outstanding shares, with this target percentage dropping to 6.41% in the 2002-2006 subsample but then increasing to 7.61% in the 2007-2011 subsample. For the full sample the average size quintile is 2.38, where 1 is smallest and 5 is largest, indicating a tilt towards smaller stocks. The average size quintile is larger during the later two subperiods, albeit the difference in magnitudes are small (2.31, 2.49, and 2.43, for the first, second and third subperiods, respectively). We do not find any strong tilt towards value stocks, even though the hypothesis that repurchases are a response to undervaluation suggests that there might be. In fact, there is a slight tilt towards growth stocks and the tilt is greater in later periods, with the mean B/M quintile being 2.95, 2.71, and 2.77, for the first, second and third subperiods, respectively. Both dividend payout ratios and total payout ratios have increased over time for the sample buyback firms and their corresponding matching firms. The increase in total payout is especially noticeable in the last subperiod, 2007-2011.

Panels, B and C report the statistics for non-repeaters and repeaters, respectively, and Panel D reports the differences between non-repeaters and repeaters. Non-repeaters' abnormal returns prior to buyback announcements are negative and significantly worse than repeaters' except during the second subperiod, 2002-2006. It is also interesting to note that announcement period returns are not much different between non-repeaters and repeaters except for the 2002-2006 subsample. This suggests that most of the time the market does not pay close attention towards whether an announcing firm is a repeat repurchase. During the first subperiod, the average B/M quintile of repeaters is significantly higher than that of non-repeaters but the difference disappears in later periods, suggesting that repeaters are as likely to be growth stocks as non-repeaters in later periods.

Both dividend and total payout ratios have increased for both repurchasing and matching firms, including both non-repeaters and repeaters. Unsurprisingly, payout ratios of repeating buyback firms are significantly higher than those of non-repeating buyback firms.

C. Construction of variables

To investigate whether risk and costs of capital significantly change around buyback announcements, we examine changes in various risk measures and estimates of risk premiums around buyback announcements. The risk measures are market-model betas and realized volatilities estimated from stock returns and implied volatilities computed from individual stock option prices. Our beta estimates are from regressions of monthly excess stock returns on market excess returns over either the 36 months prior to the buyback announcements (for pre-announcement beta estimates) or the 37 months starting from the month of buyback announcements (for post-announcement beta estimates). Realized volatilities (Vol) are sample standard deviations of monthly stock returns over 36 months prior to and 37 months starting from the month of buyback announcements. For implied volatilities, we obtain daily implied volatilities from OptionMetrics, and for each stock we select the implied volatility of the closest-to-the-money shortest time-to-expiration call option with at least 21 days to expiration. We use call options because they generally have greater open interest and trading volume than put options (e.g., Lakonishok, Lee, Pearson and Poteshman (2007)). The implied volatility (IVol) risk measures we report are the average daily implied volatilities over the corresponding period.

Similar to Grullon and Michaely (2004), we estimate risk premiums (RPrem) using the Carhart (1994) 4-factor model. Using the monthly excess returns available on Kenneth French's website, we estimate risk loadings before and after buyback announcements using the data from the 36 months prior to and the 37 months including and after the announcement month,

respectively. Using the estimated coefficients and the average values of the four factor risk premiums from 1991 to 2014, we calculate risk premiums before and after buyback announcements. Using similar methods, we calculate risk premiums for the matching firms. Matching firm-adjusted changes in risk premiums are defined as the differences between buyback firms' changes in risk premiums and the average changes of corresponding matching firms' risk premiums around buyback announcements. We set the risk premium to be missing if the estimated risk premium is negative.

Throughout the paper, we use quarterly Compustat data to measure operating performance, risk or financial policy variables over periods before and after buyback announcements because the use of annual data leads to imprecise matching with the announcement dates.[11] To estimate changes before and after buyback announcements, we measure averages over 12 quarters before buyback announcements and 12 quarters starting from the quarter of announcements. For all variables that are standardized by total assets, we calculate quarterly ratios and then calculate average ratios over longer horizons as the averages of quarterly ratios over the corresponding horizons. However, for dividend and total payout ratios that are calculated as percentages of net income, average ratios over longer horizons are defined as the sum of quarterly values of the numerator (dividend or total payouts) divided by the sum of quarterly values of the denominator (net incomes), instead of simple averages of quarterly ratios. This is to minimize the impacts of outliers created by the use of fluctuating quarterly incomes.

Operating performance can be measured in various ways. We report results based on return on assets (ROA), where ROA is defined as operating income before depreciation

[11] For example, if a firm's fiscal year end is December, depending on when a buyback is announced, the gap between the announcement date and the fiscal year end right before the announcement can vary from less than a month to more than 11 months when annual data are used. The gap will decrease to less than three months as we use quarterly Compustat.

(OIBDPQ) over total assets (ATQ).[12] To examine changes in capital structure we measure leverage (Lev) as long-term debt (DLTTQ) over total assets (ATQ). In addition to the stock return risk measures, we also measure cash flow uncertainty by estimating the standard deviation of 12 quarterly ratios of operating cash flow (OIBDPQ) over the average of total assets at the beginning and at the end of a quarter (OVol).

Given that optimal payout policies are closely related to investment opportunities, we measure investments (Inv) as quarterly capital expenditures (CAPXY) over total assets. To measure the degree of external financing needs around buyback announcements, we use financial deficits over total assets (FD), where financial deficit is defined as: sale of common and preferred stocks (SSTK) – purchase of common and preferred stocks (PRSTKC) + long-term debt issuance (DLTIS) – long-term debt reduction (DLTR). We also measure changes in cash reserves where cash reserves (Cash) are defined as cash and short-term investments (CHEQ) over total assets. To investigate changes in payout policies, we estimate both dividend payout ratio (DPR) and total payout ratio (TPR), where DPR is defined as quarterly cash dividends (DVY) over quarterly net incomes (NIQ) and TPR is defined as total payout over net income. Total payout is the sum of quarterly dividends (DVY) and share repurchases, where quarterly share repurchase amounts are either purchases of common stock (PRSTKCCY, cash flow statement) if available or purchases of common and preferred stock (PRSTKCY) (minus purchase of preferred/preference stock (PRSTKPCY, cash flow statement) when it is available). We set both DRP and TPR to be zero when net income is zero or negative.

III. Long-Horizon Returns Following Repurchase Announcements

[12] Quarterly Compustat variables are described in parentheses. As explained in Appendix, some quarterly variables are for accumulated values from the beginning of the fiscal year (ones that end with "Y"). For these variables, quarterly values are calculated by comparing two consecutive values except for those for the first fiscal quarter.

We examine the abnormal stock returns of buyback firms over various horizons up to three years using three different return measures.[13] We first consider buy-and-hold abnormal returns, calculated by subtracting the equally-weighted average buy-and-hold returns of five matching firms from the return of the corresponding buyback firm. Due to potential problems in measuring long-horizon benchmark returns (Barber and Lyon (1997)), we also use two alternative approaches. The first is based on the Ibbotson's (1975) regression across time and securities (RATS) method, modified to use the Carhart (1994) four-factor model to control for the market, size, value, and momentum effects. The second alternative is the calendar-time portfolio approach advocated by Fama (1998) but using the four-factor model.

For the RATS method, we estimate a four-factor cross-sectional regression for each month between 36 months prior to and 36 months following the month of each repurchase announcement. Each intercept or "alpha" is interpreted as an estimate of the monthly abnormal return in the corresponding month. An advantage of this approach is that it allows for changes in risk exposures by separately estimating regressions across sample firms in each month.

For the calendar-time portfolio approach, for each calendar month starting from February 1994 we measure post-announcement performance over one and three-year horizons by forming portfolios composed of the firms with buyback announcements made within the previous 12 and 36 months ending with the previous month. We then regress the monthly portfolio excess returns on the market, size, value, and momentum factors and report the regression intercepts or "alphas," which are estimates of the monthly abnormal returns. We estimate regression models using both value- and equally-weighted average returns in order to examine the extent to which the results are driven by large or small firms.

[13] For the firms with multiple classes of common stocks, we calculate value-weighted average returns of the several classes and use them as the returns of the buyback firms. This implies that we measure stock return performance of a firm, not a particular class of common stock, even when the firm repurchases a single class of common stock.

Table II Panel A reports the BHARs and RATS CARs over five different investment horizons for the entire sample period and three subsamples consisting of repurchases announced during 1994-2001, 2002-2006, and 2007-2011. Panel B reports the 3-year BHARs for non-repeaters and repeaters and the differences between the BHARs of non-repeaters and repeaters for the entire sample period and the three subsamples. In each case, averages are on top and *p*-values are below in parentheses. Except for the last row in Panel B, numbers of observations are reported below the *p*-values of BHARs and percentages of samples with positive BHARs are reported below the *p*-values of CARs. In addition, in columns (3)-(6), ***, **, and * indicate that the average returns for the second or third subsamples 2002-2006 and 2007-2011 are significantly different from the average returns for the first subsample at the 1, 5 and 10 percent significance levels, respectively.

In the full sample, buyback firms on average outperform their matching firms over all horizons, consistent with the previous results in the literature. Over the three-year horizon, the average BHAR is 11.13%, while the cumulative abnormal return based on the RATS method is 16.66%. Unsurprisingly, the alternative ways of calculating long-term abnormal returns result in different point estimates, though both the mean BHAR and mean CAR are significant at the 1% level. But despite the large BHAR, the percentage of buyback firms with positive BHARs is only 51.06%, which indicates that a significant fraction of buyback firms does not outperform their industry, size and B/M-adjusted matching firms even though the mean BHAR is positive.

Turning to the subperiods, during the first (1994-2001) subperiod the average three-year BHAR and RATS CAR are a significant 17.33% and 25.63%, respectively, consistent with Peyer and Vermaelen (2009). However, even during this time period, based on the BHARs that control

for the effects of industry, size, and B/M only about 54% of the sample buyback firms outperform their matching firms over the three years following buyback announcements.

Shifting attention to the second subperiod, 2002-2006, the abnormal performance of repurchasing firms is smaller over the one, two, and three-year horizons and much smaller over the two and three-year horizons. Both the BHARs and CARs for the 2002-2006 subsample are significantly lower than those in the 1994-2001 subsample at the 1% significance level, and the one-year BHARs and CARs are different at the 5% level. Over the three-year horizon the mean BHAR is only 0.74% and not significantly different from zero. While the three-year CAR is a significant 5.45%, it is much smaller than the three-year CAR of 25.63% for the 1994-2001 subsample. In this subsample only 44.89% of the buyback firms outperform their matching firms.

During the last (2007-2011) subperiod, the one, two, and three-year BHARs and CARs of repurchasing firms remain significantly smaller than the corresponding returns during the first subperiod. For example, the mean three-year BHAR is 8.44% versus 17.33% in the first subperiod, and the mean CAR is 5.76%, dramatically less than the 25.63% during the first subperiod. In addition, only 51.61% of the buyback firms earn positive BHARs. In sum, we find that abnormal returns are much lower for buybacks announced after the end of the sample period used in Peyer and Vermalen (2009), especially during the second subperiod 2002-2006 before the onset of the global financial crisis. In addition, a significant proportion of buyback firms do not outperform their industry, size and B/M- matched firms.

Panel B reports average three-year BHARs and CARs for non-repeaters and repeaters. During the first subperiod non-repeaters performed worse than repeaters, with average differences of -8.08% and -6.64% in the BHARs and CARs, respectively. However, during the

second subperiod, 2002-2006, repeaters perform very poorly with a three-year BHAR of -6.95%, and only 42.01% of repeaters outperform their benchmarks during this subperiod. Non-repeaters outperform their matching firms, with a three-year mean BHAR of 8.67%. Consistent with the BHARs, the mean CAR for non-repeaters, 9.48%, is significantly greater than the mean CAR of repeaters, 1.44%. The poor performance of repeaters disappears in the last subperiod and the relative performance of non-repeaters and repeaters is sensitive to the measure used to calculate abnormal returns.

As indicated above, in addition to examining BHARs and RATS CARs we also use the calendar time approach. Table III reports monthly four-factor alphas of calendar time portfolios composed of the firms that have announced buybacks within the past one year (Panel A) or three years (Panel B) in each calendar month during February 1994 and December 2014. We report the alphas estimated using both value-weighted and equally-weighted portfolio returns.

Consistent with the results for the BHARs and RATS CARs, the alphas of the equally-weighted returns are large and significant at both the one- and three-year horizons for both the full sample in the columns headed "All" and the first (1994-2001) subsample. Also consistent with the previous results, the point estimates of the alphas of the equally-weighted returns are smaller for the second and third subsamples; the one- and three-year alphas for the 2007-2011 subsample are significantly different from those for the 1994-2001 subsample at the 5% level, and the three-year alpha for the 2002-2006 subsample is different from that for the 1994-2001 subsample at the 10% level.

Turning to the value-weighted portfolio alphas, the alphas are smaller than the equally-weighted alphas for the full sample and the first (1994-2001) subsample. The one-year value-weighted alpha for the first subsample is not significantly different from zero and the three-year

alpha is significant at only the 10% level. These differences between the performances of equally- and value-weighted portfolios indicate that the abnormal performance during the 1994-2001 subsample is mainly due to smaller buyback firms, consistent with the findings in Peyer and Vermaelen (2009). The poor performance of the value-weighted portfolios is also found in the 2002-2006 subsample, where the one and three-year alphas are only 0.026% and 0.023%, respectively, and insignificant. During the last (2007-2011) period, however, the one and three-year alphas based on value-weighted portfolio returns are of about the same magnitude as the equally-weighted alphas, and the point estimate of the value-weighted three-year alpha exceeds the corresponding point estimate for the first (1994-2001) subperiod. For our total sample, the difference between monthly alphas of value-weighted and equally-weighted portfolio returns is 28.3 basis points per month (18.7 basis points vs. 47.0 basis points), implying more than 3% difference in annual abnormal return estimates.

In aggregate, these results comprise convincing evidence that the long-horizon returns following repurchase announcements during the latter two (2002-2006 and 2007-2011) subsamples differed from those in the first (1994-2001) subsample. For the three-year horizon, all of the measures based on equally-weighted returns—BHARs, RATS CARs, and calendar-time equally-weighted portfolio alphas—indicate that abnormal returns during the latter two subsamples were significantly different from those in the first subsample at least at the 10% level. For the BHARs and RATS CARs the differences are significant at the 1% level. The only exception to the pattern of findings that returns following more recent repurchase announcement differed from those following announcements made between 1994 and 2001 is that the one- and three-year value-weighted calendar-time alphas of firms that announced repurchases during the

2007-2011 period that overlapped with the financial crisis are not significantly different from the corresponding measures of firms that announced repurchases between 1994 and 2001.

