

Share Repurchase and CEO Bonus

Tianming (Tim) Zhang

Department of Accounting
College of Business
Florida State University
ttz4030@fsu.edu

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Abstract

I examine whether Chief Executive Officers (CEOs) manipulate earnings per share (EPS) through share repurchases to meet or exceed the EPS threshold for bonus pay. The EPS threshold for bonus award is an ex ante, clear target for CEOs to reach, and the benefit to CEOs for meeting or exceeding the benchmark is easily observable. Utilizing a large hand-collected database of CEO bonus structure, I find that firms are more likely to conduct share repurchases and the magnitude of repurchases tends to be larger when CEO bonuses are tied to EPS performance. Furthermore, for firms with CEO bonuses tied to EPS, share repurchase has a positive impact on both the probability of the CEO receiving a bonus and the magnitude of the bonus award. When pre-repurchasing EPS is below but close to the EPS threshold for CEO bonuses, firms are more likely to conduct share repurchases. In the three-year post-repurchase period, while firms that do not tie their CEO bonuses to EPS achieve significant and positive abnormal returns, there is no evidence of post-repurchase abnormal returns from firms that tie their CEO bonuses to EPS. Because the bonus contract is constructed so that CEOs receive bonuses only if the reported EPS meets or exceeds the bonus EPS threshold, these findings suggest that tying CEO bonuses to EPS may motivate CEOs to make repurchasing decisions opportunistically for meeting or exceeding an important accounting benchmark — the threshold EPS for bonus award.

Share Repurchase and CEO Bonus

1. Introduction

The amount of share repurchases has increased tremendously since 1982 (Figure 1). In 2007, the total repurchases by industrial firms exceeded \$420 billion, greater than the GDP of Poland, the 21st largest GDP ranked by country. Skinner (2008) states “repurchases are now the dominant form of payout.” One of the potential explanations for the explosive growth in repurchases is that managers make sub-optimal decisions to repurchase shares for improving earnings-per-share (EPS). For example, Bens et al. (2002) find that firms shift resources away from real investments towards repurchasing their own stocks to offset the EPS-dilution effect of option exercises, and Hribar et al. (2006) suggest that managers use repurchases as a tool to improve EPS for meeting or exceeding analysts' earnings expectations.

Although prior studies have provided sufficient evidence of managers making sub-optimal repurchasing decisions for improving EPS, little research has been done to examine why managers make such decisions. Bens et al. (2002) noted: "Given the real investment consequences documented here, it is worth investigating *why* managers have an aversion to EPS dilution." This study examines the link between share purchases and the explicit financial benefits of Chief Executive Officers (CEOs). I argue and find strong evidence that CEOs sometimes make repurchasing decisions when repurchases help improve EPS to the level that triggers their bonus award. Hence, this study fills the void in the literature by demonstrating the direct financial benefit to CEOs when they use repurchases to manipulate EPS.

Healy (1985) pioneered the research in how bonus schemes create incentives for managers to select accounting procedures and accruals to maximize their bonus awards. He called for future research to answer the question, "what are the other incentive effects of bonus contracts?" (p. 106) I hand-collect information about CEO bonus structure for more than 1,000 firms over 14 years to test whether bonus contracts motivate CEOs to use share repurchases, an increasingly important corporate activity since Healy (1985), for the purpose of improving EPS to receive bonus pay. In about half of the sample, firms explicitly tie CEO bonuses to EPS performance. The tie between CEO bonuses and EPS has a significantly positive impact on the probability of a firm having positive net repurchases, with the odds ratio being 1.38. Controlling for other explanatory factors, the scaled share buyback increases by about half of the sample mean when CEO bonuses are tied to EPS. Furthermore, when CEO bonuses are tied to EPS, share repurchases have a positive impact on the probability of a CEO receiving a bonus and the magnitude of the bonus. For firms with the bonus-EPS tie, the magnitude of CEO bonuses is approximately 35% higher when a firm's net repurchases are positive.

When a firm's *As-if EPS*, the EPS that would have been reported had the firm not undertaken repurchases during the year, is close to the threshold EPS for bonus award, the firm is more likely to conduct share repurchases. When *As-if EPS* is close to the threshold EPS, 75% of the firms conduct share buybacks during the year, significantly higher than the 60% when *As-if EPS* is not close to the threshold EPS. Multivariate analysis confirms that firms are more likely to repurchase shares when the *As-if EPS* is close to the threshold EPS.

I examine the three-year post-buyback stock performance of the repurchasing firms. Although firms that do not tie their CEO bonuses to EPS exhibit positive and significant abnormal returns and outperform the matching non-repurchasing firms, I do not find such evidence from the subset of firms that tie their CEO bonuses to EPS. The results suggest that when CEO bonuses are determined by EPS performance, some repurchases may be motivated by bonus maximization rather than signaling undervaluation.

This paper builds on studies examining managers' incentives to meet or exceed certain accounting benchmarks by opportunistically engaging in various operating, investing, and financing activities during the fiscal period (e.g., Bange and De Bondt 1998; Hermann et al. 2003; Roychowdhury 2006; Hribar et al. 2006). However, prior studies typically do not show the evidence of specific managerial benefits associated with meeting or exceeding benchmarks. Such evidence is critical because it is the basis for arguing why managers would be motivated to meet or exceed the benchmarks. I demonstrate that CEO bonuses, a significant portion of CEO compensation and a direct measure of CEO financial incentives, can induce CEOs to make repurchasing decisions for meeting or exceeding the bonus EPS benchmark. In addition, the most salient benchmark for studying managerial opportunistic behavior has been the analyst earnings expectation. I believe the EPS benchmark for CEO bonus award has several advantages over analyst earnings expectation. First, analysts continuously revise their earnings forecasts up to the day prior to the earnings announcement. Given that firms typically report their earnings at least one month after the fiscal period end, it may be difficult for managers to take actions *during* the fiscal period for the purpose of meeting or exceeding a target that will not be set until *after* the period end. On the other hand, the target EPS

for CEO bonus award is set and written into the compensation contract prior to the start of fiscal period. Therefore, CEOs may act opportunistically during the period to meet or exceed such an *ex ante* benchmark. Second, managers can exert their influence on analysts and guide analyst earnings forecasts down to the level that they can meet or exceed (Richardson, Teoh, and Wysocki 2004). Because the costs of guiding analysts are likely low, managers may prefer “walking-down” analyst forecasts to engaging in costly real activity manipulations for the purpose of meeting or exceeding analyst earnings expectation. In contrast, CEOs have little influence on the EPS benchmark for bonus award once it is set and written into the compensation contract at the beginning of the year. Third, there are variations in analyst earnings expectation across analysts and over time. Prior studies typically use the median (mean) forecast or the latest forecast prior to the earnings announcement by an *ad hoc* number of days as the proxy for analyst earnings expectation, and each measure may yield a different value. The benchmark EPS for CEO bonus award, on the other hand, is an objective measure of CEO performance and a clear target for the CEO to reach. Hence, the bonus EPS threshold may provide a more powerful setting in studying managerial opportunistic behavior.

The hefty bonuses paid to corporate executives have been subjected to significant government scrutiny recently amid the global financial meltdown. President Barack Obama, after confirmation that Wall Street firms paid more than \$20 billion in bonuses in 2008 as the US economy sank into recession, described those bonuses as "shameful" and the "height of irresponsibility." Spurred by public outrage, the US House of Representatives passed measures imposing a 90% tax on bonuses paid to executives at banks bailed out by the government. Policy makers are actively seeking ways to curb the

excessive executive compensation. This study shows that both share repurchases and CEO bonuses have experienced explosive growth in the past two decades and documents the link between the two. That is, share repurchases have been used by CEOs as a mean to maximize their bonus awards. Thus, this study may be of interest to regulators who are concerned with executives' excessive compensation.

The remainder of the paper is organized as follows. The next section discusses the relevant literature and develops the hypotheses. Section 3 describes the data collection and sample selection procedures. Section 4 reports the empirical tests and results. The study concludes in Section 5.

2. Relevant literature and hypothesis development

The principal-agent theory assumes managers are self-interested, opportunistic, utility-maximizing agents (see, e.g., Baiman 1990; Luft 1997). Prior research on meeting or exceeding certain accounting benchmarks provides evidence supporting the theory. For example, Burgstahler and Dichev (1997) find unusually low frequencies of small decreases in earnings and small losses and unusually high frequencies of increases in earnings and small profits, suggesting managers strategically meet or exceed two earnings benchmarks — prior period earnings and the break-even point. Other studies (e.g., Matsumoto 2002; Burgstahler and Eames 2006) show that managers manipulate earnings upward and/or guide analyst earnings forecasts downward in order to meet or exceed another earnings benchmark — analyst earnings expectations. Recent studies (e.g., Roychowdhury 2006) present evidence of managers manipulating real activities to avoid losses, earnings decreases, and negative earnings surprises. Based on a sample of firms from 1974 to 1996, Degeorge et al. (1999) investigate the relative importance of the three

accounting benchmarks to managers and conclude that managers seek to avoid losses and earnings decreases more than to avoid negative earnings surprises. Brown and Caylor (2005), while confirming the results of DeGeorge et al. (1999), find precisely the opposite result after the mid-1990s.

Another accounting benchmark, the earnings threshold for executives to receive bonus pay, has received much less attention. Healy (1985) shows managers select accounting procedures and accruals to report the level of income that maximizes their bonus awards. Since Healy's (1985) seminal work, other than a few studies that intended to validate Healy's findings in different contexts and using improved proxies for abnormal accruals,¹ researchers have been shying away from examining the executive bonus threshold, possibly due to the difficulty in gathering detailed data. However, it is important to note the distinct advantages the bonus threshold has over the three popular benchmarks. First, studies examining managers' opportunistic behavior around the three popular benchmarks fully rely on the assumption that managers benefit from meeting or exceeding the benchmarks but typically do not identify the benefit. On the other hand, if earnings meet or exceed the bonus threshold, managers will receive a bonus award, a significant and explicit monetary benefit. It is difficult to envision a scenario where managers would prefer not to meet or exceed the bonus threshold. Second, the three popular benchmarks have considerable limitations. The zero-profit benchmark is relevant only for firms around the break-even point and irrelevant for all firms that are either profitable or deep in losses. The level of prior period earnings is a meaningful target only when there is no significant change in the macro-economic environment. In contrast, a

¹ These studies include Holthausen, Larcker, and Sloan (1995); Gaver, Gaver, and Austin (1995); and Guidry, Leone, and Rock (1999).

firm's compensation committee takes into consideration the firm's profitability and the economic situation when setting the earnings threshold for executive bonuses, making the bonus threshold always a relevant goal for managers to achieve. Compared to analyst earnings expectation, a noisy ex post measure that managers can guide up or down, the bonus threshold is a clear ex ante target that managers can have little influence on once it is set and written into the compensation contract. Hence, the advantages of the bonus threshold may make it a more powerful setting than the three popular benchmarks when examining managerial opportunistic behavior.

