

Leveraged Buybacks

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Abstract

Debt-financed share buybacks generate positive short-term and long-run abnormal stock returns. The market reactions are lower for firms with ex-ante higher leverage, and are less positive than those of cash-financed buybacks. Leveraged buyback firms ex-ante have more debt capacity and lower growth prospects, and ex-post increase leverage and reduce real investments more sharply than cash-financed buyback firms. Leveraged buybacks also have lower completion rates than cash-financed buybacks. We do not find significant differences in operating performance and financial distress risk ex post. The evidence is consistent with leveraged buybacks enabling firms to optimize their leverage, therefore benefiting shareholders.

JEL Classification: G32; G33; G35

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1. Introduction

“Corporate America is increasingly turning to debt to fund stock repurchases. Some investors view even debt-financed stock buybacks as a form of returning cash to shareholders—except, it isn’t!” - CNBC (8th November 2011)

Share repurchases have become a dominant payout method for firms to return excess cash to shareholders (Skinner (2008)). Previous research shows that share repurchases are value-enhancing for shareholders, both in the short-term and the long-run (Vermaelen (1981), Ikenberry, Lakonishok, and Vermaelen (1995), Gong, Louis, and Sun (2008), Peyer and Vermaelen (2009)). One of the key explanations is that managers convey favorable information to the market by buying back undervalued stocks (Vermaelen (1981), Jagannathan, Stephens, and Weisbach (2000)). Another explanation is that payouts in the form of share repurchases from firms with declining investment opportunities reduce the agency cost of free cash-flows (Jensen (1986), Grullon and Michaely (2004)).¹

Over the past decade it has been increasingly popular for firms to finance their share repurchase programs by issuing debt, which generates controversy. On the one hand, share buybacks from undervalued firms may send a positive signal to the market even if they are financed by debt. A key difference between debt- and cash-financed repurchases is that leveraged buybacks have a larger impact on a firm’s leverage than cash-financed buybacks. Issuing debt to finance share buybacks creates tax benefits as interest payments are tax-

¹Other motives of share repurchases include wealth expropriation from bondholders (Bradley and Wakeman (1983), Maxwell and Stephens (2003)), takeover defenses (Bagwell (1991), Billett and Xue (2007)), and inflation of earnings per share (Fenn and Liang (2001), Kahle (2002)).

deductible², and mitigates the agency problem of free cash-flows as money borrowed is paid back over time. From a standard tradeoff theory point of view, firms that are ex-ante underlevered, with substantial debt capacity, or with declining future growth options may conduct leveraged buybacks to increase tax shields and reduce agency costs.³ Therefore such leverage optimization is consistent with maximizing shareholder value. For example, Jim Turner, head of debt capital markets at BNP Paribas, said in an interview: “If a company has debt capacity at its current ratings, and it makes sense from a capital optimization point of view, share repurchases with bond proceeds still make good sense.” (Reuters, 6th September 2013).

On the other hand, it is likely that leveraged buybacks are detrimental to shareholder value. In leveraged buybacks the cash paid out to shareholders is raised from debtholders. The adjustment in capital structure associated with leveraged buybacks, which is akin to a debt-for-equity swap, may increase debt excessively and raise the probability of bankruptcy.⁴ It may also lead to investment-related agency issues such as the debt overhang problem, where a positive net-present-value project is not invested in (Myers (1977)). In an article titled “Share buybacks: corporate cocaine”, *Economist* (13th September 2014) argues “Some firms may be borrowing

² In addition, multinational companies with substantial cash trapped overseas may save taxes by raising debt to finance repurchases rather than repatriating cash. For example, Ebay was criticized by investors for repatriating cash to repurchase shares and paying \$3 billion in taxes. (The Wall Street Journal, 29th April, 2014).

³ For example, Lang, Ofek, and Stulz (1996) show that leverage is negatively associated with future growth and does not reduce growth for firms with good investment opportunities.

⁴ Moody’s Investor Service reports that rating agencies often reacted leveraged buybacks or debt-financed dividends less favorably than debt used for other corporate purposes (CFO Journal, WSJ, 25th March 2013). For instance, Moody’s Investor Service downgraded Lowe Cos.’s debt two levels after the leverage increase was announced to facilitate repurchasing shares (Bloomberg, 17th April 2012).

too much to pay for their buyback habit... Shareholder capitalism is about growth and creation, not just dividing the spoils.” Therefore, it is ultimately an empirical question whether or not leveraged buybacks add value to shareholders.

To test this question we construct a comprehensive sample of debt-financed repurchases in the U.S. from 1994 to 2012. We find positive short-term market reactions for debt-financed repurchases. The average three-day abnormal return for debt-financed repurchases is 2.2%, which suggests that leveraged buybacks convey favorable information to the stock market initially. In addition, there are significantly negative abnormal returns in the six months prior to the repurchase announcements. The market reacts less favorably for leveraged buybacks than cash-financed ones. We also find positive long-term stock performance following leveraged buybacks. For the next three years following the announcements, the abnormal return for leveraged buybacks is 82 basis points per month (10% per annum). This is consistent with leveraged buybacks motivated by market timing/undervaluation (Stephens and Weisbach (1998), Peyer and Vermaelen (2009)).

Then we examine whether firms optimize leverage via leveraged buybacks. In our sample, 74% of leveraged buyback firms have substantial unused debt capacity and 84% are estimated to be under-levered ex ante. For those under-levered firms, the average pre-repurchase debt ratio (13%) is substantially below the average target debt ratio (25%). Four years after the buyback announcements, the debt ratio is 6.4% higher than that before repurchase announcements. The increase in leverage is permanent and supports our leverage optimization hypothesis. This suggests that under-levered firms utilize their unused debt capacity to repurchase shares.

We next examine whether the benefits from leveraged buybacks depend on ex-ante firm characteristics such as debt and cash level. We find that the average three-day abnormal returns

of over-levered firms are lower than those of under-levered firms. In our sample, 73% of leveraged buyback firms have ex-ante cash holdings below the estimated optimal level. But the free cash-flows do not have a significant impact on the market reaction to leveraged buybacks.

After share buybacks, firms experience a decline in real investments and reduced growth prospects (Grullon and Michaely (2004)). Firms with lower future growth options may conduct leveraged buybacks from a leverage optimization point of view. Consistent with our conjecture, we find that leveraged buyback firms have lower ex-post investments than matched non-repurchasing peers. The decline in real investments is larger for leveraged buybacks than that for cash-financed ones. The reduction is sharper for firms that are over-levered ex ante.

To examine whether the reduction in investments is related to declines in future growth options, we then follow Rhodes-Kropf, Robinson, and Viswanathan (2005) to measure a firm's growth prospects. We find that the growth prospects for leveraged buyback firms are significantly lower than those for cash-financed repurchasing firms. This suggests that lower growth prospects contribute to the post-repurchase reduction in real investments.

In addition, debt-financed repurchases exhibit lower completion rates than cash-financed ones. We do not find significant differences in ex-post operating performance and financial distress risk between debt- and cash-financed buybacks.

Our paper contributes to the following strands of literature. First, we contribute to the share repurchase literature (Vermaelen (1981), Ikenberry, Lakonishok, and Vermaelen (1995), Grullon and Michaely (2004)) by documenting that firms with declining growth prospects and substantial debt capacity optimize leverage via leveraged buybacks. Financing buybacks by debt affects the motivations, short-term market reactions, long-run performance, real investments and completion rates of repurchase programs. To our best knowledge our study is the first paper analyzing

leveraged buybacks. Second, our paper adds to the literature on debt-for-equity swap. Cornett and Travlos (1989) analyze a sample of 40 firms proposing debt-for-equity exchanges and find positive market reactions. We report positive abnormal returns for leveraged buybacks in which a firm simultaneously increases debt and reduces equity. Third, our study is also related to the literature on sources of financing of corporate financial transactions such as takeovers (Schlingemann (2004), Martynova and Renneboog (2009)).⁵ We show that the sources of financing matter for share buybacks.

The remainder of the paper is organized as follows. Section 2 describes our data and methodology. Section 3 reports our empirical results and Section 4 concludes.

2. Data

We collect our initial sample of common stock repurchases from the Securities Data Company (thereafter SDC) US Mergers and Acquisitions database. Our sample contains buybacks announced between January 1, 1994 and December 31, 2012. The time period is chosen from 1994 as SEC's EDGAR Database starts providing comprehensive filings for buyback firms. SDC reports the "source of funds used to finance deal" if firms disclose relative information via corporate filings, news or other related sources. A share repurchase is defined as a debt-financed one if it is partially or fully financed by debt.

To verify the reliability of the data, we collect information from SEC's EDGAR Database and manually check the corporate filings i.e. 8-K, 10-Q, and 10-K for each repurchase. We

⁵ Schlingemann (2004) analyzes the relation between the source of funds available before a takeover and the potential bidder gains. Martynova and Renneboog (2009) show that bidder's pecking order preference, the corporate governance environment and firm's potential growth opportunities together determine the financing decision in takeovers.

classify a repurchase as a debt-financed one only if the filings explicitly say that the firm expects to use debt to fund the share repurchase.⁶ Several categories of debt financing are mentioned to finance buybacks in the filings, including revolving credit facility, bridge loan, borrowing, line of credit or debt offering etc. However, details of the exact source of financing for each leveraged buyback are unavailable. Similarly, we define a repurchase as a cash-financed one if the firm explicitly states that cash or internal fund is used to finance the repurchase program.⁷ The above procedures lead to 277 debt-financed repurchases and 433 cash-financed repurchases.

