

MANAGERIAL OVERCONFIDENCE AND THE BUYBACK ANOMALY

PANAYIOTIS C. ANDREOU, ILAN COOPER, IGNACIO GARCÍA DE OLALLA AND CHRISTODOULOS LOUCA¹

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Abstract

Employing a press-based managerial overconfidence measure, we find that abnormal returns following share repurchases, while positive, are substantially lower when managers are classified as overconfident. This holds particularly for small, young, financially constrained, non-dividend paying and distressed firms, firms with negative earnings, and those with poor past performance, all of which are more difficult to value. Corporate governance quality substantially improves the post-buyback stock performance when managers are overconfident, suggesting that governance quality is effective at curbing these managers. Overall, our results suggest that particularly when valuation is subjective and difficult, the share repurchases of overconfident managers are more likely to underperform relative to unconfident managers. Moreover, the fraction of shares sought is larger when managers are overconfident. Our results are consistent with managers' perceived undervaluation of their shares being a central motive for share repurchase announcements. These results are only compatible with the overreaction hypothesis of the buyback anomaly.

Key Words: Share repurchase, overconfidence, asymmetric information, governance

JEL classification: G14, G32, G35, D80

¹ Andreou is at the Cyprus University of Technology, Department of Commerce, Finance and Shipping, Cooper is at the Department of Financial Economics, Norwegian Business School (BI), García de Olalla López is at the Department of Accounting, Auditing and Law, Norwegian Business School (BI), Louca is at the Cyprus University of Technology, Department of Commerce, Finance and Shipping. We thank Andriy Bodnaruk, Shrikant Jategaonkar, Andreea Mitache, Charlotte Østergaard, Ibolya Schindele, Bogdan Stacescu, Danielle Zhang, Roy Zuckerman, seminar participants at the Norwegian Business School and participants at the 2015 Midwest Finance Association annual meeting for helpful comments and suggestions.

1. Introduction

The buyback anomaly is one of the most robust and difficult to explain stock market anomalies. Ikkenberry, Lakonishok and Vermaelen (1995, 2000) find positive long-term abnormal returns for a period of up to 48 months following share repurchase announcements. Several explanations have been offered for the buyback anomaly. Grullon and Michaely (2004) argue that changes in the cost of capital following repurchase announcements drive the post-buyback high returns. Another explanation is the liquidity hypothesis: when firms repurchase stock, they reduce their liquidity. If liquidity is priced (Pástor and Stambaugh, 2003), then the abnormal returns could be due to this liquidity factor, which is omitted in the empirical tests (Peyer and Vermaelen, 2009). A different explanation is suggested by Chan, Ikkenberry and Lee (2004) as well as Peyer and Vermaelen (2009) who argue that mispricing drives the anomaly. Specifically, these authors suggest that the buyback anomaly is a consequence of a correction to an overreaction to bad news. Managers try to signal the undervaluation to the market by announcing a stock repurchase. This explanation also implies that firms' managers try to time the market when they consider their stocks to be undervalued.

In this paper we test the overreaction hypothesis where managers try to signal an undervaluation to the market given by an overreaction to bad news. If this is the motivation behind stock repurchase announcements, then the market will react differently when the signals are likely to be true than when the signals are likely to be a consequence of managerial misvaluation. The other explanations for the buyback anomaly, namely changes in the cost of capital and changes in liquidity, are silent regarding the effect of managerial misvaluation on abnormal returns. To discern the credibility of the signals, we divide the announcing firms according to the degree of confidence of their CEOs, and we test whether the market reacts in the same way when facing a signal from an overconfident CEO than from an unconfident CEO. Intuitively, an overconfident CEO is likely to overvalue his own stock and the market will tend to disregard the signal. Therefore, we expect the cumulative abnormal returns following announcements by overconfident managers to be lower than the cumulative returns of firms with unconfident managers who base their announcements on more objective information.

To further test the overreaction hypothesis, we divide the announcing firms according to whether they are financially constrained or unconstrained since informational asymmetries are larger for constrained firms (Kaplan and Zingales, 1997), and therefore constrained firms

are more difficult to value for outsiders. Since managers of constrained firms know that their firms are more difficult to value for investors, their level of overconfidence is likely to influence negatively the credibility they give to the market price. Accordingly, buybacks based on managerial misvaluation due to overconfidence are more likely to occur for constrained firms than for unconstrained firms. We also divide firms into different categories regarding their difficulty to be valued following Baker and Wurgler (2006) criteria. According to these authors, young, non-dividend paying, and unprofitable firms are harder to value. In addition, we divide firms according to their six-month stock performance previous to the stock repurchase announcement, and according to their book-to-market ratios. Poor past performers experience larger positive long-run excess returns because these cumulative returns are a correction to a negative overreaction by the market (Peyer and Vermaelen, 2009). If this is the case, then overconfident managers are likely to judge the poor performance as a misvaluation by the market since they probably overvalue their own stock, while unconfident CEOs will act following a more objective valuation of their stock and will only announce a repurchase when their stock is truly undervalued. The same logic applies to high book-to-market stocks, since high book-to-market can be used as a proxy for undervaluation (Ikenberry, Lakonishok, and Vermaelen, 1995).

Moreover, we test further by classifying announcing firms according to their corporate governance quality. Well-governed firms have more control over their managements and as a consequence, overconfident managements are more constrained when trying to follow their personal appraisals to make decisions. Therefore, one expects that the cumulative abnormal returns following stock repurchase announcements are larger for well-governed firms than for weakly-governed firms under overconfident managements. Finally, we test whether firms under overconfident CEOs tend to announce a larger fraction of their stock to be repurchased. We expect this to be the case since they are likely to consider the market price more undervalued and the future economic benefits of the repurchase larger.

We apply a press-based managerial overconfidence measure as in Malmendier and Tate (2005a, 2008), Hribar and Yang (2011) and Hirshleifer, Low and Teoh (2012), and we find five main results that support the overreaction hypothesis where the observed abnormal returns are a correction for an overreaction to bad news by the market. First, firms with overconfident managers earn substantially poorer post-announcement abnormal returns than firms with unconfident managers. For example, firms with unconfident CEOs earn a 48-month cumulative

abnormal return of 27.84 percent, whereas firms with overconfident CEOs earn a 17.98 percent return. This finding suggests that at the buyback announcement time, the shares of firms with overconfident managers are less underpriced than the shares of unconfident managers. However, overconfident managers overvalue their own firms' shares, which induces them to undertake repurchase activities.

Second, using standard measures of financial constraints (size, the Whited and Wu (2006) index and the size and age measure of Hadlock and Pierce (2010)) we find that the post-buyback announcement abnormal returns of financially constrained firms are substantially higher than those of financially unconstrained firms. Intuitively, given the asymmetric information between insiders and outsiders that characterizes financially constrained firms, the signal sent by the management is more valuable for this type of firms. These results are consistent with Peyer and Vermaelen (2009) who find that small firms substantially outperform large firms following buyback announcements. We also find that the adverse effect of overconfident managers occurs largely for financially constrained firms. We do not find a statistically significant difference in post-announcement abnormal returns between repurchases announced by overconfident and unconfident managers for unconstrained firms. We argue that when valuation is relatively easy, overconfident managers are more likely to take into account the market prices than when valuation is difficult. Therefore, when valuations are difficult, overconfident managers are more likely to act based on their misvaluation giving rise to a larger difference in stock performance between them and unconfident managers. When firms are easier to value, overconfident CEOs give more credit to the information contained in the market price, and this decreases the probability of announcing stock repurchases when the market prices are correct. Therefore, the difference between the post-announcement abnormal returns of firms under overconfident managements and firms under unconfident managements decreases for firms that are easier to value. In the same line, we find that among young firms, non-dividend paying firms, negative earnings firms all of which are difficult to value, unconfident managers substantially outperform stocks of firms with overconfident managers.

Third, we find that the cumulative abnormal returns among poor past performers and high book-to-market stocks are larger for firms with unconfident managers than for firms with overconfident managers. The difference is substantially smaller for other firms. This suggests that overconfident managers in poor-performing firms are more likely to consider the bad performance as a misvaluation by the market.

Fourth, employing the managerial entrenchment index of Gompers, Ishii and Metrick (2003) as a proxy for corporate governance quality, we find that corporate governance is an important determinant of post-buyback abnormal returns. Firms with good governance (low value of the Gompers, Ishii and Metrick index) earn higher post repurchase announcement abnormal returns than firms with bad corporate governance. Moreover, good governance raises abnormal post-announcement returns for both overconfident management firms as well as for unconfident management firms. This finding suggests that corporate governance quality is effective at controlling overconfident managers, inducing them to take decisions based on more objective information, and that high quality corporate governance improves decisions taken by unconfident managers.