Bonuses are designed to align the interests of managers and shareholders when separation of ownership and control causes agency problems (Jensen and Meckling 1976). Frequently, bonuses are tied to earnings, a popular performance measure. Typically, an earnings threshold is determined by the compensation committee and written into the contract of top executives at the beginning of the fiscal year. If, at the end of the year, actual earnings meet or exceed the threshold, executives will receive their cash bonuses. Otherwise, no bonus will be paid. The earnings per share (EPS) have become an increasingly popular measure of performance and executive bonus threshold is frequently expressed in terms of EPS. If the actual EPS is close to the threshold EPS for bonuses, executives have incentives to exercise their discretion to manipulate EPS up to the threshold level, and they can do so in several ways. One way is to manage earnings upward by reporting positive abnormal accruals. However, the gain in earnings through accruals manipulation may be limited and accruals must reverse over time. The passage of the Sarbanes-Oxley Act may have further limited the gain through accruals management. In addition, although there is little direct cost, accruals manipulation may

result in higher risks of regulatory scrutiny and shareholder lawsuits (Dechow et al. 1996; DeFond and Subramanyam 1998; Heninger 2001). Another way to improve EPS is to manage earnings upward via manipulation of underlying real business activities. For example, Roychowdhury (2006) documents that managers often reduce discretionary expenditures to avoid reporting losses or missing analyst earnings forecasts. However, manipulating real business transactions may deviate from the optimal business plan and impose a real cost to the firm.

Hribar et al. (2006) suggest that share repurchases serve as a good tool for EPS management and find a disproportionately large number of EPS-increasing share repurchases among firms that would have missed analyst EPS forecasts without repurchases. Supporting the argument of Hribar et al. (2006), Marquardt, Tan, and Young (2009) find that firms are more likely to choose accelerated share repurchases (ASRs) over open market repurchases (OMRs) when the repurchase is EPS-accretive, when executive bonus compensation is tied to EPS performance, when CEO horizons are short, and when CEOs are more entrenched. Marquardt, Tan, and Young (2009) suggest that managers try to “accelerate” the EPS-accretive effect of repurchases by undertaking ASRs instead of OMRs. Share repurchases reduce the number of shares outstanding and thus may mechanically increase EPS under certain conditions.² According to the survey conducted by Brav, Graham, Harvey, and Michaely (2005), improving EPS is the most frequently mentioned reason for share repurchases by corporate managers. Hence, when

² Share repurchases may affect EPS in several ways. First, share repurchases reduce the number of shares outstanding (the denominator). Second, share repurchases decrease the current period earnings (the numerator) as firms forego the returns from cash paid for repurchases. Third, timing affects the impact of a repurchase on EPS — the earlier a repurchase during the fiscal period, the larger the impact on the EPS. Hribar et al. (2006) show that a repurchase increases EPS when the earnings-price ratio is higher than the foregone rate of return on cash paid for the repurchase.

executive bonuses are tied to EPS, managers may be motivated to undertake EPS-increasing share repurchases to improve the likelihood of meeting or exceeding the EPS bonus threshold. As a result, we should observe that firms with executive bonuses tied to EPS are more likely to repurchase their own stocks. Furthermore, if the bonus-EPS tie induces some additional share repurchases that are undertaken for the purpose of meeting or exceeding the bonus EPS threshold, all else being equal, the magnitude of repurchases should be larger for firms with executive bonuses tied to EPS. Because the CEO is typically included if a firm has a bonus plan, I use a firm's CEO to proxy for its top executives who are eligible for the bonus plan. The first set of testable hypotheses is:

H1a: *Firms are more likely to repurchase shares when CEO bonuses are tied to EPS performance.*

H1b: *Tying CEO bonuses to EPS performance has a positive impact on the magnitude of share repurchases.*

If a CEO is successful in using repurchases to meet or exceed the EPS bonus threshold, by contract the CEO will receive the EPS-tied bonus pay shortly after the fiscal year end. Hence, share repurchases should have a positive impact on the probability of the CEO receiving a bonus. In addition, firms typically reward CEOs with extra bonuses for every penny increase in EPS, conditional on meeting the threshold EPS goal. For example, in its proxy for fiscal year 1999, Wendy's International Inc. discloses that its CEO will receive up to \$12,500 in annual bonuses for every penny increase in EPS. Another example, Watsco, Inc., explicitly specifies in its 2006 proxy that its CEO will be awarded \$65,250 in annual bonuses for every penny increase in EPS. Therefore, if CEOs make some repurchasing decisions for the purpose of maximizing bonuses, we should

observe a positive relation between share repurchases and the amount of CEO bonuses.

The second set of hypotheses is:

H2a: *When CEO bonuses are tied to EPS performance, share repurchases increase the probability of meeting or exceeding the bonuses EPS threshold and hence, the probability of the CEO being awarded a bonus.*

H2b: *When CEO bonuses are tied to EPS performance, share repurchases have a positive impact on the amount of CEO bonuses.*

A CEO may have the strongest incentive to make the bonus-driven repurchasing decision when the EPS is below but close to the bonus EPS threshold because the gain in bonus will be dramatic. On the other hand, when the EPS is far below or is above the bonus threshold, a CEO may have no or little incentive to make repurchasing decisions for bonus purpose because the gain in bonus will be absent or marginal. Therefore, *ceteris paribus*, we should observe a higher probability and a larger magnitude of share repurchases from firms with pre-repurchasing EPS below but close to the bonus threshold.

The third set of hypotheses is:

H3a: *Firms are more likely to conduct share repurchases when the pre-repurchasing EPS is below but close to the EPS threshold for CEO bonuses.*

H3b: *The magnitude of share repurchases is larger when the pre-repurchasing EPS is below but close to the EPS threshold for CEO bonuses.*

Firms frequently repurchase shares to signal undervaluation. For example, when foreseeing the upcoming success of a new product, a CEO may make repurchasing decisions to take advantage of the current low price. Such decisions may serve as a signal of undervaluation to the market. Consistent with the undervaluation hypothesis, the

extant literature has documented the positive long-run post-repurchase abnormal returns (e.g., Ikenberry, Lakonishok, and Vermaelen 1995; Lie 2005). However, when a firm's bonus compensation explicitly rewards EPS performance, the primary motivation of repurchasing shares may be to meet or exceed the bonus threshold for the personal gain to the CEO. On the other hand, repurchasing firms without the bonus-EPS tie are not influenced by the bonus incentive and are more likely to be related to undervaluation. Hence, the fourth hypothesis is:

H4: *Shares of repurchasing firms that tie their CEO bonuses to EPS underperform shares of repurchasing firms that do not tie their CEO bonuses to EPS in the post-repurchase period.*

3. Data sources, sample selection, and descriptive statistics

3.1 Sample selection

The sample selection procedure starts with the intersection of COMPUSTAT's Industrial Annual database and Execucomp dataset. Execucomp provides information on executive compensation starting fiscal year 1992. COMPUSTAT provides information needed to calculate the dollar amount of share repurchases as well as firms' financial information (e.g., total assets, earnings, number of shares outstanding). I exclude financial and utility firms, firms with negative book value of equity, and firms with share price less than \$1. There are 17,555 firm-year observations during 1992-2007 in the COMPUSTAT-Execucomp merged sample.³

³ COMPUSTAT adopts a new data format starting fiscal year 2007. In the new format, data are labeled by abbreviated letter names. To be comparable with previous studies (e.g., Skinner 2008), I still describe the data by their item numbers, although the sample covers fiscal year 2007.

3.2 Data collection on CEOs' bonus structure

For the sample obtained from COMPUSTAT and Execucomp, I retrieve the annual proxy statements (Form DEF 14A) filed with SEC electronically.⁴ There are 12,476 proxy statements by 1,423 companies in the final sample, from fiscal year 1993 to 2007. I read each proxy statement and hand-collect the information on CEO bonus structure.

Bonus is a short-term performance-based incentive plan that is paid in cash shortly after the end of the fiscal year if certain criteria are met. The compensation committee decides the criteria of the bonus award at the beginning of the fiscal year. Some companies provide very detailed descriptions of the evaluating factors that determine the CEO bonuses in their SEC filings, while some are very vague about the process. Bonus calculations vary among firms, but generally no bonuses are payable if the threshold goals are not reached.

The following is an example obtained from the proxy statement of BJ Services Corporation for fiscal year 2007 filed on February 7, 2008:⁵

“The purpose of the annual bonus is to provide motivation toward, and reward the accomplishment of, corporate annual objectives and to provide a competitive compensation package that will attract, reward and retain individuals of the highest quality. As a pay-for-performance plan, cash bonus awards are paid based upon two factors: (1) the individual bonus award levels set for each executive officer’s position and (2) the achievement of corporate performance objectives established for the fiscal year.

⁴ The mandated electronic filing with SEC commenced in April 1993. However, not all documents filed with the Commission by public companies are available on EDGAR. Companies were phased in to EDGAR filing over a three-year period, ending May 6, 1996. As of that date, all public domestic companies were required to make their filings on EDGAR, except for filings made in paper because of a hardship exemption.

⁵ In this example, "NEOs" is the abbreviation for "Named Executive Officers" and Mr. Stewart is the CEO.

There are three bonus award levels for each executive officer: entry level, expected value (target) and over achievement. Each level represents the percentage of base salary that the executive officer will receive as a bonus if that particular bonus award level is met for the fiscal year. The bonus levels for fiscal 2007 were 10%, 100% and 175% of base salary for Mr. Stewart and 7%, 70% and 122.5% of base salary for the other NEOs. Bonus award levels are not based on performance factors for each individual officer; rather, they are based on the officer's position and generally remain the same from year to year. The bonus levels under the annual bonus plan for fiscal 2008 were modified slightly from fiscal 2007. The bonus levels for fiscal 2008 are 10%, 100% and 175% of base salary for Mr. Stewart, 8%, 80% and 140% of base salary for Messrs. Dunlap and Smith and 7%, 70% and 122.5% of base salary for the remaining NEOs.

The second factor in the award of cash bonuses is the achievement of corporate performance objectives. We choose earnings per share (EPS) as our performance objective metric for the annual bonus because it is currently the metric that we believe is most widely used to evaluate the performance of the Company by investors and analysts. The target level is typically the earnings per share estimated by the Company in its annual planning process completed in October of each year. Based on that number, the Chief Executive Officer then determines earnings per share goals for the entry level and over achievement bonus levels. The Chief Executive Officer then recommends all three levels to the Compensation Committee for their approval.

For fiscal 2007, the annual bonus EPS target was set in November 2006 for all NEOs at \$2.70 for entry level, \$3.38 for expected value (target) and \$3.88 for over-

achievement. Because market conditions in our industry change rapidly, our publicly released financial forecasts may differ from the EPS targets determined in the earlier financial planning process. That was the case in 2007, when the Company's initial financial guidance for fiscal 2007 was lower than the EPS targets for annual bonus purposes. The Company did not meet the entry level of earnings per share for fiscal 2007; therefore, none of the NEOs received a cash bonus at any level."

