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A RE-EXAMINATION OF STOCK REPURCHASE IN USA

by

Hua Yang

A Dissertation Submitted to the Faculty of
College of Business and Public Administration
Old Dominion University
in Partial Fulfillment of the Requirements for the Degree of

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ABSTRACT

A RE-EXAMINATION OF STOCK REPURCHASE IN USA

Hua Yang
Old Dominion University, 2010
Director: Dr. Mohammad Najand

Since the adoption of U.S. Securities and Exchange Commission (SEC) Rule 10b-18 Safe Harbor for Issuer Repurchases in 1982, stock repurchases have been growing explosively. Extant literature has shed some light on the motivation behind companies' repurchase activities. The most popular beliefs include signaling undervaluation (Dann 1981, Vermaele 1981, Comment and Jarrell 1991), reducing free cash flow (Guay and Harford 2000, Jagannathan, Stephens and Weisbach 2000, Grullon and Michaely 2004), raising leverage ratio (Hovakimian, Opler and Titman 2001) and increasing earnings (Bens, Nagar, Skinner and Wong 2003).

Motivated by Stephens and Weisbach's (1998) research which found that companies on average acquire 74 to 82 percent of the shares announced as repurchase targets within three years of the repurchase announcement, I re-examined the motivations for stock repurchase by linking repurchase announcements with actual repurchases: 1) why some companies announce stock repurchase, but don't actually buy back any of their shares, and 2) why some companies complete the repurchase program as announced.

Applying Logit regression to investigate the motives, I find that companies which make repurchase announcements but not actually buy back any stock tend to use

announcements to signal undervaluation, so they don't need to actually purchase their stocks to convey the insider information once again. On the other side, those companies which complete repurchase programs are more likely to buy back shares to reduce free cash flow, raise leverage ratio or improve earning per share. And they have to actually repurchase their own stocks to achieve those purposes.

I also examine market reaction to announcements made by Non-Repurchaser and Repurchaser. Non-Repurchaser receives more favorable market responses than Repurchaser. It provides further support to my hypothesis that Non-Repurchaser is undervalued and market corrects the mistake after the repurchase announcement.

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Last but not least, I owe all my success and achievements to my parents who hand me everything they have and support me in whatever means. Hope I have lived up to their expectations.

TABLE OF CONTENTS

	Page
LIST OF TABLES	VII
LIST OF FIGURES	VIII
1.0 INTRODUCTION	1
2.0 LITERATURE REVIEW AND HYPOTHESES	4
2.1 Undervaluation Signaling	4
2.2 Free Cash Flow	6
2.3 Financial Leverage	10
2.4 Earning Per Share	11
2.5 Hypothesis Development	13
3.0 MOTIVATIONS BEHIND REPURCHASERS & NON-REPURCHASERS	16
3.1 Announced Repurchase	16
3.2 Actual Repurchase	17
3.3 Repurchaser vs. Non-Repurchaser	18
3.4 Methodology	18
3.5 Descriptive Statistics	21
3.6 Logit Regression	25
3.7 Summary	30
4.0 MARKET REACTION TO REPURCHASER & NON-REPURCHASER	31
4.1 Methodology & Data	31
4.2 Stock Return after Repurchase Announcement	34
4.3 Abnormal Return from Repurchase Announcement	38
4.4 Summary	42
5.0 CONCLUSION	44
REFERENCES	48
VITA	85

LIST OF TABLES

	Page
Table 1 Sample Distribution by Year	54
Table 2 Sample Distribution by Industry	55
Table 3 Firm Characteristics of Non-Repurchaser and Repurchaser	57
Table 4 Logit Regression Result for Non-Repurchaser and Repurchaser	59
Table 5 Logit Regression Coefficient Correlation Matrix	63
Table 6 Probit Regression Result for Non-Repurchaser and Repurchaser	64
Table 7 Probit Regression Coefficient Correlation Matrix	68
Table 8 Daily Stock Return from Day 0 to Day 60	69
Table 9 Cumulative Stock Return from Day 0 to Day 60	72
Table 10 Cumulative Stock Return from Day 0 to Day 250	75
Table 11 Abnormal Return (AR) from Day 0 to Day 60	77
Table 12 Cumulative Abnormal Return (CAR) from Day 0 to Day 60	80
Table 13 Cumulative Abnormal Return (CAR) from Day 0 to Day 250	83

LIST OF FIGURES

	Page
Figure 1 Non-Repurchaser & Repurchaser Distribution by Year	21
Figure 2 Cumulative Stock Return from Day 0 to Day 60	35
Figure 3 Cumulative Stock Return from Day 0 to Day 250	37
Figure 4 Cumulative Abnormal Return (CAR) from Day 0 to Day 60	40
Figure 5 Cumulative Abnormal Return (CAR) from Day 0 to Day 250	41

1.0 INTRODUCTION

The adoption of US Securities and Exchange Commission (SEC) Rule 10b-18 Safe Harbor for Issuer Repurchases in 1982¹ set up guidelines that a company must follow in stock repurchase program so as to exempt from liabilities for price manipulation. Since then stock repurchase has emerged as an increasingly important payout method complementing cash dividend.

From 1985 to 1990 aggregate net repurchases were in the \$30 billion range. After a slowdown during the recession of early 1990s, the value of repurchases, for the first time in 1998, outnumbered cash dividends for US companies. Such trend continued in 1999, 2000, 2004 and 2005 (Lazo 2007). In 2007 the dollar amount of stock repurchases by S&P 500 companies reached a record high of \$586 billion, more than double the amount of dividend payouts (Richardson and Zuckerman 2008).

This explosive growth in stock repurchase has invited research interest in academic field. A large portion of papers shed light on the rationales behind stock buybacks. The most

¹ See Grullon and Michaely (2002) for a detailed description on the creation of Rule 10b-18 and how the Rule affected stock repurchase activity.

popular beliefs include signaling undervaluation (Dann 1981, Vermaele 1981, Comment and Jarrell 1991), reducing free cash flow (Guay and Harford 2000, Jagannathan, Stephens and Weisbach 2000, Grullon and Michaely 2004), raising leverage ratio (Hovakimian, Opler and Titman 2001) and improving earning per share (Bens, Nagar, Skinner and Wong 2003).

Rule 10b-18 is a voluntary “safe harbor”. Companies are not required to issue repurchase announcements even after the adoption of the Rule in 1982, but if they want to be protected from charges against price manipulation, they must follow Safe Harbor provisions to announce their intent to repurchase stock beforehand and to make repurchases satisfying the four conditions of Rule 10b-18 regarding manner, timing, price and volume of the repurchase.

In practice most companies do announce stock repurchases, however companies are not required to fulfill their commitments after declaring buyback programs to the public. Stephens and Weisbach (1998) find that “from 1981 to 1990, firms on average acquire 74 to 82 percent of the shares announced as repurchase targets within three years of the repurchase announcement”. Extant literatures have covered various issues regarding repurchase announcements or actual repurchases, but fail to disclose why some companies buy back stocks as announced while others don’t, and what is the motivation behind those companies that announce repurchase programs but don’t actually buy back a single share after the announcements?

This paper is designed to test the motives for stock repurchases, but it differs from its precedents in that I will link repurchase announcement with actual repurchase, and differentiate companies that fulfill their commitments from those that only announce buyback programs but do not take actions. To my knowledge no publication so far has ever taken a close look at the characteristics and motivations of those Non-Repurchasers.

The remainder of this paper is organized as follows. Section Two reviews repurchase literatures and develops hypotheses for testing. Section Three tests hypotheses and centers on the different motivations behind Non-Repurchasers and Repurchasers. The comparison of market reaction after buyback announcement between the two groups will be presented in Section Four. Section Five concludes.

2.0 LITERATURE REVIEW AND HYPOTHESES

Numerous studies have cited various motivations for share buyback. The most popular and widely accepted theories include undervaluation signaling motive, free cash flow motive, financial leverage motive and earning per share motive.

2.1 Undervaluation Signaling

The separation of ownership from control enables managers to possess more information of the company than the shareholders. In addition to financial statement, managers can convey their inside information to public through other channels like payout policy (Miller and Modigliani 1961, Miller and Rock 1985). The most well known motives associated with stock repurchase is the so called “undervaluation signaling”. Usually share buybacks are announced after prolonged declines in share prices. Managers use repurchase announcement as a “news bulletin” that they are convinced the stocks are undervalued (Asquith and Mullins 1986). Therefore, it will be profitable for the company to acquire its own stocks at bargain price and reissue them when the price bounces back. Various researches have detected short-term abnormal return following announcements of stock repurchase (Dann 1981, Vermaele 1981, Comment and Jarrell

1991, Grullon and Michaely 2002, Webb 2008). Value stocks, which are more likely to be undervalued, experience significant long-term abnormal return after initial stock repurchase announcement, while no such positive drift in abnormal return is observed for glamour stocks (Ikenberry, Lakonishok and Vermaelen 1995). A recent study (Peyer and Vermaelen 2009) confirms that such underreaction to undervaluation still persists for open market repurchases from 1991 to 2001. In addition, Jagannathan and Stephens (2003) find that infrequent repurchases receive more positive market reaction than frequent repurchases. The possible reason may be that companies which repurchase stocks frequently may do so to substitute dividend increase rather than to signal mispricing. Compared with their counterparties, infrequent repurchasers appear to be smaller firms with low market-to-book ratio and high degree of asymmetric information. Therefore, infrequent repurchasers are likely to be undervalued. Comment and Jarrell (1991) compare the signaling power of three most common forms of stock repurchase: Dutch-auction self-tender offer, fixed-price self-tender offer and open-market share repurchase program. In fixed-price offers, managers set the terms of trade including a fixed purchase price. However, for Dutch-auction offer, it is the outsiders who establish the term of trade by submitting their tendering price and managers only disclose to public the market-clearing price. In open-market share repurchase program, shares are sought at market price. Obviously among the three, fixed-price offers send out most insider information about the degree of undervaluation, and open-market share repurchase programs convey the least from managers. To test this hypothesis, Comment and Jarrell examined the three types of repurchase announcements issued by US companies between

1984 and 1989. In line with the signaling power, they find the average excess return is about 11% for fixed-price self-tender offer, 8% for Dutch-auction self-tender offer and 2% for open-market share repurchase program. All these researches shed light on the “undervaluation signaling” power from stock buyback. Generally, announcements made out of this motivation are welcomed by favorable market reactions.

2.2 Free Cash Flow

Besides information asymmetry caused by divergence of ownership and control, publicly held business organizations have to deal with another issue — agency cost. Jensen and Meckling (1976) point out that in an agency relationship principal and agent face different utility functions. To maximize its own utility, agent may not act in the best interest of principal and thus agency problem arises. Agency cost can include monitoring cost from principal, bonding cost from agent as well as residual cost from the reduction of principal’s maximized welfare when no divergence occurs. In a business organization setting, agency relationship exists between shareholder (principal) and manager (agent). Managers tend to overinvest so as to increase the size of the company and expand their power of control. By taking cash out of managers’ possession, it will make it harder for managers to invest in projects with negative net present value, since it forces managers to raise funds externally and encounter keener monitoring from capital market (Easterbrook 1984, Jensen 1986). Consistent with free cash flow hypothesis, Stephens and Weisbach

(1998) find positive relationship between repurchase activity and level of cash flow. Evidences also show that market reactions to repurchase announcements are more positive among companies that are more likely to overinvest (Grullon and Michaely 2004). Jiraporn's (2006) research reveals that in companies with strong shareholder rights, managers are less able to retain cash inside company for private benefit and are more likely to send it out to shareholders in form of cash repurchases, while companies with weak shareholder rights carry out less share repurchases. Likewise, Webb (2008) also finds evidence in banking industry: board structure, especially the independence of the board, is positively related to the extent and size of bank stock repurchase program.

Cash dividend used to be the dominant payout vehicle. However, stock repurchases drastically increased after the adoption of Rule 10b-18 in 1982. The dollar value of stock repurchases surpassed cash dividends in late 1990s and doubled dividends in 2007 (Lazo 2007, Richardson and Zuckerman 2008). Consistently, Fama (2001) also recorded "disappearing dividends". Does stock repurchase really substitute cash dividend as the preferred cash distribution vehicle?

Share repurchase has several advantages over cash dividend. First, for individual investor cash dividend was taxed at a higher personal ordinary income rate, while profit from repurchase was taxed at a lower capital gain rate (Black 1976, Barclay and Smith 1988, Bagwell and Shoven 1989). Though Jobs and Growth Tax Relief Reconciliation Act of 2003 allows qualified dividends to be taxed at same rate as long-term capital gain, stock repurchase is still subject to more favorable tax treatment. Shareholders have to

pay tax on every dollar of cash dividends they receive. With stock buybacks, shareholders who sold stocks only need to pay tax on the excess of selling price over their cost basis and those who didn't sell can defer the tax payments until capital gains are realized. Second, dividend payments always cause drops in the share prices after the ex-dividend days (Jakob and Ma 2003), but stock repurchase announcements are usually followed by price rallies (Comment and Jarrell 1991, Ikenberry, Lakonishok and Vermaelen 1995, Peyer and Vermaelen 2009). Third, dividend payments imply to public a long-term commitment. They are expected to be stabilized and maintained by the company. Therefore, there will be serious penalties associated with dividend cut due to companies' inability to meet the market expectation (Bajaj and Vijh 1990, Kaplan and Reishus 1990, Denis, Denis and Sarin 1994). Ghosh and Woolridge (1988) report an average 7% stock price decline three days surrounding the announcement of dividend cut. Stock repurchase, on the other hand, does not signal commitment of any kind. Repurchase announcement does not necessarily lead to actual repurchase activity and repurchase this year does not necessitate repurchase in the following years.

