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Two Essays on Stock Repurchases-The Post Repurchase Announcement Drift: An Anomaly in Disguise? and Intra Industry Effects of IPOs on Stock Repurchase Decisions

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Two Essays on Stock Repurchases-The Post Repurchase Announcement Drift: An Anomaly in Disguise? and Intra Industry Effects of IPOs on Stock Repurchase Decisions

by

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Abstract

We reexamine the stock price drifts following open-market stock repurchase announcements by differentiating actual repurchases from repurchase announcements and by controlling for the repurchasing firms' earnings improvement in the announcement year relative to the prior year. Our results show that only firms that actually repurchase their shares exhibit a positive post-announcement drift. More importantly, we find that these repurchasing firms have the same post-announcement drift as their matching firms that have similar size and earnings performance but do not repurchase. Further analysis indicates that the post-repurchase announcement drift is not a distinct anomaly but the well-documented post-earnings announcement drift in disguise. In addition, previous studies suggest that the market perceives IPOs as bad news (i.e., competitive threats) to existing firms in the same industry. At the same time, the market has a tendency to be overly optimistic about IPO prospects, especially during hot IPO markets. Thus, the negative industry rival reaction could be the result of investors' over-optimism toward the IPOs' growth prospects and underestimation of the competitive positions of industry rivals. Our findings show that rival firms use repurchases as a means to signal their firm quality, as well as to correct the market's overreaction to the bad news. These IPO-induced repurchases are stronger when the rival firms are in a concentrated industry and experienced poor stock performance in the previous year.

The Post Repurchase Announcement Drift: An Anomaly in Disguise?

1. Introduction.

Numerous studies have provided evidence of long-term return anomalies following important corporate events[1]. In particular, some studies find that the stock market slowly reacts to information delivered by certain corporate events, leading to abnormal returns up to five years following major corporate events. This observation strongly challenges the informational efficiency of stock markets.

However, Fama (1998) argues that these anomalies are chance results, or due to incorrect methodologies such as incorrect statistical methods and bad model problems. As a result, most long-term return anomalies tend to disappear with reasonable changes in methodologies or with out-of-sample tests. Schwert (2003) further reviews anomalies and concludes that they seem to have disappeared in recent years. Along similar lines, Liu, Szewczyk, and Zantout (2008) report that after controlling for the earnings announcement drift, there is no evidence of price drift following dividend reductions or dividend omission announcements. In particular, Liu et al. (2008) argue that earnings performance and dividend payout are positively related to each other, and dividend reductions or omissions might be the result of a firm's earnings deterioration. As predicted, they find that, on average, the dividend reduction or omission firms actually do not

[1] For example, self-tender offer (Lakonishok and Vermaelen, 1990), stock repurchase (Ikenberry, Lakonishok and Vermaelen, 1995; Peyer and Vermaelen, 2008), mergers (Agrawal, Jaffe and Gershon, 1992), spinoffs (Cusatis, Miles and Woolridge 1993), dividend initiation and omission (Michaely, Thaler and Womack 1995), new exchange listings (Drahan and Ikenberry, 1995), earnings announcement (Bernard and Thomas, 1990), and IPOs (Loughran and Ritter, 1995, Chan, Kalok, Junbo, Wang, John Wei, 2004).

underperform their benchmark firms that have a similar level of earnings deterioration in the announcement year. Their conclusion is that the observed price drift following dividend reduction or omission announcements is actually driven by the earnings announcement price drift first found by Ball and Brown (1968) and later confirmed by Bernard and Thomas (1990) and Chan, Jegadeesh and Lakonishok (1996).

Motivated by their interesting findings, this paper reexamines the stock price drift following open-market stock repurchase announcements first found by Ikenberry, Lakonishok, and Vermaelen (1995) (hereafter ILV). In particular, ILV (1995) find that the market underreacts to information conveyed by the repurchase announcements. This underreaction leads to an average of 12.1% (45.3% for 'value' stocks) buy-and-hold abnormal return for four years after repurchase announcements. Chan, Ikenberry, Lee (2004, 2007) attribute the positive long-run abnormal returns following repurchase announcements to the market's incomplete initial reaction to the earnings information conveyed by the repurchase announcements and to the managers' market timing skills. On the other hand, Peyer and Vermaelen (2008) argue that the drift is a correction of the market's overreaction to bad news prior to the repurchase.

The finding by Liu et al. (2008) that the post-dividend announcement drift is actually driven by the post-earnings announcement drift leads us to question the existence of the repurchase drift. Specifically, we want to examine whether the post-earnings announcement drift is also an underlying force behind the repurchase drift. Previous studies find evidence of a strong connection between repurchase activities and earnings performance. In particular, Skinner (2008) finds that repurchases have become substitutes for cash dividends and increasingly absorb the variation in earnings. In addition, he notes that the relation between earnings performance and repurchases is getting stronger, while the relation between earnings performance and dividend has become

weaker. Vermaelen (1981), Dann, Masulis, and Mayers (1991) and Bartov (1991), among others, find significant earnings improvement in the repurchase announcement year and less improvement in the two years after. Moreover, Lie (2005) distinguishes actual repurchases from repurchase announcements and concludes that only firms that actually buyback their stock experience earnings improvement. Similarly, Yook (2010) looks at stock performance and finds that only actual repurchase firms exhibit positive post-announcement abnormal returns. Taken together, the above evidence suggests that repurchase announcements, especially actual repurchases, are associated with earnings improvement and this association is more profound in the announcement year. This connection leads us to conjecture that the repurchase drift is not a distinct anomaly but the earnings drift in disguise. To our knowledge, none of the previous studies consider this alternative explanation when examining the repurchase drift.

While dividends and repurchases are widely viewed as alternative payout methods, the motivations behind these two different types of payout can differ significantly. Thus, we cannot simply infer that the earnings announcement drift also drives the repurchase announcement drift. For example, repurchases are often used for non-payout reasons such as signaling undervaluation, manipulating EPS, optimizing capital structure, offsetting the dilutive effects of stock option exercises, and exploiting tax advantages, among others. In addition, compared to dividends, repurchases are notoriously known for a lack of commitment, giving managers considerable flexibility in determining when and how many stocks they are going to repurchase. Moreover, repurchase announcements are followed by a positive drift, while dividend reduction/omission announcements are followed by a negative drift. Thus, the underlying explanations behind the dividend omission drift and the repurchase drift may not be the same.

In this study, we first document the existence of the repurchase drift for the group of firms that actually buyback their stocks, and then we examine if this drift still exists after taking into account the effect of the earnings drift. In particular, we examine 6,311 repurchase announcements from 1988 to 2010. Our results from the calendar-time approach with Fama-French three factors confirm the existence of a positive drift following repurchase announcements made by the actual repurchasing firms. Specifically, the average monthly abnormal return of these repurchasing firms is 0.314% or 17.21% for four years after the announcement. On the other hand, we do not observe any drift following the announcements made by the non-repurchasing firms, consistent with Yook (2010). Similarly, we also find the drift for the actual repurchasing firms using the matching method based on common benchmarks such as Size, Size-Industry, Size-B/M, and Size and Past Performance. Specifically, the four-year buy-and-hold abnormal return ranges from 13.6% to 25.7%, depending on the matching criteria. However, the drift becomes smaller and less significant when matching by pre-announcement earnings performance (EarningsΔ) and disappears when matching by both Size and EarningsΔ. These findings are not confined to any particular sub-periods, such as the bubble or financial crisis years, nor are they limited to any particular terciles based on Size, B/M, past performance, or EarningsΔ. As a robustness check, we subtract the monthly return of the matching firm based on Size and EarningsΔ from the monthly return of the repurchasing firm and then estimate the average monthly abnormal return using the calendar-time approach. The results show that all the alphas are insignificant, meaning there is no drift following repurchase announcements after simultaneously controlling for the effects of Size, B/M and EarningsΔ.

This study contributes to the literature in the following ways. First, we shed light on whether the well-documented repurchase announcement drift is a distinct anomaly or just the

earnings announcement drift in disguise. Second, we document that the earnings change in the repurchase announcement year is a significant determinant of the post-repurchase performance, distinct from other previously known factors such as firm size, book-to-market, past stock performance, or market risk change. Third, our findings have implications for other types of documented long-run anomalies that may appear to exist only due to the lack of proper controls.

The remainder of this paper is organized as follows. Section II describes the sample selection and statistical description. Section III examines the post-announcement long-term abnormal stock return. Section IV presents robustness checks. Section V shows the cross-sectional regression analysis. Section VI presents the conclusions.

