Free Cash Flows and the Wealth Effects of Stock Repurchase Announcements

Abstract

The free cash flow hypothesis predicts that repurchasing firms with free cash flows will have larger announcement-period abnormal returns than repurchasers that do not have free cash flows. We test the free cash flow hypothesis by examining the announcement-period abnormal returns of repurchasing firms sorted by their available investment opportunities, as measured by the Tobin's q ratio and cash flows. Firms with low q (less than one) and high cash flows are identified as firms with free cash flows. We find that firms with free cash flows earn significantly higher abnormal returns than all other firms. Cross-sectional regression analyses provide robust empirical support for the free cash flow hypothesis even after controlling for other variables that can affect the announcement-period abnormal returns.

1. Introduction

There is ample evidence in the literature that stock repurchases generate significantly positive announcement-period abnormal returns. Studies report average abnormal announcement-period returns of 3 - 5% for open market repurchases (see Dann, 1981; Vermaelen, 1981; Comment and Jarrell, 1991; Ikenberry, Lakonishok, Vermaelen, 1995; Grullon and Michaely, 2002; Chan, Ikenberry, and Lee, 2004), and 8 - 15% for fixed-price or Dutch-auction tender offers (Comment and Jarrell, 1991; Louis and White, 2007).

Several hypotheses have been proposed in the literature to explain the positive announcement-period abnormal returns. Among these, the signaling (undervaluation) hypothesis and the free cash flow hypothesis have received the most attention. The signaling hypothesis suggests that repurchase announcements are interpreted as managerial signals that the shares are currently undervalued (Vermaelen, 1981; Lakonishok and Vermaelen, 1990; Ikenberry, Lakonishok and Vermaelen, 1995; Stephens and Weisbach, 1998; Dittmar, 2000; D'Mello and Schroff, 2000; Chan, Ikenberry and Lee, 2004; Peyer and Vermaelen, 2005). Repurchasing shares is also thought to be a commonly used method of enhancing shareholder wealth by distributing free cash flows to the shareholders (Stephens and Weisbach, 1998; Nohel and Tarhan, 1998; Dittmar, 2000; Grullon and Michaely, 2004; Skinner, 2008).[1]

However, the results of a few recently conducted industry surveys (and of a recent academic study) cast doubts about the validity of the signaling (undervaluation) hypothesis (see Baker, Powell, and Veit, 2003; Jagannathan and Stephens, 2003; Grullon and Michaely, 2004; Brav, Graham, Harvey, and Michaely, 2005; Dittmar and Dittmar, 2008). These studies suggest that firms repurchase shares primarily to distribute free cash flows to shareholders, and not

necessarily to signal undervalued share prices. In this paper we test the free cash flow hypothesis using the Tobin's *q* ratio of repurchasing firms.

Several other studies have also tested the free cash flow hypothesis using the Tobin's *q* ratio, which is defined as the ratio of a firm's market value to the replacement cost of assets. Howe, He, and Kao (1992) examine tender offer repurchases and find that there is no significant difference in the announcement-period abnormal returns between firms with high Tobin's *q* ratios (value-maximizing firms) and those with low *q* ratios (over-investing firms). Furthermore, low-*q* firms with high free cash flows do not have larger announcement-period returns than other firms. They conclude that the observed positive announcement-period returns for repurchasing firms cannot be attributed to the reduction of agency costs of free cash flows for repurchasers. The positive returns are probably due to the signaling aspects of the repurchase announcements. The Tobin's *q* ratio in Howe, He, and Kao's (1992) study is based on average values calculated over a three year period before the announcement.

Perfect, Peterson, and Peterson (1995) also examine tender offer repurchase announcements and find that the empirical results are sensitive to how the Tobin's *q* ratios are calculated. While the evidence does not support the free cash flow hypothesis when long-run measures of Tobin's *q* are used (as in the Howe et al.), the empirical evidence is consistent with the free cash flow hypothesis when current values are used. Perfect et al. (1995) argue that the free cash flow hypothesis cannot not be dismissed conclusively.

These two early studies present conflicting empirical evidence about the free cash flow hypothesis. In this paper we reexamine the free cash flow hypothesis using stock repurchase data from 1994 to 2007. Our research differs from previous studies in several important aspects. All the earlier studies use small sample sizes. We examine all repurchase program announcements

that are listed in the SDC Platinum database between 1994 and 2007. The SDC Platinum database has the most detailed and accurate information on stock repurchase announcements. Furthermore, whereas the earlier studies examine only tender offer repurchase announcements we examine all listed announcements. We also examine whether the announcement-period wealth effect is related to the different features of the announced programs. The SDC Platinum database lists different features of the repurchase programs, such as the method of repurchase, the stated purpose of the programs, the initial size of the programs, etc. We expect to gain a better understanding about the free cash flow hypothesis by linking the wealth effect to the various attributes of the announced programs.

Our paper is organized as follows. Section 2 describes the free cash flow hypothesis and our empirical study design. Section 3 describes our sample. Section 4 presents the main empirical results of the paper. Summary and concluding remarks are presented in Section 5.