In reality tax does not seem to be the determinant for payout decisions. As pointed out by Miller and Modigliani (1961), "Strong as this tax push toward capital gains may be for high-income individuals, however, it should be remembered that a substantial (and growing) fraction of total shares outstanding is currently held by investors for whom there is either no tax differential (charitable and educational institutions, foundations, pension trusts, and low-income retired individuals) or where the tax advantage is, if anything, in favor of dividends (casualty insurance companies and taxable corporations

generally).” This point of view is echoed in a recent survey with 384 financial executives who claim that tax considerations are not a dominant factor in their decisions about whether to pay dividends or to increase dividends, or in their choice between repurchases or dividends (Brav, Graham, Harvey and Michaely 2005).

No evidence shows that stock repurchases contribute to the reduction in dividend payments (DeAngelo, DeAngelo and Skinner 2000, Fama and French 2001, Grullon and Michaely 2002). Disappearing dividends are largely due to changing characteristics of publicly traded companies and their lower propensity to pay dividends. The surge in stock repurchases results from the demand for an increase in payout ratio which companies are reluctant to satisfy with dividend increase. In Brav, Graham, Harvey and Michaely’s (2005) survey, when asked how to do with extra funds from dividend cuts, companies’ first choice is to pay down debt, then followed by stock repurchases. This result implies that managers don’t view dividend and repurchase as “fluid, one-for-one substitution”. In addition, Brennan and Thakor (1990) as well as Lucas and McDonald (1998) disclose that shareholders prefer dividend payments for small distributions, open market stock repurchases for larger distributions and tender offer repurchases for the largest distributions. Guay and Harford (2000), Jagannathan, Stephens and Weisbach (2000), Lie (2000) and Skinner (2008) find that companies use dividends to distribute permanent, recurring and stable cash flows, and use stock repurchases to distribute transient, nonrecurring and volatile cash flows.

According to Jain, Shekhar and Torbey (2009), though IPO firms prefer stock buyback to dividend as payout mechanism, market responds equally positive to both. The choice between repurchase and dividends is determined by fundamentally different characteristics and motivation of the IPO firms. The decision to dividend payout is driven by life cycle factors and investor preference to dividend, while the decision to stock repurchase is more for undervaluation signaling purpose.

In short, more and more researches arrive at the same conclusion: cash dividend and stock repurchase are not interchangeable, that is, one cannot and will not substitute the other as the only payout method to distribute free cash flow. Instead they are independent and complimentary to each other, serving for different purposes. Dividend payments are used for sustainable, stable and small cash distributions. Stock buybacks are mainly for temporary, volatile and large cash distributions.

2.3 Financial Leverage

Previous studies have validated the existence of optimal capital structure. According to Modigliani and Miller's (1963) static trade-off theory, companies optimize their capital structures by trading off the tax benefits of debt financing against the costs of financial distress. Jensen and Meckling's (1976) agency theory implies that optimal capital structure should minimize the sum of the agency cost associated with equity and the agency cost associated with debt (Stulz 1990, Hart and Moore 1995). In signaling model,

optimal capital structure results from the trade-off between the benefit of a higher market value with increased leverage and the cost of credible debt signaling (Ross 1977). In line with these theories, both academic research and field survey reveal that some optimal capital structures do exist within companies (Bradley, Jarrell and Kim 1984, Graham and Harvey 2001), and managements base their financing decisions on some long-run target leverage (Marsh 1982, Jalilvand and Robert 1984). Bagwell and Shoven (1988), Hovakimian, Opler and Titman (2001), Lie (2002) as well as Hovakimian (2004) find that the probability of stock repurchase is positively related to leverage deficit, that is, before repurchase companies tend to have debt ratios that are lower than the target level, and managements utilize stock repurchases to bring the capital structures to more optimal levels. Particularly, announcement period returns are higher when stock buybacks are financed with debt (Masulis 1980, Vermaelen 1981) in that debt-financed repurchases can raise debt ratio even more than cash repurchases.

2.4 Earning Per Share

The fourth motivation for stock repurchase, widely circulated among practitioners, is associated with earning per share. Since corporate executives' remunerations and promotions are linked to some kind of earning measures, it is not uncommon for managers to engage in earning misrepresentation (Schrand and Walther 2000).

Numerous articles² in business magazines and newspapers have claimed that repurchase can reduce outstanding shares and thus push up earning per share even when profits remain unchanged. If profits do rise, earning per share can increase even more. For example, as a result of grand stock buybacks, Dell and Cisco's earning per share grew 18% and 19% in the fourth quarter of 2005, while their net income merely grew 12% and 8% respectively (Henry 2006). As another example, more than 16 percent of ExxonMobil's earning per share growth over four-year period from 2002 to 2006 is attributed to share repurchase rather than performance improvement (Oded and Michel 2008). Also in 2008 fiscal year, Darden Restaurants reported an earning per share of \$2.69 after buying back five million shares. Reimers and Singleton (2010) pointed out that the earning per share would have been \$2.59, a 10-cents decrease, if there had been no share repurchase. Three-fourths of the 384 financial executives surveyed by Brav, Graham, Harvey and Michaely (2005) admit that "increasing earning per share is an important factor affecting their share repurchase decisions". Research reveals that corporate executives manage diluted earning per share. Stock repurchase activities increase when outstanding employee stock options can potentially dilute earning per share, or when earnings fall short of the past earning per share growth rate (Bens, Nagar, Skinner and Wong 2003). Ghosh, Harding, Sezer and Sirmans (2008) as well as Hurtt, Kreuze and Langsam (2008) already discovered positive relationship between executive

² See Koretz and Mehring (2004), Dobbs and Rehm (2005), Goddard (2005), Rosenberg (2005), Siegel (2006), Smith (2006), Brandstrader (2007), Silverblatt and Guarino (2007).

stock option holdings and the likelihood of repurchase announcement in REIT industry and IT industry, respectively.

The four motives covered in this paper are neither mutually exclusive nor all-encompassing. Most of the time companies conduct share buyback for more than one purpose (Guffey and Schneider 2004, Bozanic 2010). For example, Guffey and Schneider (2004) reveal that variables associated with free cash flow hypothesis remain as the most important explanations for stock repurchases, but leverage and tax hypothesis also adds some additional explanatory power. Dittmar (2000) has pointed out that the rationales behind stock buyback change with circumstances over time. Companies utilize repurchases to take advantage of potential undervaluation throughout the sample period from 1977 to 1996, and to distribute excess capital and raise leverage ratio in many subperiods. Companies also repurchase stock to fend off takeovers and counter the dilution effects of stock options in limited subperiods, which coincided with an active takeover market in mid 1980s and the increasing usage of management stock options from late 1980s and early 1990s.

2.5 Hypothesis Development

It is surprising to know that a lot of repurchases are announced, but not executed. Traders estimate that only one third of all the announcements in a given year actually get completed (Power 1995). A study by Stephens and Weisbach (1998) documents that

from 1981 to 1990 companies on average acquired 74 to 82 percent of the shares announced as repurchase targets within three years of the repurchase announcements. But why companies announce repurchase programs, but not implement it? If companies don't plan to buy back their own shares, why they make announcements in the first

According to undervaluation signaling hypothesis, companies repurchase stocks to (1) profit from buying low and selling high, and (2) send out information to public that their stocks are underpriced. If companies do want to make money from the transactions, they should not announce at all. Researches reveal that repurchase announcements usually trigger price rally and it will make no economic sense for the companies to buy stocks after the prices are bidding up. Even after the adoption of SEC Rule 10b-18 Safe Harbor for Issuer Repurchases in 1982, companies are allowed to buy back their stocks without announcement beforehand. Therefore, it is more reasonable for companies to purchase their undervalued stocks behind others' back and reissue them when the prices are high. For the latter, if companies only intent to pass on the insider information to the public, announcement already serves as a "news bulletin" and it is not necessary to signal again with actual repurchase, thus incurring little or no cost on the companies' part to convey the information.

As for the other three motives, companies have to buy back stocks to distribute cash to shareholders and lower their cash level, have to buy back stocks to shrink equity composition and raise leverage ratio, and have to buy back stocks to reduce outstanding

shares and raise earning per share. Announcements without action will not achieve their purposes.

In summary, the hypotheses to be tested in this research are:

H1: Companies which make repurchase announcements but do not actually repurchase stocks tend to use announcements to signal undervaluation.

H2: Companies which make repurchase announcements and actually complete the program tend to use repurchase to reduce free cash flow, to increase leverage ratio or to improve earning per share.

3.0 MOTIVATIONS BEHIND REPURCHASERS & NON-REPURCHASERS

In this section, I will test the aforementioned two hypotheses relating to the different motives of Repurchasers (i.e. companies that complete the repurchase program as announced) and Non-Repurchasers (i.e. companies that announce stock repurchase but do not actually buy back any share).

3.1 Announced Repurchase

I examined all repurchase announcements from Year 2000 to 2009 made by companies listed in either New York Stock Exchange (NYSE) or National Association of Securities Dealers Automated Quotation System (NASDAQ). These announcements are retrieved from Thomson ONE Banker Mergers & Acquisitions Database.

Neither SEC nor stock exchanges require announcing companies to disclose number of shares or dollar amount of shares to be repurchased, so some companies disclose both, but many only disclose one (Fried 2005). Thomson ONE Banker Mergers & Acquisitions Database does not provide number of target shares directly, but does have information on Value of Transaction, Price per Share and Target Share Price 1 Day Prior

to Announcement. So, to calculate the Number of Announced Repurchase Share, I divide Value of Transaction by Price per Share or Target Share Price 1 Day Prior to Announcement, if Price per Share is not available.

Some companies buy back stocks on a regular basis. To avoid contamination from other repurchase program and double-counting of shares purchased under different programs, I exclude announcements which are followed by another repurchase announcement in the same quarter or one quarter after.

3.2 Actual Repurchase

Number of shares actually bought following announcements is not reported directly by listed companies and has to be derived indirectly from Bloomberg's Decrease in Capital Stocks³ which refers to repurchase of common stock, common stock warrants, or other common stock equivalents, including redemption of preferred share capital.

To get the Number of Actual Repurchased Share, first I subtract reduction in Preferred Stock⁴ from Decrease in Capital Stocks to get the dollar amount spent for common stock repurchase. And I then divide it by quarterly closing price for an estimated number of common shares repurchased in each quarter.

³ Bloomberg code for "Decrease in Capital Stocks" is CF031 - CF_DECR_CAP_STOCK

⁴ Bloomberg code for "Preferred Equity" is BS061 - BS_PFD_EQY

3.3 Repurchaser vs. Non-Repurchaser

In this paper I include the actual shares repurchased in the announcement quarter as well as actual shares repurchased in the following quarter, and compare it with the announced repurchase target to determine my Repurchaser and Non-Repurchaser. More specifically,

$$REPO\%_t = \text{Share_Actual}_{t+1} / \text{Share_Announce}_t$$

$$\text{Where } \text{Share_Actual}_{t+1} = (\text{Capital_Decrease}_t - \text{Prefer_Decrease}_t) / P_t +$$

$$(\text{Capital_Decrease}_{t+1} - \text{Prefer_Decrease}_{t+1}) / P_{t+1}$$

$$\text{Share_Announce}_t = \text{Transaction_Value}_t / P'_t$$

$$P_t, P_{t+1} = \text{Price at the end of quarter } t \text{ and } t+1$$

$$P'_t = \text{Price in the announcement or price 1 day before announcement}$$

By the end of quarter $t+1$, Repurchaser must buy back at least the target number of shares announced in quarter t , or $REPO\%_t \geq 1$. On the other hand, Non-Repurchaser does not buy back a single share by the end of quarter $t+1$, or $REPO\%_t = 0$.

3.4 Methodology

Following other studies (Kahle 2002, Lee and Alam 2004, Skinner 2008) I will also adopt Logit regression with cross-sectional data to investigate the motives behind Repurchaser

and Non-Repurchaser. What make companies complete repurchase program as announced and what make them fail to buy back any share?

Logit model can be used to analyze the determinants of qualitative response variables. In this research I run the Logit regression to predict the probability that the company will become Repurchaser or Non-Repurchaser as a function of some independent variables. Specifically, the Logit regressions I will use for hypothesis testing are shown below,

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} \quad (1)$$

$$\text{REPO}_t = b_0 + b_2 R_{t-1} \quad (2)$$

$$\text{REPO}_t = b_0 + b_3 \text{MKBK_IND}_{t-1} \quad (3)$$

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} \quad (4)$$

$$\text{REPO}_t = b_0 + b_4 \text{FCF_AT}_{t-1} \quad (5)$$

$$\text{REPO}_t = b_0 + b_5 \text{DEBT_AT}_{t-1} \quad (6)$$

$$\text{REPO}_t = b_0 + b_6 \text{DEPS_Chg}_{t-1} \quad (7)$$

$$\begin{aligned} \text{REPO}_t = & b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} \\ & + b_4 \text{FCF_AT}_{t-1} + b_5 \text{DEBT_AT}_{t-1} + b_6 \text{DEPS_Chg}_{t-1} \end{aligned} \quad (8)$$

REPO is the discrete dependent variable to represent different groups of companies. If it is Non-Repurchaser, REPO equals 0 and if it is Repurchaser, it equals 1. In Equation (1)

LOGAT is the natural log of total assets before repurchase announcement. R in Equation (2) gives the quarterly return immediately before announcement quarter. In Equation (3) MKBK_IND equals market-to-book ratio prior to repurchase announcement divided by the industry average market-to-book ratio in the sample. LOGAT, R and MKBK_IND are associated with undervaluation, so Equation (1) to (3) are used to test my first hypothesis that undervalued companies will fail to buy back their stocks after repurchase announcement. Equation (4) is a multivariate Logit regression to include all three independent variables of LOGAT, R and MKBK_IND to jointly test the undervaluation signaling hypothesis. Equation (5) to (7) as shown above are related to my second hypothesis that companies are more likely to complete repurchase program if they buy back their own stocks to reduce free cash flow, to increase leverage ratio or to improve earning per share. Equation (5) covers free cash flow motive. FCF_AT in Equation (5) is free cash flow scaled by total assets in the quarter preceding announcement. Equation (6) is for financial leverage motive. DEBT_AT represents leverage ratio, equaling total debt divided by the sum of total debt and market value of common equity. Earning per share motive will be examined in Equation (7) where DEPS_Chg is the change in diluted earning per share in the last quarter before repurchase announcement. Both of my hypotheses will be tested simultaneously in Equation (8), so it combines all six independent variables mentioned above in the regression. All of the independent variables can be extracted from Bloomberg.