We obtain stock returns from the Center for Research in Securities Prices (CRSP) files. Accounting variables are collected from Compustat and we require that financial variables of each firm are available in Compustat in the year prior to the share repurchase. We winsorise all control variables of firm characteristics at the 1st and 99th percentiles. Our summary statistics of

⁶ For example, we define the following repurchase as a debt-financed repurchase. Below is extracted from the Current-Event (8-K) filing of Dollar General Corp: “In connection with its previously announced \$500 million common stock repurchase program, on March 25, 2012 Dollar General Corporation entered into an agreement with Buck Holdings, L.P. to repurchase from it approximately \$300 million in shares of common stock concurrent with, and conditional upon, the completion of a contemplated underwritten secondary offering of shares by certain selling shareholders. *Dollar General expects to fund the share repurchase with borrowings under its asset-based revolving credit facility.*”

⁷For example, we define the following buyback as a cash-financed repurchase. Below is derived from the Current-Event (8-K) filing of Extreme Networks Inc. :“Extreme Networks, Inc. (Nasdaq: EXTR) today announced its Board of Directors has authorized the repurchase of common stock worth up to \$75 million which may be purchased over the next three years from time to time in the open market or in privately negotiated transactions. *Extreme Networks will fund the share repurchases from cash on hand*, which was approximately \$200 million as of September 30, 2012. As of August 6, 2012, there were approximately 95 million shares of common stock outstanding.”

firm characteristics are comparable to the literature (Lie (2005), Massa, Rehman, and Vermaelen (2007)). The summary statistics will be discussed in Section 2.6. The sample for cross-sectional analysis consists of 218 debt-financed repurchases and 357 cash-financed repurchases from 1994 to 2012.

2.1 Measuring Abnormal Stock Returns

We measure the short-term market reaction using the three-day cumulative abnormal return (CAR) from day -1 to day 1 where day 0 is the announcement date of a share repurchase. We use the market model to measure expected returns and the CRSP value-weighted market index as the benchmark. The estimation period ends 46 days before the repurchase announcement and we require the minimum (maximum) estimation length to be 15 (255) days.

We estimate the long-run abnormal returns after the buyback announcement using the calendar-time portfolio approach and Ibbotson's (1975) Returns Across Time and Securities (RATS) method. For the calendar-time portfolio approach, we form an equally-weighted portfolio which includes all the firms that made a buyback announcement in the previous 12, 24 or 36 months in each calendar month. The composition of the portfolio varies each month and the average monthly abnormal return of the portfolio (the intercept) is estimated based on the Fama-French three-factor model:

$$(1) \quad R_t - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2HML_t + \beta_3SMB_t + \varepsilon_t$$

Where R_t stands for the portfolio return in month t , HML and SMB denote the returns on book-to-market and size factor-mimicking portfolios. R_{mt} is the stock market benchmark return, R_{ft} is the monthly risk-free return, and α captures the monthly risk-adjusted return.

Ibbotson's (1975) RATS method allows firm risk to change over time. Following the literature (Peyer and Vermaelen (2009)), cross-sectional regressions are estimated for each month after buyback announcements:

$$(2) R_{it} - R_{ft} = \alpha_t + \beta_{1t}(R_{mt} - R_{ft}) + \beta_{2t}HML_t + \beta_{3t}SMB_t + \varepsilon_{it} \quad t = 1, \dots, 36$$

Where i stands for each buyback firm, t denotes the number of months following an announcement date. α_t captures risk-adjusted abnormal return in time t .

2.2 Measuring Abnormal Investment & Operating Performance

We measure a firm's investment as the capital expenditure (item 145 in Compustat) divided by total assets (item 6). We construct a control sample of non-repurchasing firms matched by investment, industry and size. For each repurchasing firm, the matched non-repurchasing firm is of the same two-digit SIC code, and with both pre-repurchase investment and book value of assets in year -1 within $\pm 20\%$ of those of the repurchasing firm. Among those firms satisfying the above criteria, the matched firm is the one with the least deviations from the repurchasing firm.⁸ If no firms meet the criteria, we relax the industry criterion to one-digit SIC code. The *abnormal investment* of a repurchasing firm is defined as its capital-expenditure-to-assets ratio minus that of its matched firm.

Operating performance is measured as return on assets (ROA), which is defined as operating income before depreciation (item 13) divided by book assets at the beginning of the year (item 6). This is calculated over the eight quarters after the repurchase announcement quarter (Lie

⁸ The score function is defined as:

$$\frac{(|\text{Investment}_{\text{year}-1, \text{sample firm}} - \text{Investment}_{\text{year}-1, \text{matched firm}}|) / \text{Investment}_{\text{year}-1, \text{sample firm}} + (|\text{Total Assets}_{\text{year}-1, \text{sample firm}} - \text{Total Assets}_{\text{year}-1, \text{matched firm}}|) / \text{Total Assets}_{\text{year}-1, \text{sample firm}}}{2}$$

(2005), Gong, Louis, and Sun (2008), Chen and Wang (2012)). Prior research (Fama and French (2000), Jagannathan, Stephens, and Weisbach (2000)) shows that pre-announcement performance characteristics and market-to-book ratio predict future operating performance. Hence we select the matched sample of non-repurchasing firms based on prior operating performance, market-to-book ratio, industry and size.

The non-repurchasing firm is of the same two-digit SIC code, and with both operating performance and market-to-book ratio in year -1 within $\pm 20\%$ of those of the repurchasing firm. In addition, the book value of assets for the matched firm in year -1 is also within $\pm 20\%$ of that of the repurchasing firm. If no firms meet the above criteria, we relax the industry criterion to one-digit SIC code or disregard the industry criterion if there is still no match. Among firms satisfying the above criteria, we select the matched firm as the one with the least deviations from the repurchasing firm.⁹ The *abnormal operating performance* for a repurchasing firm is defined as its ROA minus that of the matched firm.

2.3 Measuring Growth Prospects

To measure firms' growth prospects, we follow Rhodes-Kropf, Robinson, and Viswanathan (2005) to decompose the market-to-book ratio into three components:

$$(3) \quad m_{it} - b_{it} = \underbrace{m_{it} - v_{it}(\alpha_{jt})}_{\text{firm-specific error}} + \underbrace{v_{it}(\alpha_{jt}) - v_{it}(\alpha_j)}_{\text{time-series sector error}} + \underbrace{v_{it}(\alpha_j) - b_{it}}_{\text{long-run value to book}}$$

⁹ This score function is defined as:

$$\frac{(|ROA_{\text{year-1, sample firm}} - ROA_{\text{year-1, matched firm}}|)/ROA_{\text{year-1, sample firm}} + (|TA_{\text{year-1, sample firm}} - TA_{\text{year-1, matched firm}}|)/TA_{\text{year-1, sample firm}} + (|M/B_{\text{year-1, sample firm}} - M/B_{\text{year-1, matched firm}}|)/M/B_{\text{year-1, sample firm}}}{3}$$

i stands for each firm, t denotes year and j accounts for industry. m is the market value of equity, b is the book value and v is a measure of fundamental value, all expressed in logs. α is the regression coefficient. The fundamental value $v_{it}(\alpha_{jt})$ is to be estimated for firm i on time t in industry j and $v_{it}(\alpha_j)$ is an industry-specific long-run value that equals the industry average of $v_{it}(\alpha_{jt})$.

The first term in equation (3) is the difference between the market value and the estimated fundamental value. It captures firm-specific error in market valuation. The second term reflects the difference between the estimated fundamental value on time t and industry j and the long-run sector-specific value. Hence it captures the time-series sector error. Our variable of interest is the third component: long-run value to book $v_{it}(\alpha_j) - b_{it}$. It is the difference between the long-run sector-specific fundamental value and the observed book value. It measures a firm's growth prospects.

To measure the last component, we follow Rhodes-Kropf, Robinson, and Viswanathan (2005), and estimate α via the following regression based on Fama-French 12 industries:

$$(4) \quad m_{it} = \alpha_{0jt} + \alpha_{1jt}b_{it} + \varepsilon_{it}$$

Equation (4) is estimated annually for each industry j so that we have estimated coefficients α_{0jt} and α_{1jt} for each industry-year. $\bar{\alpha}_{0j}$ and $\bar{\alpha}_{1j}$ are the average α_{0jt} and α_{1jt} respectively over the sample period for each industry j . They are used to calculate the long-run sector-specific fundamental value:

$$(5) \quad v_{it}(\bar{\alpha}_{0j}, \bar{\alpha}_{1j}) = \bar{\alpha}_{0j} + \bar{\alpha}_{1j}b_{it}$$

The long-run value to book, i.e. the difference between v_{it} and b_{it} , is our measure of a firm's growth prospects. The higher the measure, the better the growth prospects.

2.4 Measuring Target Leverage, Debt Capacity and Optimal Cash Ratios

The target leverage ratios vary across firms and over time. Following Flannery and Rangan (2006) and Faulkender, Flannery, Hankins, and Smith (2012), we estimate the target leverage ratio for each firm per year using the following model:

$$(6) \quad MDR_{i,t+1} = \beta X_{i,t} + \varepsilon_{it}$$

Where $MDR_{i,t+1}$ is firm i 's market debt ratio, i.e. the book value of debt divided by the sum of the book value of debt and the market value of equity, at year $t+1$, $X_{i,t}$ is a vector of firm characteristics related to costs and benefits of adjusting the leverage ratio. They include $EBIT_TA$, MB , DEP_TA , $LnTA$, FA_TA , $R\&D_TA$, $R\&D_DUM$ and Ind_median . $EBIT_TA$ is earnings before interest and taxes, as a proportion of total assets. MB is market-to-book ratio of assets. DEP_TA is depreciation as a proportion of total assets. $LnTA$ is log of asset size, measured in 1983 dollars. FA_TA is fixed assets proportion to total assets. $R\&D_TA$ is R&D expenses as a proportion of total assets. $R\&D_DUM$ is a dummy variable that equals one if firm did not report R&D expenses. Ind_median is median industry market debt ratio calculated for each year based on the industry groupings in Fama and French (2002). After β is estimated, the predicted value of $MDR_{i,t+1}$ is the *target leverage ratio* for firm i at year $t+1$. A firm is defined as over-levered (under-levered) if its actual market debt ratio is higher (lower) than the target debt ratio before the repurchase announcement.