2. Theory and Methodology

Jensen (1986, 1988) argues that managers of firms with free cash flows (cash flows in excess of profitable investment opportunities) tend to waste cash by taking excessive perquisites or by making unprofitable investments. Managers are more likely to use the free cash flows to make investments that will be incremental to the size of the firm (or to pay themselves excessive perks), than to pay dividends to the shareholders or repurchase outstanding shares. A testable implication of the agency hypothesis is that firms that have free cash flows are likely to grow beyond the optimal point of shareholder wealth maximization. Shareholders of such firms will benefit from any managerial decision that prevents these wasteful expenditures. Share repurchases prevent such waste by using up excess cash flows.

To test the agency hypothesis we need to first identify repurchasing firms that have free cash flows, and then to measure the levels of those free cash flows after controlling for the investment opportunities of firms. Several earlier studies have used the Tobin's *q* ratio to control for the investment opportunities of firms. Tobin's *q* compares a firm's market value with the replacement cost of assets, and reflects the average realized return on the firm's capital. Following previous studies we use the Tobin's *q* ratio to control for the investment opportunities of repurchasing firms.

We identify firms with free cash flows using a method described in Lang, Stulz, and Walkling (1991) . Lang, et al. provide an operational definition of free cash flows based on the level of a firm's total cash flows and its Tobin's *q* ratio. They argue that firms with Tobin's *q* below one do not have profitable internal investment opportunities. Thus firms that have a combination of high levels of total cash flows and Tobin's *q* below one are identified as firms with free cash flows.

Several researchers have developed complex algorithms to estimate the Tobin's *q* ratio (see Lindenberg and Ross, 1981; Perfect and Wiles, 1994; Lewellen and Badrinath,1997). Erickson and Whited (2006) evaluate the measurement quality of these algorithms and conclude that none of the estimates of Tobin's *q* are of high quality. They argue that the elaborate algorithms reduce the number of usable observations and introduce sample selection biases. Erickson and Whited (2006) conclude that "researchers are just as well off using a simple measure of *q* as using a computationally complex measure."

In this paper we calculate a simple measure of the Tobin's *q* using the methodology outlined in Chung and Pruitt (1994). Chung and Pruitt (1994) report very high correlation between their proxy measure of the Tobin's *q*, and the more theoretically correct *q* calculated

using the Lindenberg and Ross (1981) algorithm. They argue that their measure of Tobin's *q* can be successfully used in empirical studies. The Chung and Pruitt (1994) *q* ratio is calculated as follows:

q ratio = (Market Value of Equity + Preferred Stock + Debt)/Total Assets

Lehn and Poulsen (1989) define cash flows as operating income before depreciation minus interest expenses, taxes, and preferred and common dividends. This cash flow measure is normalized by dividing by total assets. Thus cash flow is calculated as:

Cash Flow = Operating Income before Depreciation - Interest Expense - Taxes - Preferred and Common Dividends

Following Lang et al. (1991), firms that have normalized cash flows that are higher than the sample median and Tobin's *q* below one are identified as firms with free cash flows.[2] Our hypothesis is that over-investing firms (those with low Tobin's *q* and high cash flows) have larger announcement-period abnormal returns than other firms.

3. Data

The sample is drawn from the SDC Platinum Mergers and Acquisitions database. The database contains information on stock repurchases since the 1980s. We choose 1994 as the starting year for our sample because we observe that the data coverage appears to be more comprehensive since 1994. The data includes all repurchase programs announced by NYSE, AMEX, and NASDAQ firms. The initial authorization date of a program is the date that the company's board of directors first authorizes the repurchase program. A repurchase program may have multiple board authorizations. These subsequent announcements authorize changes in the previously announced programs, such as an expansion of an existing program. We exclude these

subsequent authorizations from our sample. Repurchase programs that are announced within a month of a previously announced program are also excluded from the sample.

To remain in the sample repurchasing firms must have data available on the CRSP and Compustat tapes during the pre-event estimation period, and the event period. Our final sample consists of 7,343 repurchase programs that were announced between 1994 and 2007. These 7,343 repurchase programs were announced by 3,389 different firms.

Table I provides descriptive statistics for our sample of repurchasing firms, and for all NYSE-, AMEX-, or NASDAQ-listed non-repurchasing firms. Only firms for which all the required data are available between 1994 and 2007 are kept in the sample. The statistics for the non-repurchasing group are based on 57,357 firm years of data for 8,879 firms. The statistics for the repurchasing firms are for end of the fiscal year preceding the announcement date of the repurchase programs.