2. Sample Selection and Description.

We obtain the sample of open market stock repurchase announcements from the Securities Data Corporation (SDC) Mergers and Acquisitions database. Our sample of repurchase announcements span from January 1988 through December 2010. The sample excludes repurchase announcements from utilities and financial firms and deal values less than one million dollars. If a firm has more than one announcement in one year, we only retain the first announcement since the subsequent announcements are more likely duplicate announcements. Repurchase firms need to have data for computing returns at least one year after the announcement (Center for Research in Security Prices) and have sufficient data for accounting variables (from Standard and Poor's Compustat). Our final sample has 6,311 repurchase announcements from 2,854 firms.

Following Yook (2010), we divide the repurchase announcement sample into repurchasing firms and non-repurchasing firms based on the actual repurchases made from the announcement quarter through quarter t+4. Repurchases in each fiscal quarter are computed as Compustat data item PRSTKCY (purchase of common and preferred stock) less any decrease in preferred stock.

Since PRDTKCY is a year-to-date item, we need to convert it to quarterly repurchases. Specifically, each quarterly repurchase, except the first quarter of the fiscal year, is equal to the PRDTKCY of the current quarter minus the PRDTKCY of the previous quarter. Preferred stock is estimated as, in order of preference, data item PSTKCY (redemption value), item PSTKL (liquidating value), or item PSTK (carrying value). We then obtain the total repurchases for the 1-year period as the sum of repurchases from the announcement quarter t to quarter t+4. If a firm's total repurchases for the 1-year period are positive, we define the firm as a repurchasing firm, and as a non-repurchasing firm otherwise.

In Table 1, we present the distribution of the sample repurchase announcements by calendar years and by subsamples based on actual repurchases over a 1-year period. The annual distribution of repurchase announcements is uneven throughout the sample period. In particular, more repurchase announcements occur in the late 1990s than in other periods. Grullon and Ikenberry (2000) previously highlight this surge in repurchase activity, noting that in 1998, for the first time in the history, U.S. corporations distributed more cash to investors through repurchases than through cash dividends.

According to our definition of actual repurchases, 4,603 repurchase announcement firms (or 72.9% of the entire sample) are considered repurchasing firms, consistent with Yook (2010). We see more firms classified as repurchasing firms since 2000. In 2008, 463 (7.3%) announcements were made, but only 65% actually repurchased their stock.

Table 2 presents the descriptive statistics for the entire sample of repurchase announcement firms as well as for the two subsamples defined by actual repurchases. Size is measured as the market value of equity in the month prior to the repurchase announcement. On average, the repurchasing firms are larger than non-repurchasing firms. The repurchasing firms also have a

higher B/M value of equity ratio than that of the non-repurchasing firms, suggesting that repurchasing firms are more undervalued compared to the non-repurchasing firms. This is intuitive and consistent with the most cited reason for repurchase, which is undervaluation. EarningsΔ is the percentage change in earnings before extraordinary items (IB in COMPUSTAT) in the announcement year relative to the prior year. Table 2 shows that, on average, repurchasing firms exhibit higher EarningsΔ in the announcement year compared to non-repurchasing firms. Performance is measured as the monthly compounded return for 12 months prior to the repurchase announcement month. The mean prior return of repurchasing firms is 9%, as compared to 11% for non-repurchasing firms. Peyer and Vermaelen (2007) find that the pre-announcement performance of repurchasing firms is negatively related to the post-announcement returns.

Grullon and Michaely (2004) find that repurchasing firms experience a decrease in systematic risk after repurchase announcements. We measure the change in systematic risk (RiskΔ) as the beta estimate for the [+30, +250] window minus the beta estimate for the [-250, -30] window using the market model. We observe an average decrease of 0.09 and 0.10 in the systematic risk for repurchasing firms and for non-repurchasing firms, respectively. Real_RP is a dummy variable which receives a value of one if the firm actually repurchases stock and zero otherwise. As shown previously in Table 1, 73% of the firms that announce repurchases actually proceed with implementing the repurchase. The three-day Car [-1, +1] around the repurchase announcement is 2%, consistent with previous studies.

3. Long-term Abnormal Returns after Repurchase Announcements.

a. Long-term abnormal stock returns using the calendar-time methodology.

We use the calendar-time method to compute the long-run abnormal returns following repurchase announcements for the entire sample of repurchase announcement firms and for two

subsamples defined by the actual repurchase. The calendar-time portfolio method is recommended by Fama (1998) and has been broadly used in long-term event studies such as Loughran and Ritter (1995), Brav and Gompers (1997), Boehme and Sorescu (2002), and Liu et al. (2008). For every month, we calculate the equally weighted returns for the portfolio of all firms that made a stock repurchase announcement during the preceding 12, 24, 36 or 48 calendar months. Then, we estimate the portfolio's monthly abnormal returns (α_p) using the Fama and French (1993) three-factor model as follows:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_p (R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + e_{p,t}$$

where $R_{p,t}$ is the return of the event portfolio in month t; $R_{f,t}$ is the 1-month U.S. Treasury bill rate in month t; $R_{m,t}$ is the return on the value-weighted index of all NYSE, AMEX, and NASDAQ listed stocks in month t; SMB_t is the difference between the returns on portfolios of small and big stocks in month t; and HML_t is the difference between the returns on portfolios of high and low B/M value of equity ratio in month t. The intercept α_p is the monthly abnormal return of the event portfolio of 12, 24, 36, or 48 months.

The results from the calendar-time approach with Fama-French three factors confirm the existence of positive abnormal returns following repurchase announcements for the entire sample of repurchase announcement firms. In particular, based on the Fama-French three-factor model, the average monthly abnormal return for one, two, three, and four years after the announcement is 0.312% (significant at the 5% level), 0.327%, 0.315%, and 0.306% (all significant at the 1%), respectively. However, as expected, these results are strongly driven by the subsample of firms that actually repurchase. The average monthly abnormal returns of the repurchasing firms are similar to those of the entire sample in terms of magnitude and level of significance. On the other hand, the intercept for the subsample of non-repurchasing firms is not significant in any of the

periods. This evidence is consistent with findings by Yook (2010) that only firms with actual repurchases show positive abnormal returns following the announcements.

Panel B of Table 3 shows the results of a four factor model, including the momentum factor suggested by Jegadeesh and Titman (1993). When including the momentum factor, the monthly abnormal returns of the repurchasing firms become even larger and more significant. Specifically, the average monthly abnormal return over the 4 years following the announcement for repurchasing firms is 0.50% (significant at 1% level), or 27% monthly compounded for 4 years. The monthly abnormal returns for non-repurchasing firms are not significant for all durations.

b. Buy-and-hold abnormal stock returns using the matching method.

The abnormal performance of repurchase announcement firms is measured as the mean difference in the stock price performance between the repurchase announcement firms and the matching firms over buy-and-hold periods that extend from 1 to 4 years following the announcement. The non-event benchmark firms are chosen using the following matching criteria: (1) firm size, which is measured as the market value of equity in the month prior to the repurchase announcement; (2) firm size and industry, based on the two digit SIC code from the CRSP database; (3) size and book to market value of equity (B/M is measured as of the end of the fiscal year prior to the announcement date); (4) size and performance (performance is measured as the monthly compounded return in the 12 months prior to the repurchase announcement month); (5) earningsΔ, which is the percentage change in earnings before extraordinary items (IB in COMPUSTAT) in the announcement year relative to the prior year; and (6) size and EarningsΔ. In matching by size (by EarningsΔ), we require that the size (EarningsΔ) of the matching firm be between 60% and 140% of the market value of equity (EarningsΔ) of the repurchase announcement firms. For matching by size and B/M, we select the matching firm which has the smallest difference

in B/M from all firms which have size between 60% and 140% of the market value of equity of the repurchase announcement firms. Similar procedures are applied for matching by size and performance, and by size and EarningsΔ. If a matching firm is delisted, we replace it by the next-best matching firm. The matching firms cannot have any repurchase announcements 4 years before to 4 years after the event year.

Table 4 summarizes the outcome of our procedure for matching the repurchase announcement firms with non-repurchase matching firms based on the four matching criteria above. For each matching criteria, the event firms and the matching firms are very close, by design. On average, when not matched by EarningsΔ, the repurchase firms have higher earnings performance than their matching firms

After matching the repurchase announcement firms with their benchmark firms, we follow Barber and Lyon (1997) in computing the holding period abnormal return for a firm as: $BHAR_{(i,a,b)}=\prod_{t=a}^{b}(Rit+1)-\prod_{t=a}^{b}(Rmt+1)$,where $BHAR_{(i,a,b)}$ is the buy-and-hold abnormal return for event firm i over the holding period from a to b, R_{it} is the return on stock i in month t, and R_{mt} is the return on the matching firm in month t. The buy-and-hold average abnormal returns (BHAAR) are measured from 12 months up to 48 months following the announcement. If an event firm is delisted before the end of a holding period, we keep its returns and replace the missing values by the matching firm's returns. The BHAR is winsorized at the 1 and 99 percentiles. We use both t-tests and Wilcoxon tests to determine statistical significance.