Table 1 reporting summary statistics for the repurchasing and matching firms contains additional evidence that repurchases announced during the latter two subperiods differed from earlier repurchases. In Panel A, the average industry, size and B/M-adjusted abnormal return over a five-day window surrounding the announcement date is 2.01% during the first subsample but only 1.20% and 1.37% during the other two subperiods, with the differences between the first period and the other two significant at the 1% level. We also find that the average industry, size and B/M-adjusted one-year abnormal return prior to the buyback announcement is –13.32% during the first subperiod but only –6.01% and –6.03% during the second and third subperiods. These differences are also significant at the 1% level.

Figure 2 explores the time patterns of returns by showing CARs based on matching firms (on the left) and the RATS method (on the right) starting from 36 months prior to the buyback announcements until 36 months following the announcements. Each figure has three lines showing the cumulative returns for the firms making repurchase announcements during the three subperiods. Here, the CARs based on matching firms are calculated by cumulating monthly abnormal returns calculated by subtracting the average monthly return of five matching firms. The buyback firms in our sample performed well up until between six months and one year prior to the buyback announcements, then experienced performance declines through the announcement date.[14] Interestingly, these time patterns reveal an additional difference between

[14] When CARs are estimated based on the RATS, buyback firms in the second subperiod performed extremely well during the past three years prior to announcements with greater than 35% of three-year CAR, which suggests that the undervaluation is less likely to be the main driver behind buybacks in the second subperiod. When CARs are calculated using matching firms, buyback firms' performance seem less impressive, especially for those in the first subperiod. However, we still find that buyback firms' performance over prior three-year horizons is not very poor compared to matching firms.

repurchasing firms in the first subsample and those in the latter two subsamples—the performance of firms in the first subsample began declining about one year before the announcement date, while the performance of firms in the second and third subperiods began declining about six months before the announcement date. In addition, we do not observe significant increases in CARs following buyback announcements in the second subperiod regardless of the method used to calculate CARs. Finally, Section 4.C below presents evidence that the positive abnormal returns in different subperiods were driven by firms with different characteristics. During the first (1994-2001) subperiod small value and large growth firms had significant positive abnormal returns (and large value firms had positive but insignificant abnormal returns), while during the last (2007-2011) subperiod only large growth firms had significant abnormal returns.

A natural interpretation of the returns after, at, and prior to the announcements is that during the latter two subperiods either (i) a larger proportion of repurchasing firms did so for reasons other than undervaluation, or (ii) firms that repurchased their shares to address undervaluation did this when undervaluation was less severe. The next section investigates whether the differences in stock performance are caused by changes in the motivations behind buybacks by examining abnormal changes in buyback firms' characteristics around buyback announcements.

IV. Changes in Risk, Investment, Leverage and Operating Performance

In this section, we examine changes in various characteristics of buyback firms, including their risk, operating performance, and investment and financing activities, during the three years before and after buyback announcements. Given that the market and industry environments can affect investment and financing policies as well as risk characteristics and performance, we focus

on abnormal changes after adjusting for the changes experienced by industry, size and B/M-matched firms.

A. Changes in Risk

As firms mature, they are likely to exercise growth options and have fewer growth options remaining, providing a reason to return cash to shareholders via repurchases. These changes are likely to be associated with risk changes, which in turn affect expected returns and valuation. As pointed out by Grullon and Michaely (2004), the observed outperformance of buyback firms could be due to these changes in risk, if they are not fully reflected in market prices on the announcement date. Alternatively, as Kumar, Sorescu, Boehme and Danielsen (2008) argue, the estimation uncertainties regarding growth options may decrease following buybacks, lowering risk and increasing valuations. On the other hand, it is possible that the changes in risk due to the disappearing growth options are offset by changes due to increased leverage at the time of the repurchases. If, however, firms' buyback decisions are not driven by fundamental reasons but by "pressures" from outside short-term oriented investors or managerial self-interest, then we may not observe significant drops in risk following buybacks. This might explain the relatively weak performance of buybacks in the second subperiod.

To investigate these hypotheses, we examine changes in risk around buyback announcements, focusing on matching firm-adjusted abnormal changes over three-year horizons before and after the buyback announcements. The risk measures we examine include one-factor market model betas, risk premiums based on the four-factor model, realized stock return volatilities, implied volatilities, and cash flow volatilities.

Consistent with Grullon and Michaely (2004), as shown in Table IV Panel A, the subsample firms that announce repurchases between 1994 and 2001 on average experience

significant decreases in beta compared to their matching firms. The average abnormal change of –0.049 implies that buyback firms' average expected annual return change from three years before to three years after the buyback announcement is about 20 basis points smaller than the comparable change experienced by matching firms, assuming an annual market risk premium of 5% (–0.002 = –0.049 × 5%). In contrast, abnormal changes in beta of buyback firms in the second subperiod, 2002-2006, are not significantly different from zero, though abnormal changes are again significantly negative in the last subperiod.

As an alternative measure of risk changes, we estimate abnormal changes in risk premiums based on the four-factor model and report the results in Panel B of Table IV. Mean abnormal changes are all significantly negative across all subperiods but medians are not significantly different from zero except for the last subperiod during which the median change is significantly positive. When we separately examine the results for non-repeaters and repeaters, we find that non-repeaters have larger decreases in both betas and four-factor model risk premia. These mean and median differences in the risk changes of non-repeaters and repeaters are significant at the 1% or 5% level for repurchase announcements during the last subperiod, but are either insignificant or less significant during the other subperiods.

Shifting attention to a measure of total risk, realized volatility, Table IV Panel A shows that abnormal changes in realized volatilities are significantly negative during the first and last subperiods. However, during the second subperiod, repeaters experience significant abnormal increases in realized volatilities whereas non-repeaters experience decreases. Implied volatilities based on subsets of the sample with available data provide similar results except that we do not find significant abnormal changes in the last subperiod.

Finally, across all subperiods, we do not find any significant decreases in the abnormal changes in operating cash flow volatilities reported in Panel D. Instead, we find significantly positive abnormal changes in operating cash flow volatilities of repeaters across all subperiods.

To better understand abnormal and unadjusted changes in risk around buyback announcements, we report volatilities of weekly stock returns measured over each calendar quarter during 12 quarters before and 12 quarters following the quarter of buyback announcements in Figure 3. Buyback firms' realized and implied volatilities are lower than those of matching firms even before buyback announcements, indicated by negative matching firms-adjusted volatilities throughout the period shown.

In summary, the results are sensitive to risk measure used, and abnormal changes in risk following buybacks are not stable across subperiods. That said, some of the results are consistent with the hypothesis that the stock return performance of buyback firms is related to changes in risk as proposed by Grullon and Michaely (2004). In particular, the largest decreases in betas, realized volatilities, and implied volatilities are found in the first subperiod, when the long-horizon abnormal returns are largest, and changes in betas, realized volatilities, and implied volatilities are positive during the second subperiod, when there is limited evidence of positive long horizon abnormal returns. On the other hand, the changes in the four-factor model risk premia in the different subperiods do not line up with the abnormal returns, and implied volatilities increase during the third subperiod when long-horizon returns are positive. Also, the differences Non-Repeater minus Repeater are negative for betas, realized volatilities, and four-factor risk premia in all periods, though not always significant, but the differences in abnormal returns between non-repeaters and repeaters are not consistently positive but rather sometimes are significantly negative. Thus, some of the results are not consistent with the hypothesis that

the abnormal returns are due to changes in risk that are not reflected in changes in stock prices on the announcement dates.

B. Changes in Investment, Financial Policies and Operating Performance

If significant decreases in risk following buybacks are due to exercises of growth options and the lack of investment opportunities as suggested by Grullon and Michaely (2004), then we expect to observe significant decreases in investments following buybacks. Alternatively, when buybacks are driven by the pressures from outsider short-term oriented institutional investors or due to undervaluation, firms' investment policies might not change following buyback announcements. To examine this, we report abnormal changes in investment in Panel A of Table VI. Abnormal changes in investments are statistically significantly positive across all subperiods, though the economic magnitudes are quite small—for example, in the full sample the mean abnormal change is 0.069%.[15] For repeaters in the second subperiod, the average abnormal change in investments is insignificant. Figure 3 graphically shows that there is no unusual movement in the investments of buyback firms around the time of repurchase announcements.

We also check abnormal changes in cash reserves and report the results in Table VI Panel B. Even though untabulated results show that cash reserves decrease significantly after buybacks across all subperiods, the abnormal changes reported in Panel B of Table VI are significantly negative only in the second subperiod, especially for repeaters.

Repurchasing firms return their cash back to shareholder through buybacks. If this is due to lack of investment opportunities, they may be less likely to raise external capital after buyback announcements. The implications of the results in Panel A of Table VII on external financial activities depend on whether one looks at the means or medians. However, we find consistent

[15] Untabulated results show that unadjusted changes are significantly negative in the first and third subperiods.

differences between non-repeaters and repeaters across all three subperiods. Significantly negative abnormal changes are observed for non-repeaters while significantly positive abnormal changes are observed for repeaters. The results suggest that even if repeating buyback firms reduce their external financing following buyback announcements, the reductions experienced by repeating buyback firms are smaller than the reductions in external financing experienced by matching firms during the same period.

Even though buyback firms typically increase their leverage following buybacks, the comparisons with their matching firms reported in Panel B of Table VII indicate that their leverage increases are on average significantly smaller than increases observed for their matching firms, especially for non-repeaters. For repeaters, however, abnormal changes in leverage ratios are insignificant or significantly positive, suggesting that repeat buyback firms experience larger leverage increases than their matching firms.

Finally, we turn our attention to abnormal changes in the profitability reported in Table VIII. Grullon and Michaely (2004) find that even though buyback firms experience significant abnormal stock returns following buybacks, they do not experience abnormal improvements in their operating performance. This evidence supports their hypothesis that the outperformance of repurchasing firms is mostly driven by changes in risk. Consistent with the findings in Grullon and Michaely (2004), we do not find any significant abnormal increases in profitability following buybacks. Instead, abnormal changes in the profitability are significantly negative across all subperiods and for both non-repeaters and repeaters. However, one noteworthy fact is that, even though we do not find any increases in ROAs of buyback firms relative to ROAs of matching firms, ROAs of buyback firms are on average higher than ROAs of matching firms over 25 quarters around buyback announcements.

Table VIII also reports abnormal changes in dividend and total payout ratios. There is only limited evidence of abnormal changes in dividend payouts, but we observe significant increases in abnormal total payouts, especially for those non-repeaters. The greatest increases in total payouts for repeaters occur in the second subperiod, while abnormal increases are not observed for repeaters in the first and third subperiods. The fact that repurchasing firms, even those repeaters, did not significantly reduce their dividend payout ratios suggests that the rapid growth in share repurchases in recent years is not due to the substitution of cash dividends with share repurchases. Rather, firms return more cash back to shareholders in recent years.

C. Abnormal returns and changes in operating performance, risk, investment, and financial policies across size and B/M groups

Peyer and Vermaelen (2009) present evidence that small and value stocks, which are more likely to be undervalued, tend to perform better following buyback announcements. To check whether this finding holds in more recent periods, we examine abnormal stock and operating performance and abnormal changes in risk, investment and financing activities across four groups, small value, small growth, large value and large growth stocks. We report the averages and the differences in averages between non-repeaters and repeaters in Table IX.[16]

The results in Panel A show that among buyback firms in the first subperiod, small value (35.4 basis points per month) and large growth firms (46.4 basis points per month) experience significantly positive alphas while others do not. (In addition, the alpha of large value stocks is large but insignificant.) During the second subperiod, no group significantly outperforms while during the third subperiod, only large growth firms significantly outperform. In addition, we observe significant differences in alphas between non-repeaters and repeaters only among large

[16] Alphas reported in Panel A are estimated using monthly value-weighted returns of calendar time portfolios composed of stocks with the given characteristics that announced buybacks in the past 36 months.

growth firms in the second subperiod. It is interesting to note that alphas are greater and more significant for large growth firms than for small value firms even during the first subperiod, suggesting that undervaluation might not be the main driver behind better performance of buyback firms.

In Panels B through G, we find that small value and large growth buyback firms in the first subperiod do not experience abnormal increase in ROAs. Instead, even small value stocks in the first subperiod experience abnormally smaller changes in ROAs relative to changes experienced by their matching firms. In addition, during the first subperiod, small value stocks' changes in risk (both risk premium and realized volatilities) are significantly less than those changes experienced by their matching firms but changes in investment and leverage are significantly greater than changes of their matching firms. For large growth stocks in the first subperiod, we find similar abnormal changes in ROAs and investments but insignificant abnormal changes in risk and leverage. These results suggest that outperformance of small value buyback firms during the first subperiod is at least partially driven by risk changes.

To better understand the differences in stock return performance across subperiods and buyback groups, in the next section, we use regression approaches to see whether abnormal stock performance is indeed different across subepriods after controlling for other factors and whether the impacts of changes in firm characteristics following share repurchases on stock return performance have changed across subperiods and across groups.

V. What covariates explain the differences in abnormal performance?

We have used a variety of return measures to document that the long-horizon abnormal performance of buyback firms during the second and third subperiods was less than that of firms

that announced repurchases during the first period. In fact, buyback firms in the second subperiod did not outperform their matching firms and they, especially repeaters, also did not experience significant abnormal decreases in risk. In this section we use regression analyses to investigate what factors are associated with the stock performance of buyback firms in recent years and whether there are significant changes in the roles of key drivers during the 2002-2006 period. To control for possible industry and time effects in the analysis, we include industry and year dummies in the analyses.

We estimate the following regression model to examine the determinants of abnormal stock performance following buyback announcements:

$$AR_i = \alpha + \beta_1 \text{RepeatD}_i + \beta_2 \Delta\text{Vol}_i + \beta_3 \Delta\text{RPrem}_i + \beta_4 \Delta\text{OVol}_i + \beta_5 \Delta\text{ROA}_i + \beta_6 \Delta\text{Lev}_i + \beta_7 \Delta\text{Inv}_i$$
$$+ \beta_8 \Delta\text{FD}_i + \beta_9 \Delta\text{Cash}_i + \beta_{10} \Delta\text{DPR}_i + \beta_{11} \Delta\text{TPR}_i + \beta_{12} \text{Size}_i + \beta_{13} \text{B/M}_i$$
$$+ \beta_{14} \text{AR} - 1_i + \beta_{15} \text{Target}_i + \beta_{16} \#\text{SubAuth}_i + \beta_{17} \text{UnderD}_i$$
$$+ \beta_{18} Industry\ \&\ YearDummies_i + e_i$$

where *AR* is a three-year abnormal return measure, either BHAR or alpha from the 4-factor model. Different from the portfolio alphas used in Table III, for these regressions alphas are calculated for each firm using monthly returns of each buyback firm and four factors over 37 months starting from the month of the buyback announcements. The variable RepeatD is a dummy variable to indicate repeat buybacks, where a buyback is a repeat buyback if it was announced by a firm that had at least two initial authorizations of repurchases within the past five years or had an active repurchase programs over 60% of the previous five-year period. All explanatory variables based on financial statements information with names beginning with the symbol "Δ" represent changes over three years (12 fiscal quarters) before and after the buyback announcements. In addition, the regressions include matching firm-adjusted abnormal returns

during the one-year period prior to the announcement (AR-1), the number of shares targeted to repurchase at the announcement as a percentage of outstanding shares (Target), the number of subsequent authorizations that are considered to be a part of one program by SDC (#SubAuth), and a dummy variable to indicate that undervaluation was a stated motivation behind buyback announcements (UnderD).[17] We also include industry and year dummies to control for possible industry and time effects.