The results reported in Table 1 are consistent with our expectation that repurchasing firms are on average larger, more profitable, have higher cash flows, and have fewer investment opportunities than non-repurchasing firms. Median *q*, return on assets and cash flows are 1.08, 3.58%, and $33.30 million for the repurchasing firms, and 1.20, 2.34%, and $12.55 million for the non-repurchasing firms. The median market values of repurchasing and non-repurchasing firms (market value equity plus book value of liabilities) are $938.21 million and $490.24 million respectively. The ratio of cash flows to total assets is also higher for the repurchasing firms (0.0667) than for the non-repurchasing firms (0.0430). The repurchasing firms also have higher median 'earnings available to common shareholders' ($23.52 million for repurchasing firms vs. $8.92 million for non-repurchasing firms), and higher median aggregate dividend payments including common and preferred cash dividends and stock repurchases ($4.68 vs. $0.76 million

for repurchasing and non-repurchasing firms respectively) than the non-repurchasing firms.

(PLACE TABLE 1 ABOUT HERE)

The differences between the two groups are all statistically significant at less than the 1% level. The statistics presented in Table 1 indicate that repurchasing firms have higher levels of free cash flows than non-repurchasing firms.

4. Empirical Results

4.1. Announcement Returns

We estimate market model parameters by regressing each firm's daily return on the CRSP value-weighted index return over 255 trading days before the announcement (day -301 to day -46 relative to the announcement date).

Table 2 reports the average cumulative abnormal returns (CARs) for three event windows: (-90, -1), (0, 2), and (3, 30) relative to the announcement date (day 0)[3]. Table 2 also reports parametric (Patell Z test) and non-parametric test (Corrado Rank test) statistics and the associated p-values in order to assess the significance of the cumulative abnormal returns.

We first examine the announcement-period abnormal returns for all the repurchase program announcements in Panel A. Previous studies have reported that repurchase programs typically follow a period of significant abnormal stock price declines, but that the share prices bounce back upon the repurchase announcement (Vermaelen, 1981; Lakonishok and Vermaelen, 1990; Ikenberry, Lakonishok, and Vermaelen, 1995; Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003; Peyer and Vermaelen, 2005). The results reported in Panel A are consistent with this notion. The average CAR from day -90 to day -1 is -8.90% (Patell Z-value = -24.687). Over the next three days (0,2) share prices bounce back as the repurchase programs are

announced, resulting in a significantly positive average CAR of 2.35% (Patell Z-value = 47.154). We also find evidence of a small but statistically significant post-announcement drift over the window (3,30) – the average post-announcement CAR is 0.82% (Patell Z = 3.506).

Next, we partition our sample into quartiles based on the calculated *q* values and cash flows, and compute the average CAR for each quartile. Panel B shows that the three-day (0,2) announcement-period CARs range from a low of 2.09% for firms in quartile 4 (low cash flow and low *q*), to a high of 3.42% for firms in quartile 2 (high cash flow and low *q*). Following Lang, Stulz, and Walkling (1991) we label firms that have high cash flows and low *q* ratios (*q* ratios below 1) as high-free-cash-flow firms. Panel B shows that these firms that have the largest announcement-period CAR. Panel C of Table 2 shows that the mean CAR of high-free-cash-flow firms (quartile 2 firms) over the window (0, 2) is significantly larger than the mean CARs of firms in quartiles 1, 3, and 4.

(PLACE TABLE 2 ABOUT HERE)

It is clear that stockholders of high-free-cash-flow firms experience the largest gains upon the announcement of share repurchase programs. This evidence is consistent with the free cash flow theory.[4]

Panel B also show that the high-free-cash-flow firms (quartile 2 firms) experience much smaller negative pre-announcement CAR and larger positive post-announcement CAR than firms in the other quartiles. Negative pre-announcement returns are consistent with the implications of the signaling (or undervaluation) theory. One can argue that negative pre-announcement returns indicate that firms time their repurchases to take advantage of temporary declines in stock prices. The combined evidence of smaller pre-announcement CAR and significantly larger announcement-period CAR for the quartile 2 firms provide strong support for the free cash flow

theory. The primary motivation behind the decision to repurchase shares for firms with free cash flows is to increase shareholder wealth by distributing the excess cash to the shareholders via share repurchases.

To examine the evidence more closely we further partition our sample according to the stated purposes of the repurchase programs. During the press release announcing the repurchase programs many firms state specific purposes of the program.[5] The SDC Platinum database lists eleven different purposes of stock repurchases using descriptive phrases like "Enhance Shareholder Value," "Undervalued" (shares), "Stock Option Plan," "Employee Benefits Plans," "Offset Dilution Effect," "Acquisition Purpose," "Prevent Takeover," etc. Many programs list only one specific purpose. Some programs list multiple purposes.

We focus on repurchase programs that list "Enhance Shareholder Value" (ESV) as the purpose of the programs. The SDC Platinum database does not provide explanations about the meanings of the stated purposes. Firms can enhance shareholder value in various ways such as by distributing excess cash to the shareholders, by changing the firm's leverage ratio in the direction of the optimal capital structure, by avoiding dividend taxation, by reducing agency costs, etc. We focus on repurchase programs that list "Enhance Shareholder Value" (ESV) as a purpose of the program.[6] We then split the ESV sample into two groups of firms: firms that have free cash flows and those that do not have free cash flows. Then we examine the announcement returns of each group of firms.