I collect the following information on CEO bonus structure:

- Whether EPS is a determining factor of the CEO bonus.
- If EPS is a factor in determining the bonus, the threshold EPS for the CEO to receive a bonus, e.g., \$2.70 in the proxy statement above.
- The target bonus-to-salary ratio for the CEO, which is the ex-ante expected bonus the CEO will receive as a percentage of CEO's base salary. In the example above, the target bonus-to-salary ratio for the CEO is 100%.

As shown in Table 1, out of the 12,476 firm-year observations, only 283 (2.27%) do not have a bonus component in the CEO compensation, confirming that bonus is widely used as a short-term incentive plan. About 49% of the sample has a bonus component that is tied directly to EPS performance, while in 29.75% of the sample EPS is not a determining factor of the CEO bonus. In 18.87% of the sample, firms do not specify the evaluating factors for bonus award, thus I cannot determine whether EPS is a factor of the bonus decision.

Insert Table 1

The majority of firms do not disclose the threshold EPS for bonus, often treating it as confidential business information that they do not want to make available to their competitors. As an example, the following is extracted from the proxy statement of Cypress Semiconductor Corp for fiscal year 2007:

“The details of the specific earnings per share target have not been included in this proxy statement in order to maintain the confidentiality of our earnings per share expectations, which we believe are confidential commercial or business information, the disclosure of which would adversely affect the Company.”

For about 7% of the firm-year observations with CEO bonuses directly tied to EPS, I am able to collect the threshold EPS for bonuses. Specifically, 185 firms disclosed their threshold EPS for bonuses for a total of 402 firm-year observations. The majority of the threshold EPS is defined in basic EPS, while about 27% of them are expressed in diluted form. It is important to note that, because the bonus contract is constructed so that the CEO will receive a bonus only if the reported EPS meets or exceeds the EPS bonus threshold, the meet-or-beat outcome can be inferred from the CEO bonus compensation even when a firm does not disclose its EPS bonus threshold.

About 20% of the proxy statements explicitly specify the target bonus-to-salary ratio for CEOs. Figure 2 plots the average target bonus-to-salary ratio for each fiscal year from 1993 to 2007. The target bonus-to-salary ratio increased significantly during the sample period. In fiscal year 2007, the target bonus is, on average, about 105% of the salary. This demonstrates the economic significance of bonuses in CEO compensation: they represent a substantial amount of income for CEOs.

Insert Figure 2

3.3 Measuring share buyback and firm characteristics

Following Fama and French (2001) and Skinner (2008), I measure share repurchases as the dollar amount of annual net repurchases. For firms treating repurchased shares as treasury stocks, I calculate net repurchases as the increase in common treasury stock (COMPUSTAT #226). Treasury stock captures the cumulative effects of stock repurchases and reissues. If treasury stock is zero in the current and prior year, suggesting the retirement method has been used, I measure net repurchases as the difference between stock purchase (#115) and stock issuance (#108). If either the change in treasury stock or the difference between #115 and #108 is negative, net repurchases are set to zero. As discussed by Skinner (2008), it is preferable to use the change in treasury stock, if available, rather than net purchases (#115–#108) because the change in treasury stock nets out any associated issuances, including non-cash issuances.

In the analysis, I control for the various determinants of repurchases documented by previous studies. According to the distribution of excess cash hypothesis (Jensen 1986; Guay and Harford 2000; Grullon and Michaely 2002), if a firm has cash in excess of its investment opportunities, it may use repurchases as a substitute for dividends to pay out this excess cash to shareholders. Thus, I include profitability, cash holdings, and dividend payout ratio in the analysis of share repurchases. Profitability is net income deflated by total assets at the beginning of the year. A firm achieving a higher profitability is likely to have more excess cash for distribution. Cash holdings are cash and cash equivalents

deflated by total assets at the beginning of the year. Dividend payout ratio is the dividends paid to common shareholders scaled by the net income of prior fiscal year.⁶

According to the target leverage ratio hypothesis (Opler and Titman 1996; Lie 2002), firms may repurchase shares to increase leverage and achieve a target leverage ratio. Leverage is calculated as the sum of long-term debt and debt in current liabilities scaled by total assets at the beginning of the year. Because a firm's leverage strongly depends on the industry it belongs to, I use industry-adjusted leverage ratio, which is the difference between a firm's leverage ratio and the median leverage ratio of all firms with the same industry.⁷ Under such a setting, a firm's target leverage ratio is the median leverage ratio within the same industry.

Under the takeover avoidance hypothesis (Bagwell 1991), a potential target firm may repurchase shares to make it costlier for potential rival management teams to acquire a significant ownership in the firm (in the presence of an upward sloping supply curve for shares). I construct a dummy variable, takeover, which equals one for firms that are targets of takeover attempts in the current or the prior year and zero otherwise. I extract the information on takeovers from the SDC Platinum Database of Mergers and Acquisitions.

According to the management stock option dilution hypothesis, share repurchases can reduce the dilution effect of employee stock option exercises (Fenn and Liang 2001; Bens et al. 2002, Bens et al. 2003). Managers holding stock options receive no dividends while underlying share price declines as employees exercise options, giving managers a

⁶ In about 5% of the firm-year observations, firms report negative net income yet still pay dividends. In this case, I set the dividend payout ratio as missing value. For robustness test, I also compute dividend payout ratio as the dividends scaled by sales. The results are robust to this alternative measure.

⁷ I use the Fama-French 48-industry classification.

clear preference for repurchases over dividends. I use management stock options, measured as the number of shares underlying options held by a firm's top five executives scaled by the number of shares outstanding, to control for management incentives to repurchase for offsetting the EPS dilution effect. The information on management stock options is extracted from the Execucomp database.

The signaling or undervaluation hypothesis (Vermaelen 1981; Bartov 1991; Lucas and McDonald 1996) argues that firms may use stock repurchases to signal the undervaluation of their equity. Following Dittmar (2000), I use market-to-book ratio and stock return momentum as proxies of misvaluation. Market-to-book is the ratio of market value of equity plus debt to the book value of assets. Stock momentum is the 12-month market-adjusted abnormal return prior to the beginning of the current fiscal year. The stock return information is obtained from CRSP monthly data.

3.4 Descriptive statistics

Table 2 provides preliminary statistics of firm characteristics, CEO compensation, and share repurchases. All dollar amounts are adjusted to 1992 values using the consumer price index (CPI).⁸ Panel A summarizes the variables in the whole sample. Bonus is a significant portion of CEO compensation. It is about 31% (mean) or 34% (median) of the cash compensation (the sum of salary, bonus, and other annual pay). It is also around 19% (mean) or 15% (median) of the total compensation (the sum of cash pay, restricted stock, option exercised, long-term incentive plan, and others).

Total assets, stock momentum, one-year return to shareholders, management stock options, and bonus have extreme values on both ends of the distribution. In the

⁸ CPI data is taken from the website of Bureau of Labor Statistics: <http://www.bls.gov/cpi/>.

multivariate analysis, these variables are winsorized at the 1st and 99th percentiles to reduce the potential impact of outliers.

Insert Table 2

Forty-five percent of the firm-year observations have positive net repurchases. In Figure 3, I plot the percentage of firms with positive net repurchases by year. Overall, the percentage of firms with positive net repurchases increases over time. In fiscal year 1993, 39% of firms have positive net repurchases. By contrast, in fiscal year 2007, more than 64% of the firms have positive net repurchases.

Insert Figure 3

In Panel B of Table 2, I compare firm characteristics and CEO bonus compensation between repurchasing and non-repurchasing firms. Repurchasing firms (non-repurchasing firms) are firms with positive (non-positive) net repurchases during the fiscal year. The t-statistic tests the null hypothesis that the means of the two groups are equal under the assumption of normal distribution, while the Kruskal-Wallis Chi-squared tests whether the two groups are from the same population without assuming normality. Compared to non-repurchasing firms, repurchasing firms are larger and have smaller cash holdings, a higher profitability, greater dividend payout ratios, lower leverage and industry-adjusted leverage ratios, and lower market-to-book ratios.

The probability of being the target of a takeover attempt in the current or the prior year is about the same between the two groups. The CEOs of repurchasing firms receive a larger amount of bonuses than those of non-repurchasing firms. At the same time, repurchasing firms have lower one-year returns than non-repurchasing firms. For

repurchasing firms, the average amount of net repurchases is \$173.91 million and the average buyback ratio is 3.49%.⁹

Panel C of Table 2 presents the Pearson correlation coefficients between buyback ratios and the explanatory variables of repurchases for the whole sample. The buyback ratio is positively related to firm size, profitability, probability of being a take over target, and management stock options. It is negatively related to leverage, market-to-book ratio, and stock momentum. The univariate results are generally consistent with prior literature.

Panel D of Table 2 reports the Pearson correlation coefficients between CEO bonuses and firm characteristics for the whole sample. The level of CEO bonuses is positively related to the amount of repurchases (correlation coefficient is 0.20) and the buyback ratio (correlation coefficient is 0.07). The correlation between firm size (total assets) and bonus is positive and significant (correlation coefficient is 0.38). One-year return to shareholders is also positively correlated with CEO bonuses.

4. Empirical analysis and results

I now test the hypotheses presented in Section 2. First, I investigate whether firms are more likely to undertake share repurchases and whether the magnitude of repurchases is larger when CEO bonuses are tied to EPS. Second, I examine how share repurchases affect the probability of a CEO receiving a bonus and the magnitude of the bonus. Next, I test whether firms are more likely to conduct share repurchases when the EPS is close to the level that triggers CEO bonuses. Finally, I compare the post-repurchase abnormal returns between firms with and without the bonus-EPS tie.

⁹ The buyback ratio is the dollar amount of net repurchases scaled by market value of equity at the beginning of the year.

4.1 Share repurchases and the tie between CEO bonuses and EPS

I examine whether tying CEO bonuses to EPS performance has an impact on share repurchases. In Table 3, I compare the frequency of positive net repurchases, the dollar amount of net repurchases, and the buyback ratio between the two groups: firms that tie CEO bonuses to EPS and firms that do not. In the group with CEO bonuses tied to EPS, 52% of the observations have positive net repurchases, significantly higher than the 41% in the other group. The dollar amount and relative size of repurchases are also significantly larger in the first group. The univariate results from Table 3 strongly support H1a and H1b.