Following Lemmon and Zender (2010), our measure of debt capacity is based on the likelihood that a firm has access public debt market. We estimate a logit model in which the dependent variable is one if a firm has debt rating in a given year and zero otherwise. Debt rating data are available in Compustat and our sample period is from 1994 to 2012. The explanatory variables include Ln_TA , ROA , PPE , MB , $Leverage$, Ln_Firm Age and *Standard deviation of*

daily stock returns. *Ln_TA* is natural log of asset size. *ROA* is the ratio of operating profits to total assets. *PPE* is the ratio of property, plant and equipment to total assets. *MB* is market-to-book ratio of assets. *Ln_Firm Age* is the natural log of firm age where firm age is measured as the age of the firm relative to the first year the firm appears on Compustat. The estimated coefficients from the logit model are used to derive an estimated probability that a given firm could get a bond rating for each year during the sample period. We divide our sample firms into three groups based on their estimated likelihood of gaining access public debt market.¹⁰ Firms in the lowest (highest) tercile are defined as firms with low (high) debt capacity.

Following Opler, Pinkowitz, Stulz, and Williamson (1999), we estimate the optimal cash level for each firm in each year and define the excess cash of a firm as its cash holdings in excess of its optimal level of cash. In the regression to estimate the optimal cash level, the dependent variable is the logarithm of cash and short-term investments (item 1) divided by net assets, where net assets are defined as total assets (item 6) minus cash and short-term investments (item 1). The explanatory variables are those that affect firms' cash expenditure and revenue, including the market-to-book ratio, size, cash flow, net working capital, capital expenditure, leverage, industry sigma (a measure of the volatility of an industry's cash flow), R&D and a dividend dummy. Cash flow, net working capital and capital expenditure are divided by net assets. After the regression model is estimated, we calculate excess cash by taking the antilog of the residual of the regression model.

2.5 Measuring Financial Distress Risk

¹⁰ We also divide our sample firms into two groups based on the ranking of their debt ratings. The results are similar to those reported here.

A firm's credit risk is measured by using Altman's (1968) methodology. In particular, Altman's Z-score is computed as:

$$(7) \quad Z \text{ score} = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.4X_4 + 0.999X_5$$

where X_1 is working capital divided by book assets; X_2 is retained earnings divided by book assets; X_3 is earnings before interest and taxes divided by book assets; X_4 is the market value of equity divided by total liabilities; and X_5 is net sales divided by book assets. A lower Z-Score indicates a higher financial distress risk.

The *abnormal Z-Score* for a repurchasing firm is its Z-Score minus that of a matched non-repurchasing peer. The matched firm is of the same two-digit SIC code, and both the pre-announcement Z-Score and book value of assets in year -1 within $\pm 20\%$ of those of the repurchasing firm. These factors are important in explaining the cross-sectional variation in corporate distress risk (Fama and French (1993)). If no firms meet these criteria, we relax the industry criterion to one-digit SIC code or disregard the industry criterion. Among these firms, the matched firm is selected as the one with the least deviations from the repurchasing firm.¹¹

2.6 Summary Statistics

The distribution of our sample of share repurchases over time is presented in Table 1. There is relative small numbers of repurchases in the 1990's.¹² In most years of our sample period, the median deal size of debt-financed repurchases is larger than that of cash-financed ones.

¹¹ This score function is $(|Z_Score_{year-1, sample\ firm} - Z_Score_{year-1, matched\ firm}|) / Z_Score_{year-1, sample\ firm} + (|Total\ Assets_{year-1, sample\ firm} - Total\ Assets_{year-1, matched\ firm}|) / Total\ Assets_{year-1, sample\ firm}$

¹² Our sample is smaller than that of previous research on repurchases (Grullon and Michaely (2004), Gong, Louis, and Sun (2008), Chen and Wang (2012)) as we require that the sources of financing of buybacks are

Table 2 reports the difference of pre-repurchase firm characteristics between debt- and cash-financed buybacks. Debt-financed repurchasing firms have higher capital expenditure ratios, lower cash holdings, higher debt ratio and financial distress risk than cash-financed ones. Those firms are more mature with more assets in place, lower growth prospects, larger firm size, and better operating performance before conducting leveraged buybacks. The differences are statistically significant at, at least, the 5% level. Our summary statistics of firm characteristics are comparable to the literature (Lie (2005), Massa, Rehman, and Vermaelen (2007)).

3. Empirical Results

3.1 Stock Performance

Table 3 presents the short-term market reaction and long-run stock return following share repurchase announcements for debt- and cash-financed repurchases. Panels A reports average CAR using either equally- or value-weighted market index as the benchmark. We observe positive market reactions for both debt- and cash-financed repurchases. The average three-day announcement-period abnormal returns for debt-financed repurchases vary from 2.19% to 2.27%, which is lower than the average abnormal returns of 2.72% to 2.83% for cash-financed repurchases. Our three-day abnormal returns for cash-financed repurchases are comparable to those in Grullon and Michaely (2004), who report an average 2.71% three-day CAR using value-weighted market index as the benchmark for cash-financed repurchases.

The long-term price drift prior to and following repurchase programs is listed in Panel B and C. Long-term stock returns in Panel B are measured via a calendar-time portfolio approach

disclosed. Rule 10b-18 of SEC became effective on 17 December 2003, which requires voluntary disclosure of the sources of financing used to finance repurchases.

where the Fama-French three factors are used as the benchmark. We observe negative monthly calendar-time alphas six months prior to buyback announcements and the returns of debt-financed buybacks are significant (-51 basis points per month). Consistent with previous research (Ikenberry, Lakonishok, and Vermaelen (1995), Peyer and Vermaelen (2009)), we find positive post-repurchase abnormal returns. The average monthly abnormal returns for debt-financed buybacks range from 82 basis points to 96 basis points per month, while cash-financed repurchases experience average abnormal returns of 74 basis points to 118 basis points per month.

To the extent that the calendar-time portfolio approach does not allow the factor loadings to change over time (Peyer and Vermaelen (2009)), the observed positive abnormal return may be due to higher systematic risk ex post. Hence we re-estimate the long-term price drift using Ibbotson's (1975) RATS method, which allows for risk changes through time.

Panel C exhibits negative monthly abnormal return for both debt- and cash-financed repurchases six months prior to buyback announcements (-59 basis points and -91 basis points per month respectively). The results are consistent with Information/Timing hypothesis as beaten down firms initiate share repurchase (Peyer and Vermaelen (2009)). The monthly abnormal returns are between 31 basis points and 47 basis points over 36 months for debt-financed repurchases. The long-term monthly abnormal returns for cash-financed repurchases vary from 39 basis points to 45 basis points over 36 months. Hence our results show that debt-financed repurchases add value to shareholders. Our results support the Information/Timing hypothesis and the value-enhancing view of leveraged buybacks.

3.2 Changes in Firm Performance Around Repurchases

Panel A of Table 4 shows the average changes in investment, cash, leverage, net leverage, operating performance and Z-score before repurchase announcements. Firms exhibit significant declines in cash and significant increases in operating performance before buyback announcements. Cash-financed buyback firms experience significant declines in investment and improved operating performance before buyback announcements.

Panel B of Table 4 shows the average changes in investment, cash, leverage, net leverage, operating performance and Z-score between year -1 (the year before the repurchase announcement) and years +1, +2, +3, and +4 (i.e. the years after the repurchase announcement). Debt-financed buyback firms experience significant declines in investment, and operating performance and significant increases in leverage, net leverage and financial distress risk ex post. After the initial mechanical increases following buyback announcements, the debt ratio begins levelling off and remains 6.4% higher in 4 years than that before repurchase announcements. Cash-financed repurchasing firms experience significant declines in cash, and operating performance and significant increases in financial distress risk following buyback announcements. Consistent with Lie (2005) and Gong, Louis, and Sun (2008), we observe a decline in ex-post operating performance for all buyback firms. Figure 1 depicts changes of cash and leverage prior to and after repurchase announcements.

3.3 Motives of Leveraged Buybacks

We study why firms use debt to finance repurchases by employing logit and probit regressions. The dependent variable is a dummy variable that equals one if firms use debt to fund repurchases and zero otherwise. The explanatory variables include one-year lagged firm

characteristics. We include both industry and year dummies to account for potential industry-specific and year-specific differences. Standard errors are clustered by firm.

Table 5 shows that firms with lower cash holdings are more likely to use debt to finance share buybacks. Holding other explanatory variables at the average, the probability of using debt to buy back shares increases by 7.8% for a one-percent decrease in cash holdings. As the optimal cash holdings vary across firms, following Opler, Pinkowitz, Stulz, and Williamson (1999), we estimate the target cash holdings for each firm-year. 73% of debt-financed repurchasing firms have ex-ante cash holdings below the estimated optimal cash level. This result supports a pecking order of financing where the firm raises external debt if internal cash is insufficient (Myers and Majluf (1984)).

Furthermore, firms with stronger past performance have higher probability of conducting leveraged buybacks. Holding other explanatory variables at their average, there is a 8.5% (1.3%) increase in the probability of using debt to finance repurchases for a one-percent increase in ROA (prior abnormal returns).

We then study whether unused debt capacity motivates firms to conduct leveraged buybacks. 74% of debt-funded buyback firms belong to the substantial debt capacity group. Ex-ante under-levered firms may adjust the debt ratio towards its optimal level via leveraged buybacks. We estimate the target debt ratio and show that 182 out of 218 debt-financed repurchasing firms (84%) are under-levered ex ante. For those under-levered firms, the average pre-repurchase debt ratio (13%) is substantially below the average target debt ratio (25%). These results show that firms with lower cash holdings and leverage, better past performance, and higher debt capacity are more prone to conduct leveraged buybacks.

3.4 Ex-ante Firm Characteristics: Leverage and Free Cash-Flows

Results in Table 6 relate market reactions to ex-ante firm characteristics such as leverage and free cash-flows. The *LBB Dummy* equals one for debt-financed repurchases and zero otherwise. As the announcement effect of a privately negotiated repurchase is stronger than that for an open market repurchases (Chen and Wang (2012)), we include a dummy variable that equals one if the repurchase is an open market share repurchase and zero otherwise. Bonaime (2012) shows that after the 2004 modification to SEC Rule 10b-18, firms disclose more about repurchase transactions. Hence we also include a binary variable that equals one if the repurchase announcement is made from 2004 onwards.