Our fifth finding concerns the fraction of shares to be bought back at the announcement time. We find that this fraction is substantially higher when managers are overconfident. This finding is consistent with the conjecture that overconfident managers view their stocks as being undervalued by the market.

Our paper contributes to the literature in several aspects. First, it expands our understanding of the buyback anomaly: while a number of potential explanations for the anomaly are suggested in the literature (the change in cost of capital explanation (Grullon and Michaely, 2004), the liquidity hypothesis based on the pricing of liquidity (Peyer and Vermaelen, 2009), and the overreaction hypothesis (Chan, Ikkenberry and Lee, 2004; Peyer and Vermaelen, 2009)), our finding that the cumulative returns of announcing firms under overconfident managers underperform is only consistent with one of these explanations, specifically with the overreaction hypothesis. Overconfident managers tend to overvalue their firms and engage into repurchase activities even when their stocks are not underpriced. The market interprets the signal as driven by mere overconfidence and on average abnormal returns after announcements by overconfident managers are lower than for unconfident managers. Unconfident managers, however, only announce a repurchase based on more objective assessments of the misvaluations. The market reacts accordingly to the signal and the average abnormal returns are higher. Therefore, our results support Chan, Ikkenberry and Lee (2004) and Peyer and Vermaelen (2009) explanation of mispricing driving the anomaly.

Second, we extend the growing literature about the way managerial overconfidence influences firms' decisions. For example, using the degree of under-diversification of managers' portfolios as a measure for managerial overconfidence, Malmendier and Tate (2005b) show that firms with managers that are classified as overconfident exhibit high investment-cash flow sensitivity. In addition, overconfident managers have been found to engage intensively in unsuccessful mergers and acquisitions (Malmendier and Tate, 2008), and avoid tapping the capital markets (Malmendier, Tate, and Yan, 2011). Ben-Rephael, Oded, and Wohl (2014) find that firms repurchase at prices which are significantly lower than average market prices. Using a direct measure of CFO overconfidence, Ben-David, Graham and Harvey (2013) find that when CFOs are classified as overconfident, firms invest more, have higher financial leverage, pay out fewer dividends, use more long-term debt than short-term debt and engage in market timing activity. We expand this literature by showing that the degree of overconfidence of the CEO is positively related to the fraction of shares sought to be bought back in stock repurchase announcements, and negatively related to the long-term cumulative abnormal returns after the announcements. Moreover, our finding that the effect of managerial overconfidence on the post-buyback abnormal returns is substantially stronger for financially constrained firms, small firms, non-dividend paying firms, young firms, and firms with negative earnings, all of which are difficult to value, suggests that overconfident managers in these firms often misvalue their own firms. Overconfident managers in such firms know that outsiders have more difficulty to appraise the true value of these firms, and tend to disregard the information given by the market price. These managers tend to use the personal appraisals of their own firms, and are more likely to infer that the market price is too low. Unconfident managers, on the other hand, use every piece of information available in order to assess the value of their firms' stocks, and only announce stock repurchases when they are almost certain that their stocks are truly underpriced. Therefore, we find a large difference between the cumulative abnormal returns after stock repurchases announced by firms under overconfident and unconfident managements when firms are difficult to value. If firms are easier to value, overconfident managers are likely to consider the market price as more informative and this reduces the likelihood of overvaluation. Therefore, the difference between the abnormal returns after stock repurchase announcements by overconfident and unconfident managers is largely diminished for firms that are easier to value. For example, analyst coverage of small firms is substantially lower than that of large firms, making valuation mistakes by investors more likely. While the post-buyback abnormal returns of small stocks with overconfident managers is positive (implying that investors sometimes underprice these stocks), it is substantially lower than the post-buyback abnormal

returns of small firms with unconfident managers, implying that overconfident managers often overvalue their stocks. This conclusion is further supported by our finding that the effect of overconfidence is stronger for firms with poor past performance and high book-to-market firms. These firms are more likely to be considered as undervalued by their managements when these are overconfident even in the case that the market is correct, whereas unconfident managements tend to be more objective about the undervaluation, and announce repurchases when they are more certain that their firms' stocks are indeed undervalued.

Third, we expand the corporate governance literature by showing that firms with good governance earn higher post-announcement returns, and that the abnormal return is higher for both overconfident and unconfident managers. This suggests that either well-governed firms are not trying to time the market to the extent that poorly governed firms are, or that timing the market is being made with more caution and based on higher quality information when it is being made. The managers of well-governed firms might be curbed by the lack of entrenchment. In addition, good governance might also protect shareholders from the effects of quiet life seeking managers (see Bertrand and Mulainathan, 2003).

One of the most important reasons for repurchasing stock given in the literature is that it is a way of distributing free cash flow in case of lack of good investment opportunities, and therefore a tool to diminish the agency costs of free cash-flow as argued by Jensen (1986). Stephens and Weisnach (1998) find a positive correlation between repurchases and the level of cash flows, consistent with this explanation. Another possible reason for a stock repurchase can be a restructuring of the capital structure of the firm. This is especially so in the case of the repurchase being largely funded through debt. Bagwell and Shoven (1988) and Opler and Titman (1996) discuss and show the impact that repurchasing stock has on leverage. The results of these papers indicate that firms may repurchase stocks to increase their leverage ratio. Bagwell (1991) explains how firms use repurchases to fend off unwanted takeover attempts and Jolls (1996) and Fenn and Liang (1997) illustrate that firms use repurchases to counter the dilution effects of employee and management stock options. A third possible reason for share buybacks is that a stock repurchase is a tool to transfer wealth from debtholders to stockholders since the amount of wealth remaining in the firm is reduced and therefore, debtholders are more damaged in case of liquidation (Dhillon and Johnson, 1994; Maxwell and Stephens, 2003). Finally, a reason for repurchasing stock might be to exploit information asymmetries between insiders and outsiders. Vermaelen (1981, 1984) studies repurchases and argues that

management uses its inside informational advantage to buy back the shares of their own firms when they consider these to be undervalued. This signals the mispricing to the market and, after the repurchase announcement, the market takes corrective action pushing the stock price upwards. Dittmar (2000) finds that the dominant motivation for share repurchases is to take advantage of potential undervaluation. Brav et al. (2005) conduct a survey among a large number of financial executives. The executives surveyed say that they accelerate (or initiate) share repurchases when the company's stock price is low by recent historical standards. The most popular response for all repurchase questions on the survey is that firms repurchase when their stock is a good value, relative to its true value. This is consistent with the informational asymmetry explanation given by Vermalen (1981, 1984). Our paper relates to Vermalen's signaling hypothesis since we use the informational content of the signal sent by the management when announcing stock repurchases. Overconfident managers send a less credible signal and the market does not react in the same way as it reacts after a more credible signal sent by unconfident managers.

The rest of the paper is organized as follows. Section 4.2 describes the data. Section 4.3 details our empirical methodology. The results are presented in Section 4.4 and Section 4.5 concludes.

2. Data and variable construction

We use several data sources in our study. We obtain our sample of common stock repurchases from the Securities Data Company (SDC) US mergers and acquisitions and repurchase database. Our sample period covers the period 1992 through 2009 (the period for which we have managerial overconfidence data) and includes 16,133 repurchase announcements. For stock returns we use the Center for Research in Security Prices (CRSP) database. We require a firm to have 36 months of data previous to the announcement before being included in the sample. Accounting information is from Compustat. The data for the Fama and French three factors and momentum are obtained from Kenneth French's website.