Insert Table 3

I then conduct multivariate analyses of repurchases with the bonus-EPS tie as one of the explanatory variables. I estimate a Logit model of the likelihood of a firm having positive net repurchases:

$$\begin{aligned} Buy_{i,t} = & \gamma_0 + \gamma_1 Size_{i,t-1} + \gamma_2 Profit_{i,t-1} + \gamma_3 Cash_{i,t-1} + \gamma_4 Pay_{i,t-1} + \gamma_5 IndLever_{i,t-1} \\ & + \gamma_6 Takeover_{i,t-1} + \gamma_7 MTB_{i,t-1} + \gamma_8 Momentum_{i,t-1} + \gamma_9 MO_{i,t} + \gamma_{10} Negative_{i,t} + \gamma_{11} EPSfactor_{i,t} + \varphi_{i,t} \end{aligned} \quad (1)$$

I also estimate a Tobit model of the buyback ratio:¹⁰

$$\begin{aligned} Buyback_{i,t} = & \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Profit_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Pay_{i,t-1} + \beta_5 IndLever_{i,t-1} \\ & + \beta_6 Takeover_{i,t-1} + \beta_7 MTB_{i,t-1} + \beta_8 Momentum_{i,t-1} + \beta_9 MO_{i,t} + \beta_{10} Negative_{i,t} + \beta_{11} EPSfactor_{i,t} + \mu_{i,t} \end{aligned} \quad (2)$$

The dependent variable in Equation (1), *Buy*, is 1 if the net repurchases of firm *i* in year *t* are positive and 0 otherwise. The dependent variable in Equation (2), *Buyback*, is the dollar amount of net repurchases for firm *i* in year *t* scaled by the market value of equity at the beginning of the year. In both equations, *Size* is the log of total assets. I include *Size* to control for the positive correlation between repurchases and firm size.

¹⁰ I estimate a Tobit model because any negative net repurchases are set to zero.

Negative is one if earnings are negative and zero otherwise. I include *Negative* because a repurchase will not increase EPS when earnings are negative. Thus, bonus-driven repurchases are unlikely when earnings are negative, and I expect a negative sign from the estimated coefficient of *Negative*. *EPSfactor* is one if the CEO bonus is tied to EPS and zero otherwise. The rest of the independent variables are profitability (*Profit*), cash holdings (*Cash*), dividend payout ratio (*Pay*), industry-adjusted leverage ratio (*IndLever*), takeover dummy (*Takeover*), market-to-book ratio (*MTB*), stock momentum (*Momentum*), and management stock options (*MO*). As discussed in Section 3.3, I include these variables to control for the five alternative hypotheses for repurchases: the distribution of excess cash hypothesis, the target leverage ratio hypothesis, the takeover avoidance hypothesis, the signaling or undervaluation hypothesis, and the management stock option dilution hypothesis. I also control for year fixed effects when estimating Equation (1) and (2).

The estimated coefficients and standard errors are presented in Table 4. Panel A reports the results from the Logit regression of Equation (1), and Panel B presents the results from the Tobit regression of Equation (2). In both panels, Column (1) excludes the firms that do not have a bonus plan or do not provide information on whether EPS is a determining factor of CEO bonuses, while Column (2) includes all the firms. The standard errors are computed by clustering the observations by firm (Petersen, 2009) and are robust to heteroskedasticity.

Insert Table 4

Firm size is a positive and significant determinant of the probability of having positive net repurchases (Panel A) and the magnitude of repurchases (Panel B). Both

profitability and cash holdings have positive and significant coefficients on the probability of buyback and the buyback ratio, supporting the distribution of excess cash hypothesis. Industry-adjusted leverage ratio has a significantly negative coefficient in both panels, supporting the target leverage ratio hypothesis. Both market-to-book and stock momentum are negative and significant determinants of the probability of buyback and the buyback ratio, supporting the undervaluation hypothesis. The management stock options variable is significant and positive in both panels, consistent with Fenn and Liang (2001). The coefficients on takeover dummy are insignificant, providing no support to the anti-takeover hypothesis. As expected, when earnings are negative, firms are less likely to conduct share repurchases and the magnitude of repurchases is smaller.

The variable of interest is the tie between CEO bonuses and EPS. In Panel A, the bonus-EPS tie significantly increases the probability of a firm having positive net repurchases, with the odds ratio being 1.38 (not tabulated). Panel B shows that tying CEO bonuses to EPS has a significantly positive effect on the scaled net repurchases. Tying CEO bonuses to EPS is associated with a 0.7% increase in the scaled net repurchases, which is about half of the sample mean (the sample mean of the scaled net repurchases is 1.59%, as shown in Panel A of Table 2). The multivariate results in Table 4 strongly support H1a and H1b: firms that tie their CEO bonuses to EPS are more likely to repurchase shares and the magnitude of repurchases is larger.

4.2 The gains to CEOs from share repurchase

I now examine whether CEOs achieve personal gains from share repurchases when their bonuses are tied to EPS (H2a and H2b). I exclude firms that do not disclose whether EPS is a determining factor of CEO bonuses and firms that do not have a bonus plan in

CEO compensation. First, I estimate a Logit model of whether a CEO receives a bonus as follows:

$$\begin{aligned} Bonus_{i,t} = & \eta_0 + \eta_1 Size_{i,t} + \eta_2 Ret_{i,t} + \eta_3 Buyback_{i,t} + \eta_4 EPSfactor_{i,t} \\ & + \eta_5 EPSfactor_{i,t} * Buyback_{i,t} + \varphi_{i,t} \end{aligned} \quad (3)$$

The dependent variable, $Bonus_{i,t}$, takes the value of one if firm i grants a cash bonus to its CEO in year t and zero otherwise. Then, I estimate an OLS regression of the magnitude of CEO bonuses as follows:

$$\begin{aligned} CEOBonus_{i,t} = & \lambda_0 + \lambda_1 Size_{i,t} + \lambda_2 Ret_{i,t} + \lambda_3 Buyback_{i,t} + \lambda_4 EPSfactor_{i,t} \\ & + \lambda_5 EPSfactor_{i,t} * Buyback_{i,t} + \delta_{i,t} \end{aligned} \quad (4)$$

$CEOBonus$ is the natural log of (1 + dollar amount of the CEO bonus). In both Equation (3) and (4), $Size$ is the natural log of total assets, and Ret is the one-year return to shareholders for fiscal year t . $Buyback$ is measured in three ways: whether the net repurchases are positive, log of (1+net repurchases), and net repurchases scaled by market value of equity. $EPSfactor$ is the indicator of whether EPS is a determining factor of CEO bonuses: it is one if CEO bonuses are tied to EPS and zero otherwise. Both equations include the interaction term between $EPSfactor$ and $Buyback$. For firms that do not tie their CEO bonuses to EPS, η_3 (λ_3) measures the impact of repurchase on the probability of the CEO receiving a bonus (the magnitude of CEO bonuses). For firms with CEO bonuses tied to EPS, $\eta_3 + \eta_5$ ($\lambda_3 + \lambda_5$) captures the impact of repurchase on the probability of the CEO receiving a bonus (the magnitude of CEO bonuses). I control for year and industry fixed effects when estimating Equation (3) and (4). I use the Fama-French 48-industry classification.

Panel A of Table 5 presents the estimated coefficients and standard errors from the Logit regression. CEOs of larger firms are more likely to receive a bonus. Higher stock returns are associated with a higher probability of the CEO receiving a bonus, consistent with bonus being a performance-based compensation. η_3 is not statistically significant for all three buyback measures, suggesting that when CEO bonuses are not tied to EPS, there is no evidence of share repurchase affecting the probability of a CEO receiving a bonus. However, the interaction term between the bonus-EPS tie and the buyback measures is positive and significant. F-tests confirm that when the bonus-EPS tie is present, the impact of repurchases on the probability of a CEO receiving a bonus ($\eta_3 + \eta_5$) is significantly positive for each of the three buyback measures. Thus, share repurchases increase the probability of a CEO being awarded a bonus, but only when the bonus is tied to EPS (H2a). Equivalently, because a CEO receives the bonus pay only when the reported EPS meets or exceeds the bonus EPS threshold, share repurchases increase the probability of reporting the EPS that meets or exceeds the bonus EPS threshold when CEO bonuses are tied to EPS performance.

Insert Table 5

The estimated coefficients and standard errors from the OLS regression are presented in Panel B of Table 5. Larger firms award a higher bonus to their CEOs. Higher stock returns are associated with a higher bonus, consistent with bonus being a performance-based compensation. λ_3 is not statistically different from zero for any of the three buyback measures, suggesting that when CEO bonuses are not tied to EPS, there is no evidence that share repurchase is related to CEO bonuses. However, the interaction term between *EPSfactor* and *Buyback* is positive and significant. F-tests confirm that ($\lambda_3 + \lambda_5$)

is positive and significant in all three columns. Thus, when CEO bonuses are tied to EPS, share repurchases increase the amount of CEO bonuses (H2b). The lack of significance in λ_3 also mitigates the concern of possible omitted correlated variables. If the positive effect of repurchases on CEO bonuses observed when CEO bonuses are tied to EPS is driven by some omitted correlated variables, one would expect the same positive effect when the bonus-EPS tie is absent. The significantly positive ($\lambda_3 + \lambda_5$) combined with an insignificant λ_3 gives me more confidence to say that tying CEO bonuses to EPS motivates some CEOs to make repurchasing decisions for bonus maximization.

The impact of share repurchases on the level of bonuses is economically significant. In Column 1, $\lambda_3 + \lambda_5$ equals 0.36, which means that conducting share buyback increases the level of bonuses by approximately 43% (i.e., $\exp(0.36)-1$) when CEO bonuses are tied to EPS. In Column 2, $\lambda_3 + \lambda_5$ equals 0.091, suggesting that an increase of one standard deviation in the log of buyback amount (the standard deviation is 2.15) increase the level of bonuses by about 19% when CEO bonuses are tied to EPS. In Column 3, $\lambda_3 + \lambda_5$ equals 4.16, meaning that an increase of one standard deviation in the buyback ratio (the standard deviation is 0.03) increases the level of bonuses by about 12% when CEO bonuses are tied to EPS.

4.3 Share repurchases when “As-if” EPS is close to the threshold EPS

In this section, I examine share repurchases when EPS is close to the level that triggers CEO bonuses (H3a and H3b). For firms with positive net repurchases, I compute the “As-if” EPS, i.e., what the EPS would have been without repurchases, in two ways:

$$\text{As-if EPS } I = \text{Earnings}_t / (\text{Weighted average shares outstanding}_t + 0.5 * \text{Shares bought}_t)$$

$$As\text{-if } EPS\ 2 = (Earnings_t + 0.5 * Cost_t) / (Weighted\ average\ shares\ outstanding_t + 0.5 * Shares\ bought_t)$$

$Earnings_t$ is the reported income available to common shareholders in year t . $Weighted\ average\ shares\ outstanding_t$ is the number of shares outstanding used to compute the reported EPS, as provided by COMPUSTAT. $Shares\ bought_t$ is the number of shares bought during the fiscal year, computed as the dollar amount of net repurchases divided by the monthly average stock price. I assume that the shares are bought back uniformly throughout the year. $Cost_t$ is the “opportunity cost,” that is, what the company could have earned from the cash spent on share repurchases. The “opportunity cost” is estimated as the product of the buyback dollar amount and the annualized 3-month Treasury-bill rate.

As mentioned in data collection description, the majority of firm-year observations use basic EPS while some use diluted EPS when specifying the threshold EPS for CEO bonuses. I compute *As-if EPS 1* and *As-if EPS 2* accordingly, in order to compare them with the threshold EPS.¹¹

When comparing *As-if EPS 1* and *As-if EPS 2* with the reported EPS (with the effect of repurchases), I find that the reported EPS, on average, is 12 cents higher than *As-if EPS 1* and 9 cents higher than *As-if EPS 2* (not tabulated). When testing H3a and H3b, I include non-repurchasing firms in the analysis. For non-repurchasing firms, *As-if EPS 1* and *As-if EPS 2* are the same as the reported EPS.