The coefficient on the *LBB Dummy* in column (1) is significantly negative at the 5% level. This suggests that debt-financed repurchases experience lower abnormal returns than cash-financed ones. Consistent with the agency cost of free cash-flows (Jensen (1986)), there is a less favorable market reaction if the firm has substantial free cash-flows. Larger firms and those with higher prior abnormal returns experience lower market reactions.

The financial leverage increases mechanically following leveraged buybacks. We study whether the benefits from leveraged buybacks depend on the ex-ante debt ratio. In column (2) of Table 6, we interact the *LBB Dummy* with the *Market Leverage*. The coefficient on this interaction term is significantly negative at the 5% level. The *LBB Dummy* is significantly positive at the 10% level, which suggests that market reacts favorably to debt-financed repurchasing firms with low debt ratio, consistent with the leverage optimization hypothesis. In contrast, for leveraged buybacks, firms with ex-ante high debt ratio experience lower abnormal returns than those with low debt ratio.

A firm with high debt ratio is not necessarily over-levered. The optimal capital structure varies across firms. In column (3) of Table 6, we add an interaction term, *LBB Dummy* \times *TLEV Dummy* to the regression, where *TLEV Dummy* is a binary variable that equals one if the firm is over-levered before the repurchase announcement and zero otherwise. For leveraged buybacks, we find that the average three-day abnormal return is lower if the firm is ex-ante over-levered.

We then examine how free cash-flows in a firm determine the impact of debt financing on the market reaction to repurchases. We include an interaction term, *LBB Dummy* \times *Free Cash Flow* in column (4) of Table 6. The coefficient on the interaction term is insignificant. As the optimal cash holdings vary across firms, following Opler, Pinkowitz, Stulz, and Williamson (1999), we estimate the target cash holdings for each firm-year. We include an interaction term in column (5) of Table 6, *LBB Dummy* \times *TCASH Dummy*, where *TCASH Dummy* is a binary variable that equals one if a firm's cash holding ex ante is above the optimal level and zero otherwise. The coefficient on the interaction term is insignificant. This suggests that free cash-flows or excess cash does not affect the impact of debt financing on three-day abnormal returns.

Our results are consistent with the leverage optimization view. Market reacts favorably for leveraged buyback firms with low debt ratio. We find lower three-day abnormal returns for firms that are ex-ante over-levered.

3.5 Ex-Post Real Investments

Grullon and Michaely (2004) find that firms reduce their capital expenditures and R&D following repurchases. Table 7 shows results of the cross-sectional analysis of changes in real investments ex post. The dependent variable is changes of *abnormal investment*, where *abnormal investment* is the capital expenditure of a repurchasing firm minus that of the matched peer with

similar pre-buyback characteristics, from the end of year -1 to the end of year +2. In column (1), the coefficient of the *LBB Dummy* is significantly negative at the 5% level, which shows that debt-financed repurchasing firms experience sharper decline in ex-post abnormal investments than cash-financed ones. Post-repurchase capital expenditures are higher for firms with higher growth opportunities as proxied by Tobin's Q, similar to findings in previous studies (Jagannathan, Stephens, and Weisbach (2000)). Leverage is negatively associated with changes of abnormal investment (Lang, Ofek, and Stulz (1996)).

In column (2), we include an interaction term, *LBB Dummy* \times *Leverage*, to examine how leverage affects the impact of debt financing on post-repurchase real investments. The coefficient on the *LBB Dummy* is no longer significant but the coefficient on the interaction term is significantly negative at the 5% level. This suggests that leveraged buybacks lead to a sharper decline in ex-post abnormal investment only for highly-levered firms, not for firms with ex-ante low leverage.

We then investigate whether over-levered buybacks are associated with sharper decline in ex-post real investment than under-levered ones. In column (3) of Table 7, we include an interaction term *LBB Dummy* \times *TLEV Dummy*. For leveraged buybacks, post-repurchase abnormal investment declines more sharply for firms with leverage above the optimal ratio ex ante.

In columns (4) and (5), we interact *LBB Dummy* with *Free Cash Flow* and *TCASH Dummy* to examine whether free cash-flows or excess cash affects the impact of debt financing on post-repurchase real investments. The coefficients of both interaction terms are insignificant, suggesting that the free cash-flows do not have a significant impact on the change in ex-post real investments to leveraged buybacks.

The results indicate that leveraged buybacks experience a steeper decline in abnormal investments ex post than cash-financed ones. The reduction in real investments is sharper for firms with high leverage ex ante.

3.6 Growth Prospects

We analyze whether the reduction in real investments ex post is driven by declining growth prospects. For each repurchasing firm, the matched non-repurchasing firm is of the same two-digit SIC code, and with both pre-repurchase investment and book value of assets in year -1 within $\pm 20\%$ of those of the repurchasing firm. Table 8 reports changes of growth prospects, measured by long-run value to book, prior to and following buyback announcements for debt-, cash-financed repurchases and their matched non-repurchasing peers. Figure 1 shows the graph.

The average change in the long-run value to book from the end of year -1 to the end of year 0 is insignificant for both leveraged buybacks and their matched peers. From the end of year 0 to the end of year +4, only the change for leveraged buybacks is significantly negative. The difference between the changes for leveraged buybacks and matched peers is statistically significant at the 1% level.

Then we compare the changes in long-run value to book of debt-financed repurchases with those of cash-financed ones. Debt-financed buyback firms experience a significantly sharper decline in long-run value to book than cash-financed buyback firms from the end of year 0 to the end of year +4.

Our results suggest that the growth prospects decline significantly for all repurchasing firms ex post after controlling for non-repurchasing matched peers. The effect is stronger for debt-

financed buyback firms. Hence lower growth prospects contribute to the post-repurchase reduction in real investments for leveraged buybacks.

3.7 Completion Rates

Unlike repurchases via Dutch auction or tender offers, open-market repurchase programs do not commit to completing a pre-specified buyback program. Hence managers may use repurchase programs for their own interest (Fenn and Liang (2001), Chan, Ikenberry, Lee, and Wang (2010)).¹³ For leveraged buybacks, existing bondholders may deter the execution of repurchases due to an increased leverage.¹⁴

We examine the completion rates of debt-financed repurchases after repurchase announcements. We keep only open-market repurchases and drop privately-negotiated deals. To measure the completion rates of share repurchases, we use the purchase of common and preferred stock (item 115) minus any decrease in redeemable preferred stock (item 175) from Compustat, divided by the market value of equity (Grullon and Michaely (2004), Gong, Louis, and Sun (2008)).¹⁵

¹³ Bonaime (2012) finds a reputation effect where the lagged completion rate predicts future completion rates of buybacks.

¹⁴ This is possibly due to interventions from debtholders. For example, Bloomberg reports on 17 April 2012: “Lowe’s Cos. (LOW) is raising \$2 billion in the bond market to finance stock repurchases as the second-biggest U.S. home-improvement retailer boosts leverage to reward shareholders even as its profitability wanes. That raises concern among bondholders and bondholders are somewhat skeptical of the company given that the firm changed its financial policies. Debtholders tend to negotiate with the senior officials in order to avoid worsen financial position of the company.”

¹⁵ Several proxies are proposed by previous research to measure actual buyback ratio. Fama and French (2001) select changes in treasury stock from Compustat to proxy for actual repurchase rate. Stephens and Weisbach (1998)

In column (1) of Table 9, we employ the Tobit model where the dependent variable is the actual buyback ratio two years after the repurchase announcement. We include intended buyback ratio as additional explanatory variable in our regression. Intended buyback ratio is defined as the intended buyback size disclosed in the Current-Event (8-K) filing over the market value of equity (Chen and Wang (2012)). The coefficient on the *LBB Dummy* is significantly negative at the 5% level. This suggests that debt-financed repurchases have lower completion rates than cash-financed buybacks. The results also show that more levered firms have lower completion rates. The results are similar when we use OLS regressions in column (2).

3.8 Post-Repurchase Operating Performance and Financial Distress Risk

We examine whether operating performance improves following debt-financed repurchases. Figure 2 depicts changes of operating performance following repurchase announcements for debt- and cash-financed buybacks and their matched peers. We find lower reductions in operating performance ex post for debt- and cash-financed repurchases than matched non-repurchasing firms.¹⁶ We then test whether the abnormal post-repurchase operating performance differs between debt- and cash-financed buybacks. In Table 10, the dependent variable is changes of *abnormal operating performance* from the end of year -1 to the end of year +2. We do not find significant difference in ex-post *abnormal operating performance* between debt- and cash-financed buybacks.

and Guay and Harford (2000) use decreases in shares outstanding from CRSP to measure actual buyback ratio. Banyl, Dyl, and Kahle (2008) show that purchase of common and preferred stock minus any decrease in redeemable preferred stock from Compustat is considered a better measure.

¹⁶ This is consistent with Lie (2005) and Gong, Louis, and Sun (2008) who find better operating performance ex post for share buybacks than matched non-repurchasing peers.

Shareholders may use buybacks to expropriate wealth from debtholders (Bradley and Wakeman (1983), Maxwell and Stephens (2003)). For instance, Greenberg reports on 8th November 2011: “Fitch Rating downgraded Amgen the day when the firm announced that it would use debt to finance the repurchase.” We next examine whether debt-financed buyback firms face higher financial distress risk ex post than their matched non-repurchasing peers. Figure 2 plots changes of Z-score following buyback announcements for debt-, cash-financed repurchases and their matched non-repurchasing peers. Debt-financed buyback firms do not exhibit higher financial distress risk than their matched peers. In Table 11, the dependent variable is changes of *abnormal Z-score* from the end of year -1 to the end of year +2. The coefficient of the *LBB Dummy* is negative but insignificant. We do not find significant difference of abnormal changes of financial distress risk ex post between debt- and cash-financed buybacks.