Following Malmendier and Tate (2005a, 2008), Hribar and Yang (2011) and Hirshleifer, Low and Teoh (2012) we use a press-based measure of CEO overconfidence. As Hirshleifer, Low and Theo (2012) we search Factiva for articles referring to the CEO in The New York Times, BusinessWeek, Financial Times, The Wall Street Journal, The Economist, Fortune, and Forbes. We identify all articles using the available unique company code in Factiva and the search keyword “CEO.” For each CEO and year, we record (1) the total number of articles, (2) the number of articles containing the words “confident,” “confidence,” or variants such as overconfidence and overconfident, (3) the number of articles containing the words “optimistic,” “optimism,” or variants such as overoptimistic and overoptimism, (4) the number of articles using “pessimistic,” “pessimism,” or variants such as overpessimistic, and (5) the number of articles using “reliable,” “steady,” “practical,” “conservative,” “frugal,” “cautious,” or “gloomy.” Category 5 also contains articles in which “confident” and “optimistic” are negated. The sample is divided into two groups: firms with overconfident managers and firms with unconfident managers. For every year, a CEO is classified as overconfident if the number of articles using the confident terms is larger than the number of articles using the pessimistic terms. A CEO is classified as unconfident if the number of articles including pessimistic terms surpasses the number of articles including the optimistic terms. Note that from all the firms that announce a repurchase, we only have information about the degree of confidence of those CEOs that are referred to in articles available in Factiva. Therefore, we can only divide the sample between overconfident CEOs and unconfident CEOs. We cannot say anything about non-overconfident CEOs since this group would include all CEOs for which there is not a match in Factiva and therefore, it would content overconfident managers that were simply not named. We avoid using the option-based measure for managerial overconfidence (Malmendier and Tate, 2005b) because managers know that share prices on average rise following a buyback announcement. Therefore they might refrain from exercising their options prior to the buyback announcement not due to their overconfidence but due to their wish to exercise them at a higher price. This is true even if the vested options are in the money.

We use four different measures of financial constraints commonly employed in recent literature (for example Lamont et al. (2001), Li (2011), Chen and Wang (2012) among others), namely the Whited and Wu (2006) WW index, the Hadlock and Pierce (2010) size and age SA measure, the Kaplan and Zingales (1997) KZ index, and firm size where size is measured as the

market value of common equity.² Firms with higher WW index, higher SA index, higher KZ index, and smaller firms are more financially constrained.

We calculate the book-to-market ratio as the book value of assets divided by the market value of assets, where the market value of assets is calculated as the book value of assets minus the book value of common equity plus the market value of common equity.

We employ the Gompers, Ishii and Metrick (2003) corporate governance quality index to divide the firms between strong governance and weak governance. This index classifies firms according to the number of provisions that restrict shareholder rights and therefore increases the degree to which management can resist shareholder activism. A high value of this index means less shareholder rights and therefore more managerial power.

Table 1 reports descriptive statistics for firms that announce stock repurchases, and Table 2 presents descriptive statistics for non-announcing firms. Announcing firms tend to be more constrained than non-announcing firms by every one of our constraint measures. This does not support the explanation of firms repurchasing stock to distribute free cash flow to reduce their agency costs. Moreover, announcing firms tend to have higher book-to-market ratios, indicating that these firms are likely to be undervalued and that the management uses the repurchase announcement as a means of signaling the misvaluation to the market.

²The WW index is calculated as follows:

$$WW = -0.091(CF/TA) - 0.062DIV + 0.021TLTD - 0.044LNTA + 0.102ISG - 0.035SG$$

where CF/TA is cash flow over lagged book assets, DIV is a dummy variable taking the value one if the firm pays cash dividends and zero otherwise, $TLTD$ is the ratio of long-term debt to total assets, $LNTA$ is the natural log of total assets, ISG is the firm's three-digit industry sales growth, and SG is the firm's sales growth.

The Hadlock and Pierce (2010) SA index is calculated as:

$$SA = -0.737SIZE + 0.043SIZE^2 - 0.040AGE$$

where $SIZE$ is the log of book assets, and AGE is the number of years a firm has been on Compustat with non-missing stock price information.

The Kaplan and Zingales (1997) KZ index as:

$$KZ = -1.002(CF/TA) - 39.368(DIV/TA) - 1.315(CA/TA) + 3.139LEV + 0.283Q$$

where CF/TA is cash flow over lagged book assets, DIV/TA is cash dividends over lagged book assets, CA/TA is cash balances over lagged book assets, LEV is total debt over book assets, and Q is the ratio of the market-to-book value of the assets.

3. Methodology

To investigate whether firms have long-run abnormal returns after the announcement of open market repurchases, we follow Peyer and Vermaelen (2009) and use the Fama-French (1993) three-factor model with momentum as an additional factor combined with Ibbotson's RATS methodology to calculate the abnormal returns. In this methodology, security excess returns are regressed on the four factors for each month in event time, and the estimated intercept represents the monthly average abnormal return for each event month. We consider long-run abnormal returns between 1 month and 48 months j after the announcement of the open market repurchase program.

The sample is then divided into two groups, one having overconfident CEOs, and another with unconfident CEOs. The following cross-sectional regression is run each event month j ($j=0$ is the event month in which the open market repurchase is announced, $j=1$ to $j=48$ are the first month to the 48th month after announcement) for each sample:

$$R_{i,t} - R_{f,t} = a_j + b_j(R_{m,t} - R_{f,t}) + c_jSMB_t + d_jHML_t + e_jMOM_t + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the monthly return on security i in the calendar month t corresponding to event month j . $R_{f,t}$, $R_{m,t}$, SMB_t , HML_t , and MOM_t are the risk-free rate, the return on the equally weighted CRSP index, and the monthly returns on the size, book-to market and momentum factors in the calendar month t corresponding to event month j , respectively. The coefficient a_j is the result of a monthly cross-sectional regression. We get 12, 24, 36 and 48 of these a_j depending on the length of the horizon we are exploring. Then, the cumulative abnormal returns (CARs) for the 1, 2, 3 and 4 years holdings are calculated as the sum of the a_j over the relevant period of time. The standard error for a given event window is the square root of the sum of squares of the monthly standard errors.

To clarify, let us suppose that we have one repurchasing event in December, January and February for firms i_1 , i_2 and i_3 respectively. Then, for firm i_1 , event month 1 (i.e. $j=1$) is

January; for firm i_2 , event month 1 is February; and for firm i_3 , event month 1 is March. Then the cross-sectional regression for event month $j=1$ would have 3 observations for which:

$$\begin{aligned}
 R_{i_1,Jan} - R_{f,Jan} &= a_1 + b_1(R_{m,Jan} - R_{f,Jan}) + c_1SMB_{Jan} + d_1HML_{Jan} + e_1MOM_{Jan} + \varepsilon_{i_1,Jan} \\
 R_{i_2,Feb} - R_{f,Feb} &= a_1 + b_1(R_{m,Feb} - R_{f,Feb}) + c_1SMB_{Feb} + d_1HML_{Feb} + e_1MOM_{Feb} + \varepsilon_{i_2,Feb} \\
 R_{i_3,Mar} - R_{f,Mar} &= a_1 + b_1(R_{m,Mar} - R_{f,Mar}) + c_1SMB_{Mar} + d_1HML_{Mar} + e_1MOM_{Mar} + \varepsilon_{i_3,Mar}
 \end{aligned}$$

This would cover the estimation of the abnormal return for the first month after the announcement. Now, to calculate the abnormal return at event month 2, $j=2$, (i.e., two months after announcement) each firm moves one month into the future. So, for firm i_1 , event month 2 is February; for firm i_2 , event month 2 is March; and for firm i_3 , event month 2 is April. Again we would have 3 observations and the equations would be:

$$\begin{aligned}
 R_{i_1,Feb} - R_{f,Feb} &= a_2 + b_2(R_{m,Feb} - R_{f,Feb}) + c_2SMB_{Feb} + d_2HML_{Feb} + e_2MOM_{Feb} + \varepsilon_{i_1,Feb} \\
 R_{i_2,Mar} - R_{f,Mar} &= a_2 + b_2(R_{m,Mar} - R_{f,Mar}) + c_2SMB_{Mar} + d_2HML_{Mar} + e_2MOM_{Mar} + \varepsilon_{i_2,Mar} \\
 R_{i_3,Apr} - R_{f,Apr} &= a_2 + b_2(R_{m,Apr} - R_{f,Apr}) + c_2SMB_{Apr} + d_2HML_{Apr} + e_2MOM_{Apr} + \varepsilon_{i_3,Apr}
 \end{aligned}$$

Finally, event month 3 ($j=3$) for firm i_1 is March. Event month 3 for firm i_2 is April, and event month 3 for firm i_3 is May. The equations would be:

$$\begin{aligned}
 R_{i_1,Mar} - R_{f,Mar} &= a_3 + b_3(R_{m,Mar} - R_{f,Mar}) + c_3SMB_{Mar} + d_3HML_{Mar} + e_3MOM_{Mar} + \varepsilon_{i_1,Mar} \\
 R_{i_2,Apr} - R_{f,Apr} &= a_3 + b_3(R_{m,Apr} - R_{f,Apr}) + c_3SMB_{Apr} + d_3HML_{Apr} + e_3MOM_{Apr} + \varepsilon_{i_2,Apr} \\
 R_{i_3,May} - R_{f,May} &= a_3 + b_3(R_{m,May} - R_{f,May}) + c_3SMB_{May} + d_3HML_{May} + e_3MOM_{May} + \varepsilon_{i_3,May}
 \end{aligned}$$

Then the cumulative abnormal return for a buy-hold strategy from the first day of the 1st month until the last day of the third month would be given by $a_1 + a_2 + a_3$.