3.5 Descriptive Statistics

The sample includes 737 observations with all the necessary dependent and independent variables. It stretches ten years from 2000 to 2009. As presented in Figure 1, the number of observations keeps increasing from 27 (i.e. 13 Non-Repurchasers and 14 Repurchasers) in Year 2000 to 145 (i.e. 57 Non-Repurchasers and 88 Repurchasers) in Year 2008. There is a sharp decrease in 2009, which is mainly due to lack of actual repurchase information for companies announcing repurchase program in third or fourth quarter of 2009.

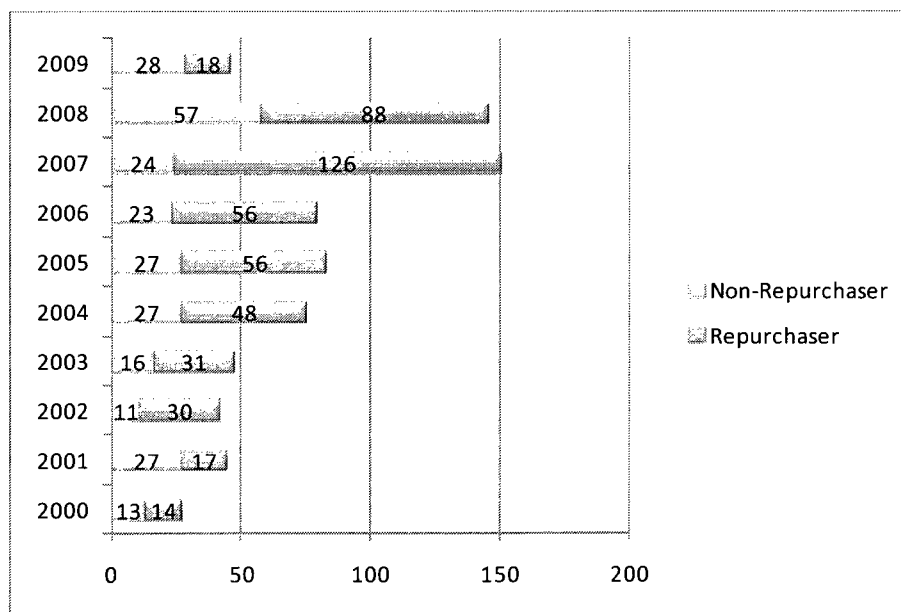


Figure 1 Non-Repurchaser & Repurchaser Distribution by Year

According to Table 1, among the 737 observations, 253 are the so called Non-Repurchasers, which didn't buy back any share in the announcement quarter or the following quarter. The rest 484 observations are grouped under Repurchaser. These companies complete the repurchase program within one to two quarters after announcement. In contrast to Non-Repurchasers which incur little cost, Repurchasers' abilities to buy back stocks largely depend on general market conditions and their own operational performances, thus they are more vulnerable to changes in business cycle. The number of Repurchasers peaked in 2007, just before the financial crisis erupted, to reach 126, or 26% of all Repurchasers in the sample. Then it dropped dramatically in the following years when most companies are tight with cash to carry out the stock buyback. The number of Non-Repurchasers is relatively more stable throughout the years. But it more than doubled in 2008 to 57 or 23% of all Non-Repurchasers in the sample, when the market experienced the most severe shock of the past few decades. This phenomenon supports my first hypothesis that Non-Repurchasers are more likely to signal undervaluation through repurchase announcements.

< Insert Table 1 here >

Table 2 Panel A and Panel B present the sample distribution by Standard Industrial Classification (SIC) code. One-third of the observations are under Manufacturing sector, followed by Finance, Insurance, and Real Estate sector as well as Services sector, both accounting for 20% of the total sample. The composition of Non-Repurchaser and

Repurchaser looks similar across the sectors and across the sample. No sector portrays itself as a typical Non-Repurchaser or as a typical Repurchaser.

< Insert Table 2 here >

Next I take a closer look at both Non-Repurchaser and Repurchaser, trying to identify their different traits. Table 3 lists a comparison of key variables between these two groups of companies. LOGAT represents the natural log of total assets. Non-Repurchaser's LOGAT is smaller than that of Repurchaser in terms of both mean and median, so Non-Repurchaser is small firm relative to Repurchaser. R is the quarterly return. The mean and median quarterly returns for Non-Repurchaser are -2.56% and -3.44%, and for Repurchaser are 1.26% and 0.15%. Non-Repurchaser's stock price declines in the quarter before repurchase announcement, so it is likely that Non-Repurchaser is undervalued. But Repurchaser's stock price rises before repurchase announcement, thus it is less likely that Repurchaser is undervalued by the market. The management issues repurchase announcement probably for reasons other than signaling undervaluation. On the whole, Repurchaser's market-to-book ratio (MKBK) is higher than that of Non-Repurchaser. This is especially true for the mean. On average, Non-Repurchaser's market-to-book ratio stands at 2.36 while Repurchaser's market-to-book ratio hovers at 8.66. When company's market-to-book ratio is scaled by its corresponding Industry's (as defined in Table 2 Panel B) ratio, Non-Repurchaser's market-to-book ratio, on average, is lower than the Industry's market-to-book ratio, about 63% of the Industry level. However, Repurchaser possesses a market-to-book ratio that

is 19% higher than the Industry average number. Once again, the market-to-book ratio indicates that Non-Repurchaser is more likely to be undervalued than Repurchaser.

Repurchaser controls more free cash flow (FCF), more than double of the Non-Repurchaser's level. FCF_AT equals FCF divided by total assets. As shown in Table 3, Repurchaser still has higher FCF_AT , though its total assets are relatively larger than its counterpart. On average, free cash flow accounts for 1.96% of Repurchaser's total assets and Non-Repurchaser's free cash flow is about 1.29% of its assets. The difference is around 0.67%. The result from median FCF_AT is about same, with Non-Repurchaser's being 1.04%, Repurchaser's being 1.56% and difference being 0.52%. The variable $DEBT$ tells a mixed story. Non-Repurchaser has a higher mean $DEBT$ while Repurchaser has a higher median $DEBT$. $DEBT_AT$ measures leverage ratio. It equals total debt ($DEBT$) divided by sum of total debt and market value of equity. Repurchaser's debt ratios are 18.69% (mean) and 11.36% (median), 2.83% and 4.12% lower than those of Non-Repurchaser. $DEPS$ is the quarterly diluted earning per share. Repurchaser's diluted earning per share is higher than Non-Repurchaser's earning per share in terms of both mean and median. $DEPS_Chg$ measures the change in quarterly $DEPS$ prior to repurchase announcement. Though Repurchaser has higher diluted earning per share, but it was decreasing in the short term. The mean $DEPS_Chg$ for Repurchaser is -0.10. In contrast, Non-Repurchaser's diluted earning per share is improving in the quarter before the announcement, though it is still not as good as Repurchaser's diluted earning per share figure. The mean $DEPS_Chg$ for Non-Repurchaser is 0.27, which 0.37 higher than that of Repurchaser. From the above

statistics, it is easy to see Repurchaser has more free cash flow, lower debt ratio and deteriorating earning per share. Therefore, it is more likely that Repurchaser would want to buy back their stocks so as to distribute excess cash, raise financial leverage and improve earning per share than Non-Repurchaser.

< Insert Table 3 here >

3.6 Logit Regression

To shed light on the relationship between motives and actual repurchase activities subsequent to announcement, I estimate the Logit regressions of Equation (1) to (8) presented in Methodology chapter.

If it is Non-Repurchaser, the dependent variable REPO is set to 0; if Repurchaser, REPO is equal to 1. In my first hypothesis, I propose that undervalued companies are more likely to use repurchase announcement to signal undervaluation and actual repurchase is not necessary since insider information is already sent out through announcement. According to Vermaelen (1981), small firms are less likely to be covered by analysts and media, so information asymmetry and undervaluation will be more pronounced in small firms than in large firms. If this rationale is valid, small firms are more likely to be the Non-Repurchaser. b_1 in Equation (1), (4) and (8), i.e. the coefficient for independent variable LOGAT, is expected to be negative. Likewise, b_2 in Equation (2), (4) and (8), the coefficient for independent variable R, should also be negative since firms are more

likely to signal undervaluation if their share prices are plunging. MKBK_IND is equal to company's market-to-book ratio divided by its corresponding industry's average market-to-book ratio. Some industries have high market-to-book ratio while others have low market-to-book ratio, thus the ratio per se does not indicate companies in low market-to-book industry are undervalued or companies in high market-to-book industry are not undervalued. However, if the company's market-to-book ratio is lower than its industry average, it is very likely that its stock is undervalued by the market. By comparing company's market-to-book ratio with the industry average in the sample, I try to clean up the impact from industry disparity. When MKBK_IND is small or less than 1, it is more likely that the company is undervalued. Therefore, b_3 in Equation (3), (4) and (8) is expected to be negative.

The other three independent variables, i.e. FCF_AT, DEBT_AT and DEPS_Chg are associated with my second hypothesis which states that companies are more likely to buy back their own stocks after repurchase announcement to distribute free cash flow, raise leverage ratio and boost earnings per share. If companies have excess cash flow, they are more likely to send out the money through actual repurchase, so b_4 in Equation (5) and (8), the coefficient for FCF_AT, should be negative. Only when DEBT_AT is low will companies want to reduce equity through stock repurchase, so b_5 in Equation (6) and (8), is expected to be of positive sign. DEPS_Chg is the change in diluted earning per share before announcement. It is very likely that when earning per share deteriorates management will want to buy back stocks, reduce number of shares outstanding, and quickly raise earning per share so as to maintain it at historical level or to meet market

expectation. Therefore, b_6 in Equation (7) and (8), the coefficient for DEPS_Chg is expected to be positive in this case.

Table 4 shows the Logit regression results. Overall market condition can trigger companies to conduct repurchases around same time. For example, as indicated previously in Table 1, 23% of all Non-Repurchasers in the sample occur in 2008 and 26% of all Repurchasers in the sample occur in 2007. As a result, the standard error of the observations in my sample may be correlated, which will bias the test statistics and misrepresent the significance level. So in Table 4, besides the normal statistical results, I also show the test results after adjusting for cluster by year in column “adj. χ^2 ”. The major findings from the Logit regression are as follows.

In Table 4 the coefficient for LOGAT in Equation (1) is -0.31, which is significant at 1% level. It provides strong support that small firms, vulnerable to information asymmetry and undervaluation, are more likely to be the Non-Repurchaser. The coefficient for R in Equation (2) is also negative, significant at 10% level for normal χ^2 and significant at 5% level for adjusted χ^2 . It means that stock price decline is often followed by repurchase announcement, but not actual repurchase. The coefficient for MKBK_IND in Equation (3) is negative as expected and significant at 5% level. So, when company's market-to-book ratio is low relative to Industry average, there will be more chance that it will be Non-Repurchaser after making the announcement. LOGAT, R and MKBK_IND are proxies for undervaluation to test my first hypothesis, so in Equation (4) I include all three of them as the independent variables. Just as in univariate regression, LOGAT, R

and MKBK_IND still have negative coefficients and significant at 1% or 5% level. Thus, results from Equation (1) to Equation (4) all support my first hypothesis that “companies which make repurchase announcements but do not actually repurchase stocks tend to use announcements to signal undervaluation”.

The negative coefficient for FCF_AT in Equation (5), which is significant at 10% level, implies that cash rich companies are more likely to complete the repurchase program as announced. The coefficient for DEBT_AT in Equation (6) is 0.58, significant at 10% level for normal χ^2 and insignificant for adjusted χ^2 . This result provides mild support that low leveraged companies are more likely to repurchase stocks so as to decrease equity level and benefit from more leverage. DEPS_Chg in Equation (7) has positive marginal effect in the regression and is significant at 1% level. If a company's diluted earning per share increases, it is more likely that it will not buy back its stocks. However, if the diluted earning per share is in a downward trend, company tends to repurchase its own stocks to reduce the number of shares outstanding and boost the earning per share instantly. So far, the univariate Logit regressions on FCF_AT, DEBT_AT and DEPS_Chg all support my second hypothesis that “companies which make repurchase announcements and actually complete the program tend to use repurchase to reduce free cash flow, to increase leverage ratio or to improve earning per share”.

Finally in Equation (8) I include all variables in the multivariate Logit regression to test both hypotheses simultaneously. As shown in Table 4, all coefficients are of expected signs, among which LOGAT and DEPS_Chg are significant at 1% level, R, MKBK_IND

and DEBT_AT at 5% level, and FCF_AT at 10% level. I also look at the coefficient correlations among all these variables in Table 5 to check whether there exists any multicollinearity. All variables in the regression are not highly correlated, thus multicollinearity should not be a concern here.

< Insert Table 4 here >

< Insert Table 5 here >

Similar to Logit regression, Probit regression also models the marginal effect of independent variables on the likelihood of the qualitative dependent variables. However, Logit model assumes a logic error term while Probit model assumes a normally distributed error term. Thus, I also tried univariate and multivariate Probit regressions to test my hypotheses. As shown in Table 6, the results are almost same as those from Logit regression: all coefficients are of the same sign and mostly at the same significance level as those in Table 4. Also there is no high correlation among the variables in the Probit regression in Table 7.