Table 5 presents the results of the buy-and-hold method matching by different criteria. When controlling for firm size, size and industry affiliation, size and B/M, or size and past performance, the buy-and-hold abnormal returns are positive and significant for the entire sample and for the subsample of repurchasing firms. Specifically, the average four year buy-and-hold

abnormal return for the repurchasing firms is in a range of 13.6% to 25.7% and is strongly significant at the 1% level in both parametric t-tests and non-parametric Wilcoxon tests. This result confirms the appearance of a positive post-repurchase announcement drift found by our calendar-time approach in the previous section, as well as in the prior repurchase literature. However, when we control for the earnings change effect, the average abnormal return for repurchasing firms becomes smaller and less significant. Specifically, when controlling for earnings change only, the average four year buy-and-hold abnormal return is around 8% for the entire sample and 15% for the subsample of repurchasing firms, both significant at the 5% level. Furthermore, when we control for the combination effect of size and earnings change, the abnormal returns are small and insignificant for the entire sample as well as for the subsample of repurchasing firms. Thus, these results indicate that controlling for both size and earnings performance is a key in understanding post-repurchase performance.

Throughout our analysis, the post-repurchase announcement drift observed from the calendar-time method and from the matching method based on non-earnings related criteria is significantly weakened when using a matching method based on EarningsΔ. Previous studies show that repurchases are associated with improvement in earnings performance in the announcement quarter, and up to 8 quarters following the announcements (Bartov (1991), Chan et al. (2004), Lie (2005), Gong et al. (2008)). Thus, our findings suggest that the post-repurchase announcement drift using the calendar-time method and matching methods based on non-earnings related criteria may be the post-earnings announcement price drift first found by Ball and Brown (1968) and confirmed by Bernard and Thomas (1990), and Chan et al. (1996). Our result indicates that firms that repurchase their stock have the same post-event returns as firms that have similar size and earnings performance but do not repurchase their stocks.

4. Robustness Tests.

The association between the repurchase drift and earnings performance might be confined to a specific period or significantly influenced by macro-economic conditions such as the bubble years (1999-2001) or financial crisis years (2007-2009). In order to address these concerns, we divide our sample period into sub-periods, 1988-2000; 2001-2010 and a sub-period without the bubble years and crisis years. We then reapply the calendar-time method and the matching method to estimate the post announcement abnormal returns for repurchasing firms during the three sub-periods. The reason we focus on the group of repurchasing firms is that only this group exhibits positive drift after the announcements.

Panel A of Table 6 shows the average monthly abnormal returns for repurchasing firms using the calendar-time method. Although the magnitude of the abnormal returns is higher during the 2001 through 2010 period, all three sub-periods show statistically significant positive drift.

Panel B presents the results of the matching method. A similar conclusion can be made for each sub-period as in the case for the entire sample period shown in Table 5. In particular, after controlling for the size effect and earnings performance effect, the buy-and-hold abnormal returns are insignificant in the sub-periods, suggesting that there is no independent repurchase drift.

Previous studies document that the long-run abnormal returns following repurchase announcements are driven by small firms, by "value" firms, or by firms with poor performance in the year prior to the announcement year (ILV (1990, 1995); Peyer and Vermaelen (2008), Bradford (2008), and Yook (2010), among others). To examine whether our previous conclusion on earnings performance and repurchase drift is confined to any particular group of repurchasing firms, we further stratify the sub-sample of repurchasing firms based on size terciles, B/M terciles,

performance terciles, and EarningsΔ terciles and then reapply the calendar-time method and the matching method based on size and EarningsΔ for each tercile. [2]

As shown in Table 7, the small firm tercile has the largest average monthly abnormal return compared to the medium and large size terciles. In particular, the average monthly abnormal return for 4 years is 0.823%, 0.374% and 0.233% for the small, medium, and large size terciles, respectively. This result is consistent with the findings from previous studies which document that price drift is more profound in small firms. However, the result of the matching method by size and earnings shows that the buy-and-hold abnormal returns are insignificant for all size terciles. Similarly, for the B/M terciles, the high B/M tercile, or the "value" firm tercile, experiences the largest abnormal return when using the calendar-time approach. However, the result from the matching method shows that the abnormal return disappears for all B/M terciles when controlling for the size and earnings performance of repurchasing firms.

We also divide the repurchase firms based on their pre-repurchase performance, based on Peyer and Vermaelen's (2007) observation that prior performance is negatively related to post-announcement repurchase performance. Our evidence supports their findings. In particular, the monthly abnormal return for 4 years for low, medium and high performance terciles is 0.377%, 0.154%, and 0.313%, respectively. Again, after controlling for size and earnings, the buy-and-hold returns become insignificant for all terciles. Finally, for the earnings terciles, the high earnings tercile seems to have higher abnormal returns using the calendar-time approach, but abnormal

[2] We put firms into size terciles based on their sizes relative to the sizes of all Compustat/CRSP firms in the month prior to the announcement month. Similarly, firms are put into B/M terciles based on the B/M ratio at the fiscal year-end prior to the announcement relative to the B/M ratio of all Compustat firms. A firm's performance tercile is based on their performance (measured as monthly compounded returns for 12 month prior to the announcement months) relative to all firms in that month. Firms are divided into EarningsΔ terciles based on their EarningsΔ (measured as the percentage change in earnings before extraordinary items (IB in COMPUSTAT) of the announcement year relative to the prior year) relative to all firms in that month.

returns are all insignificant across the earnings terciles using the matching method by size and earnings. Overall, our conclusion above that the post-repurchase announcement drift is driven by the post-earnings announcement drift holds for all repurchasing firms regardless of its size, B/M, performance, or earnings.

As another robustness check of the role of earnings performance in explaining the post-repurchase announcement drift, we reapply the calendar method with the Fama-French three factors after controlling for the earnings performance effect. The motivation for this test is that the calendar-time approach, unlike the matching method using earnings performance, does not control for the earnings performance of the event firms. As our previous evidence shows, we need to control for earnings performance to see whether the post-repurchase announcement drift is not actually the post-earnings announcement drift. In particular, following Liu et al. (2008), we compute the excess monthly returns by subtracting returns of matching firms based on earnings from returns of the repurchase event firms. We then create a rolling portfolio using the excess monthly returns and use the Fama-French three-factor model to estimate the abnormal return on the portfolio. As shown in Table 8, after controlling for the earnings performance of repurchase firms, we find no evidence of significant abnormal returns for all durations. This finding supports our conclusion that the post-repurchase announcement drift is actually driven by the post-earnings announcement drift based on matching methods as well as calendar-time methodology.

The empirical evidence so far indicates the importance of taking into account the firm's earnings performance in the announcement year in order to examine whether the post-repurchase announcement drift is a distinct anomaly. In the next step, we examine the role of earnings performance in determining the post-repurchase announcement abnormal returns together with other factors that have been documented as significant determinants of the post-repurchase

announcement abnormal returns. In particular, we run a cross-sectional regression of the size adjusted buy-and-hold abnormal returns for one through four years (BHARi, i=1,2,3,4) after repurchase announcement on earnings performance, EarningsΔ , the actual repurchase dummy, and other well-documented determinants including size, book-to-market, prior year return, systematic risk changes, and market returns. We control for changes in macro-economic condition by including the adjusted market return. We run the following cross-sectional regressions for BHAR1 through BHAR4.

For columns (1), (3), (5), and (7):

$$\mathbf{BHAR_i = Intercept + \beta_1 Earnings\Delta_i + \beta_2 Real\_RP_i + \beta_3 AdjSize_i + \beta_4 B/M_i + \beta_5 Performance_i + \beta_6 Risk\Delta_i + \beta_7 Market_i + e.}$$

For columns (2), (4), (6) and (8) we add the interaction term between Earnings and Real_RP dummy:

$$\mathbf{BHAR_i = Intercept + \beta_1 Earnings\Delta_i + \beta_2 Earnings\Delta_i c Real\_RP_i + \beta_3 Real\_RP_i + \beta_4 AdjSize_i + \beta_5 B/M_i + \beta_6 Performance_i + \beta_7 Risk\Delta_i + \beta_8 Market_i + e.}$$

Table 9 shows that the coefficients of the Earnings□ variable are positive and significant for all regressions even after controlling for other relevant factors. This finding supports our argument that earnings performance in the announcement year plays a role in the post-announcement stock performance. This finding is also consistent with the logic that the market underreacts to the earnings improvement in the announcement year, leading to a post-earnings announcement drift. Except for the market variable, which is insignificant, the other independent variables are significant and have the expected signs. In particular, real repurchases are associated with higher long-run abnormal returns. Small firms, "value" firm, and firms with poor past performance are more likely to be undervalued and exhibit a positive abnormal return in the post-announcement periods.