Since the effect of overconfidence on the abnormal returns following buyback announcements should vary with the informational asymmetries and the level of difficulty associated with the valuation of the stocks, we divide the firms into groups on the basis of firm characteristics that proxy for the extent of asymmetric information. Then, within each group we further classify firms according to the level of managerial overconfidence at the time of the repurchase announcement, using our press-based measure of CEO overconfidence. First, we divide the sample by using our four measures of financial constraints, the WW index, firm size, the SA index, and the KZ index. We classify a firm as being financially constrained if it belongs to the top 25 percentile of the WW index, to the lowest 25 percentile according to size, to the top 25 percentile of the SA index, or top 25 percentile in the KZ index in the year previous to the announcement. A firm is classified as unconstrained if it belongs to any other percentile with the exception of when using size as a constraint measure, in which case a firm is classified as unconstrained if it belongs to the top 25 percentile.

Second, we divide firms according to age, their dividend payment status, and whether the firms are profitable. Baker and Wurgler (2006) suggest that young firms are more difficult to value.³ A firm is classified as young if it appears at CRSP less than 72 months previous to the announcement and as an old firm if it appears more than 241 months previous to the announcement. Baker and Wurgler also posit that non-dividend-paying firms and unprofitable firms are more difficult to value being more exposed to fluctuations in investors' sentiment. We therefore divide our sample according to these two criteria. A firm is classified as a payer if it pays dividends in the year previous to the repurchase announcement, and as a non-payer if it does not pay dividends. A firm is classified as profitable if it has positive earnings in the year previous to the announcement, and as non-profitable if it reports zero or negative earnings, where earnings are defined as income before extraordinary items plus depreciation and amortization.

Third, following Peyer and Vermaelen (2009), we identify announcing firms that are likely to be undervalued by the market.⁴ We separate the firms according to their six-month

³ Young firms are followed by fewer specialists, and therefore they are more unknown to the different agents in the economy. This implies that they are more difficult to value for investors.

⁴ Peyer and Vermaelen (2009) show that stocks experience larger positive long-run excess returns if the repurchase follows a severe stock-price decline in the previous 6 months to the announcement. This finding strongly supports the overreaction hypothesis. They argue that the long-term excess returns are a correction of an overreaction to bad news prior to the announcement. If this is the case, then distinguishing between good and bad previous performers is an ideal setting for our confidence indicator.

stock performance previous to the repurchase announcement. Overconfident managers are more likely to consider their stock as undervalued following a large price decline in the stock of their firms, whereas unconfident managers are likely to be more objective about the undervaluation. In the case of good previous performance, we expect to see the effect of confidence substantially diminished. A firm is classified as a good performer if its cumulative return for the 6 months before the announcement lies above the 75 percentile of the cumulative returns of all firms that announce a stock repurchase. A firm is classified as a poor performer if its cumulative return lies below the 25 percentile. We also divide the announcing firms according to their book-to-market ratios as in Ikenberry, Lakonishok, and Vermaelen (1995). These authors argue that value stocks (high book-to-market ratio) are more likely to be undervalued. A firm is classified as high book-to-market if in the year previous to the announcement, it lies above the 75 percentile of all the firms that announce a repurchase. A firm is classified as low book-to-market if it lies below the 25 percentile.

Last, we follow the governance index by Gompers, Ishii and Metrick (2003) to classify firms according to corporate governance quality. Gompers, Ishii and Metrick find that firms with stronger shareholder rights have higher profits, higher growth of sales, higher firm value, lower capital expenditures and make fewer corporate acquisitions. They argue that higher capital expenditures and acquisition activity indicate that firms with weaker shareholder rights tend to have higher agency costs. If this is the case, a CEO in such a firm, will be freer to take initiatives and therefore, will be more likely to use his/her personal appraisals to make decisions. A firm is classified as having strong shareholder rights if in the year of announcement (or if not available, in the closest previous year when the index is available), the firm has a Gompers index lower than 8 (25 percentile of all the announcing firms). A firm is classified as having weak shareholder rights if it has an index above 10 (75 percentile).

We finally test whether overconfident managers also announce a larger fraction of shares to be repurchased, by running the following cross-sectional regression:

$$\begin{aligned}
 Fraction_i = & \beta_0 + \beta_1 Confidence_i + \beta_2 EqSize_i + \beta_3 BM_i + \beta_4 PriorRet_i + \beta_5 Profitability_i \\
 & + \beta_6 (DIV / BE)_i + \varepsilon_i
 \end{aligned} \tag{2}$$

where $Fraction_i$ is the fraction of the issued stock announced to be repurchased in event i , $Confidence_i$ is our overconfidence indicator calculated as in Hirshleifer, Low and Theo (2012)

for the CEO of the firm related to event i , $EqSize_i$ is the market value of common equity of the announcing firm in the year previous to the announcement, BM_i is the ratio of the book value of equity to the market value of equity in the year previous to the announcement, $PriorRet_i$ is the 6-month cumulative stock return for the six months preceding the announcement of event i , $Profitability_i$ is the ratio of income before extraordinary items plus depreciation and amortization to shareholders equity plus balance sheet deferred taxes in the previous year to the announcement of i , and DIV/BE_i is the ratio of total dividends to book equity defined as the shareholders equity plus balance sheet deferred taxes in the year preceding the announcement. We estimate this equation using OLS with clustered at the firm level standard errors. We expect to find a significant and positive coefficient for the variable *Confidence*, implying that overconfident managers announce larger repurchase fractions, consistent with our argument of overconfident managers viewing their stocks as underpriced by the market.

4. Results

We start the presentation of our results by showing the overall effect of overconfidence in the cumulative abnormal returns following repurchase announcements. Table 3. reports the abnormal returns for all the firms that announce a repurchase and then for those that we classify as having overconfident CEOs and unconfident CEOs using our press-based overconfidence indicator. Panel A shows the results including momentum as an additional factor, while Panel B reports the results using only the Fama and French (1993) factors as in Payer and Vermaelen (2009). We can see that regardless of the factors, the repurchase anomaly is still persistent up to 2009. The average abnormal return after 48 months following an announcement is 25.27 percent when estimated with 4 factors, and 17.06 percent when estimated using 3 factors. We also observe that unconfident CEOs earn higher returns than overconfident CEOs the difference being statistically significant after 36 months. For example, the average cumulative abnormal return after 48 months following a repurchase announcement is about 10 percent larger if the announcement is made by a firm with an unconfident CEO than if made by a firm with an overconfident CEO. Note also that the amount of total announcements given by overconfident CEOs is larger (1090) than the amount of repurchases proposed by unconfident CEOs (822). These results suggest that while at the time of announcement the stocks of the announcing firms tend to be undervalued, the stocks of firms with overconfident managers tend to be less so:

overconfident CEOs exaggerate the level of underpricing of their firms' stocks. The larger number of announcements by overconfident CEOs also confirms this conclusion.

4.1 Announcing firms classified according to their financial constraints

Table 4 presents the abnormal returns following repurchase announcements classifying the announcing firms on the basis of financial constraints following the four measures of financial constraints, namely the WW index (Panel A), size (Panel B), the SA measure (Panel C) and the KZ index (Panel D). The results are strikingly similar for the first three measures. The abnormal returns of financially constrained firms are significantly larger for every period. The numbers are also very similar regardless of the measure used. For example, the 48-month abnormal returns for constrained firms are 50.55, 45.95 and 45.09 percent in Panels A, B and C respectively, and 18.10, 17.15, and 19.16 percent for unconstrained firms. These results can be understood from an asymmetric information perspective. The value of information from insiders to outsiders is likely to be higher for constrained firms because in constrained firms the asymmetries between insiders and outsiders are larger. Moreover, since financially unconstrained firms have less informational asymmetries, they are easier to value and their market values tend to be closer to their real values than in the case of constrained firms. The results are also consistent with Peyer and Vermaelen (2009) who also report higher abnormal returns for announcements made by small firms. The results are different in Panel D where the differences between constrained and unconstrained firms are not statistically significant. This result is in line with Hadlock and Pierce (2010) concerns that the KZ index might not be the best measurement of financial constraints.