< Insert Table 6 here >

< Insert Table 7 here >

3.7 Summary

In this section I investigated the characteristics and motives of Non-Repurchaser and Repurchaser via descriptive statistics and Logit regression.

Non-Repurchasers appear to be small undervalued firms. Right before the repurchase announcement, although they have achieved evident improvement in terms of diluted earning per share, their stock prices still keep dropping. It is quite possible that small firms are not tracked closely, thus even though their operation is improving, it is not noticed by the market and not captured in the share price. To make things even worse, the decline in share prices still keeps its momentum. Under such circumstances, these companies are very likely to utilize repurchase announcement to demonstrate that they are pretty much undervalued. The subsequent actual buyback is not necessary in this case since companies already send out the signal through announcement.

Repurchasers seem to be big, cash-rich and low-leveraged companies with worsening diluted earning per share and higher market-to-book ratio than the Industry. These companies buy back their own stocks to distribute excess cash or to increase leverage ratio. Though Repurchasers' diluted earning per share is still higher than that of Non-Repurchasers, it is actually shifting downwards in the near term. In contrast to decreasing earning per share, these companies' stock prices keep going up. Thus, in order to sustain the historical performance and meet market expectation, Repurchasers will tend to buy back their own stocks to boost earning per share.

4.0 MARKET REACTION TO REPURCHASER & NON-REPURCHASER

Previous studies detected favorable market reactions around stock repurchase announcements (Dann 1981, Vermaele 1981, Comment and Jarrell 1991, Grullon and Michaely 2002, Webb 2008), but unfortunately none of them digs further to investigate this issue based on the execution after announcements. To fill in this gap I devote this section to the different market reactions to Non-Repurchaser & Repurchaser.

4.1 Methodology & Data

I will calculate Cumulative Abnormal Return (CAR) to gauge the excess return linked to repurchase announcements from Non-Repurchaser and Repurchaser. The announcement date is set as Day 0. The estimation period ranges from Day -250 to Day -10, and the event period covers around one year from Day 0 to Day 250.

Three-factor Asset Pricing Model (Fama and French 1996) is employed to estimate the expected return:

$$R_{it} - RF_t = a_i + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t$$

In above equation, $R_{it} - RF_t$ is the daily return on company i in excess of the risk-free rate (the one-month Treasury bill rate) for day t . $RM_t - RF_t$ is the excess return for day t on a value-weighted market portfolio of all NYSE, AMEX, and NASDAQ stocks from Center for Research in Security Prices (CRSP). The Fama-French factors are constructed using the six value-weight portfolios formed on size and book-to-market. SMB_t (Small Minus Big) is the day t average return on the three small portfolios minus the average return on the three big portfolios. HML_t (High Minus Low) is the day t average return on the two value portfolios minus the average return on the two growth portfolios. $RM_t - RF_t$, SMB_t and HML_t are used to measure the impact of market, size and book-to-market factors on returns.

Daily Abnormal Return (AR) is the difference between actual return and the return predicted from the Three-Factor Model, that is

$$AR_{it} = R_{it} - E(R_{it}) = R_{it} - [a_i + RF_t + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t]$$

R_{it} is the actual return on day t for company i , $E(R_{it})$ represents the expected return. To investigate the announcement effect on different groups of companies, the average AR on Day t for all observations in the sample AR_All_t , for Non-Repurchaser $AR_Non-Repurchaser_t$ and for Repurchaser $AR_Repurchaser_t$ will be calculated separately.

$$AR_All_t = \sum_{i=1}^{N_i} AR_{it} / N_i$$

$$AR_Non-Repurchaser_t = \sum_{j=1}^{N_j} AR_{jt} / N_j$$

$$AR_Repurchaser_t = \sum_{k=1}^{N_k} AR_{kt} / N_k$$

N_i , N_j and N_k represent the number of all observations, the number of Non-Repurchaser and the number of Repurchaser, respectively, and $N_i = N_j + N_k$.

Abnormal Returns are then accumulated to form Cumulative Abnormal Return, providing a measure of how much the share price changes over the event interval as a result of the announcement.

$$CAR = \sum_{t=0}^{250} AR_t$$

Daily Fama-French factor data, i.e. $RM - RF$, SMB , HML and RF , are downloaded from Kenneth R. French's website⁵. Companies' stock price information from Day -251 to Day 250 is obtained from Bloomberg to calculate stock returns. In the sample examined in previous section for my hypothesis testing, 697 of the 737 observations have all the price data available, so I will use these 697 announcements as my sample to test market reaction. Among the 697 observations, 232 belong to Non-Repurchaser and 465 belong to Repurchaser.

⁵ Kenneth R. French's data library webpage:

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

4.2 Stock Return after Repurchase Announcement

The quarterly returns, before repurchase announcement, are -2.56% for Non-Repurchaser and 1.26% for Repurchaser, then what happens to the stock price after the announcement?

Table 8 lists the daily return from repurchase announcement date (Day 0) to 60 days after the announcement date (Day 60). As normal, the most pronounced price appreciation occurs on Day 0 and Day 1. The 697 announcements in the sample, on average, have positive return of 0.92% on Day 0 and 0.85% on Day 1. Non-Repurchaser's price appreciation is much more than that of Repurchaser. More specifically, Non-Repurchaser's share price increases 1.29% and 1.41% on Day 0 and Day 1, while the price appreciation is only 0.73% and 0.57% for Repurchaser for the same two days. Non-Repurchaser has positive daily return in 49 days out of the 61 days from Day 0 to Day 60, and Repurchaser only has 27 days with price increase. So the positive stock return is only persistent with Non-Repurchaser throughout the first 61 days since announcement. For Repurchaser, the most positive returns only occur for the first few days after repurchase program is announced and then share prices actually drop in most of the 61-day period.

< Insert Table 8 here >

The different trends between Non-Repurchaser and Repurchaser are apparent in Figure 2, which shows the cumulative return from Day 0 to Day 60. Non-Repurchaser's share

price keeps rising for one quarter after the announcement. However, Repurchaser starts with slightly positive return, and then drifts downwards into the negative territory. In the first 61 days, the two groups' stocks head for different directions and the difference in stock returns enlarges with the time.

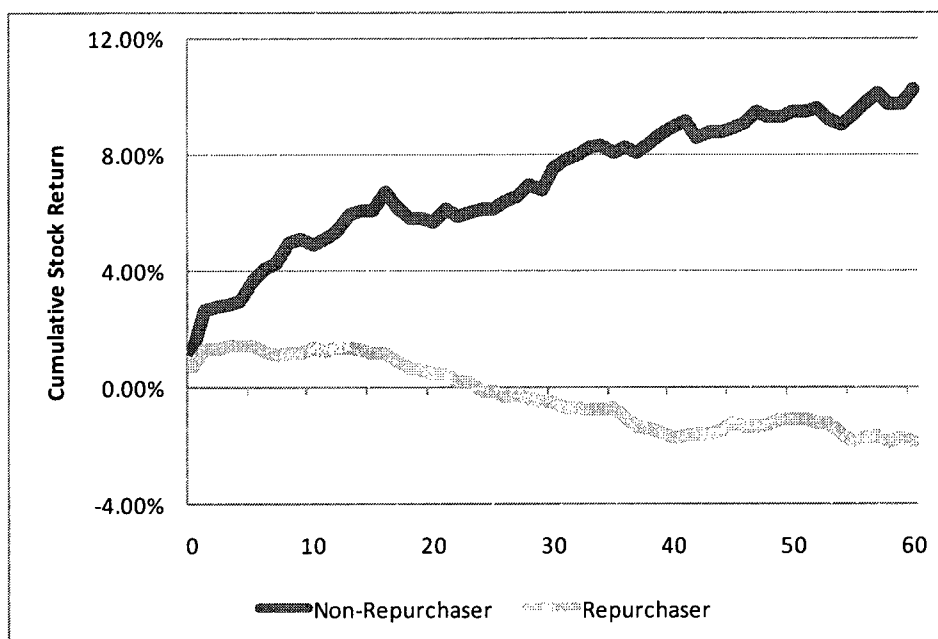


Figure 2 Cumulative Stock Return from Day 0 to Day 60

Table 9 presents cumulative stock return from Day 0 to Day 60 for all announcements in the sample, for Non-Repurchaser and for Repurchaser. On average the sample in question achieves 2.16% quarterly return since repurchase announcement. But if we investigate further, only Non-Repurchaser maintains positive cumulative return of 10.25% on Day 60. Repurchaser's cumulative return on Day 60 is actually -1.88%. In

other words, Non-Repurchasers' stocks outperform Repurchasers' by 12.13% in the 60 days after announcement. Repurchaser starts with positive cumulative return like Non-Repurchaser, but the cumulative return turns negative from Day 24 and remains more negative in subsequent days. This contrasts sharply with the stock performance before repurchase announcement when Non-Repurchaser experiences decline in price and Repurchaser enjoys stock price appreciation.

< Insert Table 9 here >

In previous paragraph I examined the quarterly return up to 60 days after repurchase announcement. Now I would like to check out the yearly return up to 250 days after the announcement. First, Figure 3 draws the cumulative return trends of both Non-Repurchaser and Repurchaser for the period of Day 0 to Day 250. Non-Repurchaser's share price keeps climbing up only till around Day 70, then it slowly drifts downwards. Repurchaser's stock keeps declining until Day 150, then bounces back a little bit thereafter. From the figure, it seems the divergence between Non-Repurchaser and Repurchaser only exists for the first 70 days, and then both move in the same direction.

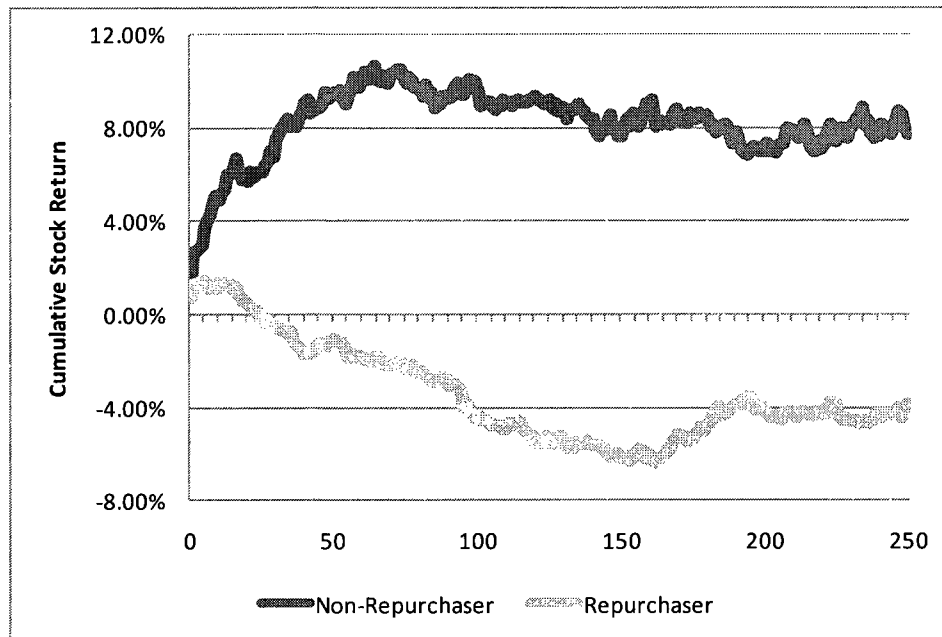


Figure 3 Cumulative Stock Return from Day 0 to Day 250

Table 10 Cumulative Stock Return from Day 0 to Day 250 furnishes more details on this phenomenon. On Day 250, about one year after the repurchase announcement is made, the whole sample, the Non-Repurchaser and Repurchaser obtain a yearly return of -0.02%, 7.74% and -3.89%. The difference between Non-Repurchaser and Repurchaser is about 11.63%. For Non-Repurchaser, the turning point occurs around Day 70, when its cumulative stock return peaks at 10.31% and difference with Repurchaser stands at 12.53%. Therefore, the 11.63% difference in returns on Day 250 is actually acquired within the first 70 days after announcement. The cumulative stock returns from Day 70 to Day 250 are very close between the two groups. In other words, the different market

response to Non-Repurchaser and Repurchaser only exists about one quarter since the announcement. After that, the market views the two groups pretty much the same.

< Insert Table 10 here >

4.3 Abnormal Return from Repurchase Announcement

In the previous chapter, it is detected that Non-Repurchaser receives higher stock returns after announcement than Repurchaser does. However, it is possible that Non-Repurchaser's share premium may not result from repurchase event. As indicated by Fama and French (1993), the premium may be due to more favorable market condition when Non-Repurchaser announces the buyback program, or may be due to Non-Repurchaser's small size and high book-to-market. To remove all these noises, I further investigate the Abnormal Return (AR) and Cumulative Abnormal Return (CAR) associated with repurchase announcement.

First I ran the Fama-French Three-Factor Asset Pricing regression based on return information from Day -250 to Day -10 to estimate for all 697 announcements the parameters in the Three-Factor Asset Pricing Model, from which I calculated expected return from Day 0 to Day 250. The difference between actual and expected return is the so-called Abnormal Return. Table 11 only lists the average Abnormal Returns for the whole sample, for Non-Repurchaser and for Repurchaser from Day 0 to Day 60. Consistent with result from daily stock return, the most significant Abnormal Returns

occur on the first two days. On announcement day (Day 0) the whole sample, Non-Repurchaser and Repurchaser have positive Abnormal Return of 1.08%, 1.49% and 0.87%, respectively. And on Day 1 they gain 0.91%, 1.51% and 0.60%, respectively. Obviously, Non-Repurchaser experiences larger Abnormal Return than Repurchaser does. This is consistent with my hypothesis that Non-Repurchaser is more likely to be undervalued, so after repurchase program is announced, market spots the undervaluation and corrects the mistake. In the 61 days from Day 0 to Day 60, Non-Repurchaser and Repurchaser have 56 and 50 days with positive Abnormal Returns, compared with 47 and 26 days of positive stock returns for the two groups. Thus, it can be inferred that Repurchaser's negative stock returns during event period are mainly due to the unfavorable market condition when Repurchaser makes announcement, its big size or its low book-to-market. After removing the influences of all these factors, Repurchaser's stocks also benefit from the repurchase event, though not as significant as Non-Repurchaser.