Table 3 shows that firms with free cash flows (high cash flows and low q) experience the largest announcement-period (0,2) CAR of 4.13%. This group also has the largest positive post-announcement (3,30) CAR of 2.58%. The three-day announcement-period CAR for firms that do not have free cash flows is 2.38%. The difference in the announcement period CAR between the

two groups is statistically significant. Firms that have free cash flows are in a better position to enhance shareholder value by distributing free cash flows to the shareholders by repurchasing shares than firms that do not have free cash flows. Higher announcement-period CAR for firms with free cash flows is evidence that is consistent with the free cash flow hypothesis.

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We next classify the sample according to the different methods that are used to repurchase shares. The SDC Platinum database lists about 10 different methods that are used for repurchasing shares. The open market repurchase is the most commonly used method, accounting for 51.84% of our sample. The next most commonly stated method is a blend of open market and negotiated (or private) repurchases (38.47% of our sample). Purely negotiated repurchases account for 4.30% of the sample. Tender offer repurchases are about equally split between Dutch-auction tender offers (2.09%) and fixed-price tender offers (1.78%). A combination of these different methods can also be used in a single repurchase program.

As discussed earlier Howe, He, and Kao (1992) and Perfect, Peterson, and Peterson (1995) examine the free cash flow hypothesis using tender offer repurchase announcements and report mixed results. We next examine the announcement-period abnormal returns for open market and tender offer repurchase announcements in our sample.

Panel A of Table 4 has the results for the open market repurchase announcements. The highest three-day announcement-period CAR (3.23%) is observed for firms that have free cash

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flows (high CF and low *q* firms). High free cash-flow firms also earn substantially higher post-announcement period (3, 30) abnormal return than other firms. Interestingly, we do not get the same results for the tender offer repurchase announcements (see Panel B). Firms with free cash

flows (high CF and low *q*) do not earn higher announcement-period returns than other firms. This is consistent with the mixed results that have been reported in the literature .

4.2. Multivariate Analysis

The results of the univariate analyses presented so far (in Tables 2-4) provide strong support for the free cash flow hypothesis. We next perform multivariate cross-sectional OLS regressions to examine the announcement-period wealth effect of the free-cash-flow firms after controlling for variables that may also affect the wealth effect.[7] We perform the following regression :

$$CAR_i = \beta_0 + \beta_1 FCF_i + \beta_2 PRECAR_i + \beta_3 MV_i + \beta_4 TEC_i + \beta_5 DIV_i + \beta_6 FREQ_i + \beta_7 SIZE_i + \varepsilon_i,$$

where CAR_i is firm i's three-day (t = 0 to +2) cumulative abnormal return. The independent variables are defined below.

(1) FCF_i is a dummy variable which takes on a value of 1 if repurchasing firm i has free cash flows (cash flows greater than the sample median and Tobin's *q* less than 1), and 0 otherwise. A significantly positive β_1 (after controlling for the other factors) is consistent with the free cash flow hypothesis.

(2) PRECAR is the pre-announcement abnormal return over the window (-90, -1). Previous studies have reported that repurchase programs typically follow a period of significant abnormal stock price declines, but that the share prices bounce back on the announcement date (Vermaelen, 1981; Lakonishok and Vermaelen, 1990; Ikenberry, Lakonishok, and Vermaelen, 1995; Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003; Peyer and Vermaelen, 2005). Thus we expect β_2 to be significantly negative, which is consistent with the implications of the signaling or undervaluation theory.

(3) MV is the logarithm of the market value of the repurchasing firm (market value of equity plus the book value of the liabilities). MV is included in the regression to control for the well-known size effect.

(4) TEC is a dummy variable which indicates the repurchasing method that is used. TEC is set equal 1 for tender offers (fixed-price and Dutch-auction tender offers), and to 0 for the other methods. Previous studies consistently find that tender offer repurchase announcement lead to significantly larger announcement-period returns than the other methods.[8]

(5) DIV is a dummy variable which is set to 1 if the repurchasing firm paid cash dividends during the previous fiscal year (0 otherwise). As discussed elsewhere many authors have argued that firms announce share repurchase to signal good news to shareholders and/or to distribute free cash flows to shareholders. A firm can also strategically pay cash dividends for the same purposes. In light of this we expect that the announcement-period wealth effect will be stronger for the non-dividend payers. Firms that do not pay dividends also face greater information asymmetries. Thus the strength of the signal can be greater for the non-dividend payers.

(6) FREQ is the total number of repurchase programs that were announced by the repurchasing firms during the sample period. Jagannathan and Stephens (2003) find that firms that announce open market repurchase programs infrequently encounter stronger market reactions (at the time of repurchase announcements) than firms that announce repurchases frequently. Thus we expect β_6 to be significantly negative.