3.9 Robustness Checks

We conduct several robustness checks to our main results. First, we use an alternative definition of debt-financed repurchases. We define a repurchase as a debt-financed one only if the corporate filings explicitly state that the firm expects to use only debt to finance the share repurchase. In our sample, 86 out of 218 leveraged buybacks are fully financed by debt. We investigate short-term market reaction to those fully-debt financed repurchases. We find similar results to those reported before.

Second, we use alternative measures of abnormal returns. For example, we use a five-day window in CAR. We also use alternative models such as the CRSP equally-weighted market index as the benchmark or market-adjusted returns where equity beta is assumed to be 1. The results are very similar to those reported in Table 6.

Third, an alternative measure of completion rates is employed. Following Bonaime (2012), we use the purchase of common and preferred stock minus any decrease in redeemable preferred stock, all scaled by the announced size of repurchase plan to measure completion rates.¹⁷ Results remain unchanged.

Fourth, Peyer and Vermaelen (2005) argue that the motivation for conducting privately negotiated repurchase differs from that of open market share repurchases. Therefore, we exclude 57 privately negotiated repurchases in our sample. The results are very similar to what we reported previously.

4. Conclusion

This paper studies the performance of leveraged buybacks. We propose that firms conduct leveraged buybacks to optimize their capital structures. In addition, information/timing also matters for the performance of leveraged buybacks.

Under-levered firms with low cash holdings but substantial debt capacity conduct leveraged buybacks. We find positive short-term abnormal returns and long-term price drift for debt-financed repurchases. The market reactions are less positive than those of cash-financed buybacks. The stock market reacts less favorably to firms with ex-ante higher leverage. Leveraged buyback firms experience a steeper decline in real investments ex post than cash-financed buyback firms. Lower growth prospects contribute to the post-repurchase reduction in real investments. Debt-financed repurchases also exhibit lower completion rates than cash-financed ones. Debt-financed buyback firms do not have significantly different financial distress risk or operating performance ex post than cash-financed ones.

¹⁷ Results are similar when we drop the decrease in redeemable preferred stock item.

Our results suggest that leverage buybacks on average add value to shareholders. Firms with declining growth prospects and substantial debt capacity repurchase shares via debt to optimize leverage. But for firms that are ex-ante over-levered, leveraged buybacks lead to lower market reactions and sharper reductions in ex-post investments than under-levered firms.

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Table 1 The Distribution of Share Repurchases Over Time

This table lists the number of debt- and cash-financed repurchases each year over the period 1994-2012. Debt-financed repurchases are share buybacks that use external debt to buyback stocks. Cash-financed repurchases are repurchase programs that use internal funds to finance share buybacks. We also report the mean (median) deal value for both debt- and cash-financed repurchases.

Year	Debt-financed Repurchases			Cash Financed Repurchases		
	N	Mean Deal Value (\$million)	Median Deal Value (\$million)	N	Mean Deal Value (\$million)	Median Deal Value (\$million)
1994	12	81.30	25.75	13	41.93	9.40
1995	19	115.85	34.68	6	13.25	9.09
1996	14	133.78	43.67	12	113.81	24.53
1997	17	229.30	47.81	10	124.42	6.32
1998	16	36.16	17.76	10	401.69	19.22
1999	17	48.41	15.70	6	53.47	63.89
2000	4	91.47	47.50	4	9.80	8.15
2001	7	114.23	53.28	7	78.64	11.49
2002	8	104.84	33.00	13	297.15	9.60
2003	3	70.02	38.50	4	46.69	41.65
2004	7	869.66	100.00	28	318.55	101.38
2005	13	361.70	300.00	26	311.76	57.5
2006	12	411.37	250.00	27	228.59	25.52
2007	35	1001.39	150.00	62	253.43	55.00
2008	29	146.48	46.30	102	390.16	20.00
2009	10	161.65	63.00	27	167.49	25.00
2010	6	300.40	212.50	9	348.38	15.00
2011	31	470.91	100.00	37	132.09	50.00
2012	17	426.47	200.00	30	756.96	250.00
Total	277	335.21	70.00	433	291.39	30.00

Table 2 Source of Financing and Firm Characteristics

The sample consists of 218 debt-financed repurchases and 357 cash-financed repurchases over the period 1994-2012. *Investment* is defined as capital expenditure (item 145 in Compustat) divided by total assets (item 6). *Cash Holding* is the cash and cash equivalents (item 1) over total assets (item 6). *Free cash flow* is the gross operating income (item 13) minus the sum of depreciation (item 14), tax paid (item 16), interest expenses (item 15) and dividends paid (item 19+item 21). *Market Leverage* is defined as book value of debt (item 9+ item 34) divided by the sum of book value of debt (item 9+ item 34) and market value of equity (item 25* item 24). *Net Market Leverage* is the book value of debt minus cash and cash equivalents, all divided by the sum of book value of debt and market value of equity. *Intended buyback ratio* is the intended buyback size disclosed in the 8-k filing over the market value of equity (item 25* item 24). *Z-score* is Altman's (1968) measure of credit risk. *Dividend* is the sum of common (item 21) and preferred (item 19) dividend paid to shareholders over total assets (item 6). *Tobin's Q* is defined as the book value of assets (item 6) minus book value of equity (item 144) plus market value of equity (item 25* item 24), all divided by book value of assets (item 6). *Size* is defined as the log of asset size (item 6), measured in 1983 dollars. *Operating performance* is measured by ROA, which is defined as operating income (item 13) divided by book assets (item 6). *FA_TA* is the property, plant and equipment (item 14) over total book assets (item 6). The last column reports the difference in mean test. ***, ** and * represent statistical significance at the 1%, 5% and 10% level, respectively.

	Debt-Financed Repurchases			Cash-Financed Repurchases			Difference
	N	Mean	Median	N	Mean	Median	T-statistic
<i>Investment</i>	215	0.07	0.04	351	0.04	0.03	0.03 ***
<i>Cash Holding</i>	218	0.09	0.04	356	0.25	0.22	-0.16 ***
<i>Free Cash Flow</i>	203	0.06	0.05	292	0.06	0.05	0.00
<i>Market Leverage</i>	214	0.21	0.15	346	0.15	0.07	0.06 ***
<i>Net Market Leverage</i>	214	0.16	0.12	346	-0.03	-0.06	0.19 ***
<i>Intended Buyback Ratio</i>	194	0.10	0.07	317	0.07	0.05	0.03 ***
<i>Z-score</i>	193	4.34	3.71	308	6.63	4.18	-2.29 ***
<i>Dividend</i>	217	0.02	0.00	355	0.01	0.00	0.01 *
<i>Tobin's Q</i>	214	1.91	1.57	349	2.14	1.60	-0.23 **
<i>Size</i>	218	20.04	19.90	356	19.65	19.73	0.39 **
<i>Operating Performance</i>	211	0.18	0.15	349	0.13	0.12	0.05 ***
<i>FA_TA</i>	209	0.30	0.20	350	0.18	0.11	0.12 ***

Table 3 Short-Term and Long-Run Stock Performance

This table shows the short-term market reaction and long-term price drift for both debt- and cash-financed repurchases. Panel A shows the cumulative abnormal return based on different event windows. We use market model and select CRSP equally-weighted (EW) or value-weighted (VW) market index as the benchmark. Panel B reports the monthly calendar-time alphas 6-month prior to and 12-, 24-, and 36-month following the repurchase announcement date, where portfolios are formed monthly in calendar time. Panel C shows the monthly abnormal returns 6-month prior to and 12-, 24-, and 36-month following the repurchase announcement using Ibbotson's (1975) Return Across Time and Securities (RATS) method. ***, ** and * represent the 1%, 5% and 10% significance level, respectively.

Panel A: Short-term CAR

	ALL			Debt-Financed Repurchases			Cash-Financed Repurchases		
	N	EW	VW	N	EW	VW	N	EW	VW
(-1,0)	672	1.30%***	1.19%***	269	1.14%***	1.04%***	403	1.41%***	1.30%***
(0,1)	672	2.68%***	2.63%***	269	2.27%***	2.21%***	403	2.96%***	2.90%***
(-1,+1)	672	2.60%***	2.50%***	269	2.27%***	2.19%***	403	2.83%***	2.72%***

Panel B: Fama-French Long-term AR

	ALL		Debt-Financed Repurchases		Cash-Financed Repurchases	
	N	Calendar-time Approach	N	Calendar-time Approach	N	Calendar-time Approach
(-6,0)	682	-0.54%**	273	-0.51%*	409	-0.06%
(+1,+12)	682	1.00%***	273	0.96%***	409	1.18%***
(+1,+24)	682	0.87%***	273	0.89%***	409	0.84%***
(+1,+36)	682	0.78%***	273	0.82%***	409	0.74%***

Panel C: Fama-French IRATS Long-term AR

	ALL		Debt-Financed Repurchases		Cash-Financed Repurchases	
	N	Ibbotson RATS	N	Ibbotson RATS	N	Ibbotson RATS
(-6,0)	682	-0.82%***	273	-0.59%**	409	-0.91%***
(+1,+12)	682	0.46%***	273	0.47%**	409	0.42%**
(+1,+24)	682	0.43%***	273	0.37%**	409	0.45%***
(+1,+36)	682	0.37%***	273	0.31%**	409	0.39%***

Table 4 Changes in Investment, Cash, Leverage, Net Leverage, ROA and Z-Score Before and After Buybacks

This table reports average changes in investment, cash, leverage, net leverage, operating performance and Z-score before and after repurchase announcements. Panel A shows changes ex ante and Panel B displays changes ex post. Year 0 is defined as the fiscal year when share repurchase is announced. Period (x, y) measures changes from the end of year y to the end of year x. *Investment* is defined as capital expenditure (item 145) divided by total assets (item 6). *Cash Holding* is the cash and cash equivalents (item 1) over total assets (item 6). *Market Leverage* is defined as book value of debt (item 9+ item 34) divided by the sum of book value of debt (item 9+ item 34) and market value of equity (item 25* item 24). *Net Market Leverage* is the book value of debt minus cash and cash equivalents, all divided by the sum of book value of debt and market value of equity. *Operating performance* is measured by ROA, which is defined as operating income (item 13) divided by book assets (item 6). *Z-score* is Altman's (1968) measure of credit risk. ***, ** and * represent statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Changes in Performance ex ante