< Insert Table 11 here >

Next I examine the corresponding Cumulative Abnormal Return (CAR), which is the sum of all Abnormal Returns from Day 0 to Day 60. The major trends of the Cumulative Abnormal Returns can be seen in Figure 4. The upward trend of Cumulative Abnormal Return for Non-Repurchaser is very similar to its upward trend of cumulative stock return in Figure 2. But for Repurchaser, in contrast to a downward cumulative stock return, its Cumulative Abnormal Return is also climbing up throughout the 61 days, though not as

steep as Non-Repurchaser. Thus, the difference in Cumulative Abnormal Returns during this period is increasing with the time.

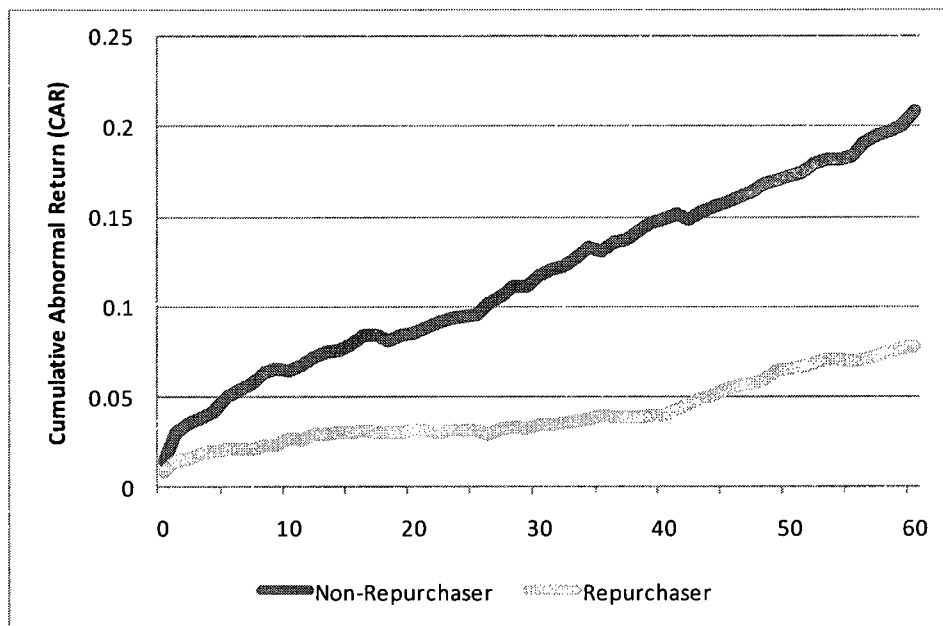


Figure 4 Cumulative Abnormal Return (CAR) from Day 0 to Day 60

The most significant single day Abnormal Return happens on Day 0 and Day 1. Accordingly, the Cumulative Abnormal Returns in Table 12 on Day 1 are 1.99%, 3.01% and 1.48% for the whole sample, for Non-Repurchaser and for Repurchaser. This result is in line with other findings on short-term Abnormal Return around repurchase announcement (Dann 1981, Vermaele 1981, Comment and Jarrell 1991, Grullon and Michaely 2002). The Cumulative Abnormal Returns keep rising throughout the event period. By the end of Day 60, Cumulative Abnormal Returns for the whole sample, for Non-Repurchaser and for Repurchaser reach 12.15%, 20.88% and 7.79%. In terms of

Cumulative Abnormal Returns, Non-Repurchaser still outperforms Repurchaser by 13.09%, about same magnitude as the difference of 12.13% in cumulative stock return.

< Insert Table 12 here >

Next, I will also explore the longer-term Cumulative Abnormal Returns. Figure 5 presents the Day 0 to Day 250 Cumulative Abnormal Return trends for Non-Repurchaser and Repurchaser. The gap between the two groups keeps enlarging at the beginning, then it stabilizes and in the end Cumulative Abnormal Returns of the two climb up hand in hand.

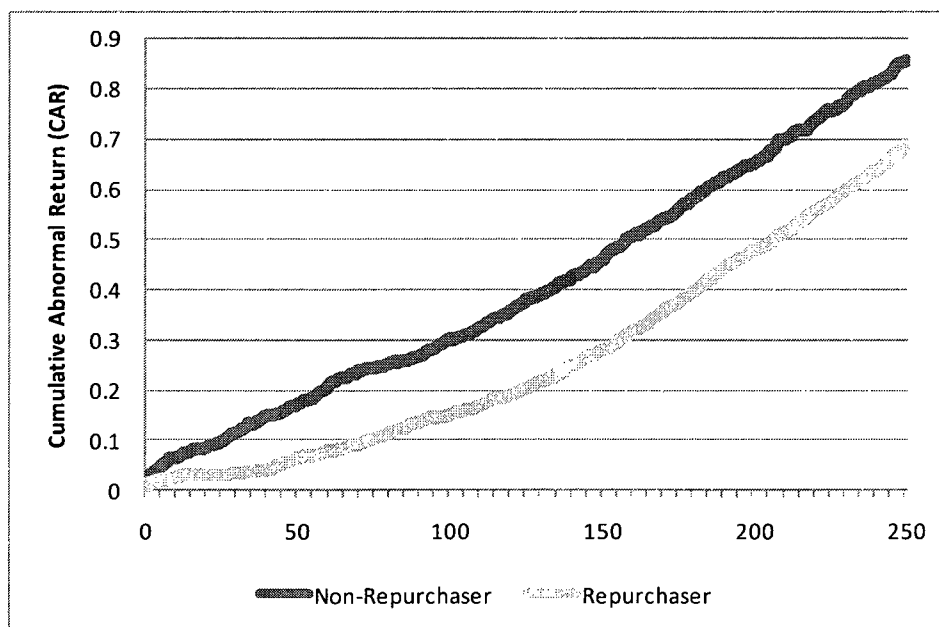


Figure 5 Cumulative Abnormal Return (CAR) from Day 0 to Day 250

As shown by Table 13, on Day 250 the Cumulative Abnormal Returns for the whole sample, for Non-Repurchaser and for Repurchaser are as high as 74.28%, 85.48% and 68.69%. Non-Repurchaser outperforms Repurchaser by 16.79%. The “Difference” column in Table 13 indicates that the gap is increasing until Day 160 to 19.06%, and then it slightly shrinks in the rest of the days. The 16.79% difference on Day 250 was acquired in the first 120 days after announcements, indicating that market treats Non-Repurchaser more favorably only for the two quarters immediately following the announcement. After that, Non-Repurchaser and Repurchaser perform equally well.

< Insert Table 13 here >

4.4 Summary

This section focuses on the different market responses to repurchase announcements made by Non-Repurchaser and Repurchaser. First, Non-Repurchaser is subject to more favorable market reaction than Repurchaser. Non-Repurchaser outperforms Repurchaser by 11% to 17% with respect to stock return or Abnormal Return. This result provides further support to my first hypothesis that Non-Repurchasers are more likely to be undervalued. The extra price appreciation experienced by Non-Repurchaser is the result of market’s self-correction triggered by repurchase announcement. Second, though the most significant single day positive Abnormal Return occurs in two days covering announcement day and one day after, both Non-Repurchaser and Repurchaser still

receive slightly positive Abnormal Returns from Day 2 up until Day 250, or about one year after repurchase announcement. Third, it appears that market's preference to Non-Repurchaser only lasts for one to two quarters after repurchase announcement. Beyond that point, it doesn't differentiate between these two groups of companies.

5.0 CONCLUSION

The 1982 US SEC Rule 10b-18 Safe Harbor for Issuer Repurchases sets up the guidelines regarding manner, timing, price and volume of repurchase. Repurchase companies will not be liable for price manipulation if they follow these guidelines to buy back their own stocks. Since then more companies utilize stock repurchase to achieve their purposes. The dollar amount of repurchases by S&P 500 companies skyrocketed to nearly \$600 billion in 2007 from merely \$30 billion in the 1980s.

So far researches have shown that the most common reasons for companies to buy back their own stocks include: 1) send out insider information to signal undervaluation to the market; 2) distribute excess cash to investors; 3) decrease equity composition and thus raise leverage ratio; 4) reduce number of shares outstanding to increase earning per share. When investigating these motivations, extant papers either look at repurchase announcements alone or actual repurchase activities and didn't try to view this issue on the basis of execution of the repurchase announcement. The execution is becoming an issue because "firms on average acquire 74 to 82 percent of the shares announced as repurchase targets within three years of the repurchase announcement" (Stephens and Weisbach 1998) and some companies didn't even buy back any share after announcing the repurchase programs.

My research differs from others in that I relate repurchase announcement with subsequent actual repurchase activity. In comparison of the actual number of stock repurchased with the announced target number of stocks to be repurchased, I group the companies into Non-Repurchaser, which doesn't buy back any stock after announcement, and Repurchaser, which completes the repurchase program as announced.

I find that prior to buyback announcements, Repurchasers are big companies, with worsening diluted earning per share but slightly positive stock returns and higher than Industry market-to-book ratio. This kind of companies is not likely to be undervalued by the market. Instead, they are more likely to reduce outstanding shares to boost earning per share so that they can maintain historical performance and keep up with the market expectation. Compared with its counterparties, Repurchasers tend to have more free cash flow and lower debt ratio before repurchases are announced, so it is also possible that this kind of companies carry out the repurchase in order to distribute cash flow to shareholders, or to benefit from more leverage. My Logit regression results also show that higher level of free cash flow, lower level of debt ratio and lower level of change in earning per share can enhance the likelihood that such companies being Repurchaser.

Non-Repurchasers tend to be small companies, with improving performance but declining share prices and lower than Industry market-to-book ratio. This kind of companies is more likely to be undervalued. Therefore, they tend to take advantage of repurchase announcement to attract market attention so as to re-appraise their stock prices

to reflect their true values. Since their only purpose is to send out signal to the outsider, actual repurchase is not necessary as repurchase announcement has already done the job.

In addition, I also examined the market reaction to repurchase announcements. Consistent with existing literature, my sample also shows positive stock returns and positive Abnormal Returns around announcement date. After I separate the Non-Repurchaser and Repurchaser in my sample, it is very obvious that the former experience much more favorable market responses, although it only exists for one to two quarters after announcement. These findings also furnish evidences from another perspective that Non-Repurchasers are undervalued companies.

My research is just an initial attempt to answer the questions why some companies announce repurchase programs but do not actually buy back any of their stocks and why some companies want to repurchase their own stocks after announcement. More works are required to solve these issues thoroughly. For example, in this paper I use Decrease in Capital Stocks, Preferred Stock and Quarterly Closing Price to obtain an estimation of the actual number of shares being repurchased. Lack confidence in the accuracy of the REPO%, I just group my sample into Non-Repurchaser and Repurchaser based on whether REPO% is equal to 0 or not less than 1, and run Logit regression for hypothesis testing. If more accurate information on actual repurchase is obtainable, future research should run the regression with REPO% as dependent variable and investigate the numerical relationship between REPO% and all the explanatory variables. Another area worth exploring is the companies in between ($0 < \text{REPO\%} < 1$) that partially complete

the repurchase program. It will be interesting to see whether these companies appear more like Non-Repurchaser or Repurchaser, or they will have their own unique characteristics and motives.

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Table 1 Sample Distribution by Year

The sample consists of 737 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

Year	N	%	Non-Repurchaser	%	Repurchaser	%
2000	27	4%	13	5%	14	3%
2001	44	6%	27	11%	17	4%
2002	41	6%	11	4%	30	6%
2003	47	6%	16	6%	31	6%
2004	75	10%	27	11%	48	10%
2005	83	11%	27	11%	56	12%
2006	79	11%	23	9%	56	12%
2007	150	20%	24	9%	126	26%
2008	145	20%	57	23%	88	18%
2009	46	6%	28	11%	18	4%
Total	737	100%	253	100%	484	100%

Table 2 Sample Distribution by Industry

Panel A presents sample distribution based on two-digit Standard Industrial Classification (SIC) code.