Table 5 divides the constrained and unconstrained firms of Table 4 according to the level of confidence of the CEO of the announcing firm. For every measure of constraints we find that constrained firms with overconfident managers have significantly lower abnormal returns for long horizons (36 and 48 months) than firms with unconfident managers. Moreover, for unconstrained firms there is not a statistically significant difference between the abnormal returns for overconfident and unconfident CEOs. These results are consistent with overconfident managers overpricing their own stocks. Financially constrained firms, where informational asymmetries are large, are more difficult to value for outsiders. Overconfident managers, who are aware of this fact, tend to disregard the information given by the market price and value their firm's stock by their personal overconfident appraisals. This implies that

a number of stock repurchases announced by overconfident CEOs is based on an overvaluation of their firms' stocks and the average abnormal returns tend to be lower than for unconfident CEOs. Unconfident CEOs, base their announcements on more objective valuations of their firms which also includes a careful consideration of the market price. Therefore, these unconfident managers tend to announce stock repurchases when their firms' stocks are truly undervalued. In the case of financially unconstrained companies, information asymmetries are smaller and overconfident managers regard the market's valuations of their firms. This reduces the differences in abnormal returns between announcements by overconfident and unconfident managers, since now both valuations tend to approach to the real value, which at the same time is closer to the market price as previously argued for Table 4.

4.2 Announcing firms classified according to age, dividend payment status and profitability

Table 6 studies the effect of overconfidence for both old firms and young firms. For old firms the 48-month abnormal return for overconfident firms is not statistically different from zero, while for unconfident firms the 48 month return is 14.43 percent significant at the 5 percent level. For young firms, the 48-month abnormal return for announcing firms with overconfident CEOs is 19.46 percent while for firms with unconfident CEOs the 48-month return is 45.35 percent both significant at the 5 percent level.

The abnormal returns classifying the announcing firms among dividend payers and non-payers and the level of confidence of their CEOs are presented in Table 7. Announcing firms that do not pay dividends have higher abnormal returns than dividend paying firms. Moreover, although for both groups unconfident CEOs achieve superior returns than overconfident CEOs, the difference is larger for firms that do not pay dividends. The 48-month return for non-dividend-paying announcing firms is 37.00 percent when their CEOs are overconfident and 54.72 percent under unconfident CEOs, while for dividend-paying firms the 48-month abnormal returns are 10.45 percent and 18.89 percent for overconfident and unconfident CEOs respectively.

Finally, Table 8 shows the results of classifying the announcing firms into firms that report positive earnings previous announcement and firms that report zero or negative earnings. Although the results for firms with zero or negative earnings are not statistically significant

because of lack of observations, the 48-month abnormal return for firms with unconfident managements is 36.94 percent whereas when managers are overconfident the average abnormal cumulative return is 5.43 percent. The results of Tables 6, 7, and 8 show that when firms are more difficult to value, i.e., young firms, firms that do not distribute dividends, and firms with negative or zero earnings, the stocks of firms with unconfident managers outperform the stocks of firms with overconfident managers, the difference being larger than for other firms. This is again consistent with the explanation of overconfident managers tending to overprice their stocks by a larger amount than unconfident managers, and the difference being larger when valuation is more difficult.

4.3 Announcing firms classified by previous stock return performance and book-to-market

Table 9 reports the results of sorting the announcing firms according to their 6-month stock performance previous to the stock repurchase announcements. We find that when the previous stock performance is good, there is not a statistically significant difference between announcements made by overconfident or unconfident managers. However, for poor previous performers the abnormal returns for overconfident and unconfident managers is 22.83 percent and 48.22 percent respectively, the difference being significant at the 1 percent level. Table 10 classifies the announcing firms according to their book-to-market ratios. While we do not find a significant difference in the cumulative abnormal returns for low book-to-market firms, we find a significant difference for firms with high book-to-market, being the 48-month abnormal return for announcing firms with overconfident CEOs 5.98 percent, and with unconfident CEOs 28.86 percent. These results are consistent with Peyer and Vermalen (2009) argument that the long-term excess returns are a correction of an overreaction to bad news by the market previous to the announcement. Overconfident CEOs of firms that have seen their stock prices fall in the previous six months to the announcements or overconfident CEOs of firms with high book-to-market ratios, are more likely to wrongly consider their stocks to be underpriced and therefore announce a repurchase when in fact the market is correct. Unconfident CEOs, however, are more objective in their judgements of the undervaluation, and only announce when in fact their stocks are truly underpriced.

4.4 Announcing firms divided according to governance quality

The abnormal returns after repurchase announcements when the announcing firms are classified according to their governance quality as measured by the Gompers, Ishii and Metrick governance index are presented in Table 11. Firms classified as having strong governance (index below 8) obtain significantly larger abnormal returns than firms classified as having weak governance (index above 10) for every time period. For example, the 48-month abnormal return of strongly governed announcing firms is 30.61 percent while for weakly governed announcing firms is 19.01 percent.

Table 12 divides the strong and weak governance groups further according to the level of confidence of the CEOs. Repurchases announced by overconfident managers obtain significantly lower abnormal returns than if announced by unconfident managers, regardless of whether firms are classified as having strong governance or weak governance. However, firms with strong governance have higher abnormal returns than firms with weak governance independently of whether their CEOs are overconfident or unconfident. For example, for announcing firms with strong governance, overconfident managers have a 48-month abnormal return of 34.35 percent while the abnormal return of weakly governed announcing firms with unconfident managers is 26.29 percent. These results show that corporate governance quality has an important influence in the post-buyback anomaly. Managers of well-governed firms seem to announce repurchases when they are more certain of their stock undervaluation. The market receives the signal and correctly adjusts to the new information arrival with the passage of time. Overconfident managers obtain lower abnormal returns than unconfident managers regardless of the governance strength. However, when governance is strong, both overconfident and unconfident managers obtain higher abnormal returns than when governance is weak. This again suggests that well-governed firms announce repurchases based on higher quality of information.

4.5 Overconfidence and the intended buyback fraction

Finally, Table 13 shows the results of a cross-sectional regression where the dependent variable is the intended buyback fraction reported by the firms in the moment of the repurchase announcement. Intuitively, one would expect that when the management of a firm is overconfident it will be less cautious about the fraction being repurchased since it is likely to price its stock higher than an unconfident management. The coefficient of the variable

Confidence is statistically significant at the 5 percent level and positive for every one of the six specifications. For example, using the estimated coefficient of Model 6, a firm with an overconfident CEO would announce a 1.32 percent larger buyback fraction than an unconfident CEO. This result is consistent with overconfident managers considering their stocks to be more underpriced and accordingly announcing larger fractions to be repurchased.

5. Conclusion

In this paper we provide empirical evidence consistent with Chan, Ikenberry and Lee (2004) and Peyer and Vermaelen (2009) that the buyback anomaly is being driven by mispricing. This hypothesis suggests that the managements of announcing firms perceive their stocks to be undervalued by the market and announce a stock repurchase in order to signal the misvaluation. If this is the case, then signals sent by an overconfident manager will be less credible to the market, and we would expect to see lower cumulative abnormal returns after the announcement. If the announcement is, however, made by an unconfident manager, then the market will be more likely to believe the signal since it will probably contain more objective information, and we should see higher abnormal returns. Using a press-based measure for managerial overconfidence, we provide evidence that while positive, the post-buyback announcements abnormal returns are substantially lower when managers are classified as overconfident.

To further explore this finding, we divide the announcing firms according to various criteria that classify the firms by their difficulty to be valued and the likelihood of being underpriced. The underperformance of firms with overconfident managers is particularly strong for financially constrained, young, small, high book-to-market, non-dividend paying, and non-profitable firms all of which are difficult to value. Intuitively, when firms are difficult to value, pricing mistakes by investors are more likely to occur. Managers have superior information relative to investors and therefore the signal sent when managers announce a buyback intention is strong, entailing a high post-buyback abnormal return for these firms. However, overconfident managers might overvalue their stocks. Managers are aware of the difficulties investors have to value these stocks and in case they are overconfident they are likely to disregard the information given by the market price. However, when managers are unconfident, they are more cautious and carefully consider each piece of information available in their

decision processes, including the market price. On the other hand, when firms are easier to value, overconfident managers know that the market price is based on better quality of information, and are less likely to disregard the market price. As a consequence, the difference in abnormal returns between repurchases announced by overconfident and unconfident managements is substantially diminished for firms that are easy to value. In addition, we also find that the difference in cumulative abnormal returns following repurchase announcements made by overconfident and unconfident managements is larger for those firms whose stock has performed poorly in the 6 months previous to the announcement, and for those that have high book-to-market ratios. This suggests that overconfident CEOs tend to overvalue their own shares when they have been performing poorly and that the market does not believe the signal. On the other hand, unconfident CEOs tend to announce when they are more certain about the undervaluation of their own stock and the market rectifies its price with time.