(7) SIZE is the size of the announced repurchase program. Size is defined as the percentage of shares authorized for repurchase at the initial authorization date (the number of shares authorized divided by the total number of shares outstanding). A repurchase program may have to be of a minimum size in order to send a credible signal to the market. The extant literature offers

inconclusive evidence on the question of whether the size of the announced program is positively correlated with the announcement-period return (see McNally, 1999, and Wang, Strong, Tung, and Lin, 2009).

Several of the independent variables exhibit moderate correlations with the other variables.[9] We report regression results with different combinations of the independent variables in Table 5. All the independent variables have the expected signs, and all are highly significant. The free cash flow dummy variable (FCF) is significantly positive in all the regression models. The coefficients of FCF (and the t-statistics) are slightly smaller in the specifications that include MV, probably due to multicollinearity between FCF and MV. The evidence in Table 5 supports the free cash-flow theory. Firms with free cash flows experience significantly greater announcement-period wealth effects even after controlling for the other variables.

The results in Table 5 are also consistent with the implications of the signaling hypothesis, which contends that managers announce share repurchases to signal undervalued share prices. The significantly negative coefficients of MV indicate that the strength of the signal is inversely related to firm size. Since smaller firms generally have greater information asymmetries than bigger firms, the signaling hypothesis predicts an inverse relationship between firm size and the wealth effect. FREQ is also significantly negative, indicating that the market responds more favorably to repurchase announcements made by infrequent repurchasers. Jagannathan and Stephens (2003) argue that firms that repurchase shares infrequently have more information asymmetries than frequent repurchasers.[10] [11] The significantly negative coefficients of DIV imply that the market reacts more favorably to repurchasing firms that do not pay cash dividends. Since firms that do not pay cash dividends have more information asymmetries than firms that pay dividends (see Li and Zhao, 2008; Deshmukh, 2005), this result is also consistent with the

signaling hypothesis. The coefficients of SIZE are significantly positive. This suggests that the bigger the size of the announced repurchase program the greater the announcement-period wealth effect. This result confirms McNally's (1999) conclusion that the market reaction depends on the size of the announced program. An announced repurchase program may have to be of a minimum size in order to send a credible signal to the market.

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The results for the two remaining independent variables, PRECAR and TEC, are also consistent with results that have been reported in the literature. The coefficient estimates of PRECAR are significantly negative. This is consistent with the implications of the signaling hypothesis.[12] The significantly positive coefficients of TEC signify that the announcement period abnormal returns are much bigger for tender offer repurchases than for open market repurchases.

5. Conclusion

In this paper we test the free cash flow hypothesis by examining all repurchase programs that were announced between 1994 and 2007. We relate the announcement-period abnormal returns of the repurchasing firms to their investment opportunity sets and cash flows. The free cash flow hypothesis posits that firms are likely to waste free cash flows on unproductive investments. Thus shareholders of firms with free cash flows will benefit from share repurchases since share repurchases use up cash that might have been wasted otherwise.

We borrow the methodology of Lang, Stulz, and Walkling (1991) to identify firms that have free cash flows. Lang, et al. provide an operational definition of free cash flows based on the level of a firm's total cash flows and its Tobin's *q* ratio. Following Lang, Stulz, and Walkling's (1991) procedure firms with low-*q* (less than one) and high cash flows are identified

as firms with free cash flows. The free cash flow hypothesis predicts that firms with free cash flows will have larger abnormal returns upon the announcement of a repurchase program than firms that do not have free cash flows.

We find that this is indeed the case. Firms that have high cash flows and low q earn significantly higher abnormal returns during a three-day event window (0, 2) than all other firms. We next examine the various announced purposes of the repurchase programs. We focus on the repurchase programs whose stated purpose is to 'Enhance Shareholder Value'. We find that firms with free cash flows (high cash flows and low q) in this sample earn higher announcement-period returns and post-announcement returns than firms that do not have free cash flows. Firms that have free cash flows are in a better position to 'enhance shareholder value' by distributing cash to share holders (by means of share repurchases) than firms that do not have free cash flows. The finding of higher announcement-period abnormal returns for free-cash-flow-firms in this sample thus solidifies support for the free cash flow hypothesis.

We also perform multivariate cross-sectional regression analyses to examine the relationship between the announcement-period abnormal returns and free cash flows of firms, after controlling for variables that may also affect the abnormal returns. The cross-sectional regressions provide robust empirical support for the free cash flow hypothesis even after controlling for other variables that can influence the announcement-period returns.