To see whether the roles of key drivers in explaining the stock return performance of buyback firms have changed over time, we estimate regression models separately for each subperiod. Alternatively, we also estimate the regressions using all sample observations with a dummy variable to indicate a particular subperiod and its interaction terms with some key explanatory variables.

Table X reports the results of regression analyses where dependent variables are three-year BHARs and alphas from the four-factor model. Different from our expectations, risk premium changes are, in general, not significantly associated with three-year BHARs albeit they are significantly negatively associated with alphas. To our surprise, changes in volatilities are positively related to stock performance for those buybacks in the first subperiod, and not closely related to performance in the second subperiod. Negative, albeit insignificant, relations between change in volatility and stock performance are observed when BHARs are used as a performance measure in the third subperiod. We also find that operating cash flow volatilities are negatively related to stock performance, except for the last subperiod.

[17] SDC Platinum has a purpose code assigned for each buyback announcement. Multiple codes can be assigned for one announcement. UnderD is set to be one if any of purpose codes assigned by SDC is either "Undervaluation" or "Enhancement of Shareholder Value". Firms reauthorize existing buyback programs and SDC groups them into one program. We use only the initial authorization date as announcement dates.

Consistent with our expectation, changes in ROAs are significantly positively associated with abnormal stock returns across all subperiods. In addition, we find a negative association between changes in leverage and stock performance, but the relation is significant only in the first subperiod. We also find a negative relation between changes in investments and stock performance, though the relation is consistently significantly negative only in the last subperiod.

Changes in financial deficits are generally positively related to stock performance, suggesting that increasing external financing activities following buybacks does not negatively affect stock performance. Regarding payout policies, it is interesting to note that changes in dividend payouts are marginally significantly negatively associated with stock performance in the second subperiod while changes in total payouts are significantly negatively associated with stock performance in the first subperiod.

Regarding other firm and buyback characteristics, we find significantly negative associations between size and stock performance, except for the last subperiod. Surprisingly, however, we find a significantly negative association between B/M and stock performance in the first subperiod, which might be due to the outperformance of large growth stocks in the first subperiod. We find that prior performance is negatively associated with future stock performance.

Finally, we find that buyback characteristics are only weakly associated with stock performance. The target percentage shares announced to repurchase is generally positively associated with stock performance but is insignificant in most cases. Similarly, the dummy to indicate undervaluation being one of the cited motivations is not significantly associated with stock performance, except in the second subperiod when BHARs are used as the performance measure.

In summary, the results in Table X consistently suggest that poorer performance of repeating buyback firms is observed only in the second subperiod after controlling for other factors. In addition, among variables considered in our regression analyses, only changes in ROA are significantly associated with stock performance in a consistent way across subperiods, which is unsurprising. For all others, either signs or significances of coefficients change depending on time periods or abnormal return measures. Finally, even though risk changes can be a possible explanation for outperformance of buyback firms, we do not find consistent relation between risk changes and stock performance across subperiods and abnormal return and risk measurements.

To check the robustness of the results in Table X and to test the significance of the changes in the roles of key variables in different subperiods, Table XI reports the results of regressions using all sample observations with a dummy variable to indicate a particular subperiod and its interaction terms with some key explanatory variables.

To save space, we report the coefficients of key variables of interest. SubD is a dummy to indicate a particular subperiod and represents different subperiods in different columns. The coefficients on the interactive dummy variables given by the products of SubD and RepeatD are all negative but significant only when the subperiod dummy indicates the second and third subperiods in columns (5) and (6), suggesting that repeaters' performance is significantly worse than other buyback firms' during the second and third subperiods. Among others, the coefficients of the interaction of the SubD dummy with changes in leverage are significantly positive across all columns, indicating that increase in leverage had less devastating effects on stock performance in later subperiods.

Finally, unreported results based on difference-in-difference approaches[18] to estimate the effects of buybacks on stock performance after controlling for possible confounding factors also show that repurchasing firms in the second subperiod do not perform significantly better than their matching firms over three years following buyback announcements, consistent with the findings in Tables II and III. Overall, the regression results provide evidence that buyback firms in the second subperiod, especially repeaters, perform significantly worse than others even after controlling for other factors.

VI. Compensation, equity ownership, institutional ownership, and analyst forecasts

As discussed earlier, the poorer performance of buyback firms in the second subperiod can simply be due to unfortunate timing of buybacks prior to the global financial crisis. It is possible that firms that return cash back to shareholders through share repurchases suffer more during a crisis due to the reduced buffer to survive the crisis period. However, relatively stable investments made by buyback firms in the second subperiod following buyback announcements cast doubt on this explanation. It is also possible that buybacks in the second subperiod that corresponds to up markets following the burst of internet bubble are not motivated by undervaluation but more by other reasons such as pressures from outside active investors to repurchase more shares or managerial self-interests to obtain more compensation by boosting stock prices using share repurchase announcements. Excellent stock performance of buyback firms in the second subperiod prior to buyback announcements, as shown in Figure 2, is consistent with this possibility. To further explore this possibility, we examine changes in

[18] For this approach, we use both repurchasing firms and their corresponding five industry, size and B/M-adjusted matching firms' values. Dependent variables are changes in three-year buy-and-hold returns and alphas from the four-factor model. Different from the regression analyses used in Tables X and XI, all share repurchase related variables are not included here. Instead, a dummy variable to indicate share repurchasing firms is added. Finally, instead of matching firms-adjusted abnormal prior return, raw returns over the one-year period prior to buyback announcements are used.

executive compensation, changes in transient institutional investors' shareholdings, and analyst earnings forecasts.

The three left-hand panels of Figure 4 show the matching-firm-adjusted level of senior managers' equity-linked compensation for buyback firms that announce repurchases during the three subperiods 1994-2001, 2002-2006, and 2007-2011. Executive compensation data are from the S&P ExecuComp database and details on how we construct these variables are explained in Appendix. The panels show that equity-linked compensation of buyback firms is greater than that of matching firms both before and after buyback announcements for the firms that announce repurchases during second and third periods, indicating that managers of buyback firms in the second and third subperiods had stronger incentives to support their stock prices compared to the managers of matching firms. This finding, combined with the previous finding of lower abnormal returns during the second and third subperiods, is consistent with the hypothesis that some buybacks during the second and third subperiods were motivated by a desire to support stock prices. Panels A and B of Table XII report mean and median abnormal changes in equity-linked executive compensation and executive equity ownership. The point estimates indicate positive abnormal changes in equity-linked compensation following buyback announcements during the second subperiod, though only the change in the median for the full sample is significant.

If buybacks are due to pressure from short-term oriented institutional investors, we expect to observe significant decreases in transient institutional investors' holdings after buyback announcements. Using the classification of institutional investors made by Bushee (2001) and the institutional holdings information from the Thomson Reuters' Institutional (13f) Holdings data (s34), we report abnormal changes in transient institutional holdings three years before and

after buyback announcements in Panel C of Table XII.[19] The results show that the ownership of transient institutional investors significantly drops after buyback announcements in all subperiods, consistent with transient investors selling shares after buyback announcements to take advantage of the positive effects of buyback announcements. Interestingly, for repeaters, the decreases in holdings during the second subperiod are significantly greater than the decreases experienced by buyback firms in the first subperiod. The results are consistent with possible increases in pressures to buy back shares by short-term oriented institutional investors, especially for repeaters during the second subperiod.

In Table XIII, we report abnormal changes in analysts earnings forecasts and forecasts errors one month before and one month after buyback announcements. Earnings forecasts data are from IBES and details on the way we construct each variable are explained in Appendix. The results indicate that abnormal changes in earnings forecasts and earnings forecasts errors are significantly more negative in the second subperiod, supporting the possibility that undervaluation is a less likely explanation for buybacks announced in the second subperiod. We also check analysts' recommendations around buyback announcements in Figure 4, and find that analysts issue worse recommendations following buybacks announced in the second subperiod, further supporting the possibility that undervaluation is not the main driver behind buybacks announced after 2001.

VII. Summary and Conclusion

As more firms repurchase their shares in recent years, critics express their concerns over excessive buybacks. Prior to the Jobs and Growth Tax Relief Reconciliation Act of 2003, returning excess cash back to shareholders through buybacks benefited taxable shareholders by

[19] The data are available on the Brian Bushee's website (http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html).

providing tax savings over cash dividend payments. However, even after the disappearance of tax advantages following the Act, the growth of buybacks did not stop and more firms have continued to use buybacks as a way to return cash back to shareholders. This trend suggests that the most cited motivation behind buybacks, i.e., undervaluation, is not likely to be the main driver behind recent buybacks. As survey results (e.g., Brave, Graham, Harvey, and Michaely (2004)) indicate, most CFOs mention "flexibility" as the main reason why they would prefer buybacks over cash dividends. If this is indeed the reason behind the recent popularity of buybacks, then previously documented outperformance of buyback firms need to be closely reexamined.

In a relatively recent study, Peyer and Vermaelen (2009) reexamine the stock performance of buyback firms using a sample of buybacks announced between 1991 and 2001, and conclude that buyback firms, especially small and value firms, continue to outperform their benchmarks even after the publication of evidence showing buyback firms' long-term abnormal performance (e.g., Ikenberry, Lakonishok and Vermaelen (1995)). They conclude that the market continues to overreact to bad news regarding buyback firms prior to buyback announcements and therefore, we continue to observe outperformance of buyback firms even after the evidence is well publicized.

However, as some critics of buybacks point out, firms started to increase their buybacks even in up markets in more recent periods, which is not easily reconciled with the undervaluation being the main motivation. Therefore, in this paper, we closely examine the performance and various investment and financing policies of buyback firms in recent up markets during 2002 and 2006 and compare them with those of buyback firms before and after the period. We find that the long-horizon abnormal returns following repurchase announcements made after 2001 are

much smaller than those following earlier announcements. Firms that announce repurchases during the second subperiod, 2002-2006, do not outperform their benchmark firms at all. In addition, we find that relative to benchmark firms, risk does not significantly decrease during the second subperiod, which is different from the results in other periods.

We further investigate whether the relatively poor performance of buybacks in recent up markets is due to changes in main drivers behind buybacks. Earlier studies provide evidence supporting undervaluation or reduction of free cash flows as main drivers behind buybacks in earlier periods. However, it is very plausible that in recent years, firms are more pressured to return cash back to investors who are aware of the market's positive reaction to buyback announcements and want to earn even higher returns after experiencing positive returns as Carl Ichan pressed Apple to buyback more shares. Alternatively, it is possible that managers whose compensation is tightly linked to stock performance become more aware of buyback's positive announcement effects in recent years and use buyback announcements to boost up stock prices for their own benefits. If these non-fundamental related motivations drive buyback waves in recent up markets, we would expect poorer performance of these. The documented evidence is consistent with these possibilities. In addition, if buybacks are done due to such pressures, buyback firms during a market-wide crisis are likely to face with more difficult times than others. This might indeed be a reason why buyback firms' stock returns, especially those repeating repurchasers', became significantly more volatile following buybacks, even compared to matching firms, in the second subperiod, being different from the results in other periods.

As discussed earlier, in a contemporaneous paper, Fu and Huang (2015) provide alternative explanations for the disappearance of long-run abnormal returns following share repurchases and seasoned equity offerings. Even though we cannot exclude the possibility that

an increase in price efficiency is a possible reason behind poorer performance of recent buyback firms, the results in our paper suggest that the increased presence of short-term oriented investors, which has led firms to base their buyback decisions less on fundamental reasons, can be a reason behind the changes in stock performance following share repurchases.

The results in the paper indicate that both investors and regulators need to pay close attention to possibly different motivations behind buybacks in making their investment decisions and policy recommendations. Even though the Internal Revenue Service (IRS) may be less concerned about regular buybacks given significantly smaller tax advantages of buybacks relative to cash dividends under the current tax rules, investors and regulators should be more concerned about those firms that regularly announce buybacks, especially during up markets. Investors should not naively interpret the announcement of buybacks as positive signals and regulators should continue to pay attention to the possibility of buybacks being used a way to manipulate stock prices. Buybacks have changed and consequently, investors and regulators should adjust their views on buybacks in different market environments.

Appendix
Definitions of Variables[20]

The following describe how each variable is measured. In most analyses, matching firm-adjusted abnormal changes in performance, risk, investment, and financial policies are calculated by subtracting average changes experienced by five industry, size and B/M-adjusted matching firms from changes of the corresponding repurchasing firm. In most analyses, changes are measured by comparing average values estimated over three years before and three years after buyback announcements.

Variables	Definitions
5-day AR	Announcement period abnormal return calculated as returns of repurchasing firms over five-day period around buyback announcement dates (-2, +2) minus average returns of five industry, size and B/M-adjusted matching firms over the same period.
AR-1	Prior abnormal return that is the difference between REP-1 and MAT-1 where REP-1 and MAT-1 are average raw returns over the one-year period prior to buyback announcements for repurchasing firms and industry, size, and B/M-matched control firms, respectively.
B/M quintile (B/M)	At the end of each June starting from 1993, book-to-market equity ratio (B/M) quintiles are formed based on the book value of equity at the nearest fiscal year end with at least a four-month lag and the market capitalization at the end of December of the previous calendar year. Cutoff points are based only on the NYSE-listed firms.
Beta from CAPM (Beta)	To estimate beta from the CAPM, monthly market risk premiums and risk free rates from the Kenneth French's website are used.[21] Prior risk loadings are based on the coefficient estimates using 36 monthly returns prior to announcements and post risk loadings are based on the coefficient estimates using 37 monthly returns starting from the month of buyback announcements.
Buy-and-Hold Abnormal Returns (BHAR)	Buy-and-hold abnormal returns (BHARs) are calculated by subtracting the equally-weighted average buy-and-hold return of five industry, size, and B/M-matched firms from the corresponding buy-and-hold return of buyback firms. Five matching firms are selected for each buyback firm among those in the same industry (based on 12 industry classifications available on the Kenneth French's website) and size and B/M quintiles with the closest market capitalizations at the end of the month prior to buyback announcements. Size and B/M quintiles are formed as explained in this table.
Cash Reserve (Cash)	Cash reserve is defined as cash and short-term investments (CHEQ) over total assets (ATQ).