We also find that corporate governance quality increases the abnormal returns after announcements made by both, overconfident and unconfident CEOs, as measured by the Gompers, Ishii and Metrick (2003) index of anti-takeover provisions. Moreover, while the CARs of overconfident CEOs are not statistically different from zero when governance is weak, it is significantly large and positive when governance is strong. These results suggest that the repurchase announcements made by strongly governed firms tend to be based on better quality of information, and that strong governance, helps in curbing the buyback activity of overconfident managers.

Finally, consistently with overconfident managers overpricing the stock of their firms, we find that the intended buyback fraction at announcement is larger for overconfident managers than for unconfident managers.

This paper, therefore, provides strong empirical evidence about the overreaction hypothesis driving the buyback anomaly. Moreover, we show that overconfident managers tend to overprice the stock of their firms and engage in repurchase activities that are not in the best benefit of the firm. Strong governance, can, however, help to control this behavior.

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Table 1: Descriptive statistics for announcing firms

This table reports descriptive statistics of our sample of firms that announced stock repurchases from 1992 to 2009. Fraction sought is the initial announced repurchase ratio authorized by the board of directors. Prior 6-month return is the cumulative return of the company in the previous 6 months to the repurchase announcement. WW is the Whited and Wu (2006) index of financial constraints. Size is the market value of common equity. SA is the Hadlock and Pierce (2010) index of financial constraints. KZ is the Kaplan and Zingales (1997) index of financial constraints. BM is the ratio of the book value of equity to the market value of equity. Gompers index is the Gompers, Ishii and Metrick (2003) index based on 24 shareholder rules that proxy for the level of shareholder rights.

Calendar year	Number of Events	Fraction sought	Prior 6-month raw returns	Average WW	Average size	Average SA	Average KZ	Average BM	Gompers index
1992	577	8.08	-1.97%	-0.27	1673.78	-1102.57	0.30	0.65	9.02
1993	579	7.27	-1.39%	-0.29	1823.38	-1042.57	0.21	0.62	9.56
1994	984	7.17	-1.71%	-0.28	1621.37	-1065.3	0.31	0.72	9.83
1995	1091	6.93	-2.53%	-0.28	2160.22	-1053.36	0.37	0.66	9.3
1996	1447	7.26	-2.55%	-0.3	2992.24	-1104.28	0.43	0.62	9.33
1997	1265	8.00	-2.46%	-0.29	3701.25	-996.54	0.56	0.50	9.33
1998	1920	8.29	-2.56%	-0.29	2807.39	-865.24	0.63	0.67	8.74
1999	1500	8.54	-2.25%	-0.28	2584.81	-953.37	0.67	0.84	8.88
2000	792	8.95	-2.69%	-0.31	5064.06	-1184.3	0.61	0.88	9.08
2001	653	8.42	-2.39%	-0.28	6200.57	-1107.09	0.63	0.66	8.84
2002	465	10.36	-0.97%	-0.29	5649.52	-1130.77	0.48	0.73	8.78
2003	487	9.18	-0.47%	-0.32	5862.11	-1219.35	0.58	0.48	9.25
2004	566	8.09	-0.41%	-0.35	8970.73	-1322.31	0.48	0.43	8.83
2005	638	8.59	-1.13%	-0.36	7682.01	-1547.49	0.57	0.49	9.42
2006	632	8.57	-2.11%	-0.35	10001.6	-1495.28	0.47	0.46	8.97
2007	982	8.94	-2.43%	-0.36	8885.74	-1481.9	0.48	0.61	9.21
2008	1106	9.21	-1.46%	-0.32	2975.46	-1059.96	0.3	1.03	8.81
2009	449	9.61	-0.20%	-0.33	5783.07	-1194.44	0.39	0.71	8.59
All years	16133	8.14	-1.99%	-0.31	4261.52	-1117.88	0.48	0.67	9.07

Table 2: Descriptive statistics for non-announcing firms

This table reports descriptive statistics of firms that did not announce a stock repurchase from 1992 to 2009. WW is the Whited and Wu (2006) index of financial constraints. Size is the market value of common equity. SA is the Hadlock and Pierce (2010) index of financial constraints. KZ is the Kaplan and Zingales (1997) index of financial constraints. BM is the ratio of the book value of equity to the market value of equity. Gompers index is the Gompers, Ishii and Metrick (2003) index based on 24 shareholder rules that proxy for the level of shareholder rights.

Calendar year	Number of firms	Average WW	Average size	Average SA	Average KZ	Average BM	Gompers Index
1992	1067	-0.16	293.83	-743.56	1.09	0.47	7.71
1993	1354	-0.20	304.5	-529.62	1.06	0.49	9.83
1994	1235	-0.19	428.28	-447.52	0.9	0.57	10.28
1995	1084	-0.19	537.5	-405.05	1.07	0.44	9.47
1996	1455	-0.22	569.39	-351.86	0.88	0.43	9.35
1997	1212	-0.23	857.45	-470.69	1.16	0.42	8.88
1998	947	-0.23	1098.89	-597.89	1.15	0.60	8.54
1999	1235	-0.21	2868.62	-565.74	1.31	0.43	8.77
2000	1103	-0.22	2405.51	-557.18	0.90	0.76	8.87
2001	512	-0.27	3550.54	-977.22	0.87	0.69	8.46
2002	491	-0.26	2206.54	-1064.75	0.83	0.70	9.05
2003	449	-0.29	2561.04	-1232.11	0.33	0.46	9.87
2004	576	-0.28	2032.43	-862.23	0.59	0.42	9.79
2005	575	-0.30	2519.14	-901.3	0.67	0.42	9.00
2006	551	-0.32	2862.24	-836.13	0.55	0.42	9.22
2007	581	-0.28	1632.21	-779.65	0.65	0.50	8.82
2008	269	-0.28	1336.93	-716.98	0.58	1.13	8.63
2009	257	-0.26	2095.6	-700.29	0.75	0.65	9.78
All years		-0.23	1406.79	-624.75	0.94	0.52	9.14

Table 3: Long-run abnormal returns after open repurchase announcements for different levels of CEO confidence

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model with the addition of momentum (Panel A) and without momentum (Panel B), for the firms that announced an open repurchase. First the regression is done for the full sample, with the only condition that another announcement has not taken place in the previous month. Then, the sample is divided into 2 groups according to whether their CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for difference between the overconfident CEO estimates and the unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test

Panel A: 4 Factors							
Months	Full sample		Overconfident CEO		Unconfident CEO		Difference
	CAR	t-statistic	CAR	t-statistic	CAR	t-statistic	z-test
(+1,+12)	5.73%	13.37***	6.25%	5.16***	6.23%	4.94***	0.01
(+1,+24)	12.76%	19.95***	13.68%	7.72***	13.35%	6.82***	0.13
(+1,+36)	19.57%	23.53***	17.03%	7.71***	21.61%	8.42***	-1.35+
(+1,+48)	25.27%	25.07***	17.98%	6.74***	27.84%	8.90***	-2.40***+
Obs	14028		1090		822		
Panel B: 3 Factors							
Months	Full sample		Overconfident CEO		Unconfident CEO		Difference
	CAR	t-statistic	CAR	t-statistic	CAR	t-statistic	z-test
(+1,+12)	3.06%	7.26***	3.16%	2.62***	4.53%	3.67***	-0.79
(+1,+24)	8.29%	13.14***	8.55%	4.84***	9.40%	4.87***	-0.33
(+1,+36)	13.12%	15.95***	10.22%	4.65***	14.84%	5.84***	-1.38+
(+1,+48)	17.06%	17.12***	9.71%	3.66***	19.22%	6.21***	-2.33***+
Obs	14028		1090		822		

Table 4: Long-run abnormal returns after open repurchase announcements for financially constrained and unconstrained firms