Table 1
Sample Statistics

The descriptive statistics are based on our sample of repurchasing firms as well as a sample of non-repurchasing firms. Our sample consists of 7,343 repurchase programs that were announced between 1994 and 2007 by 3,389 different firms. Statistics for the non-repurchasing group are based on 57,357 firm years for 8,879 firms which were listed on the NYSE, AMEX, or the NASDAQ, and for which all the required data were available on Compustat. The variables are defined as follows:

Tobin's *q* ratio = (Market Value of Equity + Preferred Stocks + Debt)/Total Assets;
Cash Flow=Operating Income Before Depreciation - Interest Expense - Taxes - Preferred and Common Dividends;
Market Value of Firm = Market Value of Equity + Book Value of Liabilities;
Earnings Available for Common = Earnings Before Extraordinary Items – Preferred Dividends – Deferred Taxes;
Aggregate Dividends = Common Dividends + Preferred Dividends + Stock Repurchase;

Variables	Non-repurchasing Firms (*N* = 57,357)		Repurchasing Firms (*N* = 7,343)		t-statistics for the Differences in Mean
	Mean	Median	Mean	Median	
Tobin's *q*	2.03	1.20	1.53	1.08	12.87*
Cash flow ($ mil)	230.68	12.55	295.97	33.3	-4.70*
Cash flow/Total assets	0.0023	0.0430	0.0699	0.0667	-23.65*
Market value of firm ($ mil)	8,280.02	490.24	9,983.75	938.21	-2.93*
Earnings available for common stockholders ($ mil)	197.17	8.92	276.48	23.52	-5.04*
Return on assets (%)	-3.56	2.34	3.93	3.58	-22.66*
Aggregate dividends ($ mil)	96.98	0.76	166.10	4.68	-4.99*
Firms paying cash dividends (%)	40.11	0	57.44	1	-27.93*

* Significant at less than 1%

Table 2
Average Announcement-Period Abnormal Returns for Repurchasing Firms Sorted by Tobin's *q* ratio and Cash Flows

The sample is divided into quartiles based on Tobin's *q* and cash flows. High *q* firms have *q* ratios that are greater than or equal to one. High CF firms are those with ratios of cash flow to total assets that are above the median for the sample. We calculate daily abnormal returns using the standard market model. For the parametric test, the Patell test Z-values and p-values are reported. For the non-parametric test, the ratios of positive to negative returns and the Corrado Rank Test Z-values and p-values are reported.

	Window	Mean CAR	Patell Z	p-value	Positive: Negative	Rank Test Z	p-value
Panel A							
All firms	(-90, -1)	-8.90%	-24.687	<0.0001	0.37:0.63	-6.229	<0.0001
(*N*=7,343)	(0, 2)	2.35%	47.154	<0.0001	0.69:0.31	13.848	<0.0001
	(3, 30)	0.82%	3.506	0.0005	0.53:0.47	2.431	0.0197
Panel B							
1: High CF- High Q	(-90, -1)	-13.62%	-23.519	<0.0001	0.32:0.68	-7.071	<0.0001
(*N* = 3,141)	(0, 2)	2.33%	30.029	<0.0001	0.68:0.32	11.274	<0.0001
	(3, 30)	0.56%	1.369	0.1711	0.53:0.47	1.721	0.0862
2: High CF-Low Q	(-90, -1)	-3.82%	-4.227	<0.0001	0.42:0.58	-2.936	0.0035
(*N* = 531)	(0, 2)	3.42%	15.486	<0.0001	0.74:0.26	9.179	<0.0001
	(3, 30)	1.78%	2.66	0.0078	0.57:0.43	2.724	0.0067
3: Low CF-High Q	(-90, -1)	-13.88%	-11.769	<0.0001	0.34:0.66	-5.777	<0.0001
(*N* = 992)	(0, 2)	2.58%	16.567	<0.0001	0.68:0.32	9.128	<0.0001
	(3, 30)	0.85%	1.202	0.2294	0.52:0.48	2.114	0.0351
4: Low CF-Low Q	(-90, -1)	-2.55%	-6.367	<0.0001	0.44:0.56	-3.168	0.0017
(*N* = 2,679)	(0, 2)	2.09%	28.583	<0.0001	0.70:0.30	13.976	<0.0001
	(3, 30)	0.92%	2.414	0.0158	0.51:0.49	1.946	0.0524

Panel C: t-tests for the differences in mean CARs over window (0, 2)

Difference	t-value	p-value
Qrtl 2 - Qrtl 1	4.36	<0.0001
Qrtl 2 - Qrtl 3	2.75	0.0060
Qrtl2 - Qrtl 4	6.41	<0.0001

Table 3
Average Announcement-Period Abnormal Returns for Repurchase Programs with the Stated Purpose of Enhancing Shareholder Value

We focus on repurchase programs whose stated purpose is to "Enhance Shareholder Value" (ESV). We classify this sample into two groups: firms that have free cash flows (cash flow to total assets ratio higher than the sample median, and Tobin's *q* below one) and all other firms. Daily abnormal returns are calculated using the standard market model. For the parametric test the Patell test Z-values and p-values are reported. For the non-parametric test the ratios of positive to negative returns and the Corrado Rank Test Z-values and p-values are reported.