Category	Period	Change in <i>INV</i>	Change in <i>CASH</i>	Change in <i>LEV</i>	Change in <i>NLEV</i>	Change in <i>OP</i>	Change in <i>Z-Score</i>
<i>Debt-Financed Repurchases</i>	(-2,-1)	0.001 (0.234)	-0.004 (2.008)**	-0.007 (0.914)	-0.004 (0.476)	0.007 (1.752)*	0.127 (0.759)
	(-3,-1)	-0.000 (0.116)	-0.012 (2.014)**	-0.022 (1.783)*	-0.008 (0.521)	0.010 (2.043)**	0.274 (1.330)
	(-4,-1)	-0.000 (0.019)	-0.015 (2.388)***	-0.022 (1.554)	-0.012 (0.687)	0.018 (2.241)**	0.141 (0.517)
	(-5,-1)	-0.002 (0.336)	-0.025 (2.876)***	-0.001 (0.075)	0.011 (0.612)	0.017 (1.964)**	-0.356 (1.119)
	(-2,-1)	-0.002 (0.936)	0.004 (0.501)	-0.001 (0.219)	-0.007 (0.741)	0.010 (1.684)*	0.205 (0.587)
<i>Cash Financed Repurchases</i>	(-3,-1)	-0.005 (2.078)**	-0.001 (0.131)	-0.004 (0.519)	-0.012 (1.033)	0.018 (2.185)**	0.213 (0.573)
	(-4,-1)	-0.009 (3.378)***	0.007 (0.732)	-0.010 (0.977)	-0.030 (2.289)**	0.028 (2.752)***	-0.204 (0.493)
	(-5,-1)	-0.006 (2.369)**	-0.003 (0.296)	-0.028 (2.417)***	-0.042 (2.561)***	0.019 (1.997)**	-1.572 (2.337)***
	(-2,-1)	-0.002 (0.936)	0.004 (0.501)	-0.001 (0.219)	-0.007 (0.741)	0.010 (1.684)*	0.205 (0.587)

Panel B: Changes in Performance ex post

Category	Period	Change in <i>INV</i>	Change in <i>CASH</i>	Change in <i>LEV</i>	Change in <i>NLEV</i>	Change in <i>OP</i>	Change in <i>Z-Score</i>
<i>Debt-Financed Repurchases</i>	(-1,+1)	-0.012 (2.225)**	-0.001 (0.123)	0.084 (7.041)***	0.068 (5.155)***	-0.003 (0.479)	-0.884 (3.915)***
	(-1,+2)	-0.021 (3.432)***	0.002 (0.318)	0.061 (4.907)***	0.044 (2.944)***	-0.013 (1.675)*	-1.016 (3.598)***
	(-1,+3)	-0.020 (3.605)***	0.008 (1.079)	0.064 (4.319)***	0.038 (2.237)**	-0.019 (-2.071)**	-1.093 (3.568)***
	(-1,+4)	-0.020 (3.845)***	0.013 (1.712)*	0.064 (3.831)***	0.033 (1.558)	-0.031 (3.320)***	-1.354 (3.948)***
<i>Cash Financed Repurchases</i>	(-1,+1)	0.001 (0.329)	-0.028 (3.073)***	0.021 (2.281)**	0.011 (0.867)	-0.018 (2.080)**	-1.469 (3.299)***
	(-1,+2)	-0.001 (0.427)	-0.032 (3.747)***	0.014 (1.411)	0.001 (0.065)	-0.014 (1.693)*	-1.418 (2.603)***
	(-1,+3)	-0.005 (1.736)*	-0.035 (3.555)***	0.036 (3.105)***	-0.008 (0.381)	-0.022 (2.302)**	-2.068 (3.720)***
	(-1,+4)	-0.001 (0.337)	-0.035 (3.327)***	0.026 (1.734)*	-0.022 (1.036)	-0.017 (1.881)*	-2.163 (3.589)***

Table 5 Motives of Leveraged Buybacks

This table shows results of the relationship between the sources of financing used and firm characteristics. The dependent variable is a dummy variable that equals one if the repurchase is debt-financed and zero otherwise. *Prior AR* represents stock returns on the firm minus returns on the value-weighted CRSP index, calculated from 44 days prior to the announcement until 4 days prior to the announcement. *Tobin's Q* is defined as the book value of assets (item 6) minus book value of equity (item 144) plus market value of equity (item 25* item 24), all divided by book value of assets (item 6). *Size* is defined as the log of asset size (item 6), measured in 1983 dollars. *Cash holding* is the cash and cash equivalents (item 1) over total assets (item 6). *Leverage* is defined as book value of debt (item 9+ item 34) divided by the sum of book value of debt (item 9+ item 34) and market value of equity (item 25* item 24). *Operating performance* is measured by ROA, which is defined as operating income (item 13) divided by book assets (item 6). *Dividend* is the sum of common (item 21) and preferred (item 19) dividend paid to shareholders over total assets (item 6). *Z-score* is Altman's (1968) measure of credit risk. We include two time dummies capturing the Dot-com bubble from 1997 to 2000 and the financial crisis from 2007 to 2012. We also include 11 industry dummy variables based on Fama-French 12 industries and cluster standard errors by firm. ***, ** and * represent 1%, 5% and 10% significance level, respectively.

	Logit	Probit
<i>Intercept</i>	1.574 (0.95)	0.660 (0.69)
<i>Prior AR</i>	1.284 (2.07)**	0.763 (2.13)**
<i>Tobin's Q</i>	0.029 (0.17)	0.001 (0.01)
<i>Size</i>	-0.091 (1.22)	-0.044 (1.03)
<i>Cash Holding</i>	-8.067 (5.10)***	-4.440 (5.48)***
<i>Leverage</i>	0.464 (0.42)	0.426 (0.74)
<i>Operating Performance</i>	8.095 (3.87)***	4.456 (3.86)***
<i>Dividend</i>	-0.339 (0.11)	-0.220 (0.13)
<i>Z-Score</i>	-0.077 (1.36)	-0.029 (1.05)
<i>Industry Dummies</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Dummies</i>	<i>Yes</i>	<i>Yes</i>
<i>N</i>	501	501
<i>Adjusted R²</i>	0.295	0.290

Table 6 Cross-Sectional Analysis of Short Term Reaction to Buyback Announcements

This table reports results of the cross-sectional analysis of short-term market reaction to repurchase announcements. The dependent variable is the three day CAR (-1, +1). *LBB Dummy* is a dummy variable that equals one if the repurchase is debt-financed and zero otherwise. We define a share repurchase as a debt-financed one if the transaction is partially or fully financed by debt. *HD Dummy* a binary variable that equals one if the repurchase announcement is made from 2004 onwards and zero otherwise. *TLEV Dummy* is a binary variable that equals one if the firm is over-levered before the repurchase announcement and zero otherwise. *TCASH Dummy* is a dummy variable that equals one if the firm has excess cash prior to the buyback announcement. *OMSR Dummy* is a dummy variable that equals one if the repurchase is an open market repurchase program and zero otherwise. We include two time dummies capturing the Dot-com bubble from 1997 to 2000 and the financial crisis from 2007 to 2012. We also include 11 industry dummy variables based on Fama-French 12 industries and cluster standard errors by firm. ***, ** and * represent 1%, 5% and 10% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)
<i>Intercept</i>	0.156 [3.09]***	0.195 [3.91]***	0.194 [3.54]***	0.157 [3.07]***	0.163 [3.18]***
<i>LBB Dummy</i>	-0.019 [2.03]**	0.022 [1.71]*	-0.000 [0.02]	-0.022 [1.66]*	-0.022 [1.47]
<i>TLEV Dummy</i>			0.042 [1.76]*		
<i>TCASH Dummy</i>					0.001 [0.06]
<i>OMSR Dummy</i>	-0.008 [0.64]	-0.006 [0.50]	-0.005 [0.42]	-0.008 [0.68]	-0.003 [0.23]
<i>HD Dummy</i>	-0.009 [0.54]	-0.016 [0.90]	-0.015 [0.73]	-0.009 [0.53]	-0.009 [0.49]
<i>Prior AR</i>	-0.116 [2.61]***	-0.128 [3.14]***	-0.152 [3.30]***	-0.116 [2.61]***	-0.123 [2.63]***
<i>Q</i>	-0.003 [0.87]	-0.001 [0.20]	-0.001 [0.20]	-0.003 [0.86]	-0.003 [0.84]
<i>Size</i>	-0.005 [2.36]**	-0.008 [3.43]***	-0.007 [3.02]***	-0.005 [2.35]**	-0.006 [2.61]***
<i>Cash Holdings</i>	-0.018 [0.52]	-0.021 [0.64]	-0.028 [0.78]	-0.019 [0.55]	-0.019 [0.50]
<i>Free Cash Flow</i>	-0.197 [1.99]**	-0.195 [1.97]**	-0.204 [1.87]*	-0.207 [1.82]*	-0.188 [1.88]*
<i>Leverage</i>	-0.008 [0.26]	0.079 [1.47]	-0.023 [0.76]	-0.008 [0.25]	-0.006 [0.19]
<i>Dividend</i>	-0.022 [0.21]	0.061 [0.59]	0.097 [0.79]	-0.022 [0.20]	-0.026 [0.25]
<i>LBB Dummy* Leverage</i>		-0.141 [2.45]**			
<i>LBB Dummy* TLEV Dummy</i>			-0.057 [1.97]**		
<i>LBB Dummy* Free Cash Flow</i>				0.042 [0.29]	
<i>LBB Dummy* TCASH Dummy</i>					0.005 [0.26]
<i>Industry Dummies</i>	Yes	Yes	Yes	Yes	Yes
<i>Time Dummies</i>	Yes	Yes	Yes	Yes	Yes
<i>N</i>	575	554	479	554	543
<i>Adjusted R²</i>	0.12	0.14	0.16	0.12	0.13