Industry	N	Industry	N
Agriculture, Forestry, and Fishing	3	Wholesale Trade	27
08 - - Forestry	3	50 - - Wholesale Trade - Durable Goods	16
		51 - - Wholesale Trade - Nondurable Goods	11
Mining	15	Retail Trade	81
12 - - Coal Mining	4	52 - - Eating and Drinking Places	5
13 - - Oil and Gas Extraction	10	53 - - General Merchandise Stores	11
14 - - Nonmetallic Minerals, Except Fuels	1	54 - - Food Stores	1
Construction	13	55 - - Automotive Dealers & Service Stations	9
15 - - General Building Contractors	9	56 - - Apparel and Accessory Stores	20
16 - - Heavy Construction, Except Building	3	57 - - Furniture and Homefurnishings Stores	3
17 - - Special Trade Contractors	1	58 - - Eating and Drinking Places	20
		59 - - Miscellaneous Retail	12
Manufacturing	251	Finance, Insurance, and Real Estate	149
20 - - Food and Kindred Products	15	60 - - Depository Institutions	62
21 - - Tobacco Products	2	61 - - Nondepository Institutions	7
22 - - Textile Mill Products	1	62 - - Security and Commodity Brokers	13
23 - - Apparel and Other Textile Products	3	63 - - Insurance Carriers	26
25 - - Furniture and Fixtures	7	64 - - Insurance Agents, Brokers, & Service	1
26 - - Paper and Allied Products	3	65 - - Real Estate	5
27 - - Printing and Publishing	11	67 - - Holding and Other Investment Offices	35
28 - - Chemicals and Allied Products	34	Services	148
29 - - Petroleum and Coal Products	3	70 - - Hotels and Other Lodging Places	10
30 - - Rubber and Misc. Plastics Products	5	72 - - Personal Services	3
31 - - Leather and Leather Products	2	73 - - Business Services	89
32 - - Stone, Clay, and Glass Products	2	75 - - Auto Repair, Services, and Parking	1
33 - - Primary Metal Industries	9	78 - - Motion Pictures	3
34 - - Fabricated Metal Products	8	79 - - Amusement & Recreation Services	8
35 - - Industrial Machinery and Equipment	43	80 - - Health Services	17
36 - - Electronic & Other Electric Equipment	50	82 - - Educational Services	3
37 - - Transportation Equipment	15	87 - - Engineering & Management Services	14
38 - - Instruments and Related Products	30		
39 - - Misc. Manufacturing Industries	8		
Transportation, Communications, Electric, Gas, and Sanitary Services	50		
40 - - Railroad Transportation	1		
42 - - Trucking and Warehousing	11		
44 - - Water Transportation	5		
45 - - Transportation By Air	2		
47 - - Transportation Services	3		
48 - - Communication	11		
49 - - Electric, Gas, and Sanitary Services	17		

(Table 2 Continued)

Panel B separates Non-Repurchaser and Repurchaser for each industry sector. The former does not buy back any share within one to two quarters after repurchase announcement and the latter completes the repurchase program and buys back at least the announced number of shares.

Industry	N	%	Non-Repurchaser	%	Repurchaser	%
Agriculture, Forestry, and Fishing	3	0%	0	0%	3	1%
Mining	15	2%	7	3%	8	2%
Construction	13	2%	2	1%	11	2%
Manufacturing	251	34%	97	38%	154	32%
Transportation, Communications, Electric, Gas, and Sanitary Services	50	7%	20	8%	30	6%
Wholesale Trade	27	4%	5	2%	22	5%
Retail Trade	81	11%	26	10%	55	11%
Finance, Insurance, and Real Estate	149	20%	52	21%	97	20%
Services	148	20%	44	17%	104	21%
TOTAL	737	100%	253	100%	484	100%

Table 3 Firm Characteristics of Non-Repurchaser and Repurchaser

The sample consists of 737 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

Suppose the repurchase announcement occurs in quarter t . This table describes the key variables and their differences between Non-Repurchaser and Repurchaser in quarter $t-1$, which is the quarter preceding the announcement. All the data are retrieved from Bloomberg. $LOGAT_{t-1}$ is the natural log of total assets ($BS035 - BS_TOT_ASSET$) before repurchase announcement. R_{t-1} is the quarterly return before announcement quarter, which equals the price ($PR005 - PX_LAST$) at the end of quarter $t-1$ minus the price at the end of quarter $t-2$ then divided by the price at the end of quarter $t-2$. $MKBK_{t-1}$ represents market-to-book ratio. It is equal to the market value of equity ($RR902 - CUR_MKT_CAP$) divided by the book value of total common equity ($RR010 - TOT_COMMON_EQY$) at the end of quarter $t-1$. $MKBK_IND_{t-1}$ is company's $MKBK$ before announcement divided by the industry average $MKBK$ in the sample. FCF_{t-1} is the free cash flow ($RR008 - CF_FREE_CASH_FLOW$) in quarter $t-1$. FCF_AT_{t-1} equals FCF divided by total assets at the end of quarter $t-1$. $DEBT_{t-1}$ is the total debt ($RR251 - SHORT_AND_LONG_TERM_DEBT$) before repurchase announcement. $DEBT_AT_{t-1}$ equals $DEBT$ divided by sum of $DEBT$ and market value of equity at the end of quarter $t-1$. $DEPS_{t-1}$ is the diluted earning per share (IS063 - IS_FULLY_DILUTED_EPS) before announcement quarter. $DEPS_Chg_{t-1}$ equals $DEPS$ at the end of quarter $t-1$ minus $DEPS$ at the end of quarter $t-2$.

(Table 3 Continued)

Variables	Non-Repurchaser		Repurchaser		Difference	
	Mean (1)	Median (2)	Mean (3)	Median (4)	Mean (1) - (3)	Median (2) - (4)
LOGAT _{t-1}	6.16	6.22	7.29	7.17	-1.14	-0.95
R _{t-1}	-2.56%	-3.44%	1.26%	0.15%	-3.82%	-3.59%
MKBK _{t-1}	2.36	1.82	8.66	2.35	-6.30	-0.53
MKBK_IND _{t-1}	0.63	0.62	1.19	0.77	-0.56	-0.15
FCF _{t-1}	58.12	2.98	131.89	14.03	-73.77	-11.05
FCF_AT _{t-1}	1.29%	1.04%	1.96%	1.56%	-0.67%	-0.52%
DEBT _{t-1}	2164.62	46.08	2145.12	188.68	19.49	-142.60
DEBT_AT _{t-1}	21.52%	15.48%	18.69%	11.36%	2.83%	4.12%
DEPS _{t-1}	0.31	0.18	0.32	0.27	-0.01	-0.09
DEPS_Chg _{t-1}	0.27	0.01	-0.10	0.00	0.37	0.01

Table 4 Logit Regression Result for Non-Repurchaser and Repurchaser

The sample consists of 737 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

I use the following Logit regressions to estimate the marginal effect of size, return, market-to-book, free cash flow, leverage and change in diluted earning per share on the likelihood that a company becomes Non-Repurchaser or Repurchaser.

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} \quad (1)$$

$$\text{REPO}_t = b_0 + b_2 R_{t-1} \quad (2)$$

$$\text{REPO}_t = b_0 + b_3 \text{MKBK_IND}_{t-1} \quad (3)$$

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} \quad (4)$$

$$\text{REPO}_t = b_0 + b_4 \text{FCF_AT}_{t-1} \quad (5)$$

$$\text{REPO}_t = b_0 + b_5 \text{DEBT_AT}_{t-1} \quad (6)$$

$$\text{REPO}_t = b_0 + b_6 \text{DEPS_Chg}_{t-1} \quad (7)$$

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} + b_4 \text{FCF_AT}_{t-1} + b_5 \text{DEBT_AT}_{t-1} + b_6 \text{DEPS_Chg}_{t-1} \quad (8)$$

Suppose the repurchase announcement occurs in quarter t . LOGAT_{t-1} is the natural log of total assets ($\text{BS035} - \text{BS_TOT_ASSET}$) before repurchase announcement. R_{t-1} is the quarterly return prior to announcement quarter, which equals the price ($\text{PR005} - \text{PX_LAST}$) at the end of quarter $t-1$ minus the price at the end of quarter $t-2$ then divided by the price at the end of quarter $t-2$. MKBK_{t-1} represents market-to-book ratio. It is equal to the market value of equity ($\text{RR902} - \text{CUR_MKT_CAP}$) divided by the book value of total common equity ($\text{RR010} - \text{TOT_COMMON_EQY}$) at the end of quarter $t-1$. MKBK_IND_{t-1} is company's MKBK before announcement divided by the industry average MKBK in the sample. FCF_AT_{t-1} equals free cash flow ($\text{RR008} - \text{CF_FREE_CASH_FLOW}$) in quarter $t-1$ divided by total assets at the end of quarter $t-1$. DEBT_AT_{t-1} equals total debt ($\text{RR251} - \text{SHORT_AND_LONG_TERM_DEBT}$) divided by sum of total debt and market value of equity at the end of quarter $t-1$. DEPS_Chg_{t-1} equals diluted earning per share ($\text{IS063} - \text{IS_FULLY_DILUTED_EPS}$) at the end of quarter $t-1$ minus diluted earning per share at the end of quarter $t-2$.

Companies tend to announce repurchase programs around same time period, which may cause correlated standard error and biased test results, so the table below also includes statistical test results after adjusting for cluster by year in column “adj. χ^2 ”.

(Table 4 Continued)

Variables	Eq. (1)			Eq. (2)			Eq. (3)			Eq. (4)		
	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2
Intercept	1.45	21.50 ***	4.61 **	-0.65	69.58 ***	9.41 ***	-0.44	13.74 ***	9.13 ***	1.64	24.75 ***	4.39 **
LOGAT	-0.31	45.73 ***	7.65 ***							-0.32	44.26 ***	7.10 ***
R				-0.75	2.98 *	3.92 **				-0.87	5.00 **	6.77 ***
MKBK_IND							-0.23	4.72 **	4.37 **	-0.20	6.03 **	4.39 **
FCF_AT												
DEBT_AT												
DEPS_Chg												
Max-rescaled R^2		10.17%			0.87%			2.02%			12.82%	
Global Null Hypothesis												
Like lihood Ratio		56.32 ***			4.65 **			10.85 ***			71.74 ***	
Score		53.27 ***			4.51 **			4.65 **			63.34 ***	
Wald		45.73 ***	7.65 ***		2.98 *	3.92 **		4.72 **	4.37 **		54.43 ***	9.90 **

*** denotes significant at 1% level

** denotes significant at 5% level

* denotes significant at 10% level

(Table 4 Continued)

Variables	Eq. (5)			Eq. (6)			Eq. (7)			Eq. (8)		
	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2
Intercept	-0.59	49.78 ***	6.03 **	-0.77	51.75 ***	13.79 ***	-0.66	70.37 ***	9.08 ***	1.74	25.38 ***	4.24 **
LOGAT										-0.36	48.27 ***	8.04 ***
R										-0.79	4.23 **	4.63 **
MKBK_IND										-0.16	4.65 **	4.01 **
FCF_AT	-3.81	3.78 *	2.95 *							-3.50	2.89 *	2.56 *
DEBT_AT				0.58	2.71 *	1.57				0.99	6.33 **	6.33 **
DEPS_Chg							0.35	6.77 ***	12.14 ***	0.33	6.94 ***	12.09 ***
Max-rescaled R^2		0.79%			0.52%			2.37%			17.06%	
Global Null Hypothesis												
Likelihood Ratio		4.20 **			2.75 *			12.76 ***			97.14 ***	
Score		4.18 **			2.79 *			9.68 ***			85.08 ***	
Wald		3.78 *	2.95 *		2.71 *	1.57		6.77 ***	12.14 ***		69.51 ***	127.98 ***

*** denotes significant at 1% level

** denotes significant at 5% level

* denotes significant at 10% level

Table 5 Logit Regression Coefficient Correlation Matrix

This table shows the coefficient correlation matrix for all variables in the following Logit regression:

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} + b_4 \text{FCF_AT}_{t-1} + b_5 \text{DEBT_AT}_{t-1} + b_6 \text{DEPS_Chg}_{t-1} \quad (8)$$

Suppose the repurchase announcement occurs in quarter t . LOGAT_{t-1} is the natural log of total assets ($\text{BS035} - \text{BS_TOT_ASSET}$) before repurchase announcement. R_{t-1} is the quarterly return prior to announcement quarter, which equals the price ($\text{PR005} - \text{PX_LAST}$) at the end of quarter $t-1$ minus the price at the end of quarter $t-2$ then divided by the price at the end of quarter $t-2$. MKBK_{t-1} represents market-to-book ratio. It is equal to the market value of equity ($\text{RR902} - \text{CUR_MKT_CAP}$) divided by the book value of total common equity ($\text{RR010} - \text{TOT_COMMON_EQY}$) at the end of quarter $t-1$. MKBK_IND_{t-1} is company's MKBK before announcement divided by the industry average MKBK in the sample. FCF_AT_{t-1} equals free cash flow ($\text{RR008} - \text{CF_FREE_CASH_FLOW}$) in quarter $t-1$ divided by total assets at the end of quarter $t-1$. DEBT_AT_{t-1} equals total debt ($\text{RR251} - \text{SHORT_AND_LONG_TERM_DEBT}$) divided by sum of total debt and market value of equity at the end of quarter $t-1$. DEPS_Chg_{t-1} equals diluted earning per share ($\text{IS063} - \text{IS_FULLY_DILUTED_EPS}$) at the end of quarter $t-1$ minus diluted earning per share at the end of quarter $t-2$.

Variables	LOGAT	R	MKBK_IND	FCF_AT	DEBT_AT	DEPS_Chg
LOGAT	1					
R	0.0243	1				
MKBK_IND	0.0022	0.0090	1			
FCF_AT	-0.0085	-0.0477	-0.1247	1		
DEBT_AT	-0.2498	0.1110	0.0816	0.1772	1	
DEPS_Chg	-0.0098	-0.0015	-0.0307	-0.0757	-0.0514	1

Table 6 Probit Regression Result for Non-Repurchaser and Repurchaser

The sample consists of 737 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

I use the following Probit regressions to estimate the marginal effect of size, return, market-to-book, free cash flow, leverage and change in diluted earning per share on the likelihood that a company becomes Non-Repurchaser or Repurchaser.