The coefficients of the interaction term are positive and significant, except for in model (8). These findings suggest that firms that experience an increase in earnings performance in the announcement year and actually repurchase shares in the 1-year period following the announcement exhibit larger long-run abnormal returns. In sum, our results indicate that, in addition to other well-known factors such as size and book-to-market, earnings performance and actual repurchase activity are two important factors in explaining abnormal returns following-repurchase announcements.

5. Conclusion.

Fama and French (2001) show that in recent years more firms have chosen to distribute earnings increases through repurchases. Also, Skinner (2008) reports that the relation between repurchases and earnings performance has become stronger while the relation between dividends and earnings performance has become weaker. In addition to this evidence, numerous studies document an improvement in earnings following repurchase announcements of firms that actually buy back their stock (Dann et al. (1991), Bartov (1991), Lie (2005) among others). Thus, it is possible that the post-repurchase announcement drift might be a result of the market's underreaction to the earnings improvement in the repurchase announcement year. In other words, the post-repurchase announcement drift might be driven by the well-known post-earnings announcement price drift.

This paper reexamines the post-repurchase announcement drift found by Ikenberry, Lakonishok and Vermaelen (1995) by differentiating actual repurchases from repurchase announcements and by taking into account the repurchasing firms' earnings improvement in the announcement year relative to the prior year.

Using both the calendar-time approach and the matching approach with buy-and-hold return methodology, we find that only firms that actually repurchase their stocks exhibit post-announcement price drift, consistent with Yook (2010). More importantly, we find that these repurchasing firms show similar post-announcement returns as their matching firms that have similar size and earnings performance but do not repurchase. This evidence supports our argument that the post-repurchase announcement drift is not a distinct anomaly but is actually the well-documented post-earnings announcement drift found by Ball and Brown (1968) and Ball and Brown (1968) and recently confirmed by Bernard and Thomas (1990) and Chan, Jegadeesh and Lakonishok (1996).

This conclusion is not limited to any specific subperiod, or to bubble or crisis years, nor is it driven by any specific group of firms based on characteristics such as size, B/M, prior year stock performance, or earnings performance. The percentage change in earnings from the repurchase announcement year relative to the prior year, along with firm size, play a key role in explaining the post-repurchase announcement performance. These findings suggest that the well-documented repurchase drift is actually the post-earnings announcement drift in disguise.

Intra Industry Effects of IPOs on Stock Repurchase Decisions

1. Introduction

Prior research has observed that IPOs may pose a competitive threat for rival firms in the same industry. In particular, Hsu, Reed, and Rocholl (2010) find that rival firms experience negative stock price reactions to completed IPOs in their industries, equivalent to an average loss of -$3.27 million for an incumbent firm around the IPO event. New IPOs prompt investors to reevaluate the competitive conditions in the industry and to recognize the possible competitive advantages possessed by the newly-public firm. As Hsu et al. note, these advantages for newly-public firms may include the improved access to financing, their recent certification by underwriters, and their valuable knowledge capital, in comparison with incumbent firms. In line with this logic, empirical evidence by Slovin, Sushka, and Ferraro (1995) shows that rival firms suffer a negative CAR of -0.93% during the two day window of an IPO announcement in the same industry. Akhibe, Borde, and Whyte (2003) also find evidence of the negative impact of IPOs on industry rivals for large IPOs in competitive industries.[3] In further support of the competitive effects of IPOs, Hsu et al. find that the operating performance of industry rivals declines following a large IPO in the industry.

While the market may view IPO firms as strong new competitors in the industry, ample evidence suggests that investors tend to be overly enthusiastic about the growth prospects of

[3] In examining all IPOs, both large and small, Akhibe et al. (2003) do not find a general valuation effect for industry rivals in response to IPOs.

newly-public firms, especially during hot IPOs markets.[4] Specifically, previous studies find evidence consistent with the misvaluation hypothesis. Ritter (1991) suggests two possible explanations for IPO misvaluation, and the subsequent long-run underperformance of IPOs: Investors tend to be overly optimistic about the future expected earnings of young growth firms during IPO periods, and firms capitalize on these "windows of opportunity". Similarly, Loughran and Ritter (1995) argue that investors might give high valuations to IPOs at the time of going public because they "believe that they have identified the next Microsoft." Ritter and Welch (2002) also find empirical evidence that IPOs are overpriced on the first day and have poor stock performance in the long-run. Over three years, the average IPO underperformed the market by 23.4 percent and underperformed size and book-to-market matched firms by 5.1 percent. Purnanandam and Swaminathan (2004) provide evidence that IPOs were about 14% to 50% overvalued at the offer price compared to their industry peers. They argue that the overvaluation is caused by IPO investors paying too much attention to optimistic growth forecasts and too little attention to current profitability in their assessment of IPO value.

Given the often overly optimistic market sentiment towards IPOs and the negative market inferences regarding rival firms' diminished competitive positions, rival firm managers may believe the damage to their stock price is unwarranted. These rival firms may choose to use repurchases as a means to signal firm-quality and to correct the market's overreaction to the bad news (i.e., the competitive threat caused by the IPO), especially during hot IPO markets. In line with this logic, Peyer and Vermaelen (2009) argue that stock repurchases may be the firm's response to investors' overreaction to analysts' downgrade recommendations during the 6 months prior to the repurchase announcement. Dudley and Manakyan (2011) further provide evidence that

[4] For example, see Ritter, 1991, Loughran and Ritter, 1995, Jain and Kini, 1994, Mikkelson and Shah, 1994, and Purnanandam and Swaminathan (2004), among others.

firms use stock repurchases in order to support their stock prices due to widespread selling by mutual funds experiencing large capital outflows. Vermaelen (1981) concludes that "…repurchase announcements make the market more efficient by allowing firms to correct mispricing of their securities".

Our results show that rival firms increase their repurchases in the presence of the incoming competitive threat from IPOs. In particular, tobit models show that a rival firm increases its share repurchase volume by around 15%, on average, when faced by the competitive effects of IPOs in the same industry. Moreover, if the firm has experienced poor stock performance in the previous year and is in a concentrated industry, its repurchase volume increases by about 29.2%. The results of probit models show that the repurchase probability of a rival firm increases by about 11.1%, on average, during IPO waves in the industry. The probability of repurchase increases to about 37.1% for poorly performing rival firms in high concentration industries.

Overall, this paper contributes to several different streams of literature. First, the results highlight a new motivation behind the repurchase decision. In particular, the evidence shows that firms strategically use repurchases to support their stock prices in the presence of the perceived competitive threat caused by large number of IPOs in the industry. The effects are stronger for rival firms with poor stock performance in the previous year and those in concentrated industries. The effects are independent of economic conditions and not driven by the internet bubble years. Second, the findings highlight a previously unrecognized link between two different corporate events, IPOs and repurchases. Furthermore, this study contributes to the literature examining the intra-industry effects of corporate decisions by not only examining the stock price impact on rivals, but also the impact on rival firm decisions.

The remainder of this paper is structured as follows. Section 2 is a brief literature review

on motivations for stock repurchases. Section 3 presents descriptions of sample data and variables. Section 4 includes summary statistics and univariate tests. Section 5 presents results of tobit and probit regressions and robustness checks. A brief conclusion follows.

2. Motivations for Stock Repurchases.

Why do firms buy back their stock? The literature has presented a long list of motivations to answer the question, and the reasons are not mutually exclusive. Given the many dimensions of the repurchase decision, this list is likely not complete. Nevertheless, the following discussion reviews the most common reasons for stock repurchases.

Agency cost of free cash flow hypothesis:

Because of the separation between ownership and control in large corporations, managers of firms which have unnecessarily high free cash flows might pursue sub-optimal projects at the expense of shareholders. The market will impose an agency cost on these firms. Managers of these firms might mitigate the agency cost problem by paying out excess cash through stock repurchase or dividend (Jensen, 1986). Stephen and Weisbach (1998) find that stock repurchase is positively related to both expected and unexpected cash flows, and Dittmar (2000) also finds a connection between repurchases and excess cash. Grullon and Michaely (2004) find evidence that the market reaction to repurchase announcements is more positive for those firms that are more likely to overinvest, consistent with the prediction of the free cash flow hypothesis.

Cash flow signaling hypothesis.

Managers might have some positive information about their firms' future earnings that may not be available to the public. Because of this information asymmetry, stock prices of those firms might be undervalued. The managers of these firms might send a credible signal of their optimism about the firms' earnings prospects by paying out through a dividend or repurchase

program (e.g., Vermaelen, 1981; Miller and Rock, 1985 among others.) Bartov (1991) finds there are positive unexpected annual earnings in the repurchase announcement year, and analysts upwardly revise the earnings forecast at the repurchase announcement dates. On the contrary, Grullon and Michaely (2004) use a much larger sample and find no evidence that analysts revise their earnings forecasts upward around the repurchase announcements and only a weak evidence of earnings improvements during the announcement year. In comparing the post-event operating performance of repurchasing firms with that of non-repurchasing firms with similar pre-event characteristics, Lie (2005) finds that repurchasing firms actually improve post-event operating performance relative to their control firms with similar pre-event characteristics. He further concludes that the improvement is restricted to firms which actually repurchase in the announcement quarters.