¹¹ For basic EPS, COMPUSTAT provides *Earnings* (data 237) and *Weighted average shares outstanding* (data 54) that are used to calculate the basic EPS. For diluted EPS, COMPUSTAT provides *Weighted average shares outstanding* (data 171) for calculating diluted EPS and *diluted EPS* (data57), and I compute earnings as the product of data 171 and data57.

If *As-if EPS 1* or *As-if EPS 2* is less than but within 15% of the threshold EPS for bonuses, I consider them being close to the threshold.¹² Table 6 compares the frequency, dollar amount, and relative size of share repurchases between two groups, those with *As-if EPS* close to the threshold EPS and those otherwise. As shown in Panel A, when *As-if EPS 1* is close to the threshold EPS, 75% of the observations have positive net repurchases, the dollar amount of net repurchases has a mean of 355.76 million and a median of 29.05 million, and the buyback ratio has a mean of 3.03% and a median of 1.75%. In contrast, when *As-if EPS 1* is not close to the threshold EPS, 60% of the observations have positive net repurchases, the dollar amount of net repurchases has a mean of 123.78 million and a median of 2.98 million, and the buyback ratio has a mean of 2.37% and a median of 0.40%. Both t-test and Kruskal-Wallis test show that values in the "close" group are significantly higher than those in the "not close" group, with the exception that the t-statistic for buyback ratio is marginally significant. An alternative measure of the "As-if EPS", *As-if EPS 2*, generates similar results (Panel B). Overall, the univariate results in Table 6 support H3a and H3b: when EPS is close to the level triggering bonus payment, firms are more likely to repurchase shares and the magnitude of repurchases is larger.

Insert Table 6

In the multivariate analysis, I estimate the Logit model of the likelihood of a firm having positive net repurchases and the Tobit model of the scaled net repurchases incorporating the indicator of whether the *As-if EPS* is close to the threshold EPS. Note

¹² Since the 15% cutoff is arbitrary, I also use 10% and 20% as the cutoff. The results are qualitatively the same.

that all the observations included in the regression have CEO bonuses tied to EPS. The regressions are specified as follows:

The Logit regression:

$$\begin{aligned} Buy_{i,t} = & \gamma_0 + \gamma_1 Size_{i,t-1} + \gamma_2 Profit_{i,t-1} + \gamma_3 Cash_{i,t-1} + \gamma_4 Pay_{i,t-1} + \gamma_5 IndLever_{i,t-1} \\ & + \gamma_6 Takeover_{i,t-1} + \gamma_7 MTB_{i,t-1} + \gamma_8 Momentum_{i,t-1} + \gamma_9 MO_{i,t} + \gamma_{10} Negative_{i,t} + \gamma_{11} Close_{i,t} + \varphi_{i,t} \end{aligned} \quad (5)$$

The Tobit regression:

$$\begin{aligned} Buyback_{i,t} = & \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Profit_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Pay_{i,t-1} + \beta_5 IndLever_{i,t-1} \\ & + \beta_6 Takeover_{i,t-1} + \beta_7 MTB_{i,t-1} + \beta_8 Momentum_{i,t-1} + \beta_9 MO_{i,t} + \beta_{10} Negative_{i,t} + \beta_{11} Close_{i,t} + \mu_{i,t} \end{aligned} \quad (6)$$

“Close” is one if the *As-if EPS* is below but within 15% of the threshold EPS and zero otherwise. The estimated coefficients and standard errors are presented in Panel A (Logit) and Panel B (Tobit) of Table 7. In both columns (*As-if EPS 1* in Column 1 and *As-if EPS 2* in Column 2), the estimated coefficient of *Close* is significantly positive, supporting H3a and H3b that when EPS is close to the threshold EPS, firms are more likely to repurchase shares and the magnitude of repurchases is larger. In the Tobit regression, when the *As-if EPS 1* (*As-if EPS 2*) is close to the threshold, the net repurchases increase by 1.4% (1.2%) of the market equity (not tabulated).

Insert Table 7

4.4 The long-run post-repurchase abnormal returns

To test H4, I examine the three-year post-repurchase abnormal returns adopting the calendar-time portfolio approach proposed by Fama (1998) and Mitchell and Stafford (2000). For each calendar month during the sample period, I form a value-weighted portfolio of firms that have positive net repurchases within the previous three years. I use the market value of equity at the end of the previous month as the weighting factor. I

follow repurchasing firms during the three years after the end of the fiscal year in which the net repurchases are positive and rebalance the portfolio each month by dropping firms that have reached the end of the three-year period and adding firms that have just repurchased shares. Following Mitchell and Stafford (2000), I drop the months with less than ten firms in the portfolio. The portfolio excess returns are then regressed onto the four factors introduced by Fama and French (1993) and Carhart (1997).

$$R_{buy,t} - R_{f,t} = \alpha_0 + \alpha_1(R_{m,t} - R_{f,t}) + \alpha_2SMB_t + \alpha_3HML_t + \alpha_4UMD_t + \varepsilon_{p,t} \quad (7)$$

$R_{buy,t}$ is the value-weighted portfolio return of repurchasing firms in month t . $R_{f,t}$ is the return of one-month Treasury bill. $R_{m,t}$ is the return of the CRSP value-weighted portfolio. SMB_t is the difference between returns of value-weighted portfolios of small and big stocks. HML_t is the difference between returns of value-weighted portfolios of high and low book-to-market stocks. UMD_t is the difference between returns of value-weighted portfolios of high and low momentum stocks. The intercept, α_0 , is interpreted as the mean monthly abnormal return to the portfolio of repurchasing firms.

I also construct a zero-investment (or hedged) calendar-time portfolio consisting of long positions on repurchasing firms and short positions on their matching firms. For each repurchasing firm, I find a matching non-repurchasing firm with the closest value of total assets in the same industry based on the Fama-French 48 industry classification. The regression of the hedged portfolio returns is specified as:

$$R_{buy,t} - R_{match,t} = \gamma_0 + \gamma_1(R_{m,t} - R_{f,t}) + \gamma_2SMB_t + \gamma_3HML_t + \gamma_4UMD_t + \eta_{p,t} \quad (8)$$

$R_{match,t}$ is the value-weighted portfolio return of the matching non-repurchasing firms in month t . γ_0 is interpreted as the mean monthly abnormal return to the hedged portfolio.

The coefficients and standard errors from estimating Equation (7) and (8) are reported in Table 8. Panel A is for the sample of all repurchasing firms, Panel B for the subset of repurchasing firms that tie CEO bonuses to EPS performance, and Panel C for the subset of repurchasing firms that do not tie CEO bonuses to EPS performance.

Insert Table 8

For the sample of all repurchasing firms (Panel A), α_0 and γ_0 are positive and significant at 10% level, suggesting that the repurchasing firms experience positive abnormal returns and outperform their matching firms in the post-repurchasing period. α_0 is 0.31%, translating to a mean annual abnormal return of 3.7%. γ_0 is 0.42%, suggesting that the repurchasing firms outperform the matching firms by 5.0% annually. The results are qualitatively consistent with Ikenberry, Lakonishok, and Vermaelen (1995).

For the subset of the firms with CEO bonuses determined by EPS (Panel B), α_0 and γ_0 are 0.07% and 0.18% respectively and are not statistically significant. By contrast, for the subset of firms that do not tie CEO bonuses to EPS (Panel C), α_0 and γ_0 are 0.49% (significant at 1% level) and 0.60% (significant at 5% level), translating to a mean annual abnormal return of 5.88% and 7.20%, respectively.

The above evidence provides support to H4. While firms that do not tie CEO bonuses to EPS experience positive post-repurchase abnormal returns, I find no evidence of post-repurchase abnormal returns for firms that tie CEO bonuses to EPS. The results

are consistent with the evidence presented earlier that suggests the bonus-EPS tie may motivate some CEOs to use repurchases for improving EPS to the bonus threshold level.

5. Conclusion

The evidence of explicit benefits to managers for meeting or exceeding accounting benchmarks has been largely missing in the literature. Such evidence is critical because it is the basis for arguing why managers would be motivated to meet or exceed the benchmarks. The EPS threshold for CEOs to receive bonuses has its distinct advantage as a benchmark because only if the reported EPS meets or exceeds the bonus threshold, will a CEO get the bonus, a direct financial benefit that is easily observable. In this study, I document the association between share repurchases decisions and the likelihood of meeting or exceeding the threshold EPS for bonuses and present evidence of CEOs achieving personal gains in bonus compensation. Specifically, I find that firms tying CEO bonuses to EPS performance are more likely to conduct share repurchases and tend to repurchase a larger amount of shares. When CEO bonuses are tied to EPS, share repurchases have a positive impact on both the probability of the CEO receiving a bonus (equivalently, the probability of meeting or exceeding the bonus EPS threshold by the nature of CEO bonus contract) and the magnitude of the bonus. In addition, firms are more likely to conduct share repurchases and the magnitude of repurchases is larger when the pre-repurchasing EPS is below but close to the EPS threshold for bonuses. Finally, in the three-year post-repurchase period, firms that tie CEO bonuses to EPS do not experience the positive abnormal returns observed for firms that do not tie CEO bonuses to EPS, consistent with the earlier evidence presented in this study that points to the bonus-maximizing incentive of CEOs in the context of share repurchases.

The findings add to the literature linking earnings management and executive compensation as well as the literature establishing the influence of executive compensation on corporate payout policy. Healy (1985) shows bonus structure motivates earnings management through accruals reporting. This paper extends his work by showing that CEOs strategically make repurchasing decisions to manipulate their bonus pay. This study further extends the literature establishing that the design of CEO compensation influences corporate payout policy. Earlier work in this area (e.g. Fenn and Liang 2001; Bens et al. 2003) has shown that executive stock option compensation creates a preference for repurchases over dividends because of the anti-dilution effect of share repurchases. This study shows that linking CEO bonuses to EPS performance creates an incentive to repurchase shares even in the absence of managerial stock options.

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Table 1: Summary of the bonus structure of CEO compensation

This table summarizes the frequency of whether EPS is a determining factor of CEO bonuses. The information is collected from the proxy statements (DEF 14A) available on SEC website for all firm-year observations in the intersection of Compustat Industrial Annual and Execucomp databases from fiscal year 1993 to 2007.