[20] Quarterly Compustat reports cumulative values from the beginning of the fiscal year for capital expenditures (CAPXY), dividends (DVY), financial deficit related variables (SSTKY, DLTISY and DLTRY), and repurchase related variables (PRSTKCCY, PRSTKCY and PRSTKPCY). For these variables, we estimate quarterly amounts by subtracting the relevant values of the previous quarter from the reported values of the quarter except for the first fiscal quarter.

[21] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Dividend Payout Ratio (DPR)	Average dividend payout ratio over a measurement horizon longer than a quarter is defined as the sum of quarterly cash dividends (calculated using DVY) over the sum of quarterly net incomes (NIQ) during the measurement period. When the sum of net incomes is zero or negative, DPR is set to be missing.
Dummy for Undervaluation (UnderD)	Dummy for undervaluation indicates those with the Purpose Code assigned by the SDC Platinum database being either "Undevaluation" or "Enhancement of Shareholder Value".
Equity-linked compensation (EComp)	Equity-linked compensation as a percentage of total compensation (TDC1). Equity-linked compensation is defined as option awards (OPTION_AWARDS, OPTION_AWARDS_BLK_VALUE, or OPTION_AWARDS_FV, whichever is available first in the order written) plus stock awards (STOCK_AWARDS or STOCK_AWARDS, whichever is available first in the order written. If both stock awards variables are missing but option awards are positive, then stock awards are assumed to be zero). If equity-linked compensation based on this definition cannot be calculated due to missing data, then equity-linked compensation is alternatively defined as total compensation (TDC1) – salary plus bonus (TOTAL_CURR) – non-equity compensation (NONEQ_INCENT). All are from S&P's ExecuComp and the names of variables are in parentheses.
Equity ownership (EOwn)	Sum of equity ownership of top executives covered in the S&P's ExecuComp database. Equity ownership is the percentage of equity owned by an executive (SHROWN_TOT_PCT) if available, or the number of shares owned (SHROWN_TOT) divided by the current outstanding shares (CSHO) at the fiscal year end, which are available in the annual Compustat database.
EPS forecast changes (EPSF)	EPS forecast changes are defined as changes in mean earnings per share (EPS) forecasts (MEANEST) made by analysts one month before and one month after the month of buyback announcements as a percentage of closing stock price on the buyback announcement date. The data are from IBES.
EPS forecast errors changes (EPSFE)	EPS forecast error changes are defined as differences in EPS forecast errors one month before and one month after the month of buyback announcements as a percentage of closing stock price on buyback announcement dates. Forecast errors are defined as mean EPS forecast (MEANEST) minus actual EPS (ACTUAL). The data are from IBES.
Financial deficit (FD)	Financial deficit is defined as financial deficits (total amount of net external capital raised) over total assets (ATQ). Quarterly financial deficit is defined as: sale of common and preferred stocks (*SSTKY*) – purchase of common and preferred stocks (*PRSTKCY*) + long-term debt issuance (*DLTISY*) – long-term debt reduction (*DLTRY*).
Implied Return Volatilities (IVol)	Implied volatilities are from Riskmetrics and represent average daily implied volatilities of the nearest-money call options with the shortest time to maturity among the options with at least 21 days to maturities. Implied volatilities are available from 1996.
Investment (Inv)	Investment is measured as capital expenditures (CAPXY) over total assets (ATQ).

Leverage (Lev)	Leverage is defined as long-term debt (DLTTQ) over total assets (ATQ).
Number of Subsequent Authorizations (#SubAuth)	Number of subsequent authorizations is the number of authorizations made following the initial authorization, which are classified as a part of one program by the SDC Platinum database.
Operating cash flow volatilities (OVol)	Operating cash flow volatilities are standard deviations of quarterly operating cash flows (OIBDPQ) over average of total assets (ATQ) at the beginning and end of the quarter measured over the number of quarters within the measurement period.
Operating Performance (ROA)	Operating performance is measured by quarterly operating cash flows (OIBDPQ) as a percentage of total assets (ATQ).
Realized Return Volatilities (Vol)	Realized volatilities are standard deviations of monthly returns over the measurement period.
Repeat repurchasing firms (RepeatD)	Repeat repurchasers are defined as buyback firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years.
Risk Premiums from the 4-Factor Model (RPrem)	Risk premiums based on the 4-factor model is the sum of each risk coefficient estimate times the average premium of the corresponding risk factor over the period, 1991 – 2014. Monthly risk premiums of four factors, market, size, value and momentum, are from the Kenneth French's website. Prior risk loadings are based on the coefficient estimates using 36 monthly returns prior to buyback announcements and post risk loadings are based on the coefficient estimates using 37 monthly returns on and after announcement dates. We set the risk premium to be missing if the estimated risk premium is negative. The average monthly market, size, value and momentum risk premiums during 1991 and 2014 were 0.69%, 0.24%, 0.28%, and 0.51%, respectively.
Target Shares (Target)	Target shares represent the percentage of outstanding shares targeted to repurchase at the initial announcements.
Total Payout Ratio (TPR)	Average total payout ratio is defined as the sum of quarterly dividends (DVY) plus share repurchases over the sum of quarterly net incomes (NIQ) during the measurement period. Share repurchase amounts are defined as the purchase of common stock (PRSTKCCY, cash flow statement) if available. Otherwise, they are defined as the purchase of common and preferred stock (PRSTKCY) (but subtract the purchase of preferred/preference stock (PRSTKPCY, cash flow statement) when it is available). We set TPR to be zero when the sum of net incomes is zero or negative.
Transient Institutional Investors	Bushee (2001) classify active institutional investors as dedicated, quasi-indexers and transient institutions based on a factor analysis and cluster analysis approach. Transient institutions are characterized by high portfolio turnover and highly diversified portfolio holdings. The classification data are available in the Brian J. Bushee's website (http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html)

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Table I
Summary Statistics

This table reports the summary statistics of open-market share repurchases announced during 1994 and 2011. N is the number of announcements. 5-day AR is the repurchase firm's return measured over the 5-day window (-2, 2) minus the corresponding average return of five industry, size, and B/M-matched control firms. REP-1 and MAT-1 are average raw returns over the one-year period prior to buyback announcements for repurchasing firms and matching firms, respectively. AR-1 is the difference between REP-1 and MAT-1. Target Shares (%) is the percentage of shares announced to buyback at the announcement as a percentage of total outstanding shares. Size quintile (1 is the smallest) is based on the market value of repurchasing firm's equity at the end of June prior to the announcement relative to all NYSE firms. BM quintile (1 is the lowest) is based on the ratio of the book value to the market value of equity. REP (MAT) DPR and TPR represent repurchasing firms' (matching firms') average dividend payout ratios and total payout ratios over the past three years prior to the announcement of share repurchases, respectively. Except for the number of observations (N), averages are reported. For abnormal returns, p-values for the test of mean being zero are reported in parentheses. Panels A, B and C report the results for all sample buybacks, repeat repurchasers and non-repeat repurchasers, respectively. Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In Panel D, the differences in values between non-repeat repurchasers and repeat repurchasers are reported. All variables are winsorized at the 1st and 99th percentiles. In columns (2)-(3), ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significance levels, respectively. In Panel D, bold characters indicate that the difference between non-repeaters and repeaters is significantly different from zero at least at the 10% significance level.

	1994-2001 (1)	2002-2006 (2)	2007-2011 (3)	All (4)
Panel A: All				
N	5,540	2,611	2,395	10,546
5-day AR	2.01% (0.000)	1.20%*** (0.000)	1.37%*** (0.000)	1.67% (0.000)
REP -1	1.47%	14.33%***	3.14%***	5.03%
MAT -1	14.79%	19.98%	9.07%	14.78%
AR -1	-13.32% (0.000)	-6.01%*** (0.000)	-6.03%*** (0.000)	-9.86% (0.000)
Target Shares (%)	6.71	6.41***	7.61***	6.84
Size quintile	2.31	2.49***	2.43***	2.38
B/M quintile	2.95	2.71***	2.77***	2.85
REP DPR	13.73%	13.15%***	17.33%***	14.58%
MAT DPR	21.63%	21.50%***	28.50%***	23.24%
REP TPR	30.89%	52.07%***	84.87%***	48.16%
MAT TPR	37.33%	46.92%***	75.98%***	48.47%
Panel B: Non-Repeat repurchasers				
N	4,176	1,297	1,253	6,726
5-day AR	1.97% (0.000)	1.46%* (0.000)	1.35%** (0.000)	1.75% (0.000)
REP -1	-1.40%	12.53%***	0.19%	1.58%
MAT -1	13.67%	18.71%***	7.42%***	13.48%
AR -1	-15.07% (0.000)	-6.53%*** (0.000)	-7.47%*** (0.000)	-12.01% (0.000)
Target Shares (%)	6.84	6.50**	7.70***	6.93
Size quintile	2.27	2.37**	2.14***	2.26
B/M quintile	2.83	2.68***	2.81	2.80
REP DPR	12.71%	11.70%	13.32%	12.63%
MAT DPR	21.55%	21.24%	28.05%***	22.76%

REP TPR	28.33%	43.39%***	51.59%***	35.31%
MAT TPR	37.76%	48.51%***	72.60%***	46.30%
Panel C: Repeat repurchasers				
N	1,364	1,314	1,142	3,820
5-day AR	2.15% (0.000)	0.95%*** (0.000)	1.39%*** (0.000)	1.51% (0.000)
REP -1	10.25%	16.12%***	6.37%***	11.11%
MAT -1	18.21%	21.24%**	10.88%***	17.06%
AR -1	-7.98% (0.000)	-5.50%* (0.000)	-4.46%** (0.000)	-6.07% (0.000)
Target Shares (%)	6.32	6.32	7.51***	6.67
Size quintile	2.43	2.61***	2.75***	2.59
B/M quintile	3.31	2.73***	2.73***	2.94
REP DPR	19.07%	14.86%***	21.73%*	18.61%
MAT DPR	21.85%	21.76%	28.98%***	24.07%
REP TPR	38.04%	59.57%***	117.68%***	68.75%
MAT TPR	36.03%	45.40%***	79.64%***	52.20%
Panel D: Difference between non-repeat and Repeat repurchasers				
N	2,812	-17	111	2,906
5-day AR	-0.18%	**0.51%***	-0.04%	0.25%
REP -1	**-11.65%**	**-3.59%*****	**-6.18%*****	**-9.53%**
MAT -1	**-4.53%**	**-2.53%**	**-3.46%**	**-3.58%**
AR -1	**-7.09%**	-1.03%***	**-3.01%****	**-5.93%**
Target Shares (%)	**0.52**	0.17	0.19	**0.26**
Size quintile	**-0.16**	**-0.24**	**-0.61*****	**-0.32**
B/M quintile	**-0.48**	-0.05***	0.08***	**-0.14**
REP DPR	**-6.36%**	**-3.15%****	**-8.40%**	**-5.97%**
MAT DPR	-0.29%	-0.52%	-0.93%	**-1.31%**
REP TPR	**-9.70%**	**-16.18%**	**-66.08%*****	**-33.44%**
MAT TPR	1.74%	3.10%	**-7.04%****	**-5.90%**

Table II

Buy-and-Hold Abnormal Returns (BHARs) and Cumulative Abnormal Returns (CARs)

Buy-and-hold abnormal returns (BHARs) and cumulative abnormal returns (CARs) are reported for three subperiods and for total. BHARs are calculated by subtracting average buy-and-hold return of industry, size, and B/M-matched firms from the corresponding buy-and-hold return of buyback firms while CARs are calculated using monthly alphas estimated based on the Ibbotson (1975)'s regression across time and securities (RATS) method. In Panel B, BHARs and CARs over the three-year period following buyback announcements are reported for non-repeat purchasers and repeat purchasers as well as their differences in BHARs and CARs are reported. Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In each cell under the "BHAR", average BHAR is reported on top, p-value is reported in parentheses and the number of buybacks is reported at the bottom. Under the "CAR" column, CAR is reported on top, p-value is reported in parentheses and the percentage of buybacks with positive BHAR is reported at the bottom. P-values of CARs are calculated based on standard errors estimated assuming independence of monthly alphas being cumulated. In the "Non-Rep - Repeater" row of Panel B, the differences in BHARs and CARs between non-repeaters and repeaters are reported on top and p-values are reported at the bottom. All variables are winsorized at the 1st and 99th percentiles. In columns (3)-(6), ***, **,* indicate significantly different values between the first subperiod and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	BHAR	CAR	BHAR	CAR	BHAR	CAR	BHAR	CAR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:Total Sample (BHAR)								
	2.84%	2.54%	1.93%	2.31%	2.97%	0.60%***	2.64%	2.20%
3-month	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.158)	(0.000)	(0.000)
	5,540	54.44%	2,611	53.77%	2,395	54.66%	10,546	54.32%
	3.35%	3.90%	1.92%	4.01%	3.62%	1.07%***	3.05%	3.49%
6-month	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.069)	(0.000)	(0.000)
	5,527	52.83%	2,610	52.15%	2,384	55.29%**	10,521	53.22%
	5.42%	7.25%	1.70%**	4.65%**	5.29%**	1.26%***	4.46%	5.67%
1-year	(0.000)	(0.000)	(0.027)	(0.000)	(0.000)	(0.152)	(0.000)	(0.000)
	5,486	52.61%	2,597	48.86%***	2,365	53.66%	10,448	51.91%
	9.78%	16.57%	1.90%***	4.83%***	5.94%***	2.35%***	6.95%	10.91%
2-year	(0.000)	(0.000)	(0.109)	(0.000)	(0.000)	(0.079)	(0.000)	(0.000)
	5,316	52.22%	2,516	45.87%***	2,323	52.17%	10,155	50.64%
	17.33%	25.63%	0.74%***	5.45%***	8.44%***	5.76%***	11.13%	16.66%
3-year	(0.000)	(0.000)	(0.646)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	4,845	53.77%	2,317	44.89%***	2,201	51.61%*	9,363	51.06%
Panel B: Non-Repeater vs. Repeater (3-year BHAR)								
	15.35%	24.28%	8.67%*	9.48%***	8.43%**	2.96%***	12.75%	18.23%
Non-Repeater	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.196)	(0.000)	(0.000)
	3,659	51.90%	1,141	47.85%**	1,124	49.64%	5,924	50.69%
	23.43%	30.93%	-6.95%***	1.44%***	8.44%***	9.01%***	8.35%	14.34%
Repeater	(0.000)	(0.000)	(0.000)	(0.367)	(0.000)	(0.000)	(0.000)	(0.000)
	1,186	59.53%	1,176	42.01%***	1,077	53.67%***	3,439	51.70%
Non-R -	-8.08%	-6.64%	15.62%***	8.04%***	-0.01%*	-6.05%	4.41%	3.89%
Repeater	(0.016)	(0.000)	(0.000)	(0.000)	(0.998)	(0.000)	(0.023)	(0.000)