Undervaluation signaling (or market timing) hypothesis.

The undervaluation motive is so far the most commonly cited motivation for the repurchase decision. This hypothesis argues that managers might signal their disagreement with how the market prices their firms based on existing public information. In line with the use of repurchases to signal undervaluation, Ikenberry, Lakonishok, and Vermaelen (1995) find excess returns of 12.14% over the four year post-repurchase period for their entire sample of 1,208 repurchase announcements. More importantly, the results show that "value" firms, which are more likely to be undervalued, experience significant abnormal returns of 45% over the four year post-repurchase period, compared to an insignificant -4.31% for "growth" firms. Other studies also find evidence of undervaluation as a common motivation for repurchase (e.g., Stephens and Weisbach, 1998; Chan, Ikenberry and Lee, 2004)

Mimicking hypothesis.

Massa et al. (2007) argue that when a firm repurchases its shares, this announcement will send a positive signal about itself and a negative signal about its rival firms in the same industry. Therefore, the rival firms will also execute repurchase programs to mitigate this negative signal.

Liquidity provision hypothesis.

Hong, Wang, and Yu (2008) argue that firms can act as "buyers of last resort" when their share prices drop far below fundamental value. They find that firms with fewer financial constraints execute repurchase programs to support their stock prices during hard times. This increases the liquidity for the stocks and decreases stock volatility over time. Dudley and Manakyan (2011) lend some support for this argument by documenting that a firm will repurchase its stock when the stock price is under selling pressures caused by financially constrained mutual funds.

Overreaction to bad news hypothesis.

More recently, Peyer and Vermaelen (2009) uncover a new possible motivation for the stock repurchase decision. They find evidence that firms use stock repurchases as responses to market overreaction to bad news prior to the repurchase i.e., significant analyst downgrades combined with overly pessimistic forecasts of long-term earnings. [5]

In a similar vein, we propose a new, related motivation for repurchases. Specifically, we examine whether firms repurchase their stock as a reaction to the competitive threat posed by strong IPO activity within the industry.

3. Data and Variable Descriptions.

The data used in this paper comes from the following sources. Repurchase data and other

[5] Other well-known reasons for stock repurchases include the following: dividend substitution, capital structure adjustment, tax savings, takeover defense, option funding, and earnings bump. These reasons do not have direct relevance to our study so we do not review this literature to conserve space.

accounting control variables are from Compustat's annual data over the period from 1988 to 2011[6]. IPO-related data are obtained from the Securities Data Corporation (SDC) New Issues Database. We start with the full set of firms in Compustat. Following the repurchase literature, we then exclude utilities, financial firms, ADRs, and firms in the financial crash year of 1987.

We also exclude tender-offers and privately negotiated repurchases because they are different from open-market repurchases in terms of flexibility and costs. We require that data be available for repurchase variables and control variables. Data for computing stock returns are from the Center for Research in Security Prices (CRSP) monthly returns. Our final sample includes 35,445 firm-year observations of 5,678 firms and spans from 1988 to 2011.

Following Dittmar and Dittmar (2008) and Yook (2010), I measure dollar repurchases for each year as the yearly repurchase of common and preferred stock (prstkc) less any decrease in preferred stock. Preferred stocks are measured as, in order of preference, redemption value (pstkr), liquidating value (pstkl), or carrying value (pstk). According to Banyi, Dyl, and Kahle (2008), this way of measuring actual repurchases is the most accurate method, especially when many repurchases are used to mitigate the dilutive effects of employee stock options. In the tobit models, we use Percent repurchases as the dependent variable, which is equal to dollar repurchases at year t divided by market value of stock at the end of year t-1. In the probit models, we use a Rp_dummy as a dependent variable equal to one when a firm repurchases at least 0.25% of its market value of equity and zero otherwise. Previous studies choose the cut-off point in the range of 0.25% to 1% to screen for significant or real repurchase activity. Our findings do not change if we vary the

[6] Compustat starts recording repurchase data since 1986. We require that firms have return data in the past twelve months so we lose repurchases in 1986. Following previous studies, we exclude 1987 due to financial crash.

cutoffs from 0 to 1%.[7] Table 10 shows an annual distribution of firms in the sample based on their repurchase activity. Out of 35,445 firm-year observations, we classify 16,719 (or 47%) as repurchasers and 18,729 (or 53%) as non-repurchasers. The lowest level of repurchase activity occurred during the early 1990's, while the strongest repurchase activity occurred during the stock market bubble period in the late 1990's as well as from 2006-2008.

Following the IPO literature, we exclude unit offers, REITs, closed-end funds, banks and S&Ls, ADRs, IPOs not listed on CRSP within six months of issuing, and IPOs from utility and financial industries. We then merge our Compustat's repurchase data with SDC's IPO data based on fiscal year and three-digit SIC code industry in order to have data for IPO related variables.

For our main variable, we use different approaches to capture the market's perception of the competitive threats on the incumbent firms as a result of a large number of IPOs in the same industry in a short period of time. First, for each fiscal year, we count the number of IPOs (Total_IPOs) which occur in the previous six months in the same three-digit SIC code industry with the incumbent firm. We argue that the more IPOs entering the industry will lead to a stronger perception of the competitive threats to the existing firms. In addition, as Ritter (1991), and Baker and Wurgler (2006, 2007) point out, firms decide to go public when market sentiment is high and, thus, IPO volume is positively related to the degree of market sentiment. To capture the competitive threat of an IPO wave, we create a High_IPOs dummy variable which receives a value of one when Total_IPOs is in the top 20th percentile and zero otherwise. Second, given that some industries may have more firms than other industries, the effect of one IPO on a small industry may be much stronger than on a much larger industry. Thus, we create a relative measure of total

[7] Dittmar (2000) and Bonaime and Ryngaert (2013) use the cut-off point ranging from 0.25% to 1% of a firm's market value of equity. Stephens and Weisbach (1998) show that the mean and median target repurchase are 7% and 5%, respectively.

IPOs, Adjusted IPOs, which is defined as Total_IPOs divided by the number of existing firms in the industry. Similarly, we create a dummy variable, High_AdIPOs which equals one when the IPOs_Pct is in the top 20th percentile of Adjusted_IPOs distribution and zero otherwise. Third, the competitive impact of IPOs on rival firms might not only be captured by the number of IPO events but also by the total proceeds from the new issues. Akhigbe, Borde and Whyte (2003) and Hsu et al. (2010), among others, argue that the use of proceeds will increase the competitiveness of IPOs, since new issuing firms will use proceeds to reduce its debt burden or to finance expansions in businesses. Using proceeds to measure the impact of IPOs on competitive conditions within the industry also reduces the problem of counting the number of IPOs, which may include very small IPOs - "penny" IPOs. Our Total_Proceeds variable is measured as the sum of proceeds of all IPOs which occurred in the previous six months and then scaled by the market capitalization of the industry. The dummy variable, High_Proceeds, equals one if it is in the top 20th percentile of the Total_Proceeds distribution and zero otherwise. Finally, previous studies show that the number of IPOs and IPO first-day returns are both positively related to market sentiment (e.g., Ritter (1991), Lowry and Schwert (2002), Baker and Wrugler (2006, 2007)), so we use the first-day return of IPOs as an alternative measure for the competitive threat of IPOs on rival firms during hot IPO markets. Following Ritter's website, we compute both the equally weighted first-day returns (RIPO_E) and the proceeds weighted first-day returns (RIPO_P) at the industry level. We then create a dummy variable, High_RIPO_E (High_RIPO_P) which takes a value of one if RIPO (RIPO_P) is above its mean and takes a value of zero otherwise. We expect that the coefficients of our proxies for the IPO competitive threat to be positive and significant in both tobit and probit models, showing rival firms repurchase more to support their stock prices under pressure caused by a large number of new entrants.

Control variables:

We include several other explanatory variables to control for other hypothesized reasons for repurchases. For example, previous studies have shown that a firm's past performance has a significant impact on the firm's buyback decision. In particular, Comment and Jarrell (1991), Stephens and Weisbach (1998), Peyer and Vermaelen, 1999, and Dudley and Manakyan (2011) find empirical evidence that a firm's repurchases are negatively related to its prior stock price performance. Following Dittmar (2000), we compute the firm's market-adjusted return as the return of the previous year minus the return of the CRSP equally-weighted portfolio. We include this variable in our regressions to control for the effect of the perceived undervaluation in the previous year on its repurchase activity.