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into financially constrained and financially unconstrained. A firm is classified as constrained if it belonged to the top 25 percentile of the Whited and Wu (2006) index (Panel A), to the lowest 25 percentile according to size (Panel B), to the top 25 percentile of the size and age Hadlock and Pierce (2010) index (Panel C), or top 25 percentile in the Kaplan and Zingales (1997) index (Panel D) in the year previous to the announcement, and as unconstrained if it belonged to any other percentile for the Whited and Wu and Kaplan and Zingales indexes, or if the firm belonged to the top 25 percentile in size. The indexes have been previously winsorized at the 1% level of their distributions to avoid the effects of extreme values. Size is defined as the market value of common equity in the year previous to the announcement. Difference z-test is the z-test for difference between the groups estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Panel A: 4 Factors & WW					
Months	Financially Constrained		Financially Unconstrained		Difference
	CAR	t-statistic	CAR	t-statistic	z-test
(+1,+12)	11.39%	7.77***	4.21%	7.65***	4.58***+++
(+1,+24)	25.56%	11.65***	9.28%	11.36***	6.95***+++
(+1,+36)	39.95%	13.96***	13.98%	13.03***	8.50***+++
(+1,+48)	50.55%	14.61***	18.10%	13.78***	8.77***+++
Obs	2319		6973		
Panel B: 4 Factors & Size					
Months	Small		Large		Difference
	CAR	t-statistic	CAR	t-statistic	z-test
(+1,+12)	12.39%	11.26***	3.94%	6.33***	6.68***+++
(+1,+24)	24.77%	15.35***	9.08%	9.68***	8.41***+++
(+1,+36)	36.22%	17.39***	13.18%	10.67***	9.52***+++
(+1,+48)	45.95%	18.30***	17.15%	11.16***	9.78***+++
Obs	3270		3316		
Panel C: 4 Factors & SA					
Months	Financially Constrained		Financially Unconstrained		Difference
	CAR	t-statistic	CAR	t-statistic	z-test
(+1,+12)	9.45%	7.79***	4.21%	9.81***	4.08***+++
(+1,+24)	21.00%	11.46***	10.13%	15.86***	5.60***+++
(+1,+36)	34.59%	14.39***	14.89%	17.92***	7.75***+++
(+1,+48)	45.09%	15.61***	19.16%	18.86***	8.47***+++
Obs	3303		9893		
Panel D: 4 Factors & KZ					
Months	Financially Constrained		Financially Unconstrained		Difference
	CAR	t-statistic	CAR	t-statistic	z-test
(+1,+12)	6.14%	5.10***	5.75%	9.34***	0.29
(+1,+24)	14.26%	7.86***	12.57%	13.84***	0.83
(+1,+36)	21.35%	9.01***	19.70%	16.62***	0.62
(+1,+48)	22.39%	7.88***	26.81%	18.51***	-1.39+
Obs	2374		7163		

Table 5: Long-run abnormal returns after open repurchase announcements for financially constrained and unconstrained firms and different levels of CEO confidence

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into financially constrained and financially unconstrained. A firm is classified as constrained if it belonged to the top 25 percentile of the Whited and Wu (2006) index (Panel A), to the lowest 25 percentile according to size (Panel B), to the top 25 percentile of the size and age Hadlock and Pierce (2010) index (Panel C), or top 25 percentile in the Kaplan and Zingales (1997) index (Panel D) in the year previous to the announcement, and as unconstrained if it belonged to any other percentile for the Whited and Wu and Kaplan and Zingales indexes, or if the firm belonged to the top 25 percentile in size. The indexes have been winsorized at the 1% level of their distributions to avoid the effects of extreme values. Size is defined as the market value of common equity in the year previous to the announcement. Then, each subsample is divided into 2 groups according to whether the CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for difference between the overconfident and unconfident CEO estimates estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Panel A: 4 Factors & WW										
Months	Financially Constrained					Financially Unconstrained				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
CAR	t-statistic	CAR	t-statistic	CAR		t-statistic	CAR	t-statistic		
(+1,+12)	14.99%	4.25***	13.04%	4.12***	0.41	4.24%	3.31***	3.39%	2.31**	0.44
(+1,+24)	26.89%	5.41***	22.91%	4.81***	0.58	9.70%	5.01***	9.37%	4.02***	0.11
(+1,+36)	29.95%	4.84***	38.87%	6.25***	-1.02	13.02%	5.35***	14.52%	4.73***	-0.38
(+1,+48)	32.22%	4.37***	54.26%	7.53***	-2.14***+	14.19%	4.79***	17.86%	4.54***	-0.75
Obs	202		213			790		468		
Panel B: 4 Factors & Size										
Months	Small Firms					Large Firms				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
CAR	t-statistic	CAR	t-statistic	CAR		t-statistic	CAR	t-statistic		
(+1,+12)	14.21%	3.73***	8.15%	3.04***	1.30+	3.04%	1.57	6.51%	2.58**	-1.09
(+1,+24)	26.94%	5.14***	18.24%	4.45***	1.31+	6.46%	2.26**	10.77%	2.84***	-0.91
(+1,+36)	24.75%	3.83***	31.26%	5.82***	-0.77	8.70%	2.47**	14.65%	3.06***	-1.00
(+1,+48)	21.89%	2.87***	44.17%	6.95***	-2.25***+	9.38%	2.30**	16.54%	2.76***	-0.98
Obs	200		268			334		144		

Panel C: 4 Factors & SA

Months	Overconfident CEO		Financially Constrained Unconfident CEO		Difference z-test	Overconfident CEO		Financially Unconstrained Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	14.84%	4.45***	9.97%	3.76***	1.14	4.64%	3.61***	3.71%	2.77***	0.50
(+1,+24)	27.35%	5.66***	19.14%	4.81***	1.31+	10.48%	5.58***	9.39%	4.38***	0.38
(+1,+36)	29.25%	4.83***	32.25%	6.19***	-0.38	13.90%	5.93***	14.82%	5.32***	-0.25
(+1,+48)	31.70%	4.35***	45.24%	7.36***	-1.42+	14.58%	5.13***	17.31%	4.95***	-0.61
Obs		196		279			887		537	

Panel D: 4 Factors & KZ

Months	Overconfident CEO		Financially Constrained Unconfident CEO		Difference z-test	Overconfident CEO		Financially Unconstrained Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	9.71%	3.20***	4.60%	1.27	1.09	5.61%	4.21***	6.52%	4.31***	-0.45
(+1,+24)	16.05%	3.82***	19.81%	3.56***	-0.54	12.96%	6.30***	11.80%	5.05***	0.37
(+1,+36)	21.30%	4.00***	28.08%	4.14***	-0.79	16.71%	6.51***	19.74%	6.19***	-0.74
(+1,+48)	17.82%	2.73***	33.11%	4.17***	-1.49+	19.36%	6.26***	26.82%	6.75***	-1.48+
Obs		261		153			706		528	

Table 6: Long-run abnormal returns after open repurchase announcements by firm age and different levels of CEO confidence

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model, with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on their age, measured by the amount of months the firms had appeared at CRSP previous the repurchase announcement. 242 months is the 90 percentile conditional on having confidence information. 71 months is the 10 percentile conditional on having confidence information. Then, each subsample is divided into 2 groups according to whether the CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for the difference between the overconfident and unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Old Firms ≥ 242 months					Young Firms ≤ 71 months				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	0.72%	0.32	0.96%	0.40	-0.07	8.75%	1.97**	13.32%	2.91***	-0.72
(+1,+24)	2.95%	0.96	4.38%	1.13	-0.23	20.19%	3.09***	28.45%	3.95***	-0.85
(+1,+36)	-0.85%	-0.23	8.62%	1.62*	-1.46+	22.44%	2.72***	38.51%	3.84***	-1.24
(+1,+48)	-4.03%	-0.92	14.43%	2.13**	-2.28***++	19.46%	2.04**	45.35%	3.83***	-1.70*++
Obs	327		180			93		100		

Table 7: Long-run abnormal returns after open repurchase announcements for dividend paying firms and non-dividend paying firms and different levels of CEO confidence
 This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model, with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on whether they paid dividends in the previous year to the repurchase announcement or not. Then, each subsample is divided into 2 groups according to whether the CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for the difference between the overconfident and unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Dividends					No dividends				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	2.44%	2.06**	2.54%	2.00**	-0.05	16.09%	5.15***	15.27%	4.51***	0.18
(+1,+24)	7.97%	4.42***	8.96%	4.57***	-0.37	28.92%	6.59***	25.64%	4.82***	0.48
(+1,+36)	8.89%	3.87***	15.24%	5.90***	-1.83*++	37.50%	7.06***	40.41%	5.81***	-0.33
(+1,+48)	10.45%	3.69***	18.89%	5.85***	-1.96*++	37.00%	5.95***	54.72%	6.71***	-1.72*++
Obs	804		622			281		188		