	Window	Mean CAR	Patell Z	p-value	Positive: Negative	Rank Test Z	p-value
All ESV Firms	(-90, -1)	-7.16%	-6.991	<0.0001	0.37:0.63	-3.651	0.0003
(*N* = 1,011)	(0, 2)	2.59%	17.951	<0.0001	0.74:0.26	10.602	<0.0001
	(3, 30)	0.62%	1.092	0.2749	0.52:0.48	1.535	0.1257
ESV & FCF	(-90, -1)	-5.16%	-1.551	0.1211	0.41:0.59	-1.494	0.1359
(*N* = 124)	(0, 2)	4.13%	4.519	<0.0001	0.82:0.18	3.339	0.0009
	(3, 30)	2.58%	1.731	0.0834	0.57:0.43	2.229	0.0264
ESV & No FCF	(-90, -1)	-7.44%	-6.813	<0.0001	0.37:0.63	-3.486	0.0005
(*N* = 887)	(0, 2)	2.38%	17.413	<0.0001	0.74:0.26	10.311	<0.0001
	(3, 30)	0.37%	0.857	0.3914	0.52:0.48	1.248	0.2128

Table 4
Average Announcement-Period Abnormal Returns for Open-market Repurchases and Tender-offer Repurchases Sorted by Tobin's *q* ratio and Cash Flows

The sample is divided into quartiles based on *q* values and cash flows. High *q* firms have *q* ratios that are greater than or equal to one. High CF firms are those with the ratio of cash flow to total assets above the sample median. We calculate daily abnormal returns using the standard market model. For the parametric test, the Patell test Z-values and p-values are reported. For the non-parametric test, the ratios of positive to negative returns and the Corrado Rank Test Z-values and p-values are reported.

	window	Mean CAR	Patell Z	p-value	Positive: Negative	Rank Test Z	p-value
Panel A: Open-market repurchases							
1: High CF-High Q	(-90, -1)	-13.26%	-18.784	<0.0001	0.31:0.69	-6.863	<0.0001
(N = 1,649)	(0, 2)	2.22%	23.209	<0.0001	0.68:0.32	10.445	<0.0001
	(3, 30)	0.67%	0.996	0.3192	0.53:0.47	1.408	0.1599
2: High CF-Low Q	(-90, -1)	-5.70%	-4.538	<0.0001	0.39:0.61	-3.203	0.0015
(N = 257)	(0, 2)	3.23%	11.057	<0.0001	0.74:0.26	7.734	<0.0001
	(3, 30)	1.66%	2.158	0.0310	0.57:0.43	2.013	0.0448
3: Low CF-High Q	(-90, -1)	-14.34%	-9.503	<0.0001	0.32:0.68	-5.54	<0.0001
(N = 411)	(0, 2)	2.55%	12.707	<0.0001	0.69:0.31	8.017	<0.0001
	(3, 30)	-0.19%	0.134	0.8934	0.49:0.51	1.001	0.3173
4: Low CF-Low Q	(-90, -1)	-3.54%	-7.343	<0.0001	0.42:0.58	-3.848	0.0001
(N = 1,486)	(0, 2)	1.92%	22.676	<0.0001	0.70:0.30	12.672	<0.0001
	(3, 30)	0.36%	0.497	0.6169	0.50:0.50	0.925	0.3556

Panel B: Tender-offer repurchases							
1: High CF-High Q	(-90, -1)	0.71%	0.489	0.6251	0.50:0.50	-0.429	0.6684
(N = 108)	(0, 2)	5.27%	17.556	<0.0001	0.88:0.12	5.917	<0.0001
	(3, 30)	1.83%	1.543	0.1229	0.62:0.38	1.701	0.0899
2: High CF-Low Q	(-90, -1)	-1.69%	0.086	0.9315	0.48:0.52	-0.371	0.7110
(N = 29)	(0, 2)	3.31%	5.038	<0.0001	0.72:0.28	1.321	0.1873
	(3, 30)	1.21%	0.555	0.5789	0.52:0.48	1.678	0.0942
3: Low CF-High Q	(-90, -1)	1.45%	0.881	0.3787	0.56:0.44	0.346	0.7296
(N = 50)	(0, 2)	4.09%	8.200	<0.0001	0.81:0.19	2.88	0.0042
	(3, 30)	-1.08%	-0.691	0.4897	0.50:0.50	0.334	0.7389
4: Low CF-Low Q	(-90, -1)	4.72%	2.221	0.0264	0.65:0.35	0.699	0.4849
(N = 87)	(0, 2)	5.39%	14.471	<0.0001	0.87:0.13	6.232	<0.0001
	(3, 30)	-0.08%	-0.347	0.7285	0.48:0.52	0.593	0.5534