We also control for market-to-book and size. Dittmar (2000) argues that firms with greater investment opportunities (high market-to-book) may be reluctant to pay out cash in the form of repurchases even if the stock is undervalued; they are more likely to have other investment options that would be more profitable than investing in the firm's stock. To control for firm size, we use the log of lagged sales. Size is often considered as a proxy for information asymmetry. Vermaelen (1981) shows that small firms face more information asymmetry than large firms, leading to a larger likelihood of undervaluation for small firms. In contrast, Dittmar (2000) finds that large firms are more likely to repurchase if they are undervalued, suggesting that undervaluation is also prevalent for large firms as well.

Previous research also finds a positive relationship between a firm's repurchases and its cash position. In particular, Stephens and Weisbach (1998) find that managers use repurchases to distribute unexpected cash flows. In a similar vein, Guay and Harford (2000) document that managers use repurchases to distribute transient cash flows and use dividends to payout more

permanent cash flows. Dittmar (2000) and Dudley and Manakyan (2011) have shown that a firm's cash flow position is positively related to both the probability of repurchases and the size of repurchases. Following Dudley and Manakyan (2011), we include two cash-related variables, Cash holdings and Cashflows, in our regressions in order to control for the effect of cash on firm repurchases. The details of these variables are described in the appendix.

Additionally, firms may use share repurchases as a means to adjust their capital structure (Bagwell and Shoven (1988) and Opler and Titman (1994)), so we include the Debt/Equity ratio, measured as long-term debt divided by equity, in our regressions. Following Massa et al. (2007), we also include other control variables which have been documented as playing a role in firm payout decisions such as operating income, non-operating income, capital expenditures, price-earnings ratio (P/E), and dividend ratio. All of the control variables are measured at time t-1. Definitions of the variables are in the appendix.

Previous studies find that intra-industry effects are stronger in concentrated industries (Lang and Stulz (1992), Massa, Rehman and Vermaelen (2007), among others). We conjecture that a rival firm in a concentrated industry is more likely to buy back its stock in the presence of strong IPO activity in its industry, as compared to a firm in a less concentrated industry. Following Massa et al. (2007), we use the Herfindahl Index to measure the degree of concentration in each industry. The Herfindahl index is measured as the sum of the squares of market shares of all the firms in a particular industry for a particular year. Market share is defined as the total sales of the firm in a given year divided the total sales of the industry in the year.[8] The value of this index is bounded between zero and one, where the value of zero is for industries with the highest level of competition and the value of one is for industries with the highest level of monopoly power.

[8] The industry is defined at the three-digit SIC code from CRSP

To test the effect of IPO waves on the repurchasing activities of rival firms, we first run basic tobit and probit models, without interaction terms between the IPO_threat variable and either the Concentration or the Past_return variable.

Tobit: Rp_Percentage$_t = \beta_0 + \beta_1$**IPO_threat**$_{t-1} + \beta_3$**Control variables**$_{t-1}$ + **Year Dummies** + **Industry Dummies.**

Probit: Rp_dummy$_t = \beta_0 + \beta_1$**IPO_threat**$_{t-1} + \beta_3$**Control variables**$_{t-1}$ + **Year Dummies** + **Industry Dummies.**

Because the coefficients of the tobit or probit model have no direct interpretation, we report the marginal effect of a one standard deviation change in a regressor while holding all other regressors at their means. This is accomplished by standardizing all continuous regressors to have a zero mean and a standard deviation of one[9]. The marginal effects for the binary regressors are evaluated as the effect of moving from a value of 0 to a value of 1. In the above regressions, β_1 will measure the marginal effect of the competitive threat of IPOs on the repurchase activities of rival firms. We expect that β_1 will be positive and significant after controlling for other factors, suggesting that IPO's competitive threat increases the probability as well as the volume of repurchases of rival firms.

In the next step, the IPO competitive threat variable is interacted with the Concentration variable and with the Past_ return variable. In the regressions specified below, the sum of β_1, β_2 and β_3 represents the effect of the IPO's competitive threat on the rival firm's repurchase decision when both the Past_return and concentration are one standard deviation from their means, holding other variables at their means.

Tobit: Rp_Percentage$_t = \beta_0 + \beta_1$**IPO_threat**$_{t-1} + \beta_2$**IPO_threat**$_{t-1}$**cConcentration**$_{t-1}$+

[9] Marginal effects are computed following Ai and Norton (2003) and Norton and Wang, and Ai (2004)

β_3**IPO_threat**$_{t-1}$c**Past return**$_{t-1+}$ β_4**Concentration**$_{t-1}$ + β_5**Past return**$_{t-1}$ +β_6 **Control variables**$_{t-1}$ + **Year Dummies** + **Industry Dummies**

Probit: Rp_dummy$_t$ = β_0+ β_1**IPO_threat**$_{t-1}$ + β_2**IPO_threat**$_{t-1}$c**Concentration**$_{t-1}$+ β_3**IPO_threat**$_{t-1}$c**Past return**$_{t-1+}$ β_4**Concentration**$_{t-1}$ + β_5**Past return**$_{t-1}$ +β_6 **Control variables**$_{t-1}$ + **Year Dummies** + **Industry Dummies**

Since repurchase activities vary by year and by industry, we use year and industry fixed effect in all of the regressions. In addition, a firm might repurchase multiple times, so we also cluster standard errors by firm to account for the within-firm correlation of residuals across years.

4. Descriptive Statistics and Univariate Tests.

Table 2 provides descriptive statistics for all variables used in this paper. The unconditional mean of the repurchase ratio is 0.47, consistent with Massa et al. (2007). On average, a firm repurchases about 2.8% of its market value of equity. The average number of IPOs in the previous six months (Total_IPOs) is around 2, and the maximum is 24 IPOs[10]. The means values for IPO first day returns are around 17%, which is similar to the first day returns reported on Ritter's IPO database website.

In Table 11, we present the results of the univariate test for repurchasers and non-repurchasers. By design, the repurchasers buyback their shares more often than the non-repurchasers do. Specifically, repurchasers, on average, bought back $203.9 million, or 5.6% of their market value, while non-repurchasers only bought back $6.6 million, or 0.19% of their market value. The mean differences for IPO related variables and IPO dummies are positive and significant, showing stronger IPO activity prior to repurchase events. This initial finding is consistent with our conjecture that the competitive threat of IPOs could play a role in repurchase

[10] The 20th percentile of Total_IPOs as the benchmark for High_IPOs dummy is 6 IPOs.

decision of the rival firms.

The market-adjusted past return of the average repurchaser is 3%, which is less than one third of the past returns of the average non-repurchaser. This evidence supports the undervaluation hypothesis which states that firms are more likely to buyback their shares when they have been experiencing poor stock performance. This point also emphasizes the importance of controlling for the past return in order to observe the net effect of IPO's competitive threat as well as the interaction term between IPOs' threat and the past return.

In addition, the average repurchaser has a lower dividend ratio and is smaller in both size and market-to-book in comparison with the average non-repurchaser. These observations are also consistent with previous studies (Skinner, 2008, Ikenberry at el, 1995; Peyer and Vermaelen, 2009 among others). The two cash related variables (Cash holdings and Cash flows) tell us that repurchasers hold more cash and have larger cash flow in comparison with non-repurchasers, in line with prior studies.

In Table 12, we present the correlation matrix of our measurements for IPO's competitive threat. These alternative measurements are highly positively correlated, as expected. This consistency in the different measures suggests that they are good proxies for strong IPO activity even though they are created using different aspects of the IPO events such as number of IPOs, total proceeds, or first-day returns.

5. Decision to Repurchase.

a. Tobit model:

Table 13 reports the marginal effect of tobit models with different measures for IPOs' competitive threats. The dependent variable is Rp_Percentage, which is the dollar repurchases at year t divided by the market value of stocks at year t-1, bounded between zero and one. The

variable of interest is the dummy variable, IPO_threat, which is represented by different measures. The coefficient of this dummy variable measures the average increase in the repurchase percentage of a rival firm caused by the IPOs' threat in the industry.

The results provided in Table 14 show that the coefficients of the IPO_threat are significantly positive and within the range of 0.41 to 0.62. Given the unconditional mean of repurchase percentage of 2.75% (in Table 2), this result implies an increase of about 15% in the repurchase percentage of the rival firm in the presence of competitive threats from IPOs. This effect holds after controlling for other variables which have been documented as determinants of repurchase decisions. The coefficients of past return, size, and B/M are negative and significant at the 1% level for all of our five specifications. The two cash-related variables have positive and significant coefficients, as expected. The other variables have signs which are consistent with previous studies, including Dittmar (2000), Massa et al. (2007), and Dudley and Manakyan (2011).