	Number of firm-year observations	Frequency
There is no bonus component in CEO compensation	283	2.27%
Bonus is part of CEO compensation		
EPS is a determining factor of CEO bonuses	6,125	49.00%
EPS is not a determining factor of CEO bonuses	3,711	29.75%
Do not specify	2,357	18.87%
Total	12,476	100%

Table 2: Preliminary statistics of firm characteristics, CEO bonus, and share repurchase

This table presents preliminary statistics on firm characteristics, CEO compensation, and share repurchases. Share repurchases are measured as annual net repurchases and set to zero if they are negative. All dollar amounts are in 1992 dollars. *Cash* is the amount of cash and cash equivalents scaled by total assets at the beginning of the year. *Profitability* is net income deflated by total assets at the beginning of the year. *Payout ratio* is the dividend paid scaled by net income of prior fiscal year. *Leverage* is the sum of long-term debt and debt in current liabilities scaled by total assets at the beginning of the year. *Industry-adjusted Leverage* is the difference between a firm's leverage ratio and the median leverage ratio of all firms within the same industry based on Fama-French 48 industry classification. *Takeover* is one for firms that are targets of acquisition attempts in the current or the prior fiscal year and zero otherwise. *Market-to-book* is the market value of equity plus debt to the book value of assets. *Stock momentum* is the market-adjusted abnormal return within one year prior to the beginning of the current fiscal year. *Management stock options* is the number of shares underlying options held by a firm's top five executives scaled by the number of shares outstanding. *Cash pay* is the sum of CEO salary, bonus, and other annual income. *Total compensation* is the sum of CEO cash pay, restricted stock, long-term incentive plan, option exercised, and all other pay. *Buyback ratio* is the dollar amount of net repurchases scaled by market value of equity at the beginning of the year. Panel A summarizes the variables in the whole sample, Panel B compares repurchasing and non-repurchasing firms, and Panel C (Panel D) presents the Pearson correlation coefficients between buyback ratio and firm characteristics (between CEO bonus and firm characteristics) in the whole sample.

Panel A: Summary of variables in the whole sample

	Number of observations	Mean	Median	Standard deviation	1% cutoff	99% cutoff
Total assets (\$mil.)	12,476	4,112	831	19,072	48	40,820
Cash	12,397	0.15	0.07	0.17	0.0005	0.75
Profitability	12,395	0.04	0.05	0.17	-0.50	0.26
Payout ratio	11,703	0.17	0	0.26	0	1
Leverage	12,359	0.21	0.20	0.16	0	0.62
Industry-adjusted leverage	12,359	0.05	0.03	0.16	-0.26	0.49
Takeover	12,476	0.01	0	0.11	0	1
Market to book	12,359	1.96	1.39	2.55	0.43	9.47
Stock momentum	12,075	8.95%	-0.59%	60.31%	-88.03%	309.00%
One-year return to shareholders	12,153	21.62%	9.53%	115.89%	-76.80%	298.11%
Management stock options	12,153	0.030	0.023	0.038	0	0.124
Dummy of Bonus Award (1 if bonus>0; 0 otherwise)	12,476	0.69	1	0.46	0	1
Bonus (\$ thousand)	12,476	450.13	208.78	857.80	0	3,515
Bonus divided by cash pay	12,476	0.31	0.34	0.26	0	0.84
Bonus divided by total compensation	12,476	0.19	0.15	0.19	0	0.71
Buy=1, if net repurchase>0; =0 otherwise	12,476	0.45	0.00	0.50	0	1
Amount of buyback (\$mil.)	12,476	78.83	0.00	432.47	0	1,582
Buyback ratio	12,476	1.59%	0.00	0.16	0%	16%

Panel B: Comparison of repurchasing and non-repurchasing firms

	Non-repurchasing firms	Repurchasing firms	t-test: t-stat (p-value)	Kruskal-Wallis test: Chi-squared (p-value)
Total assets (\$mil.)	Mean (Median) 3,431 (680) n=6,821	Mean (Median) 4,935 (1,118) n=5,655	4.39 (<0.0001)	287.26 (<0.0001)
Cash	0.16 (0.07) n=6,743	0.13 (0.06) n=5,654	6.83 (<0.0001)	5.65 (0.02)
Profitability	0.01 (0.04) n=6,742	0.07 (0.07) n=5,653	19.28 (<0.0001)	711.06 (<0.0001)
Payout ratio	0.15 (0.00) n=6,263	0.19 (0.08) n=5,440	8.43 (<0.0001)	294.77 (<0.0001)
Leverage	0.22 (0.21) n=6,729	0.19 (0.18) n=5,630	8.79 (<0.0001)	57.65 (<0.0001)
Industry-adjusted leverage	0.06 (0.04) n=6,729	0.04 (0.01) n=5,630	9.97 (<0.0001)	100.78 (<0.0001)
Takeover	0.01 (0.00) n=6,821	0.01 (0.00) n=5,655	0.18 (0.86)	0.03 (0.86)
Market to book	2.01 (1.47) n=6,729	1.90 (1.31) n=5,630	2.44 (0.01)	82.10 (<0.0001)
Stock momentum	11.65% (-0.35%) n=6,523	5.78% (-0.82%) n=5,552	1.21 (0.27)	5.34 (<0.0001)
One-year return to shareholders	28.59% (12.37%) n=6,596	13.36% (7.45%) n=5,557	7.73 (<0.0001)	41.96 (<0.0001)
Management stock options	0.031 (0.024) n=6,596	0.028 (0.021) n=5,557	3.92 (<0.0001)	56.90 (<0.0001)
Dummy of bonus award (1 if bonus>0;0 otherwise)	0.68 (1.00) n=6,821	0.70 (1.00) n=5,655	2.66 (0.008)	7.07 (0.008)
Bonus (\$ thousand)	384.98 (172.15) n=6,821	528.71 (264.56) n=5,655	9.24 (<0.0001)	93.31 (<0.0001)
Bonus divided by cash pay	0.30 (0.32) n=6,821	0.33 (0.38) n=5,655	6.55 (<0.0001)	42.72 (<0.0001)
Amount of buyback (\$mil.)	0.00 (0.00) n=6,821	173.91 (21.90) n=5,655	20.78 (<0.0001)	11086 (<0.0001)
Buyback ratio	0.00 (0.00) n=6,821	3.49% (1.78%) n=5,655	11.50 (<0.0001)	10995 (<0.0001)

Panel C: Correlation matrix of buyback ratio and firm characteristics for the whole sample

Correlation coefficient (p-value)	Total assets	Cash	Profitability	Payout ratio	Leverage	Industry-adjusted leverage	Takeover	Market to book	Stock momentum	Management stock options	Buyback ratio
Total assets	1.0										
Cash	-0.33 (0.0000)	1.0									
Profitability	0.10 (0.0000)	-0.09 (0.0000)	1.0								
Payout ratio	0.29 (0.0000)	-0.24 (0.0000)	0.10 (0.0000)	1.0							
Leverage	0.34 (0.0000)	-0.43 (0.0000)	-0.17 (0.0000)	0.13 (0.0000)	1.0						
Industry-adjusted leverage	0.23 (0.0000)	-0.13 (0.0000)	-0.21 (0.0000)	-0.04 (0.0017)	0.68 (0.0000)	1.0					
Takeover	0.02 (0.02)	0.01 (0.42)	-0.04 (0.0001)	-0.02 (0.08)	0.01 (0.38)	0.05 (0.0000)	1.0				
Market to book	-0.17 (0.0000)	0.39 (0.0000)	0.23 (0.0000)	-0.12 (0.0000)	-0.29 (0.0000)	-0.09 (0.0000)	-0.02 (0.01)	1.0			
Stock momentum	-0.06 (0.0000)	0.13 (0.0000)	0.09 (0.0000)	-0.10 (0.0000)	-0.07 (0.0000)	-0.03 (0.0013)	-0.01 (0.16)	0.31 (0.0000)	1.0		
Management stock options	-0.43 (0.0000)	0.16 (0.0000)	-0.13 (0.0000)	-0.26 (0.0000)	-0.05 (0.0000)	0.01 (0.19)	-0.01 (0.25)	-0.01 (0.18)	0.10 (0.0000)	1.0	
Buyback ratio	0.10 (0.0000)	-0.01 (0.11)	0.14 (0.0000)	0.00 (0.92)	-0.04 (0.0000)	-0.02 (0.06)	0.02 (0.01)	-0.06 (0.0000)	-0.05 (0.0000)	0.04 (0.0000)	1.0

Panel D: Correlation matrix of CEO bonus and firm characteristics for the whole sample

Correlation coefficient (p-value)	Bonus	Total assets	One-year return to shareholders	Amount of buyback	Buyback ratio
Bonus	1.0				
Total assets	0.38 (0.0000)	1.0			
One-year return to shareholders	0.07 (0.0000)	-0.03 (0.0004)	1.0		
Amount of buyback	0.20 (0.0000)	0.32 (0.0000)	-0.01 (0.44)	1.0	
Buyback ratio	0.07 (0.0000)	0.08 (0.0000)	-0.04 (0.0000)	0.29 (0.0000)	1.0

Table 3: The impact of tying CEO bonuses to EPS on share repurchases

This table compares the frequency of positive net repurchases, the magnitude of repurchases, and the buyback ratio between two groups: firms that tie CEO bonuses to EPS and firms that do not tie CEO bonuses to EPS. “n” is the number of firm-year observations.

	=1, if positive net repurchase; =0, otherwise	The amount of buyback (\$ mil.)	Net repurchases scaled by market value of equity (%)
	Mean (median)	Mean (median)	Mean (median)
EPS is a determining factor of CEO bonuses	0.52 (1.00) n=6,125	114.60 (0.14) n=6,125	1.60 (0.02) n=6,093
EPS is not a determining factor of CEO bonuses	0.41 (0.00) n=3,711	43.76 (0.00) n=3,711	1.20 (0.00) n=3,684
t-test: t-stat (p-value)	10.37 (<0.0001)	8.56 (<0.0001)	6.84 (<0.0001)
Kruskal-Wallis test: Chi-squared (p-value)	106.34 (<0.0001)	185.07 (<0.0001)	106.88 (<0.0001)

Table 4: Multivariate analysis of share buyback and the bonus-EPS tie

This table presents the estimated coefficients and standard errors obtained from the Logit regression of the likelihood of positive net repurchases (Panel A) and the Tobit regression of the buyback ratio (Panel B). In both panels, Column (1) excludes the firms that do not have a bonus plan or that do not provide information on whether EPS is a factor in the bonus award, while Column (2) includes all the firms. The numbers in the parentheses are the standard errors. The standard errors are computed by clustering at firm level and are robust to heteroskedasticity.

The Logit regression is specified as:

$$Buy_{i,t} = \gamma_0 + \gamma_1 Size_{i,t-1} + \gamma_2 Profit_{i,t-1} + \gamma_3 Cash_{i,t-1} + \gamma_4 Pay_{i,t-1} + \gamma_5 IndLever_{i,t-1} + \gamma_6 Takeover_{i,t-1} + \gamma_7 MTB_{i,t-1} + \gamma_8 Momentum_{i,t-1} + \gamma_9 MO_{i,t} + \gamma_{10} Negative_{i,t} + \gamma_{11} EPSfactor_{i,t} + \varphi_{i,t}$$

The Tobit regression is specified as:

$$Buyback_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Profit_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Pay_{i,t-1} + \beta_5 IndLever_{i,t-1} + \beta_6 Takeover_{i,t-1} + \beta_7 MTB_{i,t-1} + \beta_8 Momentum_{i,t-1} + \beta_9 MO_{i,t} + \beta_{10} Negative_{i,t} + \beta_{11} EPSfactor_{i,t} + \mu_{i,t}$$

EPSfactor is one if CEO bonuses are tied to EPS performance and zero otherwise.