Table 7 Cross-Sectional Analysis of Changes in Post-Repurchase Real Investments

This table reports results of the cross-sectional analysis of post-announcement changes in abnormal investment. The dependent variable is changes in abnormal investment from the end of year -1 to the end of year +2. Abnormal investment is a repurchasing firm's capital expenditure (item 145) divided by total assets (item 6), minus that of its matched firm. *LBB Dummy* is a dummy variable that equals one if the repurchase is debt-financed and zero otherwise. We define a share repurchase as a debt-financed one if the transaction is partially or fully financed by debt. *HD Dummy* a binary variable that equals one if the repurchase announcement is made from 2004 onwards and zero otherwise. *TLEV Dummy* is a binary variable that equals one if the firm is over-levered before the repurchase announcement and zero otherwise. *TCASH Dummy* is a binary variable that equals one if the firm has excess cash prior to the buyback announcement. *OMSR Dummy* is a dummy variable that equals one if the repurchase is an open market repurchase program and zero otherwise. We include two time dummies capturing the Dot-com bubble from 1997 to 2000 and the financial crisis from 2007 to 2012. We also include 11 industry dummy variables based on Fama-French 12 industries and cluster standard errors by firm. ***, ** and * represent 1%, 5% and 10% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)
<i>Intercept</i>	0.003 [0.06]	0.004 [0.09]	-0.006 [0.15]	0.001 [0.02]	-0.001 [0.03]
<i>LBB Dummy</i>	-0.022 [2.51]**	-0.011 [1.14]	-0.011 [1.26]	-0.015 [1.59]	-0.017 [1.63]
<i>TLEV Dummy</i>			0.006 [0.59]		
<i>TCASH Dummy</i>					0.008 [0.84]
<i>OMSR Dummy</i>	-0.015 [1.92]*	-0.014 [1.84]*	-0.013 [1.71]*	-0.014 [1.89]*	-0.014 [1.90]*
<i>HD Dummy</i>	0.001 [0.13]	0.003 [0.23]	0.003 [0.28]	0.001 [0.14]	0.000 [0.03]
<i>Prior AR</i>	-0.030 [1.35]	-0.030 [1.34]	-0.045 [2.03]**	-0.030 [1.36]	-0.029 [1.28]
<i>Q</i>	0.008 [2.35]**	0.009 [2.43]**	0.007 [1.40]	0.009 [2.57]**	0.009 [2.54]**
<i>Size</i>	0.000 [0.18]	-0.000 [0.12]	0.001 [0.32]	0.000 [0.18]	0.000 [0.16]
<i>Cash Holdings</i>	-0.025 [1.22]	-0.018 [0.90]	-0.031 [1.15]	-0.025 [1.25]	-0.036 [1.59]
<i>Free Cash Flow</i>	-0.011 [0.38]	-0.006 [0.21]	-0.015 [0.49]	0.006 [0.22]	-0.013 [0.45]
<i>Leverage</i>	-0.032 [2.17]**	0.001 [0.06]	-0.022 [1.31]	-0.031 [2.06]**	-0.033 [2.26]**
<i>LBB Dummy* Leverage</i>		-0.056 [2.20]**			
<i>LBB Dummy* TLEV Dummy</i>			-0.045 [2.55]**		
<i>LBB Dummy* Free Cash Flow</i>				-0.118 [1.30]	
<i>LBB Dummy* TCASH Dummy</i>					-0.008 [0.57]
<i>Industry Dummies</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Dummies</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>N</i>	419	419	398	419	409
<i>Adjusted R²</i>	0.16	0.17	0.20	0.17	0.17

Table 8 Changes of Growth Prospects Before and After Share Buybacks

This table reports average changes of growth prospects, measured by long-run value to book (Rhodes-Kropf, Robinson, and Viswanathan (2005)). Year 0 is defined as the fiscal year when share repurchase is announced. Period (x, y) measures changes from the end of year y to the end of year x. *Long-run value to book* is the difference between long-run value and observed book value and accounts for firm's growth prospects. Both debt- and cash-financed repurchases are matched to non-repurchasing peers with similar pre-repurchase firm characteristics. For each repurchasing firm, the matched non-repurchasing firm is of the same two-digit SIC code, and with both pre-repurchase investment and book value of assets in year -1 within $\pm 20\%$ of those of the repurchasing firm. Tests of differences and difference-in-difference are reported. ***, ** and * represent statistical significance at the 1%, 5% and 10% level, respectively.

Category	(-1,0)	(0,+1)	(0,+2)	(0,+3)	(0,+4)
<i>Debt-financed Repurchases</i>	-0.004	-0.007	-0.017	-0.027	-0.038
	[1.52]	[3.57]***	[3.84]***	[4.25]***	[5.31]***
<i>Matched Non-repurchasing Firms</i>	0.006	0.014	0.016	0.011	-0.006
	[1.11]	[1.09]	[1.00]	[0.48]	[0.46]
<i>Difference (1)</i>	-0.010	-0.021	-0.033	-0.038	-0.044
	[0.83]	[2.42]**	[2.79]***	[3.64]***	[4.71]***
<i>Cash-financed Repurchases</i>	-0.003	-0.005	-0.012	-0.015	-0.026
	[1.51]	[2.78]***	[3.43]***	[2.41]**	[4.26]***
<i>Matched Non-repurchasing Firms</i>	0.001	-0.002	-0.003	-0.007	-0.005
	[0.21]	[0.38]	[0.50]	[0.82]	[0.49]
<i>Difference (2)</i>	-0.004	-0.003	-0.009	-0.008	-0.021
	[1.02]	[2.39]**	[3.11]***	[2.25]**	[3.73]***
<i>Diff-in-Diff (1)-(2)</i>	-0.006	-0.018	-0.024	-0.030	-0.023
	[0.77]	[2.51]**	[2.86]***	[2.38]**	[3.04]***

Table 9 Cross-Sectional Analysis of Actual Share Repurchases

This table displays results of the cross-sectional analysis of actual share repurchases. The dependent variable is the *actual buyback ratio* two years after the repurchase announcement. The *actual buyback ratio* is defined as purchase of common and preferred stock (item 115) minus any decrease in redeemable preferred stock (item 175), all divided by market value of equity (item 25* item 24). *LBB Dummy* is a dummy variable that equals one if the repurchase is debt-financed and zero otherwise. We define a share repurchase as a debt-financed one if the transaction is partially or fully financed by debt. *HD Dummy* a binary variable that equals one if the repurchase announcement is made from 2004 onwards and zero otherwise. *Intended buyback ratio* is the intended buyback size disclosed in the 8-k filing over the market value of equity (item 25* item 24). We include two time dummies capturing the Dot-com bubble from 1997 to 2000 and the financial crisis from 2007 to 2012. We also include 11 industry dummy variables based on Fama-French 12 industries and cluster standard errors by firm. ^{***}, ^{**} and ^{*} represent 1%, 5% and 10% significance level, respectively.

	Tobit	OLS
<i>Intercept</i>	-0.117 (0.40)	0.098 (0.50)
<i>LBB Dummy</i>	-0.010 (2.01) ^{**}	-0.072 (2.04) ^{**}
<i>HD Dummy</i>	-0.084 (1.04)	-0.053 (0.91)
<i>Prior AR</i>	-0.047 (0.35)	-0.059 (0.61)
<i>Tobin's Q</i>	0.011 (0.54)	0.009 (0.66)
<i>Size</i>	0.012 (0.75)	0.001 (0.05)
<i>Cash Holding</i>	-0.302 (1.49)	-0.211 (1.37)
<i>Free Cash Flow</i>	0.268 (1.03)	-0.002 (0.01)
<i>Leverage</i>	-0.452 (2.76) ^{***}	-0.206 (2.22) ^{**}
<i>Dividend</i>	-0.699 (0.59)	-0.355 (0.46)
<i>Intended Buyback Ratio</i>	0.169 (1.34)	0.090 (1.41)
<i>Industry Dummies</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Dummies</i>	<i>Yes</i>	<i>Yes</i>
<i>N</i>	419	419
<i>Adjusted R²</i>	0.116	0.101

Table 10 Cross-Sectional Analysis of Changes in Post-Repurchase Operating Performance

This table reports results of the cross-sectional analysis of post-announcement changes in abnormal operating performance. The dependent variable is changes in abnormal operating performance from the end of year -1 to the end of year +2. The abnormal operating performance for a repurchasing firm is its ROA, which is defined as operating income (item 13) divided by book assets (item 6) minus that of the matched firm. *LBB Dummy* is a dummy variable that equals one if the repurchase is debt-financed and zero otherwise. *HD Dummy* a binary variable that equals one if the repurchase announcement is made from 2004 onwards and zero otherwise. *ABR* represents the actual buyback ratio which is defined as purchase of common and preferred stock (item 115) minus any decrease in redeemable preferred stock (item 175), all divided by market value of equity. We include two time dummies capturing the Dot-com bubble from 1997 to 2000 and the financial crisis from 2007 to 2012. We also include 11 industry dummy variables based on Fama-French 12 industries and cluster standard errors by firm. ***, ** and * represent 1%, 5% and 10% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)
<i>Intercept</i>	2.041 (0.84)	1.891 (0.78)	2.064 (0.82)	2.025 (0.83)	2.065 (0.85)
<i>LBB Dummy</i>	-0.071 (0.18)	0.188 (0.40)	-0.120 (0.21)	-0.131 (0.22)	-0.183 (0.46)
<i>OMSR Dummy</i>	-1.031 (1.86)*	-1.045 (1.90)*	-1.034 (1.87)*	-1.033 (1.86)*	-1.163 (2.08)**
<i>HD Dummy</i>	0.682 (1.15)	0.741 (1.24)	0.677 (1.13)	0.682 (1.15)	0.774 (1.31)
<i>Prior AR</i>	0.787 (1.05)	0.789 (1.05)	0.787 (1.04)	0.772 (1.04)	1.317 (1.43)
<i>Tobin's Q</i>	-0.005 (0.03)	-0.003 (0.02)	-0.011 (0.06)	-0.006 (0.03)	0.015 (0.09)
<i>Size</i>	0.045 (0.45)	0.048 (0.48)	0.045 (0.44)	0.047 (0.45)	0.046 (0.46)
<i>Cash Holding</i>	-0.845 (0.69)	-0.535 (0.40)	-0.840 (0.68)	-0.869 (0.70)	-0.783 (0.63)
<i>Free Cash Flow</i>	2.827 (1.67)*	2.814 (1.66)*	2.818 (1.67)*	2.812 (1.66)*	2.826 (1.68)*
<i>Leverage</i>	-0.636 (0.68)	-0.735 (0.77)	-0.624 (0.66)	-0.765 (0.51)	-0.574 (0.62)
<i>ABR</i>	-0.460 (1.01)	-0.452 (1.00)	-0.463 (1.00)	-0.458 (1.00)	-0.524 (1.17)
<i>LBB Dummy*</i> <i>Cash Holding</i>		-3.026 (1.18)			
<i>LBB Dummy*</i> <i>Tobin's Q</i>			0.028 (0.10)		
<i>LBB Dummy*</i> <i>Leverage</i>				0.262 (0.14)	
<i>LBB Dummy*</i> <i>Prior AR</i>					-2.229 (1.19)
<i>Industry Dummies</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Dummies</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>N</i>	416	416	416	416	416
<i>Adjusted R²</i>	0.094	0.097	0.094	0.094	0.098