Table III
4-Factor Alphas Based on the Monthly Calendar Time Portfolio Approach

Alphas estimated from the monthly 4-factor model (Carhart (1994)) are reported in this table. In each month, buyback portfolios are formed, which are composed of stocks with open market share repurchases announced within the past one-year (in Panel A) and three-year (in Panel B) periods. Monthly value-weighted returns and equally-weighted returns of these portfolios are used to estimate the alphas. Portfolios are formed using all sample buyback firms as well as using only non-repeaters and repeaters, separately. "Non-Rep – Repeater" rows represent the results of the long-short portfolios, long in non-repeaters and short in repeaters. Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. The intercept (alpha) is reported on top and p-value based on heteroskedasticity-adjusted standard errors is reported at the bottom. In columns (3)-(6), ***, **, * indicate significantly different values between the first subperiod and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	VW	EW	VW	EW	VW	EW	VW	EW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: One-Year								
# of Months	108	108	71	71	70	70	227	227
All	0.230	0.692	0.026	0.369	0.203	0.198**	0.187	0.470
	(0.231)	(0.000)	(0.861)	(0.011)	(0.098)	(0.143)	(0.046)	(0.000)
Non-Repeater	0.195	0.688	0.137	0.442	0.151	0.173**	0.228	0.481
	(0.491)	(0.000)	(0.597)	(0.011)	(0.332)	(0.228)	(0.064)	(0.000)
Repeater	0.276	0.701	-0.032	0.297	0.241	0.231	0.203	0.464
	(0.285)	(0.003)	(0.841)	(0.049)	(0.135)	(0.178)	(0.120)	(0.000)
Non-R - Repeater	-0.072	-0.024	0.168	0.145	-0.090	-0.058	0.028	0.013
	(0.826)	(0.905)	(0.559)	(0.320)	(0.675)	(0.734)	(0.859)	(0.907)
Panel B: Three-Year								
# of Months	132	132	95	95	94	94	251	251
All	0.173	0.578	0.023	0.221*	0.276	0.238**	0.212	0.446
	(0.072)	(0.000)	(0.831)	(0.117)	(0.000)	(0.003)	(0.001)	(0.000)
Non-Repeater	0.129	0.577	0.369	0.348	0.166	0.174**	0.281	0.450
	(0.343)	(0.000)	(0.012)	(0.018)	(0.162)	(0.071)	(0.000)	(0.000)
Repeater	0.194	0.580	-0.201*	0.088**	0.326	0.325	0.186	0.448
	(0.323)	(0.002)	(0.151)	(0.589)	(0.002)	(0.005)	(0.086)	(0.000)
Non-R - Repeater	0.183	0.010	0.571*	0.260	-0.160	-0.151	0.099	-0.002
	(0.178)	(0.924)	(0.004)	(0.053)	(0.369)	(0.261)	(0.435)	(0.981)

Table IV
Abnormal Changes in Risk Loadings and Risk Premiums: CAPM and 4-Factor Model over Three-Year Periods Before and After Buyback Announcements

Matching firm-adjusted abnormal changes in beta and risk premiums are reported in this table. For each repurchasing firm, the CAPM and the 4-factor model (Carhart (1994)) are used to estimate the risk loadings using monthly returns over 73 months around announcement dates (36 months prior to and 36 months following announcements). Prior risk loadings are based on the coefficient estimates using 36 monthly returns prior to announcements and post risk loadings are based on the coefficient estimates using 37 monthly returns on and after announcement dates. Using the same time horizons used for repurchasing firms' risk loading estimations, corresponding risk loadings of industry, size, and B/M-matched firms are estimated. The average of five matching firms' loadings are used as the benchmark changes. Matching firm-adjusted abnormal changes are differences in changes in betas and risk premiums before and after announcements after controlling for average changes of matching firms. In Panel A, matching firm-adjusted changes in beta from the CAPM is reported and in Panel B, matching firm-adjusted risk premiums calculated based on the estimated risk loadings and the average risk premiums in the 4-factor model, which are estimated over the period, 1991 – 2014, are reported. Risk premiums are set to be missing when estimated risk premiums are zero or negative. All variables are winsorized at the 1st and 99th percentiles. In each cell of column "Mean" ("Median"), the average (median) matching firm-adjusted changes before and after buyback announcements are reported on top, p-values for the test of significance of mean (median) are reported in parentheses, and the number of observations (the percentage of firms with positive matching firm-adjusted changes) are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Matching Firm-Adjusted Abnormal Changes in Beta from CAPM (Beta)								
All (%)	-0.049	-0.047	0.014*	0.022***	-0.044*	-0.045	-0.032	-0.026
	(0.000)	(0.000)	(0.539)	(0.276)	(0.021)	(0.011)	(0.001)	(0.000)
	5,165	47.57%	2,389	51.32%***	2,319	47.48%	9,873	48.46%
Non-Repeater (%)	-0.064	-0.061	-0.004*	0.003*	-0.134**	-0.134**	-0.066	-0.064
	(0.000)	(0.000)	(0.911)	(0.955)	(0.000)	(0.000)	(0.000)	(0.000)
	3,892	47.25%	1,193	50.21%*	1,200	43.67%**	6,285	47.13%
Repeater (%)	-0.002	-0.024	0.032	0.038**	0.053*	0.022**	0.027	0.011
	(0.934)	(0.256)	(0.264)	(0.078)	(0.028)	(0.090)	(0.063)	(0.158)
	1,273	48.55%	1,196	52.42%*	1,119	51.56%	3,588	50.78%
Non-Rep - Repeater (%)	-0.063	-0.037	-0.036	-0.035	-0.187	-0.155	-0.093	-0.075
	(0.046)	(0.090)	(0.279)	(0.279)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Matching Firm-Adjusted Abnormal Changes in Risk Premium based on 4-Factor Model (RPrem)								
All (%)	-3.097	0.033	-1.967***	-0.073	-0.967***	0.761*	-2.317	0.181
	(0.000)	(0.120)	(0.000)	(0.590)	(0.030)	(0.035)	(0.000)	(0.581)
	4,820	50.08%	2,354	49.66%	2,175	53.29%**	9,349	50.72%
Non-Repeater (%)	-3.368	-0.287	-2.078	-0.102	-2.172	0.121	-2.886	-0.126
	(0.000)	(0.072)	(0.010)	(0.719)	(0.002)	(0.702)	(0.000)	(0.074)
	3,598	49.47%	1,155	49.18%	1,121	50.67%	5,874	49.64%
Repeater (%)	-2.298	0.437	-1.859	0.066	0.315***	1.152*	-1.354	0.514
	(0.001)	(0.816)	(0.006)	(0.693)	(0.548)	(0.000)	(0.000)	(0.071)
	1,222	51.88%	1,199	50.13%	1,054	56.07%**	3,475	52.55%
Non-Rep - Repeater (%)	-1.070	-0.725	-0.218	-0.168	-2.487	-1.031	-1.532	-0.641
	(0.289)	(0.424)	(0.646)	(0.646)	(0.012)	(0.000)	(0.009)	(0.055)

Table V
Abnormal Changes in Realized and Implied Returns Volatilities and Operating Cash Flows Volatilities over Three-Year Periods Before and After Buyback Announcements

Matching firm-adjusted abnormal changes in realized and implied returns volatilities and volatilities of quarterly operating cash flows before and after buyback announcements are reported in this table. Realized volatilities are estimated using 73 monthly returns around buyback announcements while implied volatilities are from Riskmetrics, and represent average daily implied volatilities of the nearest-money call options with the shorted time to maturity among the options with at least 21 days to maturities. Implied volatilities are available from 1996. Operating cash flow volatilities are standard deviations of quarterly operating cash flows (OIBDPQ) over average of total assets (ATQ) at the beginning and at the end of the quarter. Prior risk measures are based on the estimates using the data over the 36-month period prior to announcements and post estimates are based on the estimates using the data over the 37-month period starting from the month of announcements. Using the same time horizons used for repurchasing firms' estimates, corresponding risk measures of industry, size, and B/M-matched firms are estimated. The average of five matching firms' estimates is used as the benchmark changes. Matching firm-adjusted abnormal changes are differences between changes of buyback firms before and after announcements and average changes of matching firms. In each cell under the column "Mean" ("Median"), average (median) matching firm-adjusted abnormal changes are reported on top, p-values for the test of significance of mean (median) are reported in parentheses, and the number of observations (the percentage of firms with positive matching firm-adjusted abnormal changes) are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Matching Firm-Adjusted Abnormal Changes in Realized Volatilities (Vol, %)								
All	-0.742	-0.585	0.135***	0.227***	-0.516***	-0.373**	-0.474	-0.369
	(0.000)	(0.000)	(0.250)	(0.030)	(0.000)	(0.000)	(0.000)	(0.000)
	5,538	43.88%	2,611	52.01%	2,394	46.83%	10,543	46.56%
Non-Repeater	-0.852	-0.687	-0.272***	-0.342***	-1.115	-0.966	-0.789	-0.647
	(0.000)	(0.000)	(0.152)	(0.095)	(0.000)	(0.000)	(0.000)	(0.000)
	4,175	43.19%	1,297	47.11%**	1,252	42.49%	6,724	43.81%
Repeater	-0.405	-0.404	0.537***	0.674***	0.140**	0.266***	0.082	0.157
	(0.003)	(0.000)	(0.000)	(0.000)	(0.441)	(0.446)	(0.345)	(0.166)
	1,363	46.00%	1,314	56.85%***	1,142	51.58%***	3,819	51.40%
Non-R - Repeater	-0.447	-0.283	-0.810	-1.015	-1.254	-1.232	-0.871	-0.804
	(0.023)	(0.007)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Matching Firm-Adjusted Abnormal Changes in Implied Volatilities (IVol, %)								
All	-1.717	-0.904	2.488***	2.343***	2.138***	0.782*	-0.204	-0.004
	(0.004)	(0.006)	(0.003)	(0.001)	(0.234)	(0.334)	(0.667)	(0.807)
	666	46.40%	291	57.39%***	96	52.08%	1,053	49.95%
Non-Repeater	-2.086	-1.439	2.243***	2.343***	1.502*	1.294	-0.878	-0.386
	(0.003)	(0.003)	(0.081)	(0.087)	(0.529)	(0.747)	(0.144)	(0.108)
	505	45.74%	149	57.05%**	61	50.82%	715	48.53%
Repeater	-0.561	-0.289	2.745**	2.110**	3.245	0.465	1.222	1.101
	(0.607)	(0.833)	(0.012)	(0.005)	(0.229)	(0.272)	(0.102)	(0.039)
	161	48.45%	142	57.75%	35	54.29%	338	52.96%
Non-R - Repeater	-1.525	-1.149	-0.501	0.233	-1.743	0.829	-2.099	-1.487
	(0.270)	(0.174)	(0.766)	(0.681)	(0.641)	(0.498)	(0.038)	(0.014)
Panel C: Matching Firm-Adjusted Abnormal Changes in Operating Cash Flows Volatilities (OVol, %)								
All	0.000	0.001	0.027	0.011	0.017	0.048*	0.011	0.011
	(0.983)	(0.715)	(0.280)	(0.130)	(0.560)	(0.006)	(0.452)	(0.024)
	5,162	50.27%	2,528	51.46%	2,343	52.67%*	10,033	51.13%
Non-	-0.029	-0.003	-0.041	0.007	-0.014	0.010	-0.028	0.001

Repeater	(0.292)	(0.461)	(0.329)	(0.822)	(0.749)	(0.311)	(0.166)	(0.782)
	3,870	49.79%	1,254	50.64%	1,224	50.74%	6,348	50.14%
	0.088	0.012	0.094	0.014	0.051	0.062	0.079	0.025
Repeater	(0.005)	(0.032)	(0.001)	(0.019)	(0.143)	(0.002)	(0.000)	(0.000)
	1,292	51.70%	1,274	52.28%	1,119	54.78%	3,685	52.84%
Non-R -	-0.117	-0.015	-0.135	-0.007	-0.065	-0.051	-0.107	-0.024
Repeater	(0.021)	(0.034)	(0.007)	(0.144)	(0.257)	(0.337)	(0.000)	(0.002)

Table VI
Abnormal Changes in Investments and Cash Reserves over Three-Year Periods Before and After Buyback Announcements

Matching firm-adjusted abnormal changes in investments and cash reserves before and after buyback announcements are reported in this table. Details on how we measure quarterly investments and cash reserves are available in Appendix. Changes in investments (cash reserves) are average quarterly investments (cash reserves) over the three-year period following buyback announcements minus average investments (cash reserves) over the three-year period prior to buyback announcements. For each buyback, five industry, size and B/M-adjusted matching firms' changes are calculated over the same horizons as those used for the corresponding buyback firm and the average of five (or less depending on the availability of the data) changes is subtracted from the corresponding buyback firm's change to calculate matching firm-adjusted abnormal changes in investments or cash reserves. In each cell under the column "Mean" ("Median"), average (median) matching firm-adjusted abnormal changes are reported on top, p-values for the test of significance of mean (median) are reported in parentheses, and the number of observations (the percentage of firms with positive matching firm-adjusted abnormal changes) are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	Mean (1)	Median (2)	Mean (3)	Median (4)	Mean (5)	Median (6)	Mean (7)	Median (8)
Panel A: Matching Firm-Adjusted Abnormal Changes in Investment (Inv, %)								
All	0.087	0.066	0.072	0.027*	0.040	0.0227***	0.069	0.036
	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)	(0.000)	(0.000)
	3,838	54.82%	2,215	56.34%	2,392	55.43%	8,445	55.39%
Non-Repeater	0.077	0.063	0.108	0.039	0.037	0.021**	0.075	0.043
	(0.000)	(0.000)	(0.000)	(0.000)	(0.112)	(0.010)	(0.000)	(0.000)
	3,230	54.43%	1,194	56.95%	1,250	54.72%	5,674	55.02%
Repeater	0.136	0.076	0.029**	0.022**	0.043**	0.024**	0.058	0.027
	(0.002)	(0.000)	(0.152)	(0.009)	(0.026)	(0.000)	(0.000)	(0.000)
	608	56.91%	1,021	55.63%	1,142	56.22%	2,771	56.15%
Non-R - Repeater	-0.059	-0.012	0.079	0.017	-0.005	-0.003	0.017	0.016
	(0.279)	(0.452)	(0.013)	(0.054)	(0.861)	(0.523)	(0.467)	(0.267)
Panel B: Matching Firm-Adjusted Abnormal Changes in Cash Reserves (Cash, %)								
All	0.251	0.264	-0.373*	-0.110***	0.262*	0.063	0.099	0.137
	(0.025)	(0.001)	(0.023)	(0.175)	(0.138)	(0.266)	(0.229)	(0.024)
	5,526	52.50%	2,609	49.21%***	2,393	50.61%	10,528	51.25%
Non-Repeater	0.282	0.292	0.054	0.056	0.222	0.153	0.227	0.217
	(0.043)	(0.002)	(0.833)	(0.615)	(0.394)	(0.434)	(0.040)	(0.003)
	4,165	52.41%	1,295	50.27%	1,251	51.16%	6,711	51.77%
Repeater	0.156	0.208	-0.793***	-0.173***	0.306	0.001	-0.126	0.029
	(0.344)	(0.180)	(0.000)	(0.014)	(0.194)	(0.440)	(0.280)	(0.746)
	1,361	52.76%	1,314	48.17%**	1,142	50.00%	3,817	50.35%
Non-R - Repeater	0.126	0.084	0.847	0.229	-0.084	0.152	0.352	0.187
	(0.630)	(0.341)	(0.010)	(0.045)	(0.812)	(0.999)	(0.039)	(0.022)