Panel A: Logit regression of the likelihood of positive net repurchases

	Buy=1, if net repurchases are positive; =0, otherwise (1)	Buy=1, if net repurchases are positive; =0, otherwise (2)
Log of total assets	0.277*** (0.019)	0.274*** (0.017)
Profitability	5.278*** (0.472)	5.029*** (0.387)
Cash	0.536*** (0.170)	0.358** (0.144)
Payout	0.160* (0.092)	0.072 (0.084)
Industry-adjusted leverage	-1.134*** (0.165)	-1.209*** (0.145)
Takeover	-0.036 (0.216)	-0.027 (0.189)
Market to book	-0.071*** (0.018)	-0.082*** (0.016)
Stock momentum	-0.166*** (0.060)	-0.155*** (0.047)
Management stock options	5.762*** (1.116)	5.149*** (0.957)
Earnings are negative	-0.387*** (0.072)	-0.388*** (0.063)
EPSfactor=1, if EPS is a factor in bonus decisions; =0, otherwise	0.282*** (0.047)	0.277*** (0.041)
Year fixed effects	Yes	Yes
Intercept	-2.721*** (0.196)	-2.591*** (0.175)
Number of observations	8,961	11,333
Chi-squared	645.69	850.18
Prob > Chi-squared	<0.001	<0.001

***, **, and *: significance at 1%, 5%, and 10% level, respectively.

Panel B: Tobit regression of scaled net repurchases

	Net repurchases scaled by market value of equity (1)	Net repurchases scaled by market value of equity (2)
Log of total assets	0.006*** (<0.001)	0.006*** (<0.001)
Profitability	0.132*** (0.008)	0.129*** (0.007)
Cash	0.027*** (0.004)	0.021*** (0.004)
Payout	0.001 (0.002)	-0.001 (0.002)
Industry-adjusted leverage	-0.013*** (0.004)	-0.016*** (0.003)
Takeover	0.004 (0.005)	0.001 (0.005)
Market to book	-0.004*** (<0.001)	-0.004*** (<0.001)
Stock momentum	-0.004*** (0.001)	-0.004*** (0.001)
Management stock options	0.241*** (0.027)	0.229*** (0.023)
Earnings are negative	-0.013*** (0.002)	-0.014*** (0.002)
EPSfactor=1, if EPS is a factor in bonus decisions; =0, otherwise	0.007*** (0.001)	0.007*** (0.001)
Year fixed effects	Yes	Yes
Intercept	-0.068*** (0.005)	-0.069*** (0.004)
Number of observations	8,961	11,333
Chi-squared	1,113.01	1,500.37
Prob > Chi-squared	<0.001	<0.001

***, **, and *: significance at 1%, 5%, and 10% level, respectively.

Table 5: Multivariate analysis of CEO bonuses and share repurchases

This table presents the estimated coefficients and standard errors obtained from the Logistic analysis of the CEO being awarded a bonus (Panel A) and the OLS regression of the amount of CEO bonuses (Panel B). The numbers in the parentheses are the standard errors. The standard errors are computed by clustering at firm level and are robust to heteroskedasticity. The Fama-French 48-industry classification is used for estimating industry fixed effects.

The Logit regression is specified as:

$$Bonus_{i,t} = \eta_0 + \eta_1 Size_{i,t} + \eta_2 Ret_{i,t} + \eta_3 Buyback_{i,t} + \eta_4 EPSfactor_{i,t} + \eta_5 EPSfactor_{i,t} * Buyback_{i,t} + \phi_{i,t}$$

The OLS regression is specified as:

$$CEOBonus_{i,t} = \lambda_0 + \lambda_1 Size_{i,t} + \lambda_2 Ret_{i,t} + \lambda_3 Buyback_{i,t} + \lambda_4 EPSfactor_{i,t} + \lambda_5 EPSfactor_{i,t} * Buyback_{i,t} + \delta_{i,t}$$

Bonus equals one if the CEO is awarded a bonus and zero otherwise. *CEOBonus* is the log of (1+dollar amount of CEO bonuses). In both Panel A and Panel B, *Buyback* is measured in three ways: whether the net repurchases are positive (Column 1), log of (1+net repurchases) (Column 2), and scaled net repurchases (Column 3).

Panel A: Logistic analysis of the CEO being awarded a bonus

	Bonus=1 if CEO receives a bonus and 0 otherwise (1)	Bonus=1 if CEO receives a bonus and 0 otherwise (2)	Bonus=1 if CEO receives a bonus and 0 otherwise (3)
Log of total assets	0.233*** (0.026)	0.220*** (0.028)	0.240*** (0.026)
One-year return to shareholders	1.395*** (0.095)	1.393*** (0.095)	1.420*** (0.096)
Net repurchases are positive	0.043 (0.097)	--	--
Log of (1+net repurchases)	--	-0.016 (0.027)	--
Net repurchases scaled by market value of equity	--	--	-3.015 (1.769)
EPSfactor =1 if bonus is tied to EPS and 0 otherwise	0.054 (0.089)	0.059 (0.084)	0.076 (0.079)
EPSfactor*buyback	0.253** (0.123)	0.084*** (0.032)	6.384*** (2.175)
Year fixed effects	yes	yes	yes
Industry fixed effects	yes	yes	yes
Intercept	-1.977*** (0.495)	-1.893*** (0.499)	-2.105*** (0.499)
Number of observations	9,604	9,604	9,546
Chi-squared	1,128.75	1,122.22	1,107.13
Prob > Chi-squared	<0.001	<0.001	<0.001
H ₀ : $\eta_3 + \eta_5 = 0$	14.42	14.02	6.33
F-stat (p-value)	(<0.001)	(<0.001)	(0.01)

***, **, and *: significance at 1%, 5%, and 10% level, respectively.

Panel B: OLS regression of the amount of CEO bonuses

	Log of (1+bonus) (1)	Log of (1+bonus) (2)	Log of (1+bonus) (3)
Log of total assets	0.523*** (0.025)	0.500*** (0.027)	0.532*** (0.025)
One-year return to shareholders	1.263*** (0.052)	1.254*** (0.052)	1.263*** (0.052)
Net repurchases are positive	0.121 (0.101)	--	--
Log of (1+net repurchases)	--	0.001 (0.029)	--
Net repurchases scaled by market value of equity	--	--	-1.922 (1.827)
EPSfactor =1 if bonuses are tied to EPS and 0 otherwise	0.158* (0.092)	0.152* (0.085)	0.182** (0.080)
EPSfactor*buyback	0.241** (0.120)	0.090*** (0.033)	6.086*** (2.132)
Year fixed effects	yes	yes	yes
Industry fixed effects	yes	yes	yes
Intercept	-1.233** (0.576)	-1.052* (0.581)	-1.373** (0.575)
Number of observations	9,604	9,604	9,546
R-squared	0.32	0.31	0.31
H ₀ : $\lambda_3 + \lambda_5 = 0$	22.55 (<0.001)	25.38 (<0.001)	12.92 (<0.001)

***, **, and *: significance at 1%, 5%, and 10% level, respectively.

Table 6: Share buyback and being close to bonus threshold

In this table, I compare share repurchases when the “As-if” EPS is close to the bonus EPS threshold and when otherwise. I compute what EPS would have been without share repurchases, i.e., the “As-if” EPS, in two ways:

$$\text{As-if EPS 1} = \text{Earnings}_t / (\text{Weighted average shares outstanding}_t + 0.5 * \text{Shares bought}_t)$$

$$\text{As-if EPS 2} = (\text{Earnings}_t + 0.5 * \text{Cost}_t) / (\text{Weighted average shares outstanding}_t + 0.5 * \text{Shares bought}_t)$$

If *As-if EPS 1* or *As-if EPS 2* is lower than but within 15% of the threshold EPS, I say it is close to the threshold EPS. “n” is the number of observations.

Panel A: As-if EPS 1

	Frequency of positive net repurchases	The amount of net repurchases (\$ mil) Mean (median)	Net repurchases scaled by market value of equity (%) Mean (median)
As-If EPS 1 is close to the threshold earnings per share	75% (n=131)	355.76 (29.05) (n=131)	3.03 (1.75) (n=129)
As-If EPS 1 is not close to the threshold earnings per share	60% (n=272)	123.78 (2.98) (n=272)	2.37 (0.40) (n=272)
t-test:			
t-stat (p-value)	2.88 (0.004)	2.87 (0.005)	1.63 (0.10)
Kruskal-Wallis test:			
Chi-square (p-value)	8.17 (0.004)	10.10 (0.002)	7.26 (0.007)

Panel B: As-if EPS 2

	Frequency of positive net repurchases	The amount of net repurchases (\$ mil) Mean (median)	Net repurchases scaled by market value of equity (%) Mean (median)
As-If EPS 2 is close to the threshold earnings per share	75% (n=130)	349.99 (28.88) (n=130)	3.01 (1.75) (n=128)
As-If EPS 2 is not close to the threshold earnings per share	60% (n=273)	127.38 (3.00) (n=273)	2.39 (0.41) (n=273)
t-test:			
t-stat (p-value)	2.81 (0.005)	2.75 (0.007)	1.55 (0.12)
Kruskal-Wallis test:			
Chi-square (p-value)	7.76 (0.005)	9.16 (0.003)	6.67 (0.01)

Table 7: Multivariate analysis of share buyback and being close to bonus threshold

This table presents the estimated coefficients and standard errors obtained from the Logit regression of the likelihood of positive net repurchases (Panel A) and the Tobit regression of scaled net repurchases (Panel B). “Close” is one if the *As-if EPS* is less than but within 15% of the threshold earnings per share and zero otherwise. Column (1) reports results for *As-if EPS 1*, and column (2) reports results for *As-if EPS 2*.

The Logit regression is specified as:

$$Buy_{i,t} = \gamma_0 + \gamma_1 Size_{i,t-1} + \gamma_2 Profit_{i,t-1} + \gamma_3 Cash_{i,t-1} + \gamma_4 Pay_{i,t-1} + \gamma_5 IndLever_{i,t-1} + \gamma_6 Takeover_{i,t-1} + \gamma_7 MTB_{i,t-1} + \gamma_8 Momentum_{i,t-1} + \gamma_9 MO_{i,t} + \gamma_{10} Negative_{i,t} + \gamma_{11} Close_{i,t} + \varphi_{i,t}$$

The Tobit regression is specified as:

$$Buyback_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Profit_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Pay_{i,t-1} + \beta_5 IndLever_{i,t-1} + \beta_6 Takeover_{i,t-1} + \beta_7 MTB_{i,t-1} + \beta_8 Momentum_{i,t-1} + \beta_9 MO_{i,t} + \beta_{10} Negative_{i,t} + \beta_{11} Close_{i,t} + \mu_{i,t}$$

The numbers in the parentheses are standard errors. The standard errors are computed by clustering at firm level and are robust to heteroskedasticity.