Table 11 Cross-Sectional Analysis of Changes in Post-Buyback Financial Distress Risk

This table reports results of the cross-sectional analysis of post announcement changes in abnormal *Z-Score*. The dependent variable is changes in abnormal *Z-Score* from the end of year -1 to the end of year +2. The abnormal *Z-Score* for the repurchasing firm is the firm specific *Z-Score* minus that of the matched firm. *LBB Dummy* is a dummy variable that equals one if the repurchase is debt-financed and zero otherwise. *HD Dummy* a binary variable that equals one if the repurchase announcement is made from 2004 onwards and zero otherwise. We define a share repurchase as a debt-financed one if the transaction is partially or fully financed by debt. *FA_TA* is the property, plant and equipment (item 14) over total book assets (item 6). We include two time dummies capturing the Dot-com bubble from 1997 to 2000 and the financial crisis from 2007 to 2012. We also include 11 industry dummy variables based on Fama-French 12 industries and cluster standard errors by firm. ***, ** and * represent 1%, 5% and 10% significance level, respectively.

	(1)	(2)	(3)	(4)	(5)
<i>Intercept</i>	3.266	3.295	1.242	2.830	3.300
	(0.48)	(0.48)	(0.19)	(0.42)	(0.49)
<i>LBB Dummy</i>	-0.393	-0.444	-0.343	-1.570	-0.498
	(0.41)	(0.34)	(0.20)	(0.97)	(0.51)
<i>OMSR Dummy</i>	1.561	1.560	1.758	1.475	1.467
	(1.79)*	(1.78)*	(2.13)**	(1.70)*	(1.67)*
<i>HD Dummy</i>	-0.340	-0.351	0.008	-0.346	-0.242
	(0.25)	(0.25)	(0.01)	(0.25)	(0.17)
<i>Prior AR</i>	0.981	0.982	0.921	0.605	1.584
	(0.51)	(0.51)	(0.47)	(0.32)	(0.65)
<i>Tobin's Q</i>	0.460	0.460	0.990	0.435	0.476
	(0.67)	(0.67)	(1.31)	(0.64)	(0.68)
<i>Size</i>	-0.183	-0.183	-0.146	-0.127	-0.184
	(0.55)	(0.92)	(0.45)	(0.38)	(0.55)
<i>Cash Holding</i>	-3.825	-3.909	-3.667	-4.242	-3.766
	(0.67)	(0.65)	(0.64)	(0.73)	(0.66)
<i>Free Cash Flow</i>	4.389	4.360	5.626	4.426	4.315
	(0.72)	(0.71)	(0.85)	(0.73)	(0.71)
<i>Fixed Assets</i>	0.555	0.570	0.955	0.586	0.468
	(0.21)	(0.22)	(0.37)	(0.22)	(0.18)
<i>Leverage</i>	-1.972	-1.959	-2.731	-4.684	-1.880
	(1.20)	(1.17)	(1.57)	(1.58)	(1.13)
<i>LBB Dummy*</i> <i>Cash Holding</i>		0.488			
		(0.05)			
<i>LBB Dummy*</i> <i>Tobin's Q</i>			-2.058		
			(1.87)*		
<i>LBB Dummy*</i> <i>Leverage</i>				5.334	
				(1.32)	
<i>LBB Dummy*</i> <i>Prior AR</i>					-2.441
					(0.69)
<i>Industry Dummies</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Dummies</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>N</i>	412	412	412	412	412
<i>Adjusted R²</i>	0.048	0.048	0.071	0.052	0.049

Figure 1 Change in Cash, Leverage and Growth Prospects around Buybacks

This figure shows average changes in cash holdings, market leverage and growth prospects prior to and following buyback announcements for both debt- and cash-financed repurchases. Year 0 is defined as the fiscal year when share repurchase is announced. *Cash Holding* is the cash and cash equivalents (item 1) over total assets (item 6). *Market Leverage* is defined as book value of debt (item 9+ item 34) divided by the sum of book value of debt (item 9+ item 34) and market value of equity (item 25* item 24). *Growth Prospects* is measured by long-run value to book, which is the difference between long-run value and observed book value.

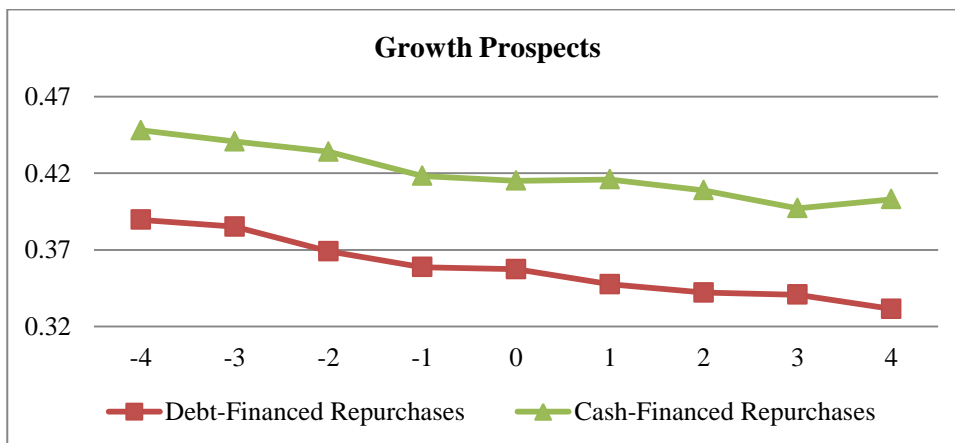
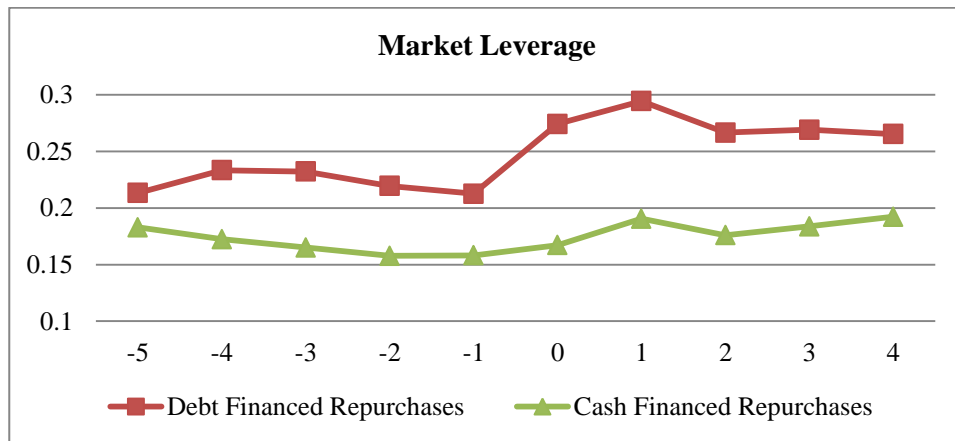
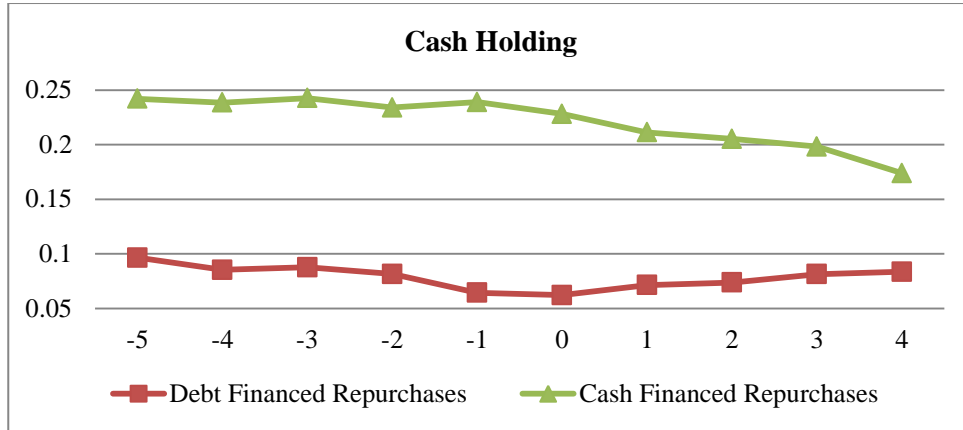


Figure 2 Changes in Investment, Operating Performance and Z-Score around Buybacks

This figure reports average change in investment, operating performance and Z-score after repurchase announcements for both debt- and cash-financed buyback firms and their matched non-repurchasing peers. Year 0 is defined as the fiscal year when share repurchase is announced. *Investment* is defined as capital expenditure (item 145) divided by total assets (item 6). *Operating performance* is measured by ROA, which is defined as operating income (item 13) divided by book assets (item 6). *Z-score* is Altman's (1968) measure of credit risk.