Table VII
Abnormal Changes in Financial Deficits and Leverage Ratios over Three-Year Periods Before and After Buyback Announcements

Matching firm-adjusted abnormal changes in financial deficits and leverage ratios are reported in this table. Details on how we measure quarterly financial deficits and leverage ratios are available in Appendix. Changes in financial deficits (leverage) are average quarterly financial deficits (leverage) over the three-year period following buyback announcements minus average quarterly financial deficits (leverage) over the three-year period prior to buyback announcements. For each buyback, five industry, size and B/M-adjusted matching firms' changes are calculated over the same horizons as those used for the corresponding buyback firm and the average of five (or less depending on the availability of the data) changes is subtracted from the corresponding buyback firm's change to calculate matching firm-adjusted abnormal change in investment or cash reserves. In each cell under the column "Mean" ("Median"), average (median) matching firm-adjusted abnormal changes are reported on top, p-values for the test of significance of mean (median) are reported in parentheses, and the number of observations (the percentage of firms with positive matching firm-adjusted abnormal changes) are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Matching Firm-Adjusted Abnormal Changes in Financial Deficits (FD, %)								
All	-0.232	0.028	0.005**	0.038	-0.137**	-0.029	-0.144	0.005
	(0.001)	(0.399)	(0.945)	(0.362)	(0.025)	(0.158)	(0.000)	(0.464)
	3,551	50.52%	2,010	50.80%	2,219	48.94%	7,780	50.14%
Non-Repeater	-0.404	-0.096	-0.236	-0.119	-0.480	-0.231*	-0.386	-0.132
	(0.000)	(0.003)	(0.027)	(0.104)	(0.000)	(0.000)	(0.000)	(0.000)
	3,005	48.62%	1,098	47.27%	1,166	44.77%	5,269	47.49%
Repeater	0.713	0.535	0.296**	0.222***	0.243***	0.160***	0.364	0.266
	(0.000)	(0.000)	(0.002)	(0.001)	(0.002)	(0.005)	(0.000)	(0.000)
	546	60.99%	912	55.04%**	1,053	53.56%***	2,511	55.71%
Non-R - Repeater	-1.117	-0.631	-0.532	-0.340	-0.723	-0.391	-0.750	-0.397
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Matching Firm-Adjusted Abnormal Changes in Leverage (Lev, %)								
All	-0.587	-0.601	-0.054**	-0.074***	-0.397***	-0.378**	-0.412	-0.420
	(0.000)	(0.000)	(0.769)	(0.610)	(0.026)	(0.008)	(0.000)	(0.000)
	5,521	46.33%	2,608	49.58%***	2,386	47.32%	10,515	47.36%
Non-Repeater	-0.782	-0.810	-1.034	-0.497	-1.158	-0.930	-0.901	-0.780
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	4,161	45.13%	1,294	46.83%	1,246	44.06%	6,701	45.26%
Repeater	0.010	-0.001	0.911***	0.382**	0.434	0.164	0.447	0.203
	(0.963)	(0.728)	(0.000)	(0.001)	(0.062)	(0.142)	(0.001)	(0.004)
	1,360	50.00%	1,314	52.28%	1,140	50.88%	3,814	51.05%
Non-R - Repeater	-0.793	-0.809	-1.945	-0.879	-1.593	-1.094	-1.348	-0.982
	(0.007)	(0.000)	(0.005)	(0.005)	(0.001)	(0.000)	(0.000)	(0.000)

Table VIII
Abnormal Changes in Operating Performance and Payout Policy over Three-Year Periods Before and After Buyback Announcements

Matching firm-adjusted abnormal changes in operating performance and payout policies are reported in this table. Details on how we measure quarterly operating performance and dividend and total payout ratio are available in Appendix. Changes in operating performance (DPR or TPR) are average quarterly operating performance (DPR or TPR) over the three-year period following buyback announcements minus average quarterly operating performance (DPR or TPR) over the three-year period prior to buyback announcements. For each buyback, five industry, size and B/M-adjusted matching firms' changes are calculated over the same horizons as those used for the corresponding buyback firm and average of the five (or less depending on the availability of the data) changes is subtracted from the corresponding buyback firm's change to calculate matching firm-adjusted abnormal change. In each cell under the column "Mean" ("Median"), average (median) matching firm-adjusted abnormal changes are reported on top, p-values for the test of significance of mean (median) are reported in parentheses, and the number of observations (the percentage of firms with positive matching firm-adjusted abnormal changes) are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Matching Firm-Adjusted Abnormal Changes in Operating Performance (ROA, %)								
All	-0.553	-0.176	-0.195***	-0.064***	-0.225***	-0.089***	-0.386	-0.119
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	5,231	35.52%	2,552	41.65%***	2,355	42.80%***	10,138	38.76%
Non-Repeater	-0.633	-0.236	-0.166***	-0.038***	-0.343***	-0.151***	-0.485	-0.172
	(0.000)	(0.000)	(0.002)	(0.099)	(0.000)	(0.000)	(0.000)	(0.000)
	3,930	35.62%	1,269	46.89%***	1,233	41.93%***	6,432	39.05%
Repeater	-0.311	-0.088	-0.224	-0.078	-0.095***	-0.046***	-0.215	-0.076
	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.006)	(0.000)	(0.000)
	1,301	35.20%	1,283	36.48%	1,122	43.76%***	3,706	38.24%
Non-R - Repeater	-0.322	-0.148	0.058	0.040	-0.248	-0.105	-0.270	-0.096
	(0.000)	(0.000)	(0.390)	(0.010)	(0.000)	(0.002)	(0.000)	(0.000)
Panel B: Matching Firm-Adjusted Abnormal Changes in Dividend Payout Ratio (DPR, %)								
All	2.572	0.000	2.248	0.000*	3.129	-0.207***	2.644	0.000
	(0.056)	(0.007)	(0.183)	(0.673)	(0.109)	(0.124)	(0.005)	(0.450)
	3,669	47.29%	2,154	44.80%*	2,295	44.18%**	8,118	45.75%
Non-Repeater	2.884	0.000	0.618	0.000***	4.216	0.000**	2.698	0.000
	(0.049)	(0.010)	(0.807)	(0.240)	(0.131)	(0.478)	(0.020)	(0.490)
	3,064	47.16%	1,144	41.17%***	1,191	43.74%**	5,399	45.14%
Repeater	0.991	0.000	4.094	0.000	1.957	-0.852*	2.536	0.000
	(0.774)	(0.416)	(0.062)	(0.064)	(0.472)	(0.143)	(0.106)	(0.718)
	605	47.93%	1,010	48.91%	1,104	44.66%	2,719	46.97%
Non-R - Repeater	1.894	0.000	-3.476	0.000	2.259	0.852	0.162	0.000
	(0.602)	(0.790)	(0.304)	(0.042)	(0.563)	(0.569)	(0.935)	(0.686)
Panel C: Matching Firm-Adjusted Abnormal Changes in Total Payout Ratio (TPR, %)								
All	24.766	1.979	32.194	17.189***	25.733	17.934*	26.876	7.200
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	4,234	53.90%	2,040	62.11%***	1,673	57.68%***	7,947	56.80%
Non-Repeater	31.628	5.870	42.648	24.881***	52.459**	42.538***	37.133	12.513
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	3,025	57.26%	896	65.74%***	764	67.15%***	4,685	60.49%
Repeater	7.597	0.000	24.006**	12.396***	3.269	-0.175	12.146	1.082
	(0.115)	(0.528)	(0.000)	(0.000)	(0.739)	(0.852)	(0.002)	(0.000)
	1,209	45.49%	1,144	59.27%***	909	49.72%*	3,262	51.50%
Non-R - Repeater	24.031	5.870	18.642	12.484	49.190	42.712	24.987	11.432
	(0.000)	(0.000)	(0.050)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)

Table IX
Abnormal Returns and Abnormal Changes of Performance, Risk, Investment and Financial Policy across Size and B/M Groups over Three-Year Periods Before and After Buyback Announcements

Alpha from the calendar time portfolio and average matching firm-adjusted abnormal changes in performance, risk, leverage, payout policies over three-year periods before and after buyback announcements are reported for each size and B/M groups. Alphas of monthly portfolios composed of buyback firms that announced buybacks in the past 36 months are estimated based on the four-factor model using value-weighted portfolio returns. At the end of June of each year, five size portfolios are formed based on the market capitalization at the end of June and five B/M portfolios are formed based on the book values of equity at the nearest fiscal year end with at least a four-month lag and the market values of equity at the end of December of the previous year based on the NYSE cutoff points. Value (growth) firms are those at the lowest (highest) B/M portfolio and small (large) firms are those at the smallest (largest) size portfolio. Details on how we measure each variable are available in Appendix and the headings of previous tables. Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively. Bold numbers indicate that they are significantly different from zero at least at the 10% significance level.

		1994-2001		2002-2006		2007-20011		All	
		Value (1)	Growth (2)	Value (5)	Growth (6)	Value (7)	Growth (8)	Value (9)	Growth (10)
Panel A: Alpha from the 4-Factor Model (Alpha)									
All	Small	**0.354**	0.025	-0.044	-0.480	-0.166	0.063	0.094	0.012
	Large	0.396	**0.464**	0.392	0.025	-0.022	**0.588**	0.278	**0.405**
Non-Rep - Repeater	Small	-0.003	-0.008	0.008	-0.005	-0.006	0.002	-0.002	0.000
	Large	0.000	0.005	-0.002	**0.005**	0.001	-0.001	0.000	**0.005**
Panel B: Matching Firm-Adjusted Abnormal Changes in Operating Performance (ROA)									
All	Small	**-0.230**	**-1.741**	-0.009*	**-0.801*****	-0.121*	**-0.714*****	**-0.171**	**-1.261**
	Large	-0.096	**-0.712**	**0.607****	0.075***	-0.191**	**-0.379*****	0.154	**-0.370**
Non-Rep - Repeater	Small	-0.170	-1.014	**0.399**	0.051	-0.211	0.161	-0.090	-0.523
	Large	-0.016	-0.179	**0.802**	-0.284	0.177	-0.383	0.229	**-0.404**
Panel C: Matching Firm-Adjusted Abnormal Changes in Risk Premium (4-Factor Model) (RPrem)									
All	Small	**-5.517**	**-9.773**	-3.172	-2.746	-2.025	-3.556	**-4.480**	**-6.471**
	Large	1.874	-0.124	0.339	-0.622	2.112	0.656	1.377	-0.076
Non-Rep - Repeater	Small	-2.781	**-23.610**	2.699	3.741	**-5.286**	-0.073	-2.393	-5.092
	Large	-5.402	**-3.085**	-4.095	0.078	-1.115	**-4.821**	-2.540	**-2.320**
Panel D: Matching Firm-Adjusted Abnormal Changes in Realized Volatilities (Vol)									
All	Small	**-0.668**	**-1.022**	**0.840**	0.060	**-1.217**	-0.880	**-0.509**	**-0.724**
	Large	-0.190	0.065	0.010	0.308	1.298	0.248	0.207	0.188
Non-Rep - Repeater	Small	-0.606	-0.945	-0.678	1.443	-0.992	-0.538	**-0.793**	-0.082
	Large	-2.066	-0.172	-0.930	-0.668	1.698	**-1.244**	-0.766	**-0.612**
Panel E: Matching Firm-Adjusted Abnormal Changes in Investment (Inv)									
All	Small	**0.230**	**0.479**	-0.005***	**0.214*****	**0.098*****	**0.216*****	**0.133**	**0.352**
	Large	0.107	**0.320**	**-0.174****	**0.148*****	0.000**	**0.202****	**-0.068**	**0.235**
Non-Rep - Repeater	Small	**-0.177**	-0.324	-0.032	-0.119	**0.080**	0.082	0.029	0.059
	Large	0.157	-0.016	-0.147	0.019	0.016	0.067	-0.020	0.057
Panel F: Matching Firm-Adjusted Abnormal Changes in Financial Deficits (FD)									
All	Small	0.043	**-0.962**	0.266	-0.104	-0.143	-0.737	0.034	**-0.696**
	Large	0.441	0.069	0.263	-0.280	-0.069	0.053	0.195	-0.044
Non-Rep - Repeater	Small	**-1.364**	**-3.946**	0.391	-0.303	-0.472	-0.225	-0.403	-1.050
	Large	1.003	**-1.469**	-0.425	**-0.780**	-0.038	**-0.821**	-0.023	**-0.934**
Panel G: Matching Firm-Adjusted Abnormal Changes in Leverage (Lev)									
All	Small	**1.156**	**-1.789**	0.048***	0.055	-0.542***	**-1.576**	**0.641**	**-1.290**
	Large	-0.780	-0.134	**2.355****	0.688*	1.197**	**1.453***	0.820	0.523
Non-Rep - Repeater	Small	**-2.116**	-3.672	-1.594	-1.960	**2.005**	0.845	**-1.126**	-1.491
	Large	3.622	-1.239	**-5.189**	**-4.774**	-1.284	-1.875	**-2.801**	**-2.689**