Panel A: Logit regression of the likelihood of positive net repurchases

	Buy=1 if net repurchase>0 and 0 otherwise (1)	Buy=1 if net repurchase>0 and 0 otherwise (2)
Log of total assets	0.371*** (0.130)	0.371*** (0.131)
Profitability	13.278*** (3.344)	13.319*** (3.352)
Cash	0.521 (1.380)	0.542 (1.371)
Payout	-0.042 (0.300)	-0.042 (0.301)
Industry-adjusted leverage	-0.675 (1.089)	-0.587 (1.073)
Takeover	-1.391 (0.795)	-1.400 (0.792)
Market to book	-0.117 (0.131)	-0.118 (0.130)
Stock momentum	-0.561 (0.391)	-0.563 (0.389)
Management stock options	8.463 (5.601)	8.375 (5.607)
Earnings are negative	-0.196 (0.663)	-0.214 (0.663)
As-if EPS 1 is close to the threshold EPS	0.789*** (0.292)	--
As-if EPS 2 is close to the threshold EPS	--	0.758*** (0.303)
Year fixed effects	Yes	Yes
Intercept	-3.983*** (1.107)	-3.968*** (1.112)
Number of observations	385	385
Chi-squared	78.60	77.80
Prob > Chi-squared	<0.001	<0.001

***, **: significance at 1% and 5% level, respectively.

Panel B: Tobit regression of scaled net repurchases

	Net repurchases scaled by market value of equity (1)	Net repurchases scaled by market value of equity (2)
Log of total assets	0.007*** (0.002)	0.007*** (0.002)
Profitability	0.331*** (0.062)	0.331*** (0.062)
Cash	0.045 (0.024)	0.044 (0.024)
Payout	-0.007 (0.006)	-0.007 (0.006)
Industry-adjusted leverage	-0.007 (0.018)	-0.005 (0.018)
Takeover	-0.021 (0.019)	-0.021 (0.019)
Market to book	-0.008*** (0.002)	-0.008*** (0.002)
Stock momentum	-0.009 (0.007)	-0.009 (0.007)
Management stock options	0.362*** (0.081)	0.361*** (0.081)
Earnings are negative	-0.012 (0.012)	-0.013 (0.012)
As-if EPS 1 is close to the threshold EPS	0.014*** (0.005)	--
As-if EPS 2 is close to the threshold EPS	--	0.013** (0.005)
Year fixed effects	Yes	Yes
Intercept	-0.087*** (0.022)	-0.087*** (0.022)
Number of observations	385	385
Chi-squared	134.17	133.05
Prob > Chi-squared	<0.001	<0.001

***, and **: significance at 1% and 5% level, respectively.

Table 8: Three-year post-repurchase abnormal returns

This table reports the results from estimating the multi-factor model introduced by Fama and French (1993) and Carhart (1997). Using the calendar-time portfolio approach, I estimate the following four-factor regressions of monthly returns:

$$R_{buy,t} - R_{f,t} = \alpha_0 + \alpha_1(R_{m,t} - R_{f,t}) + \alpha_2SMB_t + \alpha_3HML_t + \alpha_4UMD_t + \varepsilon_{p,t}$$

$$R_{buy,t} - R_{match,t} = \gamma_0 + \gamma_1(R_{m,t} - R_{f,t}) + \gamma_2SMB_t + \gamma_3HML_t + \gamma_4UMD_t + \eta_{p,t}.$$

$R_{buy,t}$ is the value-weighted portfolio return of repurchasing firms in month t ; $R_{match,t}$ is the value-weighted portfolio return of matching firms in month t . For each repurchasing firm, I find a matching non-repurchasing firm with the closest value of total assets in the same industry based on the Fama-French 48 industry classification. Panel A, B, C report results of estimating the above regressions for the sample of all repurchasing firms, for the subset of repurchasing firms that tie CEO bonuses to EPS, and for the subset of repurchasing firms that do not tie CEO bonuses to EPS, respectively.

Panel A: All repurchasing firms

	Intercept	Excess market return	Size	Book-to-market	Momentum	n	R-squared
$R_{buy,t} - R_{f,t}$	0.0031* (0.0017)	1.12*** (0.05)	0.08 (0.06)	0.01 (0.06)	-0.085** (0.043)	186	0.85
$R_{buy,t} - R_{match,t}$	0.0042* (0.0022)	-0.14* (0.07)	-0.11 (0.07)	0.12 (0.10)	-0.16*** (0.06)	186	0.19

Panel B: Repurchasing firms that tie CEO bonuses to EPS performance

	Intercept	Excess market return	Size	Book-to-market	Momentum	n	R-squared
$R_{buy,t} - R_{f,t}$	0.0007 (0.0024)	1.09*** (0.08)	0.12 (0.08)	0.04 (0.10)	-0.18*** (0.05)	185	0.76
$R_{buy,t} - R_{match,t}$	0.0018 (0.0027)	-0.08 (0.09)	-0.02 (0.09)	0.01 (0.11)	-0.21*** (0.07)	185	0.08

Panel C: Repurchasing firms that do not tie CEO bonuses to EPS performance

	Intercept	Excess market return	Size	Book-to-market	Momentum	n	R-squared
$R_{buy,t} - R_{f,t}$	0.0049** (0.0021)	1.16*** (0.06)	0.12 (0.07)	0.06 (0.08)	0.02 (0.05)	182	0.79
$R_{buy,t} - R_{match,t}$	0.0060** (0.0030)	-0.15** (0.09)	-0.11 (0.10)	0.32*** (0.14)	-0.08 (0.10)	182	0.18

***, **, and *: significance at 1%, 5%, and 10% level, respectively.

Figure 1: Total net repurchases (\$ million) by year

This figure plots the dollar amount of total net repurchases by industrial firms from 1960 to 2007 (fiscal year). The sample includes all industrial firms listed on COMPUSTAT.

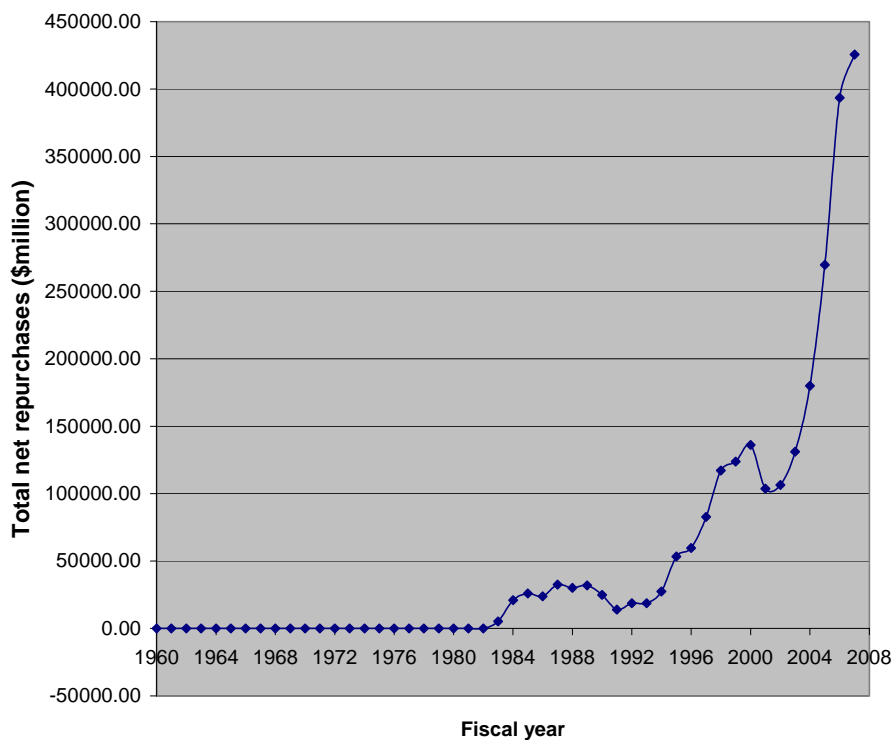


Figure 2: The target bonus-to-salary ratio obtained from the proxy statements

This figure plots the average target bonus-to-salary ratio from 1993 to 2007 (fiscal year). The target bonus-to-salary ratio is specified by the compensation committee by the beginning of the fiscal year. The information is collected from the proxy statements (DEF 14A) available on SEC website.

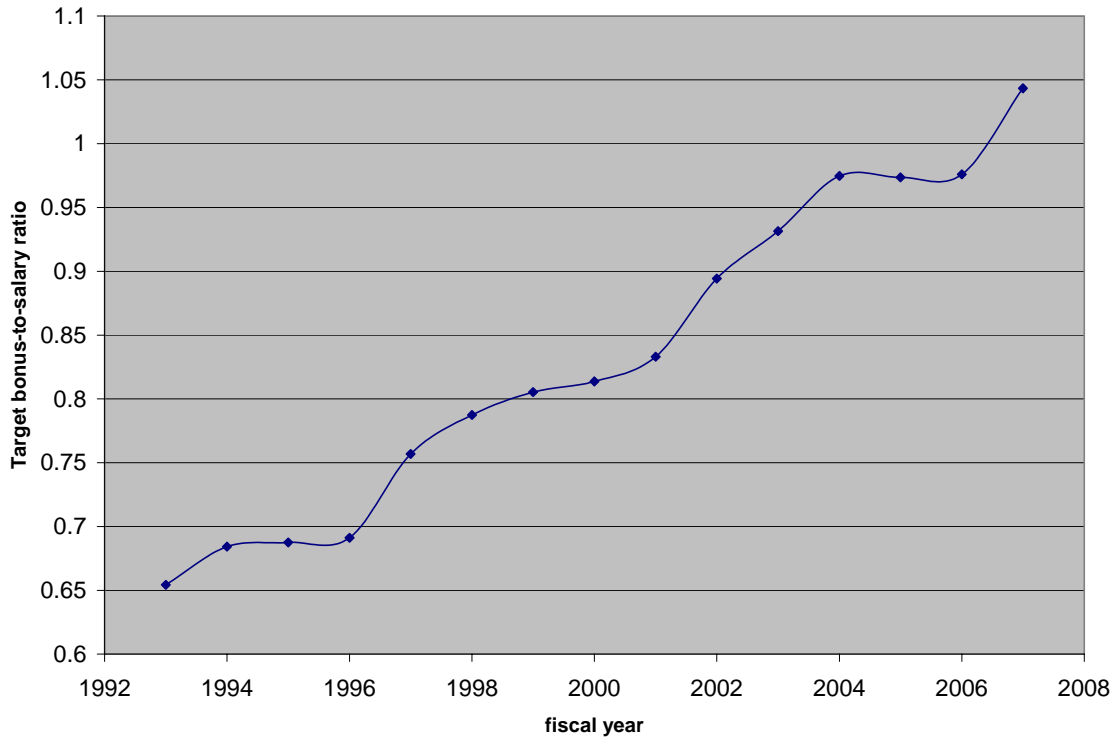


Figure 3: The percentage of firms with positive net repurchases by year

This figure plots the percentage of firms with positive net repurchases from 1993 to 2007 (fiscal year).