Table 8: Long-run abnormal returns after open repurchase announcements for positive earnings firms and negative earnings firms and different levels CEO confidence
 This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model, with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on whether they have positive earnings in the previous year to the repurchase announcement or not. Then, each subsample is divided into 2 groups according to whether the CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for difference between the overconfident and unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Earnings ≤ 0					Earnings > 0				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	4.01%	0.29	23.93%	1.63*	-0.99	6.32%	5.23***	6.17%	4.80***	0.09
(+1,+24)	34.26%	1.90*	27.02%	1.20	0.25	12.58%	7.03***	13.32%	6.69***	-0.28
(+1,+36)	17.26%	0.70	32.39%	1.02	-0.38	16.37%	7.35***	21.20%	8.08***	-1.41+
(+1,+48)	5.43%	0.18	36.94%	0.98	-0.66	18.16%	6.74***	27.20%	8.47***	-2.15**++
Obs	31		19			1028		774		

Table 9: Long-run abnormal returns after open repurchase announcements for firms with poor and good previous six-month performance and different levels of CEO confidence

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on the previous 6-month performance of their stock. A firm is classified as a good previous performer if its cumulative return for the 6 months before announcement lies above the 75 percentile of all the firms that announced a stock repurchase. A firm is classified as a bad performer if its cumulative return for the previous 6 months to announcement lies below the 25 percentile of all the firms that announced a repurchase. Then, each subsample is divided into 2 groups according to whether the CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for the difference between the over confident and unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Poor Previous 6-month Performers					Good Previous 6-month Performers				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	9.15%	2.89***	9.10%	2.87***	0.01	6.67%	2.52**	7.70%	2.86***	-0.27
(+1,+24)	21.81%	4.82***	23.26%	4.50***	-0.21	11.90%	3.02***	13.76%	3.44***	-0.33
(+1,+36)	28.08%	5.29***	37.37%	5.59***	-1.09	13.97%	2.88***	19.23%	3.77***	-0.75
(+1,+48)	22.83%	3.73***	48.22%	6.22***	-2.57***+++	20.77%	3.63***	23.47%	3.77***	-0.32
Obs	285		182			246		218		

Table 10: Long-run abnormal returns after open repurchase announcements for low book-to-market firms and high book-to-market firms and different levels of CEO confidence

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on the BM-ratio in the year before the announcement. A firm is classified as having a high BM ratio if in the year previous the announcement, it lies above the 75 percentile of all the firms that announced repurchases. A firm is classified as a low BM if in the previous year to announcement, its BM lies below the 25 percentile of all the firms that announced repurchases. BM is defined as the ratio of the market value of assets to the book value of assets where the market value of assets is calculated as the book value of assets minus the book value of common equity plus market value of common equity. The variable is winsorized at the 1% level in each tail. Then, each subsample is divided into 2 groups according to whether their CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for difference between the overconfident and unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Low BM					High BM				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	10.41%	4.51***	11.67%	4.10***	-0.34	2.97%	1.04	5.02%	2.07**	-0.54
(+1,+24)	18.90%	5.91***	19.25%	4.58***	-0.07	9.18%	2.18**	15.92%	3.92***	-1.15
(+1,+36)	26.21%	6.52***	28.45%	5.39***	-0.34	10.71%	2.08**	25.48%	4.84***	-2.00**++
(+1,+48)	28.46%	6.14***	32.88%	5.12***	-0.56	5.98%	0.95	28.86%	4.53***	-2.55***+++
Obs	286		192			266		205		

Table 11: Long-run abnormal returns after open repurchase announcements for strong governance and weak governance firms

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model, with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on their scores on the Gompers, Ishii and Metrick (2003) Governance Index the announcing firm has in the year of announcement or in the closest previous year where the index is available. A firm is classified as having strong governance if it has an index lower than 8 (25 percentile of all the announcing firms). A firm is classified as having weak governance if it has an index over 10 (75 percentile of all the announcing firms). Difference z-test is the z-test for the difference between the strong and weak governance estimates. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Strong Governance		Weak Governance		Difference z-test
	CAR	t-statistic	CAR	t-statistic	
(+1,+12)	8.17%	5.48***	4.50%	4.72***	2.07**+++
(+1,+24)	17.23%	8.41***	8.41%	5.90***	3.54***+++
(+1,+36)	23.60%	9.39***	12.93%	6.98***	3.42***+++
(+1,+48)	30.61%	10.13***	19.01%	8.43***	3.08***+++
Obs		1222		1301	

Table 12: Long-run abnormal returns after open repurchase announcements for strong governance and weak governance firms and different levels of CEO confidence

This table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) returns across time and security (IRATS) method combined with the Fama-French (1993) three-factor model, with momentum as an additional factor, for the firms that announced an open repurchase. Firms are divided into two groups depending on their scores on the Gompers, Ishii and Metrick (2003) Governance Index the announcing firm has in the year of announcement or in the closest previous year where the index is available. A firm is classified as having strong governance if it has an index lower than 8 (25 percentile of all the announcing firms). A firm is classified as having weak governance if it has an index over 10 (75 percentile of all the announcing firms). Then, each subsample is divided into 2 groups according to whether the CEOs are classified as overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Difference z-test is the z-test for the difference between the overconfident and unconfident CEO estimates. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test, and + significance in a one-tail test.

Months	Strong Governance					Weak Governance				
	Overconfident CEO		Unconfident CEO		Difference z-test	Overconfident CEO		Unconfident CEO		Difference z-test
	CAR	t-statistic	CAR	t-statistic		CAR	t-statistic	CAR	t-statistic	
(+1,+12)	8.97%	3.22***	9.66%	2.81***	-0.15	1.68%	0.69	6.57%	2.98***	-1.48+
(+1,+24)	19.46%	4.60***	25.25%	4.81***	-0.86	4.92%	1.52	12.53%	3.70***	-1.62+
(+1,+36)	27.89%	5.54***	40.18%	5.98***	-1.46+	7.36%	1.84*	19.39%	4.38***	-2.02***++
(+1,+48)	34.35%	5.91***	53.77%	6.95***	-2.00***++	5.77%	1.21	26.29%	4.89***	-2.86***+++
Obs	226		131			265		189		

Table 13: Cross-sectional regression analyses of the intended buyback fraction

This table examines whether firms with overconfident CEOs announce a higher intended buyback fraction than firms with unconfident CEOs. A CEO is classified as being overconfident or unconfident following the Hirshleifer, Low and Teoh (2012) overconfidence indicator. Size is defined as the market value of common equity. BM is defined as the ratio of the market value of equity to the book value of equity. Prior Return is the 6-month cumulative return for the 6 months preceding the announcement. Profitability is defined as the ratio of income before extraordinary items plus depreciation and amortization to shareholders equity plus balance sheet deferred taxes. Div/BE is the ratio of total dividends to book value of equity defined as the shareholders equity plus balance sheet deferred taxes. All the independent variables with the exception of Confidence have been lagged one period. The sample period is 1992 to 2009. ***, **, and * represent 1%, 5% and 10% significance level respectively. The standard errors, reported in brackets under the coefficients, have been clustered at the firm level.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	6.797 (19.18***)	6.928 (19.47***)	6.348 (14.32***)	6.254 (13.54***)	6.118 (12.36***)	6.222 (11.38***)
Confidence	1.1 (1.99**)	1.328 (2.28**)	1.303 (2.22**)	1.469 (2.39**)	1.342 (1.99**)	1.325 (1.97**)
Size		-0.000018 (-2.65***)	-0.000016 (-2.36**)	-0.000017 (-2.47**)	-0.000015 (-2.00**)	-0.000015 (-1.90*)
BM			1.36 (-1.49)	1.393 (-1.49)	1.446 (-1.47)	1.286 (-1.3)
Prior Return				0.043 (-0.04)	-0.265 (-0.23)	-0.249 (-0.83)
Profitability					0.59 (-0.92)	0.783 (-1.12)
Div/BE						-2.192 (-0.43)
N	982	967	967	925	741	740
R2	0.0043	0.0073	0.0093	0.0109	0.01	0.0097
Adjusted R2	0.0033	0.0052	0.0062	0.0066	0.0033	0.0016
F-statistic	3.97**	4.33**	3.45**	2.99**	2.44**	1.99*