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} \quad (1)$$

$$\text{REPO}_t = b_0 + b_2 R_{t-1} \quad (2)$$

$$\text{REPO}_t = b_0 + b_3 \text{MKBK_IND}_{t-1} \quad (3)$$

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} \quad (4)$$

$$\text{REPO}_t = b_0 + b_4 \text{FCF_AT}_{t-1} \quad (5)$$

$$\text{REPO}_t = b_0 + b_5 \text{DEBT_AT}_{t-1} \quad (6)$$

$$\text{REPO}_t = b_0 + b_6 \text{DEPS_Chg}_{t-1} \quad (7)$$

$$\text{REPO}_t = b_0 + b_1 \text{LOGAT}_{t-1} + b_2 R_{t-1} + b_3 \text{MKBK_IND}_{t-1} + b_4 \text{FCF_AT}_{t-1} + b_5 \text{DEBT_AT}_{t-1} + b_6 \text{DEPS_Chg}_{t-1} \quad (8)$$

Suppose the repurchase announcement occurs in quarter t . LOGAT_{t-1} is the natural log of total assets ($\text{BS035} - \text{BS_TOT_ASSET}$) before repurchase announcement. R_{t-1} is the quarterly return prior to announcement quarter, which equals the price ($\text{PR005} - \text{PX_LAST}$) at the end of quarter $t-1$ minus the price at the end of quarter $t-2$ then divided by the price at the end of quarter $t-2$. MKBK_{t-1} represents market-to-book ratio. It is equal to the market value of equity ($\text{RR902} - \text{CUR_MKT_CAP}$) divided by the book value of total common equity ($\text{RR10} - \text{TOT_COMMON_EQY}$) at the end of quarter $t-1$. MKBK_IND_{t-1} is company's MKBK before announcement divided by the industry average MKBK in the sample. FCF_AT_{t-1} equals free cash flow ($\text{RR008} - \text{CF_FREE_CASH_FLOW}$) in quarter $t-1$ divided by total assets at the end of quarter $t-1$. DEBT_AT_{t-1} equals total debt ($\text{RR251} - \text{SHORT_AND_LONG_TERM_DEBT}$) divided by sum of total debt and market value of equity at the end of quarter $t-1$. DEPS_Chg_{t-1} equals diluted earning per share ($\text{IS063} - \text{IS_FULLY_DILUTED_EPS}$) at the end of quarter $t-1$ minus diluted earning per share at the end of quarter $t-2$.

Companies tend to announce repurchase program around same time period, which may cause correlated standard error and biased test results, so the table below also includes statistical test results after adjusting for cluster by year in column “adj. χ^2 ”.

(Table 6 Continued)

Variables	Eq. (1)			Eq. (2)			Eq. (3)			Eq. (4)		
	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2
Intercept	0.85	19.79 ***	4.64 **	-0.41	71.65 ***	9.64 ***	-0.29	15.85 ***	5.24 **	0.96	22.82 ***	4.43 **
LOGAT	-0.19	44.30 ***	8.22 ***							-0.19	42.54 ***	7.57 ***
R				-0.42	2.55	3.33 *				-0.52	4.78 **	6.62 ***
MKBK_IND							-0.13	4.81 **	4.49 **	-0.12	6.57 **	4.79 **
FCF_AT												
DEBT_AT												
DEPS_Chg												
Max-rescaled R^2		10.07%			0.81%			2.00%			12.70%	
Global Null Hypothesis												
Likelihood Ratio		55.77 ***			4.32 **			10.75 ***			71.06 ***	
Score		53.27 ***			4.51 **			4.65 **			63.34 ***	
Wald		44.30 ***	8.22 ***		2.55	3.33 *		4.81 **	4.49 **		53.25 ***	10.41 **

*** denotes significant at 1% level

** denotes significant at 5% level

* denotes significant at 10% level

(Table 6 Continued)

Variables	Eq. (5)			Eq. (6)			Eq. (7)			Eq. (8)		
	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2	b_i	χ^2	adj. χ^2
Intercept	-0.37	50.95 ***	6.20 **	-0.47	53.41 ***	14.33 ***	-0.41	72.53 ***	9.33 ***	1.01	23.34 ***	4.23 **
LOGAT										-0.21	47.93 ***	8.65 ***
R										-0.47	4.08 **	4.56 **
MKBK_IND										-0.09	5.15 **	4.41 **
FCF_AT	-2.29	3.65 *	2.78 *							-2.16	3.03 *	2.69 *
DEBT_AT				0.36	2.66 *	1.52				0.61	6.53 **	6.44 **
DEPS_Chg							0.21	7.67 ***	12.92 ***	0.19	8.49 ***	12.91 ***
Max-rescaled R^2		0.77%			0.51%			2.40%			17.00%	
Global Null Hypothesis												
Likelihood Ratio		4.14 **			2.74 *			12.92 ***			96.77 ***	
Score		4.18 **			2.79 *			9.68 ***			85.08 ***	
Wald		3.65 *	2.78 *		2.66 *	1.52		7.67 ***	12.92 ***		72.60 ***	152.98 ***

*** denotes significant at 1% level

** denotes significant at 5% level

* denotes significant at 10% level

Table 7 Probit Regression Coefficient Correlation Matrix

This table shows the coefficient correlation matrix for all variables in the following Probit regression:

$$REPO_t = b_0 + b_1 LOGAT_{t-1} + b_2 R_{t-1} + b_3 MKBK_IND_{t-1} + b_4 FCF_AT_{t-1} + b_5 DEBT_AT_{t-1} + b_6 DEPS_Chg_{t-1} \quad (8)$$

Suppose the repurchase announcement occurs in quarter t. LOGAT_{t-1} is the natural log of total assets (BS035 - BS_TOT_ASSET) before repurchase announcement. R_{t-1} is the quarterly return prior to announcement quarter, which equals the price (PR005 - PX_LAST) at the end of quarter t-1 minus the price at the end of quarter t-2 then divided by the price at the end of quarter t-2. MKBK_{t-1} represents market-to-book ratio. It is equal to the market value of equity (RR902 - CUR_MKT_CAP) divided by the book value of total common equity (RR10 - TOT_COMMON_EQY) at the end of quarter t-1. MKBK_IND_{t-1} is company's MKBK before announcement divided by the industry average MKBK in the sample. FCF_AT_{t-1} equals free cash flow (RR008 - CF_FREE_CASH_FLOW) in quarter t-1 divided by total assets at the end of quarter t-1. DEBT_AT_{t-1} equals total debt (RR251 - SHORT_AND_LONG_TERM_DEBT) divided by sum of total debt and market value of equity at the end of quarter t-1. DEPS_Chg_{t-1} equals diluted earning per share (IS063 - IS_FULLY_DILUTED_EPS) at the end of quarter t-1 minus diluted earning per share at the end of quarter t-2.

Variables	LOGAT	R	MKBK_IND	FCF_AT	DEBT_AT	DEPS_Chg
LOGAT	1					
R	0.0210	1				
MKBK_IND	0.0243	0.0200	1			
FCF_AT	-0.0185	-0.0535	-0.1535	1		
DEBT_AT	-0.2032	0.1145	0.0740	0.1807	1	
DEPS_Chg	-0.0174	0.0012	-0.0254	-0.0759	-0.0613	1

Table 8 Daily Stock Return from Day 0 to Day 60

The sample consists of 697 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

Repurchase announcement date is set as Day 0. This table lists the daily returns of the whole sample, Non-Repurchaser and Repurchaser from Day 0 to Day 60. Daily return on Day t equals the price (PR005 - PX_LAST) at Day t minus the price at Day $t-1$ then divided by the price at Day $t-1$.

(Table 8 Continued)

Day	Daily Stock Return on Day 0 to Day 60 (%)			
	ALL (1)	Non-Repurchaser (2)	Repurchaser (3)	Difference (2)-(3)
0	0.92	1.29	0.73	0.56
1	0.85	1.41	0.57	0.84
2	0.07	0.12	0.04	0.09
3	0.09	0.08	0.10	-0.02
4	0.07	0.25	-0.01	0.26
5	0.26	0.70	0.04	0.66
6	0.01	0.36	-0.17	0.53
7	-0.06	0.12	-0.15	0.27
8	0.26	0.64	0.06	0.58
9	0.08	0.23	0.00	0.22
10	0.11	-0.14	0.24	-0.38
11	0.00	0.27	-0.14	0.41
12	0.12	0.04	0.15	-0.12
13	0.16	0.40	0.04	0.36
14	0.04	0.16	-0.02	0.17
15	-0.07	0.09	-0.16	0.24
16	0.18	0.45	0.05	0.40
17	-0.28	-0.36	-0.24	-0.12
18	-0.29	-0.30	-0.28	-0.01
19	0.00	0.11	-0.06	0.17
20	-0.04	0.02	-0.07	0.08
21	0.06	0.26	-0.04	0.31
22	-0.15	0.02	-0.24	0.26
23	0.06	0.23	-0.02	0.24
24	-0.16	0.02	-0.25	0.27
25	0.00	0.03	-0.02	0.05
26	-0.10	0.25	-0.27	0.52
27	0.15	0.30	0.08	0.23
28	0.08	0.42	-0.09	0.51
29	-0.10	-0.09	-0.10	0.01
30	0.25	0.71	0.02	0.70

(Table 8 Continued)

Day	Daily Stock Return on Day 0 to Day 60 (%)			
	ALL (1)	Non-Repurchaser (2)	Repurchaser (3)	Difference (2)-(3)
31	-0.03	0.18	-0.13	0.31
32	0.04	0.11	0.00	0.11
33	0.01	0.29	-0.13	0.42
34	0.06	0.16	0.01	0.15
35	0.00	-0.20	0.09	-0.29
36	-0.11	0.32	-0.33	0.65
37	-0.24	-0.08	-0.32	0.25
38	0.08	0.36	-0.07	0.43
39	0.04	0.28	-0.08	0.36
40	-0.04	0.23	-0.17	0.40
41	0.07	0.19	0.01	0.18
42	-0.06	-0.52	0.17	-0.69
43	0.08	0.20	0.03	0.17
44	0.03	-0.02	0.05	-0.07
45	0.24	0.16	0.28	-0.12
46	0.00	0.14	-0.07	0.21
47	0.09	0.34	-0.03	0.37
48	0.03	-0.01	0.06	-0.07
49	0.14	0.04	0.20	-0.16
50	0.06	0.31	-0.06	0.37
51	0.03	0.02	0.04	-0.01
52	0.02	0.12	-0.03	0.15
53	-0.09	-0.20	-0.03	-0.16
54	-0.24	-0.14	-0.29	0.15
55	-0.09	0.31	-0.29	0.60
56	0.22	0.47	0.10	0.37
57	0.14	0.41	0.01	0.41
58	-0.20	-0.22	-0.19	-0.03
59	0.10	0.04	0.14	-0.09
60	0.06	0.41	-0.12	0.53

Table 9 Cumulative Stock Return from Day 0 to Day 60

The sample consists of 697 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

Repurchase announcement date is set as Day 0. This table lists the cumulative returns of the whole sample, Non-Repurchaser and Repurchaser from Day 0 to Day 60. Cumulative return on Day t equals the price (PR005 - PX_LAST) at Day t minus the price at Day -1 then divided by the price at Day -1.

(Table 9 Continued)

Day	Cumulative Stock Return from Day 0 to Day 60 (%)			
	ALL (1)	Non-Repurchaser (2)	Repurchaser (3)	Difference (2)-(3)
0	0.92	1.29	0.73	0.56
1	1.74	2.65	1.29	1.36
2	1.80	2.76	1.32	1.45
3	1.89	2.86	1.40	1.46
4	1.92	2.98	1.40	1.58
5	2.19	3.71	1.43	2.27
6	2.19	4.09	1.25	2.84
7	2.16	4.29	1.10	3.20
8	2.42	4.96	1.15	3.80
9	2.46	5.09	1.15	3.94
10	2.54	4.89	1.38	3.51
11	2.53	5.13	1.23	3.90
12	2.68	5.37	1.33	4.04
13	2.90	5.97	1.37	4.60
14	2.91	6.08	1.33	4.76
15	2.79	6.10	1.15	4.95
16	3.02	6.72	1.18	5.54
17	2.68	6.22	0.92	5.30
18	2.39	5.85	0.66	5.19
19	2.31	5.80	0.57	5.23
20	2.22	5.71	0.48	5.23
21	2.33	6.13	0.43	5.70
22	2.09	5.90	0.19	5.71
23	2.14	6.04	0.19	5.84
24	1.99	6.16	-0.09	6.25
25	1.98	6.15	-0.10	6.25
26	1.90	6.38	-0.34	6.73
27	2.04	6.60	-0.23	6.83
28	2.08	6.98	-0.37	7.35
29	1.94	6.81	-0.50	7.31
30	2.16	7.54	-0.52	8.05

(Table 9 Continued)

Day	Cumulative Stock Return from Day 0 to Day 60 (%)			
	ALL (1)	Non-Repurchaser (2)	Repurchaser (3)	Difference (2)-(3)
31	2.16	7.83	-0.67	8.50
32	2.22	8.02	-0.68	8.70
33	2.26	8.27	-0.73	9.01
34	2.25	8.35	-0.80	9.15
35	2.22	8.10	-0.72	8.81
36	2.05	8.26	-1.04	9.30
37	1.81	8.10	-1.33	9.43
38	1.87	8.40	-1.39	9.79
39	1.87	8.71	-1.55	10.26
40	1.86	9.01	-1.71	10.72
41	1.94	9.19	-1.68	10.86
42	1.78	8.61	-1.63	10.24
43	1.87	8.81	-1.60	10.41
44	1.94	8.79	-1.49	10.28
45	2.14	8.91	-1.23	10.14
46	2.14	9.10	-1.34	10.44
47	2.27	9.53	-1.36	10.89
48	2.22	9.29	-1.31	10.60
49	2.37	9.32	-1.09	10.42
50	2.44	9.51	-1.09	10.60
51	2.41	9.48	-1.11	10.59
52	2.37	9.60	-1.24	10.84
53	2.25	9.27	-1.25	10.52
54	1.92	9.02	-1.62	10.64
55	1.87	9.39	-1.88	11.27
56	2.07	9.75	-1.76	11.52
57	2.24	10.13	-1.69	11.83
58	2.01	9.75	-1.85	11.61
59	2.07	9.74	-1.76	11.50
60	2.16	10.25	-1.88	12.13

Table 10 Cumulative Stock Return from Day 0 to Day 250

The sample consists of 697 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

Repurchase announcement date is set as Day 0. This table lists the cumulative returns of the whole sample, Non-Repurchaser and Repurchaser from Day 0 to Day 250. Cumulative return on Day t equals the price (PR005 - PX_LAST) at Day t minus the price at Day -1 then divided by the price at Day -1.