Prior research has shown that a firm's past stock performance and the degree of concentration of the firm's industry have a significant impact on the firm's buyback decision (Comment and Jarrell (1991), Stephens and Weisbach (1998), Peyer and Vermaelen, 1999, and Dudley and Manakyan (2011) among others). In the next step, we create an interaction variable between our dummy variable for IPOs threat and the Past_return variable in order to examine whether poorly performing rival firms intensify their repurchase activity in the presence of competitive threats from IPOs in the industry. In addition, we also interact our IPO_threat variable with the Concentration variable to examine the role of industry structure and the degree of concentration in determining the intra-industry impact of IPOs' threat on rival firms' repurchase decisions.

Table 15 reports the marginal effects of our tobit models with the two interaction variables.

The results show that the coefficients of the interaction term between the IPO threat dummy and the Concentration variable, IPO_threatcConcentration, are positive and significant for all specifications. These findings indicate that a rival firm in a concentrated industry repurchases more than a firm in a less concentrated industry in the presence of a competitive threat from IPOs.

Moreover, for all of our specifications, the coefficients of the interaction term between IPO_threat and the Past_return variable are negative and strongly significant at the 1% level. The negative sign of this interaction term suggests that a rival firm will buy back its shares even more in the presence of competitive threat from IPOs if the rival has had poor stock performance in the prior year. The sum of β_1, β_2, and β_3 is equal to the marginal effect of IPOs' competitive threat on the repurchase percentage of a rival firm with a previous year return that is one standard deviation below its mean, and an industry concentration that is one standard deviation above its mean. Specifically, Table 6 shows that the rival firm whose past return is one standard deviation below its mean and whose industry concentration is one standard deviation above its mean increases its repurchase percentage by 0.80 in the presence of competitive threats from IPOs. [11] Given the unconditional mean of repurchase percentage is 2.75%, this is equivalent to a 29.20% increase in the repurchase percentage of the rival firm. The coefficients on other control variables are similar in both magnitude and sign to those on Table 5.

b. Probit model:

In this section we use the probit model to estimate the probability that the rival firm repurchases its stock in the presence of IPOs' competitive threats. The dependent variable is a binary variable, Rp_dummy, which equals one when a firm repurchases at least 0.25% of its market value of equity. Similar to the tobit models, we also run the probit models using different

[11] Computed by using data on the High_IPOs column as an illustration, 0.4583+0.1324c1+(-0.2131)c(-1)=0.8038

measures of the competitive threats of IPOs.

Table 16 reports the marginal effects of the probit models. The coefficients of IPO_threat are significantly positive for all specifications and in the range from 0.052 to 0.078. Given the unconditional probability of repurchasing is 0.47, this suggests that the probability that the rival firm will buy back its stocks in the presence of competitive threats from IPOs increases by at least 11.06%.[12] The coefficients for Size, M/B and Past_return are negative and significant as expected, and consistent with results of tobit models.

Table 17 reports the marginal effects of probit models with the two interaction variables. These results are consistent with those of the tobit models in the previous section. Specifically, the coefficients of the interaction term between the IPO_threat dummy and the Concentration variable, IPO_threatcConcentration, are positive and significant for all specifications. This finding suggests that, when faced with competitive threats from IPOs, a rival firm in a concentrated industry is more likely to repurchase its shares than a firm in a less concentrated industry. In addition, the interaction term between IPO_threat and the Past_return, IPO_threatcPast_return is negative and significant at the 1% level of confidence, suggesting that the probability of repurchasing stock in response to the competitive threats caused by IPOs is even higher if the rival firm has been experiencing poor stock performance in the previous year. In particular, the results from Table 8 shows that rival firms whose previous year return is one standard deviation below its mean and the level of industry concentration is one standard deviation above its mean increase its probability of repurchasing shares by around 0.17 in the presence of competitive threats from IPOs in the industry. With an unconditional probability of repurchase of 0.47, this result indicates that the probability that a poorly performing rival firm in a concentrated industry will buyback its stock

[12] 0.052/0.47=0.1106 or 11.06%

increases by about 37.1%. This reflects a 26% increase in the probability of repurchase compared to the case where the rival firm has an average stock performance and is in an industry with an average level of concentration. The coefficients for other control variables are similar to the findings in Table 7.

In examining corporate financing waves, Dittmar and Dittmar (2008) look at the aggregate patterns of equity issuances, repurchases, and mergers and find interesting linkages among these events. In particular, they find that repurchases are positively correlated with both equity issuances and mergers at the aggregate level. The correlation between repurchase and equity issuance activity is 90%. This result seems inconsistent with the market-timing explanation which predicts a negative correlation between equity issuance waves and repurchases waves. They observe that both equity issuance waves and repurchase waves are reactions to a common stimulus, GDP growth. Specifically, both repurchases and issues tend to increase over an economic expansion and decrease over an economic contraction. Growth in issues tends to occur in earlier stages of the cycle than growth in repurchases because, in the early stage of the cycle, firms are in greater need of funds to finance their relatively strong investment opportunities.[13]. In the later stages, firms experience excess cash and will distribute it through stock repurchases. Even though we control for the effects of the firm's cash flow position in the regressions, we want to examine whether the impacts of IPO waves on the rival firms' repurchasing behavior are influenced by business cycles as pointed out by Dittmar and Dittmar (2008). To address this issue, we stratify our sample period into expansion and contraction periods using the National Bureau of Economic Research (NBER)'s definition and re-run our regressions.[14] In addition, since the sample period includes the

[13] This pattern has been confirmed by Rau and Stouraitis (2011) as well.

[14] National Bureau of Economic Research (NBER) defined recessionary economies as in July 1981 –Nov 1982, July 1990 –Mar 1991, March 2001–Nov 2001, and Dec 2007 – June 2009. Because our repurchase data is per year, we

internet bubble years of 1999 and 2000, during which many IPOs took place, we need to control for this time period. In addition, Grullon and Michaely (2002) also point out that during the same time period, 1999 and 2000, share repurchases, for the first time in history, became more common than dividends. While we control for year effect in our regressions, we re-run our regressions using a sample without observations in 1999 and 2000.

Table 18 reports the marginal effects of the tobit models for the three subsamples. We only report the results for High_IPOs dummy to save space since our other measures for IPO_theat provide similar results. The results from Table 9 show that, on average, the effects of IPOs' competitive threats on rival firms' repurchases are somewhat stronger in the expansionary period; however, these effects are still statistically and economically significant in the contractionary period as well. In particularly, given the IPOs' competitive threat within the last six months, the rival firm will increase its repurchases by about 0.48 (or 18.6%) in recessionary economy and by about 0.52 (or 18.9%) in an expansionary economy. Moreover, if the rival firm's previous year return is one standard deviation below its mean and its industry concentration is one standard above its mean, the repurchase volume will increase by about 0.66 (or 24.0%) in a recessionary economy and by about 0.77 (or 28.0%) in an expansionary economy. For the subsample without the two bubble years, 1999 and 2000, we reach similar conclusions as those with the full sample.

Table 19 reports the marginal effects of the probit models for the same three subsamples. Again, only the results for High_IPOs dummy are reported to save space. Similar to the tobit results, the findings from Table 10 show that the effects of IPOs' competitive threats on rival firms' probability of repurchases are stronger in the expansionary period, but still significant in the contractionary periods as well. More specifically, in response to the IPOs competitive threats,

consider the entire year as recession year, i.e., 1981, 1982, 1990, 1991, 2001, 2007, 2008 and 2009 are considered recession years.

the rival firm will increase its probability of repurchase by about 0.05 (or 10.6%) if the economy is in recession, and by about 0.07 (or 14.9%) if the economy is in expansion. These effects are even more pronounced for firms with poor return performance in the prior year and for firms in high concentration industries, consistent with our previous findings. Similar to the results of the tobit model for the subsample without the two bubble years, 1999 and 2000, the results of the probit model for this subsample are very close to the results for the entire sample, indicating that our previous conclusions are not driven by the two bubble years.

Overall, these results provide robust evidence that firms may strategically use repurchases in response to the competitive threats associated with IPO waves in their industry. In documenting this competitive-based motivation for repurchases, these findings further highlight the complexity of the repurchase decision.

6. Conclusion

The goal of this paper is to examine whether rival firms use repurchases as a strategic reaction to the competitive effects of IPOs in the same industry. We find that rival firms increase their repurchases in response to the competitive threats caused by a large number of IPOs in the industry during the previous six months. The intensity of repurchase activities depends on the rival firm's previous year stock performance and the level of concentration in its industry. In particular, the rival firm's repurchase is negatively related to its previous year return and positively related to the level of concentration in its industry. Overall, our paper provides evidence that firms strategically use repurchases in response to the competitive threats associated with IPOs in their industry. Thus, these findings highlight a previously unrecognized motivation behind the repurchase decision. Also, this paper adds intriguing new evidence on intra-industry signaling by showing that certain events such as IPOs can affect not only rival firm stock prices, but also rival

firm decisions. Furthermore, our paper provides insight on the sequence of equity issuance and repurchase waves documented in Dittmar and Dittmar (2008), by showing that IPO waves can provoke repurchases within the same industry.