Table X
Regression Analyses of 3-Year Abnormal Returns

Industry, size and B/M-adjusted 3-year buy-and-hold abnormal returns (BHARs) and alpha (Alpha) from the 4-factor model are regressed on various factors. Details on how we estimate BHARs are available in Appendix. Each buyback firm's alpha is estimated using monthly returns of each firm and four factors over 37 months starting from the month of buyback announcements. Alphas represent monthly abnormal returns while BHARs represent 3-year abnormal returns, both of which are in %. All basic variables are defined in Appendix and changes of these variables are defined as repurchasing firms' changes in average quarterly values over three years before and after buyback announcements. All explanatory variables are in percentages except for dummy variables and quintiles. Regressions are run separately using sample buybacks in each subperiod in columns (1) – (6). P-values based on heteroskedasticity-adjusted standard errors are reported in parentheses. ***, ** and * indicate that the number are significantly different from zero at the 1%, 5% and 10% significance levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	BHAR	Alpha	BHAR	Alpha	BHAR	Alpha	BHAR	Alpha
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RepeatD	-2.560	0.004	-11.597***	-0.108*	-12.265***	-0.083	-10.198***	-0.108**
	(0.765)	(0.972)	(0.001)	(0.076)	(0.007)	(0.418)	(0.002)	(0.043)
ΔVol	2.063**	0.102***	0.516	0.024	-0.743	-0.004	0.873*	0.053***
	(0.025)	(0.000)	(0.561)	(0.165)	(0.152)	(0.798)	(0.076)	(0.003)
ΔRPrem	-0.182	-0.034**	0.043	-0.023*	0.123	-0.015	-0.107	-0.028***
	(0.591)	(0.011)	(0.669)	(0.051)	(0.721)	(0.412)	(0.569)	(0.001)
ΔOVol	-6.217**	-0.135*	-4.209	-0.094*	3.761	0.038	-3.321	-0.082*
	(0.035)	(0.100)	(0.308)	(0.051)	(0.463)	(0.669)	(0.129)	(0.081)
ΔROA	16.894***	0.290***	13.420**	0.329***	14.677***	0.267***	15.303***	0.284***
	(0.000)	(0.002)	(0.017)	(0.005)	(0.003)	(0.005)	(0.000)	(0.000)
ΔLev	-1.098**	-0.023***	-0.014	0.003	-0.115	-0.007	-0.556**	-0.012***
	(0.036)	(0.004)	(0.965)	(0.726)	(0.786)	(0.179)	(0.033)	(0.007)
ΔInv	-4.091*	-0.046	-4.138	-0.080	-10.004**	-0.179*	-4.733**	-0.059
	(0.097)	(0.310)	(0.357)	(0.435)	(0.045)	(0.096)	(0.018)	(0.142)
ΔFD	3.172*	0.023	1.309	0.035*	0.369	0.038	2.261***	0.034***
	(0.054)	(0.307)	(0.212)	(0.064)	(0.748)	(0.242)	(0.006)	(0.008)
ΔCash	0.805*	0.018**	-0.114	0.006	-0.499**	-0.003	0.237	0.011**
	(0.077)	(0.047)	(0.647)	(0.325)	(0.047)	(0.508)	(0.255)	(0.016)
ΔDPR	-0.056	-0.001	-0.114	-0.003*	0.031	-0.001	-0.057	-0.002***
	(0.273)	(0.274)	(0.105)	(0.098)	(0.644)	(0.293)	(0.124)	(0.009)
ΔTPR	-0.052***	-0.001**	-0.020	-0.000	-0.023	0.000	-0.030***	-0.001**
	(0.004)	(0.014)	(0.184)	(0.176)	(0.301)	(0.904)	(0.004)	(0.042)
Size	-10.556***	-0.155***	-4.898***	-0.045*	-1.572	-0.031	-5.887***	-0.074***
	(0.001)	(0.008)	(0.001)	(0.069)	(0.292)	(0.272)	(0.000)	(0.003)
B/M	-6.763***	-0.078*	-0.015	0.039	-3.922	-0.029	-3.910***	-0.036
	(0.002)	(0.074)	(0.995)	(0.289)	(0.130)	(0.379)	(0.004)	(0.135)
AR-1	-0.253*	-0.001	-0.192*	-0.002**	-0.240**	-0.004***	-0.242***	-0.002**
	(0.057)	(0.662)	(0.087)	(0.038)	(0.042)	(0.007)	(0.000)	(0.038)
Target	0.240	0.002	-0.141	0.009	0.360	0.012**	0.371	0.010***
	(0.510)	(0.711)	(0.827)	(0.237)	(0.480)	(0.036)	(0.127)	(0.006)
#SubAuth	1.973	0.010	0.933	0.009	4.786	0.043	1.930**	0.014
	(0.101)	(0.635)	(0.505)	(0.592)	(0.280)	(0.382)	(0.040)	(0.398)
UnderD	1.565	0.092	7.912**	0.048	-0.388	-0.141	1.836	-0.020
	(0.764)	(0.483)	(0.019)	(0.553)	(0.943)	(0.349)	(0.581)	(0.825)
Intercept	69.694***	0.681**	42.509**	0.509**	15.016	0.589**	43.235***	0.501***
	(0.001)	(0.031)	(0.011)	(0.048)	(0.450)	(0.023)	(0.000)	(0.001)
Industry & Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.136	0.219	0.106	0.163	0.116	0.118	0.111	0.152
Sample Size	1,706	1,706	1,215	1,215	1,307	1,307	4,228	4,228

Table XI
Coefficients of Subperiod Dummies from Regression Analyses using All Sample Buybacks and Subperiod Dummies

Industry, size and B/M-adjusted 3-year buy-and-hold abnormal returns (BHARs) and alpha (Alpha) from the 4-factor model are regressed on various factors. Details on how we estimate BHARs are available in Appendix. Each buyback firm's alpha is estimated using monthly returns of each firm and four factors over 37 months starting from the month of buyback announcements. Alphas represent monthly abnormal returns while BHARs represent 3-year abnormal returns, both of which are in %. All basic variables are defined in Appendix and changes of these variables are defined as repurchasing firms' changes in average quarterly values over three years before and after buyback announcements. All explanatory variables are in percentages except for dummy variables and quintiles. All variables used in Table X plus a dummy indicating each subperiod and its interaction terms with key variables are included in each regression but only the coefficients of subperiod dummy and its interactions terms are reported in this table. In columns (1) and (2), the subperiod dummy (SubD) indicates buyback announcements made between 2002 and 2006. SubDs are similarly defined in other columns. The regressions include all sample firms with available information during 1994 and 2011. P-values based on heteroskedasticity-adjusted standard errors are reported in parentheses. ***, ** and * indicate that the number are significantly different from zero at the 1%, 5% and 10% significance levels, respectively.

	2002-2006		2007-2011		2002-2011	
	BHAR	Alpha	BHAR	Alpha	BHAR	Alpha
	(1)	(2)	(3)	(4)	(5)	(6)
SubD	-7.356*	-0.105	1.958	-0.092	-4.912	-0.099
	(0.080)	(0.172)	(0.641)	(0.216)	(0.219)	(0.167)
SubD×RepeatD	-5.091	-0.084	-6.464	-0.003	-22.246***	-0.328***
	(0.322)	(0.406)	(0.221)	(0.971)	(0.001)	(0.009)
SubD×ΔVol	-0.271	-0.026**	-0.479	-0.053***	-0.267	-0.073***
	(0.598)	(0.016)	(0.338)	(0.000)	(0.659)	(0.000)
SubD×ΔRPrem	0.190	0.006	0.131	0.018***	0.208	0.017***
	(0.507)	(0.258)	(0.713)	(0.002)	(0.441)	(0.001)
SubD×ΔOVol	0.142	0.011	9.230**	0.158**	6.914**	0.118*
	(0.968)	(0.867)	(0.013)	(0.015)	(0.046)	(0.054)
SubD× ΔROA	-1.567	0.082**	-0.411	-0.053	-1.408	0.030
	(0.451)	(0.047)	(0.854)	(0.193)	(0.514)	(0.458)
SubD×ΔLev	0.908**	0.020***	0.767*	0.014*	1.401***	0.029***
	(0.012)	(0.003)	(0.051)	(0.063)	(0.000)	(0.000)
SubD×ΔInv	2.313	0.042	-3.653	-0.077	-2.201	-0.014
	(0.596)	(0.614)	(0.456)	(0.369)	(0.589)	(0.850)
RepeatD	-8.383**	-0.072	-9.120***	-0.099	7.526	0.187
	(0.012)	(0.242)	(0.005)	(0.124)	(0.202)	(0.102)
ΔVol	0.868***	0.049***	1.029***	0.061***	0.901*	0.087***
	(0.008)	(0.000)	(0.003)	(0.000)	(0.098)	(0.000)
ΔRPrem	-0.192	-0.029***	-0.178	-0.031***	-0.203	-0.035***
	(0.243)	(0.000)	(0.242)	(0.000)	(0.293)	(0.000)
ΔOVol	-3.616*	-0.081**	-5.809***	-0.127***	-6.939**	-0.143***
	(0.095)	(0.032)	(0.006)	(0.001)	(0.013)	(0.004)
ΔROA	14.785***	0.246***	14.299***	0.282***	15.290***	0.257***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔLev	-0.952***	-0.020***	-0.830***	-0.016***	-1.426***	-0.030***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔInv	-7.536***	-0.100**	-6.716***	-0.090**	-6.489**	-0.094*
	(0.002)	(0.025)	(0.005)	(0.043)	(0.024)	(0.076)
AR-1	-0.249***	-0.003***	-0.248***	-0.003***	-0.239***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other control variables	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.110	0.153	0.109	0.156	0.116	0.168
Sample Size	4,228	4,228	4,228	4,228	4,228	4,228

Table XII
Abnormal Changes in Executive Compensation and Transient Institutional Investors' Holdings over Three-Year Periods Before and After Buyback Announcements

Matching firm-adjusted abnormal changes in the percentage of equity-linked executive compensation and executive equity ownership (in %) and abnormal changes in transient institutional investors' holdings are reported in this table. Executive compensation data are from the S&P ExecuComp database which provides compensation information for top five (up to 9) executives of S&P 1500 companies starting from 1992. Details on how we measure annual equity-linked compensation (EComp) and equity ownership (EOwn) are available in Appendix. Changes in EComp (EOwn) are average annual EComp (EOwn) over the three-year period following buyback announcements minus average annual EComp (EOwn) over the three-year period prior to buyback announcements. For abnormal changes in transient institutional holdings, we identify transient institutional investors using the classification available at the Brian J. Bushee's website (http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html) and find their holdings from the Thomson Reuters' Institutional (13f) Holdings data (s34). For each buyback, five industry, size and B/M-adjusted matching firms' changes are calculated over the same horizons as those used for the corresponding buyback firm and the average of five (or less depending on the availability of the data) changes is subtracted from the corresponding buyback firm's change to calculate matching firm-adjusted abnormal change. In each cell under the column "Mean" ("Median"), average (median) matching firm-adjusted abnormal changes are reported on top, p-values for the test of significance of mean (median) are reported in parentheses, and the number of observations (the percentage of firms with positive matching firm-adjusted changes) are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	Mean (1)	Median (2)	Mean (3)	Median (4)	Mean (5)	Median (6)	Mean (7)	Median (8)
Panel A: Matching Firm-Adjusted Abnormal Changes in Equity-Linked Compensation (EComp,%)								
All	0.260	0.531	0.600	2.066	-0.024	-0.005	0.270	0.651
	(0.478)	(0.217)	(0.244)	(0.045)	(0.952)	(0.795)	(0.264)	(0.055)
	2,246	51.56%	1,339	54.52%*	1,421	49.96%	5,006	51.90%
Non-Repeater	0.435	0.722	0.994	2.639	0.849	1.003	0.644	1.041
	(0.319)	(0.125)	(0.215)	(0.088)	(0.166)	(0.195)	(0.051)	(0.008)
	1,668	52.10%	621	55.56%	637	53.22%	2,926	53.08%
Repeater	-0.245	0.004	0.258	1.840	-0.733	-0.771	-0.255	0.058
	(0.713)	(0.814)	(0.698)	(0.243)	(0.154)	(0.119)	(0.469)	(0.814)
	578	50.00%	718	53.62%	784	47.32%	2,080	50.24%
Non-R - Repeater	0.680	0.718	0.736	0.799	1.583	1.774	0.899	0.983
	(0.417)	(0.298)	(0.479)	(0.479)	(0.027)	(0.000)	(0.067)	(0.047)
Panel B: Matching Firm-Adjusted Abnormal Changes in Equity Ownership (EOwn, %)								
All	0.186	0.025	0.949	0.264	0.070	0.061	0.077	0.061
	(0.684)	(0.361)	(0.154)	(0.104)	(0.002)	(0.000)	(0.001)	(0.000)
	10	60.00%	10	70.00%	1,374	59.24%	1,394	59.33%
Non-Repeater	0.174	-0.002	3.558**	3.558*	0.073	0.073	0.086	0.072
	(0.765)	(0.820)	(1.000)	(0.500)	(0.050)	(0.000)	(0.025)	(0.000)
	8	50.00%	2	100.00%	620	61.13%	630	61.11%
Repeater	0.235	0.235	0.296	0.221	0.066	0.045	0.069	0.046
	(0.395)	(0.500)	(0.602)	(0.383)	(0.011)	(0.000)	(0.008)	(0.000)
	2	100.00%	8	62.50%	754	57.69%	764	57.85%
Non-R - Repeater	-0.061	-0.237	3.261	3.337	0.007	0.028	0.016	0.026
	(0.960)	(0.239)	(0.356)	(0.413)	(0.197)	(0.000)	(0.718)	(0.211)
Panel C: Matching Firm-Adjusted Abnormal Changes in Transient Institutional Holdings (%)								
All	-0.247	-0.538	-0.906***	-0.493**	-0.404	-0.219	-0.446	-0.455
	(0.009)	(0.000)	(0.000)	(0.000)	(0.003)	(0.008)	(0.000)	(0.000)
	5,505	46.36%	2,611	45.84%	2,389	48.14%	10,505	46.63%
Non-Repeater	-0.276	-0.574	-0.836**	-0.352	-0.913***	-0.593*	-0.503	-0.547
	(0.013)	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
	4,146	46.31%	1,297	47.57%	1,247	44.59%	6,690	46.23%

Repeater	-0.158	-0.458	-0.976***	-0.631**	0.153	0.201**	-0.347	-0.329
	(0.356)	(0.036)	(0.000)	(0.000)	(0.368)	(0.348)	(0.001)	(0.001)
	1,359	46.50%	1,314	44.14%	1,142	52.01%***	3,815	47.34%
Non-R -	-0.117	-0.116	0.140	0.279	-1.066	-0.793	-0.156	-0.217
Repeater	(0.589)	(0.520)	(0.642)	(0.395)	(0.000)	(0.000)	(0.276)	(0.130)

Table XIII
Abnormal Changes in Analyst EPS Forecasts and Forecasts Errors One Month Before and After Repurchase Announcements

Matching firm-adjusted changes in mean analysts forecasts and forecast errors of 1-year and 3-year ahead earnings per shares (EPSs) one month before and one month after repurchase announcements are reported in this table. Changes in EPS forecast (EPSF) and EPS forecast errors (EPSFE) are calculated as the differences in EPS forecasts and EPS forecast errors, respectively, made one month before and one month after the month of buyback announcements as percentages of closing stock prices on buyback announcement dates. Both EPS forecasts and EPS forecast errors (EPS forecast minus actual EPS) are from IBES. For each buyback, five industry, size and B/M-adjusted matching firms' changes are calculated in a similar way around the corresponding buyback announcement date and the average of five (or less depending on the availability of the data) changes is subtracted from the corresponding buyback firm's change to calculate matching firm-adjusted abnormal change. In each cell under the column "1-year" ("3-year"), average matching firm-adjusted abnormal changes are reported on top, p-values for the test of significance of mean are reported in parentheses, and the number of observations are reported at the bottom (except for the "Non-Rep - Repeater" rows that show the difference between Non-Repeater and Repeater). Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. In columns (3)-(6) except for those rows for "Non-Rep - Repeater", ***, **, * indicate significantly different values between the first subperiod (1) and the corresponding subperiod at the 1, 5 and 10 percent significant levels, respectively.