(Table 10 Continued)

Day	Cumulative Stock Return from Day 0 to Day 250 (%)			
	ALL	Non-Repurchaser	Repurchaser	Difference
	(1)	(2)	(3)	(2)-(3)
0	0.92	1.29	0.73	0.56
10	2.54	4.89	1.38	3.51
20	2.22	5.71	0.48	5.23
30	2.16	7.54	-0.52	8.05
40	1.86	9.01	-1.71	10.72
50	2.44	9.51	-1.09	10.60
60	2.16	10.25	-1.88	12.13
70	1.95	10.31	-2.22	12.53
80	1.60	9.71	-2.44	12.15
90	1.04	9.28	-3.06	12.35
100	0.25	9.55	-4.39	13.94
110	-0.27	9.03	-4.91	13.94
120	-0.55	9.37	-5.50	14.86
130	-0.68	8.89	-5.45	14.33
140	-0.99	8.42	-5.69	14.11
150	-1.55	7.65	-6.14	13.79
160	-1.01	9.16	-6.09	15.24
170	-0.60	8.57	-5.17	13.73
180	-0.38	8.57	-4.84	13.41
190	0.00	7.80	-3.89	11.68
200	-0.48	6.99	-4.21	11.20
210	-0.19	7.89	-4.23	12.12
220	-0.49	7.12	-4.30	11.42
230	-0.43	7.89	-4.58	12.46
240	-0.33	7.66	-4.31	11.97
250	-0.02	7.74	-3.89	11.63

Table 11 Abnormal Return (AR) from Day 0 to Day 60

The sample consists of 697 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

I use Fama-French Three-factor Asset Pricing Model to calculate the expected returns. First I estimate the following Three-Factor model parameters over the estimation period from Day -250 to Day -10.

$$R_{it} - RF_t = a_i + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t$$

Daily Abnormal Return (AR) is the difference between actual return in Day 0 to Day 60 and the expected return from the Three-Factor Model.

$$AR_{it} = R_{it} - E(R_{it}) = R_{it} - [a_i + RF_t + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t]$$

The average ARs on Day t for all observations in the sample AR_All_t , for Non-Repurchaser $AR_Non-Repurchaser_t$ and for Repurchaser $AR_Repurchaser_t$ are calculated individually.

$$AR_All_t = \sum_{i=1}^{N_i} AR_{it} / N_i$$

$$AR_Non-Repurchaser_t = \sum_{j=1}^{N_j} AR_{jt} / N_j$$

$$AR_Repurchaser_t = \sum_{k=1}^{N_k} AR_{kt} / N_k$$

N_i , N_j and N_k are the number of all observations, the number of Non-Repurchaser and the number of Repurchaser in the sample and $N_i = N_j + N_k$. In this sample $N_i = 697$, $N_j = 232$ and $N_k = 465$.

(Table 11 Continued)

Day	Abnormal Return on Day 0 to Day 60 (%)			
	ALL	Non-Repurchaser	Repurchaser	Difference
	(1)	(2)	(3)	(2)-(3)
0	1.08	1.49	0.87	0.62
1	0.91	1.51	0.60	0.91
2	0.28	0.56	0.13	0.43
3	0.25	0.29	0.22	0.07
4	0.19	0.29	0.14	0.16
5	0.36	0.79	0.15	0.65
6	0.10	0.45	-0.08	0.53
7	0.13	0.36	0.02	0.34
8	0.33	0.58	0.20	0.37
9	0.12	0.22	0.06	0.16
10	0.23	-0.06	0.38	-0.44
11	0.05	0.25	-0.05	0.30
12	0.28	0.39	0.22	0.17
13	0.16	0.32	0.08	0.24
14	0.10	0.14	0.08	0.06
15	0.05	0.28	-0.06	0.34
16	0.26	0.53	0.13	0.40
17	-0.07	-0.03	-0.09	0.05
18	-0.06	-0.27	0.04	-0.31
19	0.09	0.28	0.00	0.28
20	0.08	0.11	0.07	0.04
21	0.15	0.39	0.03	0.36
22	0.02	0.25	-0.09	0.34
23	0.11	0.22	0.05	0.18
24	0.00	0.05	-0.03	0.08
25	0.08	0.17	0.03	0.14
26	0.08	0.55	-0.16	0.71
27	0.33	0.48	0.25	0.23
28	0.21	0.46	0.08	0.37
29	0.02	0.09	-0.02	0.12
30	0.33	0.60	0.20	0.41

(Table 11 Continued)

Day	Abnormal Return on Day 0 to Day 60 (%)			
	ALL	Non-Repurchaser	Repurchaser	Difference
	(1)	(2)	(3)	(2)-(3)
31	0.10	0.27	0.01	0.25
32	0.14	0.25	0.08	0.17
33	0.23	0.48	0.10	0.38
34	0.22	0.56	0.04	0.52
35	0.07	-0.24	0.22	-0.47
36	0.12	0.51	-0.08	0.59
37	0.02	0.11	-0.02	0.13
38	0.18	0.49	0.02	0.47
39	0.22	0.47	0.09	0.38
40	0.11	0.21	0.06	0.15
41	0.25	0.29	0.23	0.06
42	0.11	-0.35	0.35	-0.70
43	0.34	0.49	0.27	0.22
44	0.24	0.24	0.24	0.00
45	0.32	0.23	0.37	-0.13
46	0.22	0.35	0.15	0.21
47	0.22	0.35	0.16	0.19
48	0.26	0.38	0.20	0.18
49	0.40	0.17	0.51	-0.34
50	0.13	0.23	0.07	0.16
51	0.18	0.25	0.15	0.11
52	0.25	0.46	0.14	0.32
53	0.22	0.17	0.25	-0.08
54	0.04	0.06	0.03	0.03
55	-0.04	0.23	-0.17	0.41
56	0.35	0.69	0.18	0.51
57	0.30	0.47	0.22	0.25
58	0.15	0.15	0.15	0.01
59	0.28	0.32	0.26	0.05
60	0.32	0.83	0.07	0.77

Table 12 Cumulative Abnormal Return (CAR) from Day 0 to Day 60

The sample consists of 697 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

I use Fama-French Three-factor Asset Pricing Model to calculate the expected returns. First I estimate the following Three-Factor model parameters over the estimation period from Day -250 to Day -10.

$$R_{it} - RF_t = a_i + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t$$

Daily Abnormal Return (AR) is the difference between actual return in Day 0 to Day 60 and the expected return from the Three-Factor Model.

$$AR_{it} = R_{it} - E(R_{it}) = R_{it} - [a_i + RF_t + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t]$$

The average ARs on Day t for all observations in the sample AR_All_t , for Non-Repurchaser $AR_Non-Repurchaser_t$ and for Repurchaser $AR_Repurchaser_t$ are calculated individually.

$$AR_All_t = \sum_{i=1}^{N_i} AR_{it} / N_i$$

$$AR_Non-Repurchaser_t = \sum_{j=1}^{N_j} AR_{jt} / N_j$$

$$AR_Repurchaser_t = \sum_{k=1}^{N_k} AR_{kt} / N_k$$

N_i , N_j and N_k are the number of all observations, the number of Non-Repurchaser and the number of Repurchaser in the sample and $N_i = N_j + N_k$. In this sample $N_i = 697$, $N_j = 232$ and $N_k = 465$.

Cumulative Abnormal Return (CAR) is the sum of all Abnormal Return from Day 0 to Day 60.

$$CAR = \sum_{t=0}^{60} AR_t$$

(Table 12 Continued)

Day	Cumulative Abnormal Return from Day 0 to Day 60 (%)			
	ALL	Non-Repurchaser	Repurchaser	Difference
	(1)	(2)	(3)	(2)-(3)
0	1.08	1.49	0.87	0.62
1	1.99	3.01	1.48	1.53
2	2.26	3.57	1.61	1.96
3	2.51	3.86	1.83	2.03
4	2.70	4.16	1.97	2.19
5	3.06	4.95	2.12	2.83
6	3.15	5.40	2.03	3.37
7	3.29	5.76	2.05	3.71
8	3.61	6.34	2.25	4.08
9	3.73	6.56	2.32	4.24
10	3.96	6.49	2.70	3.80
11	4.01	6.74	2.65	4.09
12	4.29	7.13	2.87	4.27
13	4.45	7.45	2.95	4.50
14	4.55	7.60	3.03	4.56
15	4.61	7.88	2.98	4.90
16	4.87	8.41	3.11	5.30
17	4.80	8.37	3.02	5.35
18	4.74	8.11	3.06	5.05
19	4.83	8.39	3.06	5.33
20	4.91	8.50	3.13	5.37
21	5.06	8.89	3.16	5.73
22	5.09	9.14	3.07	6.07
23	5.19	9.36	3.11	6.25
24	5.19	9.41	3.08	6.33
25	5.27	9.58	3.11	6.47
26	5.35	10.13	2.96	7.18
27	5.67	10.62	3.21	7.41
28	5.88	11.07	3.29	7.78
29	5.89	11.16	3.27	7.90
30	6.23	11.77	3.46	8.30

(Table 12 Continued)

Day	Cumulative Abnormal Return from Day 0 to Day 60 (%)			
	ALL (1)	Non-Repurchaser (2)	Repurchaser (3)	Difference (2)-(3)
31	6.32	12.03	3.48	8.56
32	6.46	12.28	3.56	8.73
33	6.69	12.76	3.66	9.10
34	6.91	13.32	3.70	9.62
35	6.97	13.08	3.93	9.15
36	7.09	13.59	3.85	9.74
37	7.11	13.70	3.83	9.87
38	7.29	14.19	3.85	10.34
39	7.51	14.66	3.94	10.72
40	7.62	14.87	4.00	10.87
41	7.87	15.17	4.23	10.94
42	7.98	14.81	4.57	10.24
43	8.32	15.30	4.84	10.46
44	8.56	15.53	5.08	10.46
45	8.88	15.77	5.44	10.32
46	9.10	16.12	5.59	10.53
47	9.32	16.46	5.75	10.71
48	9.57	16.84	5.95	10.89
49	9.97	17.01	6.46	10.55
50	10.10	17.24	6.53	10.71
51	10.28	17.50	6.68	10.82
52	10.53	17.96	6.82	11.14
53	10.75	18.13	7.07	11.06
54	10.79	18.19	7.10	11.09
55	10.75	18.42	6.93	11.50
56	11.10	19.11	7.10	12.01
57	11.40	19.58	7.32	12.26
58	11.55	19.73	7.46	12.27
59	11.83	20.05	7.73	12.32
60	12.15	20.88	7.79	13.09

Table 13 Cumulative Abnormal Return (CAR) from Day 0 to Day 250

The sample consists of 697 repurchase announcements from 2000 to 2009, issued by companies listed in NYSE or NASDAQ. It is grouped into Non-Repurchaser and Repurchaser based on actual purchase of stock relative to announced target of repurchase. Non-Repurchaser does not buy back any share within one to two quarters after repurchase announcement while Repurchaser completes the repurchase program and buys back at least the announced number of shares.

I use Fama-French Three-factor Asset Pricing Model to calculate the expected returns. First I estimate the following Three-Factor model parameters over the estimation period from Day -250 to Day -10.

$$R_{it} - RF_t = a_i + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t$$

Daily Abnormal Return (AR) is the difference between actual return in Day 0 to Day 250 and the expected return from the Three-Factor Model.

$$AR_{it} = R_{it} - E(R_{it}) = R_{it} - [a_i + RF_t + m_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t]$$

The average ARs on Day t for all observations in the sample AR_All_t , for Non-Repurchaser $AR_Non-Repurchaser_t$ and for Repurchaser $AR_Repurchaser_t$ are calculated individually.

$$AR_All_t = \sum_{i=1}^{N_i} AR_{it} / N_i$$

$$AR_Non-Repurchaser_t = \sum_{j=1}^{N_j} AR_{jt} / N_j$$

$$AR_Repurchaser_t = \sum_{k=1}^{N_k} AR_{kt} / N_k$$

N_i , N_j and N_k are the number of all observations, the number of Non-Repurchaser and the number of Repurchaser in the sample and $N_i = N_j + N_k$. In this sample $N_i = 697$, $N_j = 232$ and $N_k = 465$.

Cumulative Abnormal Return (CAR) is the sum of all Abnormal Return from Day 0 to Day 250.

$$CAR = \sum_{t=0}^{250} AR_t$$

(Table 13 Continued)

Day	Cumulative Abnormal Return from Day 0 to Day 250 (%)			
	ALL	Non-Repurchaser	Repurchaser	Difference
	(1)	(2)	(3)	(2)-(3)
0	1.08	1.49	0.87	0.62
10	3.96	6.49	2.70	3.80
20	4.91	8.50	3.13	5.37
30	6.23	11.77	3.46	8.30
40	7.62	14.87	4.00	10.87
50	10.10	17.24	6.53	10.71
60	12.15	20.88	7.79	13.09
70	14.09	23.91	9.19	14.73
80	16.07	25.37	11.43	13.94
90	18.04	26.93	13.60	13.33
100	20.19	30.28	15.15	15.12
110	22.16	32.64	16.93	15.72
120	24.60	35.99	18.92	17.07
130	27.56	39.14	21.78	17.37
140	30.73	42.65	24.79	17.86
150	33.99	46.18	27.90	18.28
160	38.03	50.75	31.69	19.06
170	41.84	54.22	35.66	18.55
180	45.88	58.31	39.68	18.63
190	50.39	62.45	44.37	18.07
200	53.55	65.20	47.74	17.46
210	57.63	70.06	51.43	18.64
220	61.60	73.62	55.60	18.01
230	65.63	77.45	59.74	17.71
240	69.41	81.04	63.61	17.43
250	74.28	85.48	68.69	16.79

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