Table 5
Cross-sectional Regression Analysis

The dependent variable is the three-day (t = 0 to +2) cumulative abnormal return during the announcement of a repurchase program. The independent variables include: (1) A dummy variable which is equal to1 if a repurchasing firm has free cash flows (cash flows greater than the sample median and Tobin's q less than 1), and 0 otherwise (FCF); (2) cumulative abnormal returns from -90 to -1 (PRECAR); (3) log market value of the repurchasing firm (MV); (4) a dummy for the repurchasing method, which has a value of 1 for tender offer repurchases, and 0 otherwise (TEC); (5) a dummy variable which is 1 if a repurchasing firm paid cash dividends during the previous fiscal year, and 0 otherwise (DIV); (6) the total number of repurchase programs announced by each firm during the sampling period (FREQ); (7) the repurchase program size, which is the authorized number of shares divided by the total number of shares outstanding before the announcement year (SIZE). The numbers in parentheses are the t-statistics.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	0.0304 (41.64)*	0.0499 (28.72)*	0.0483 (28.02)*	0.0284 (34.91)*	0.0278 (32.33)*
FCF	0.0057 (3.11)*	0.0033 (2.43)**	0.0031 (2.41)**	0.0072 (3.99)*	0.0070 (3.57)*
PRECAR		-0.0101 (-6.54)*	-0.0094 (-6.06)*	-0.0109 (-6.97)*	-0.01079 (-6.32)*
MV		-0.0034 (-13.95)*	-0.0031 (-12.36)*		
TEC	0.0244 (9.00)*	0.0243 (9.02)*	0.0248 (9.22)*	0.0247 (9.07)*	0.0268 (9.61)*
DIV	-0.0125 (-13.39)*		-0.0070 (-6.95)*		
FREQ		-0.0010 (-5.90)*		-0.0016 (-9.90)*	-0.0015 (-9.11)*
SIZE	0.0001 (5.55)*				0.0001 (5.69)*
F-value	72.69*	93.21*	96.03*	66.48*	56.23*
Adj R^2	0.0342	0.0479	0.0493	0.0278	0.033

* Significant at less than 1%
** Significant at 5%

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Endnotes

[1] Several other theories have also been proposed to explain stock repurchases. Companies may repurchase shares to improve their leverage ratios (Vermaelen, 1981; Bagwell and Shoven,1988), fend off unwanted takeover attempts (Bagwell, 1991), or to counter the dilution effects of employee stock option plans (Fenn and Liang, 2001; Kahle, 2002).

[2] Lang et al. provide a detailed discussion of the advantages and problems associated with this measure. It is important to note that the *q* ratio that we use in this study is an average *q* ratio, and not a marginal *q* ratio. If investment opportunities exhibit declining returns, an average *q* of one implies a marginal *q* below one. However, investment opportunities may not always exhibit declining returns. Thus our identification of firms with free cash flows may not be completely accurate.

[3] The results are not sensitive to the choice of the benchmark market index. In addition, our conclusions remain unchanged when the Fama-French three-factor model is used instead of the market model.

[4] As mentioned earlier Howe, He, and Kao (1992) examine long-run estimates of Tobin's *q* (estimated over three years before the announcement) and reject the free cash flow hypothesis. By contrast, Perfect, Peterson, and Peterson (1995) accept the free cash flow hypothesis using current values of *q*. Perfect et al. (1995) argue that the results are sensitive to different measures of *q*. To test this we re-calculate the average *q* using three years of pre-announcement data. We find that the results are robust with respect to the time horizon over which the *q* values are calculated (the results are available upon request from the authors). This evidence contradicts the conclusions of Perfect, Peterson, and Peterson (1995).

[5] Fewer than 30% of the firms listed in the SDC Platinum database declare purpose of the repurchase programs.

[6] In cases where multiple purposes are listed, the repurchase program is included in the sample if any of the stated purposes is to "Enhance Shareholder Value." Our sample includes 1,011 repurchase programs whose stated purpose is to "Enhance Shareholder Value."

[7] SAS regression diagnostics (ACOV and SPEC) do not show any evidence of heteroskedasticity in the sample.

[8] It is possible to argue that fixed-price and Dutch-auction tender offers convey the strongest credible signals about future prospects of the firm, based on the premise that a signal must be costly to be credible. Rau and Vermaelen (2002) contend that open-market repurchase programs do not convey costly signals to the market because these programs do not signify firm commitments on the part of the management to follow through and actually repurchase the shares. It is costless to announce a repurchase program and to not carry it out later. Thus managers who intend to credibly signal their private information may choose a tender offer over an open market program. Open market repurchase programs are simply authorizations, not firm commitments, which allow managers to repurchase shares at their sole discretion.

[9] The Pearson correlations are 0.391between MV and DIV, 0.284 between MV and FREQ, -0.176 between MV and FCF, and 0.284 between DIV and FREQ.

[10] Jagannathan and Stephens (2003) find that "frequent repurchases are larger, have significantly less variation in operating income, and higher dividend payout ratios. Infrequent repurchases are made by smaller firms with more volatile operating income, lower institutional ownership, and lower market-to-book ratios."

[11] We also separately examine the wealth effect for a subsample of firms that announced only one repurchase program during our sampling period. Perhaps not surprisingly, we find that firms with free cash flows earn the highest announcement-period abnormal returns.

[12] We also perform the regressions separately for a subsample of firms that have free cash flows (high cash flows and low *q*). In these regressions we find that the PRECAR variable is never significant. This indicates that managers of firms with free cash flows may not be attempting to time the market when they announce share repurchase programs.