	1994-2001		2002-2006		2007-20011		All	
	1-year (1)	3-year (2)	1-year (3)	3-year (4)	1-year (5)	3-year (6)	1-year (7)	3-year (8)
Panel A: Matching Firm-Adjusted Abnormal Changes in EPS forecasts (EPSF, %)								
All	0.487	0.341	-1.879	-1.065	0.388	0.487	-0.121	-0.023
	(0.211)	(0.436)	(0.000)	(0.015)	(0.515)	(0.176)	(0.665)	(0.922)
	4,608	700	2,197	888	2,080	1,313	8,885	2,901
Non-Repeater	0.530	0.249	-3.224	-1.252	-0.173	-0.084	-0.331	-0.295
	(0.246)	(0.634)	(0.001)	(0.081)	(0.855)	(0.884)	(0.384)	(0.395)
	3,468	548	1,090	455	1,068	648	5,626	1,651
Repeater	0.359	0.674	-0.555	-0.869	0.980	1.043	0.241	0.336
	(0.627)	(0.350)	(0.291)	(0.077)	(0.172)	(0.016)	(0.531)	(0.263)
	1,140	152	1,107	433	1,012	665	3,259	1,250
Non-R - Repeater	0.171	-0.425	-2.669	-0.383	-1.152	-1.128	-0.572	-0.631
	(0.850)	(0.690)	(0.935)	(0.883)	(0.490)	(0.199)	(0.323)	(0.186)
Panel B: Matching Firm-Adjusted Abnormal Changes in EPS forecast errors (EPSFE, %)								
All	0.892	0.429	0.199	-0.883	0.218	0.493	0.561	0.057
	(0.027)	(0.292)	(0.696)	(0.063)	(0.731)	(0.178)	(0.050)	(0.815)
	4,464	571	2,146	767	2,037	1,164	8,647	2,502
Non-Repeater	0.866	0.346	0.344	-1.120	0.525	0.349	0.699	-0.062
	(0.069)	(0.498)	(0.313)	(0.849)	(0.593)	(0.522)	(0.069)	(0.858)
	3,358	445	1,063	387	1,039	554	5,460	1,386
Repeater	0.971	0.721	0.058	-0.641	-0.102	0.625	0.325	0.205
	(0.201)	(0.073)	(0.918)	(0.232)	(0.898)	(0.207)	(0.428)	(0.535)
	1,106	126	1,083	380	998	610	3,187	1,116
Non-R - Repeater	-0.105	-0.375	0.286	-0.479	0.627	-0.276	0.375	-0.267
	(0.910)	(0.702)	(0.969)	(0.817)	(0.239)	(0.041)	(0.528)	(0.585)

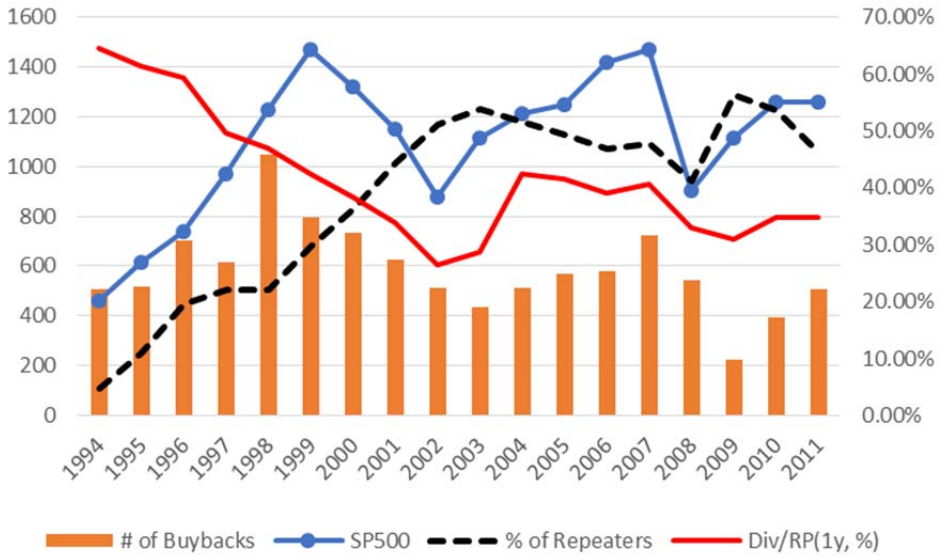

Figure 1. Number of Buybacks, Percentage of Repeating Buyback Announcements and Average Cash Dividends as a Percentage of Actual Buyback Amounts. This figure shows the number of buybacks, the percentage of repeating buyback announcements and average cash dividends as a percentage of actual buyback amounts per year during our sample period, 1994-2011. Repeat repurchasers are those firms that have at least two initial authorizations of repurchases within the past five years or those that have active repurchase programs over 60% of the time during the past five years. Cash dividends as a percentage of actual buyback amounts are winsorized at the 1st and 99th percentiles. SP500 refers to the S&P 500 Index level at the end of each year.

Figure 2. CARs. This figure shows cumulative abnormal returns (CARs) starting from 36 months prior to the month of buyback announcements and ending 36 months following the month of announcements. The figures on the left-hand side are CARs based on abnormal returns calculated by subtracting the average monthly returns of five industry, size and BM-adjusted matching firms while monthly abnormal returns on the right-hand side are calculated from the modified return across time and securities (RATS) method (Ibbotson (1975)) based on the four-factor model (Carhart (1994)). 1st, 2nd and 3rd represent sample periods, 1994-2001, 2002-2006 and 2007-2011, respectively.

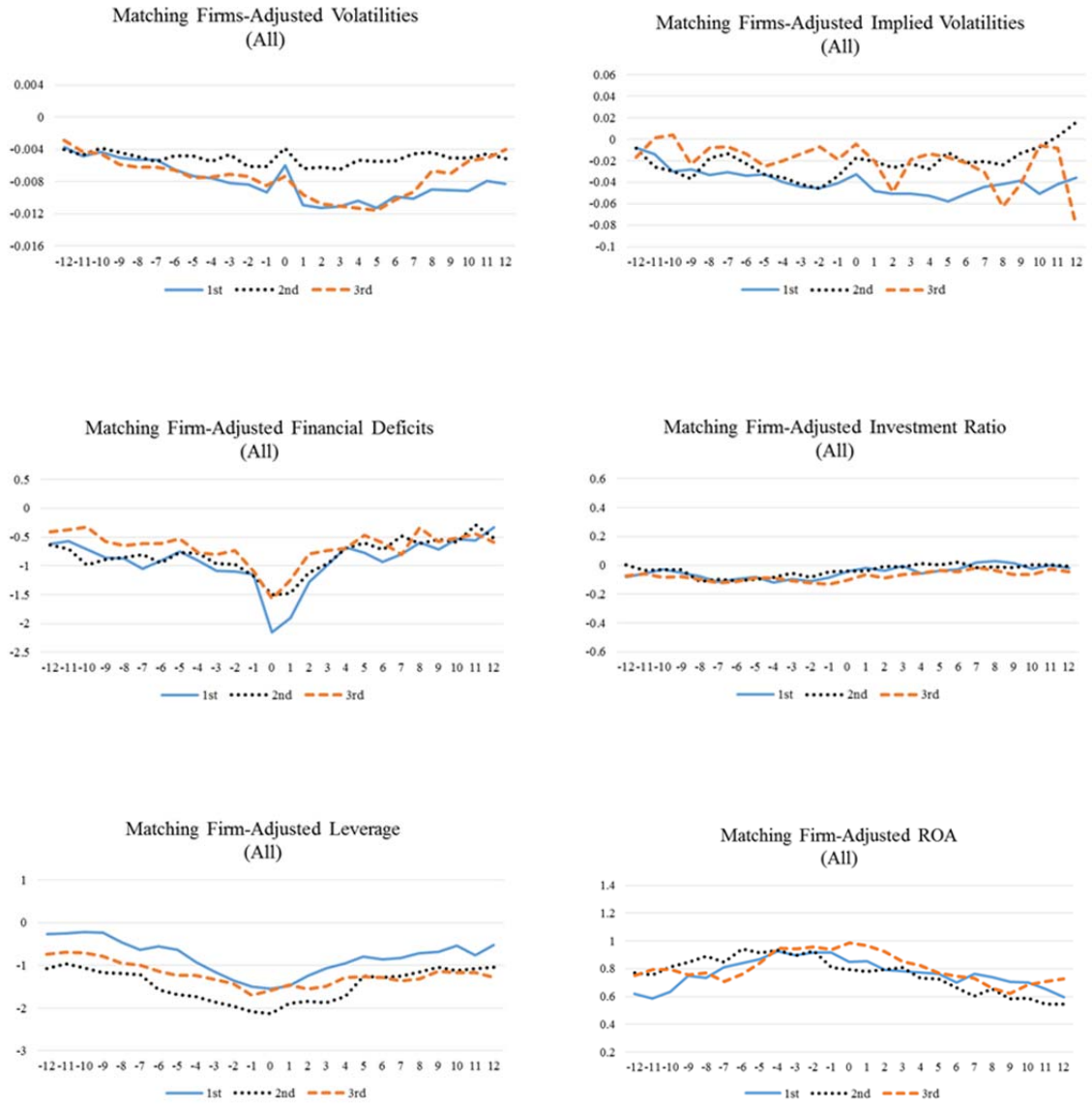

Figure 3. Firm Characteristics around Share Repurchase Announcements. This figure shows various matching firms-adjusted characteristics over a quarter from 12 quarters prior to the quarter of buyback announcements and ending 12 quarters following the quarter of announcements. Appendix explains how each variable is measured. 1st, 2nd and 3rd represent sample periods, 1994-2001, 2002-2006 and 2007-2011, respectively.

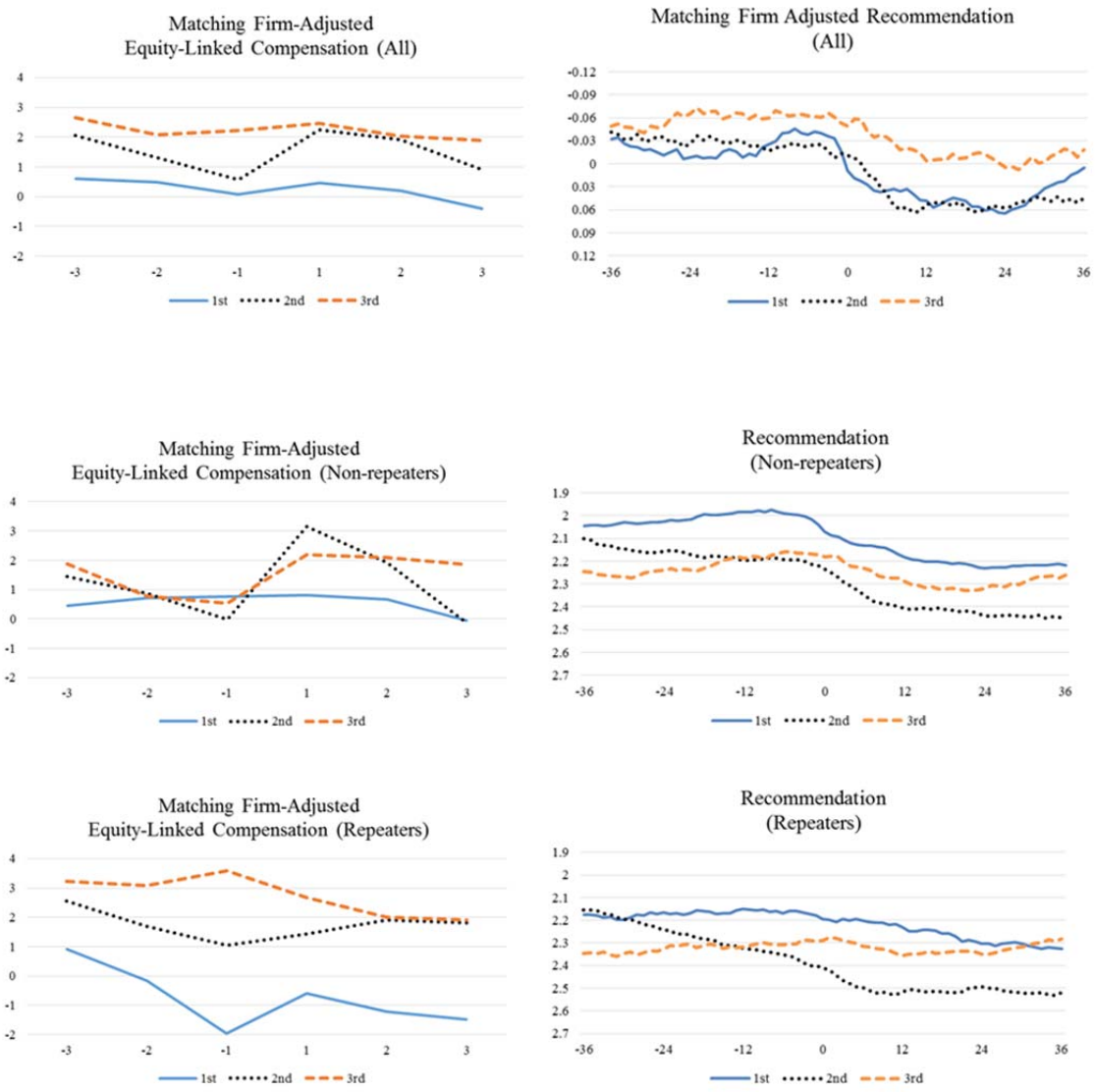

Figure 4. Equity-Linked Compensation and Analysts Recommendations. This figure shows matching firms-adjusted and unadjusted average equity-linked compensation as a percentage of total compensation and average analysts recommendation scores from 3 years before and 3 years after buyback announcements. Details on how we measure equity-lined compensation are described in Appendix. Mean analysts recommendation scores are from IBES (1 = strong buy; 2 = buy; 3 = hold; 4 = sell; 5 = strong sell). Matching firm adjustments are made by subtracting average of five (or less depending on the availability) industry, size and BM-adjusted matching firms' mean values. 1st, 2nd and 3rd represent sample periods, 1994-2001, 2002-2006 and 2007-2011, respectively.