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Appendix A:

Table 1: Distribution of Open-Market Stock Repurchase Announcements from 1988 to 2010

The OMR announcements are obtained from the Securities Data Corporation (SDC) Mergers and Acquisitions database from 1988 to 2010. The sample excludes announcements from utilities and financial firms and those with deal value less than one million dollars. If a firm has more than one announcement in one year, we only keep the first announcement. Our final sample has 6,311 repurchase announcements from 2,854 firms. Following Yook (2010), repurchasing firms (non-repurchasing firms) are firms that have positive (zero) repurchases from announcement quarter through quarter t+4.

Year	Full sample	%	Repurchasing firms	%	Non-repurchasing firms	%
1988	103	1.6%	71	68.9%	32	31.1%
1989	201	3.2%	150	74.6%	51	25.4%
1990	298	4.7%	165	55.4%	133	44.6%
1991	121	1.9%	80	66.1%	41	33.9%
1992	195	3.1%	134	68.7%	61	31.3%
1993	198	3.1%	141	71.2%	57	28.8%
1994	281	4.5%	187	66.5%	94	33.5%
1995	288	4.6%	207	71.9%	81	28.1%
1996	381	6.0%	278	73.0%	103	27.0%
1997	410	6.5%	307	74.9%	103	25.1%
1998	640	10.1%	446	69.7%	194	30.3%
1999	417	6.6%	310	74.3%	107	25.7%
2000	260	4.1%	180	69.2%	80	30.8%
2001	207	3.3%	137	66.2%	70	33.8%
2002	165	2.6%	124	75.2%	41	24.8%
2003	145	2.3%	104	71.7%	41	28.3%
2004	229	3.6%	185	80.8%	44	19.2%
2005	270	4.3%	224	83.0%	46	17.0%
2006	247	3.9%	206	83.4%	41	16.6%
2007	372	5.9%	318	85.5%	54	14.5%
2008	463	7.3%	301	65.0%	162	35.0%
2009	167	2.6%	134	80.2%	33	19.8%
2010	253	4.0%	214	84.6%	39	15.4%
Total	**6,311**	**100.0%**	**4,603**	**72.9%**	**1,708**	**27.1%**

Table 2: Summary Statistics

Table 2 presents the descriptive statistics of the full sample and for subsamples based on whether a firm actually repurchases. Size is measured as the market value of equity in the month prior to the repurchase announcement. B/M is the book-to-market value of equity, measured as of the end of the fiscal year prior to the announcement date. EarningsΔ is the percentage change in earnings before extraordinary items (IB in COMPUSTAT) of the announcement year relative to the prior year, or (EarningsΔ) = $[(IB_t - IB_{t-1})/IB_{t-1}]$, where year t is the repurchase announcement year. Performance is measured as the monthly compounded return for 12 months prior to the repurchase announcement month. Risk change (RiskΔ) is the change in the systematic risk of the firm, measured as the beta estimate for the [+30, +250] window minus the beta estimate for the [-250, -30] window using the market model. Real_RP is a dummy variable equal to 1 if the firm is a repurchasing firm, and 0 otherwise. Repurchasing firms (non-repurchasing firms) are firms whose total repurchases from announcement quarter through quarter t+4 are positive (zero). The quarterly repurchases are measured as adjusted $PRSTKCY_t$ – any decrease in preferred stock. Preferred stock is measured as, in order of preference, PSTKRV (redemption value), PSTKL (liquidating value), or PSTK (carrying value). Car [-1, +1] is the cumulative abnormal return for the three day window [-1, +1] around the repurchase announcement, using the market model.

	Full sample [6,311]				**Repurchasing Firms [4,603]**				**Non-repurchasing Firms [1,708]**			
	P5	**Mean**	**P95**	**SD**	**P5**	**Mean**	**P95**	**SD**	**P5**	**Mean**	**P95**	**SD**
Size (Mil.)	26	2,136	15,807	4,004	29	2,492	15,807	4,345	26	1,176	6,145	2,664
B/M	0.07	0.53	1.48	0.38	0.08	0.55	1.48	0.36	0.07	0.48	1.48	0.40
EarningsΔ	-2.36	0.13	3.03	0.00	-1.71	0.19	3.00	1.07	-2.36	-0.03	1.28	3.00
Performance	-0.41	0.10	0.66	113.32	-0.41	0.09	0.66	0.33	-0.41	0.11	0.66	0.38
RiskΔ	-1.00	-0.09	0.74	0.56	-0.94	-0.09	0.71	0.53	-1.17	-0.10	0.85	0.63
Real_RP	0.00	0.73	1.00	0.44	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Car [-1,1]	-0.08	0.02	0.15	0.09	-0.08	0.02	0.14	0.08	-0.10	0.03	0.19	0.10

Table 3: Post-Repurchase Announcement Calendar-Time Factor Model Regressions

For every month, we calculate the equally weighted returns for the portfolio of all firms that made a stock repurchase announcement during the preceding 12, 24, 36 or 48 calendar months. In panel A, we estimate the portfolio's monthly abnormal returns (αp) using the Fama and French (1993) three-factor model $R_{p,t} - R_{f,t} = \alpha_p + \beta_p (R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + e_{p,t}$. In panel B, we estimate the portfolio's monthly abnormal returns (αp) using Fama and French (1993) three-factor model and the momentum factor: $R_{p,t} - R_{f,t} = \alpha_p + \beta_p (R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + u_p UMD_t + e_{p,t}$. $R_{p,t}$ is the return of the event portfolio in month t; $R_{f,t}$ is the 1-month U.S. Treasury bill rate in month t; $R_{m,t}$ is the return on the value-weighted index of all NYSE, AMEX, and NASDAQ listed stocks in month t; SMB_t is the difference between the returns on portfolios of small and big stocks in month t; and HML_t is the difference between the returns on portfolios of high and low B/M value of equity ratio in month t. UMD_t is the average of the returns on two (big and small) high prior return portfolios minus the average of the returns on two low prior return portfolios in month t. The intercept α_p is the monthly abnormal return of the event portfolio of 12, 24, 36, or 48 months. The statistical significance of each of the average abnormal monthly returns is tested using the parametric t-test. a, b, c denote significance at the 1, 5, and 10% levels, respectively, in two-tailed test.

Panel A: Calendar-Time Portfolio method with the Fama-French three factors

	Full sample				**Repurchasing firms**				**Non-repurchasing firms**			
	1 yr	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**
Alpha(%)	0.312	0.327	0.315	0.306	0.313	0.332	0.331	0.314	0.307	0.312	0.324	0.282
t-stat.	2.41b	2.88a	3.00a	2.87a	2.54b	2.95a	3.28a	3.30a	1.37	1.51	1.68c	1.37
Beta	1.025	1.013	1.008	1.008	0.964	0.971	0.970	0.972	1.168	1.131	1.128	1.130
t-stat.	33.53a	36.98a	38.91a	39.85a	33.02a	37.11a	39.22a	40.23a	25.56a	29.94a	31.21a	32.12a
s	0.577	0.602	0.611	0.604	0.496	0.524	0.537	0.536	0.776	0.791	0.807	0.792
t-stat.	14.61a	17.01a	18.27a	18.49a	13.16a	15.53a	16.82a	17.17a	13.16a	16.22a	17.29a	17.44a
h	0.266	0.287	0.300	0.318	0.227	0.276	0.306	0.327	0.345	0.304	0.278	0.291
t-stat.	6.20a	7.45a	8.23a	8.94a	5.54a	7.50a	8.81a	9.63a	5.37a	5.73a	5.48a	5.89a
N	276	276	276	276	276	276	276	276	276	276	276	276
R^2	0.86	0.88	0.89	0.89	0.85	0.88	0.89	0.89	0.84	0.84	0.85	0.86

Panel B: Calendar-Time Portfolio method with the Fama-French three factors and momentum factor.

	Full sample				Repurchasing firms				Non-repurchasing firms			
	1 yr	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**
α_p(%)	0.558	0.556	0.533	0.507	0.528	0.523	0.522	0.501	0.584	0.600	0.531	0.481
t-stat.	5.30a	5.90a	5.90a	5.74a	5.01a	5.60a	5.81a	5.79a	1.47	1.59	1.72c	1.91c
Beta	0.920	0.918	0.921	0.923	0.873	0.887	0.893	0.898	1.032	1.010	1.012	1.012
t-stat.	35.28a	39.42a	41.20a	42.24a	33.49a	38.38a	40.24a	41.25a	24.79a	30.26a	31.73a	33.27a
s	0.586	0.610	0.619	0.612	0.504	0.532	0.544	0.542	0.788	0.802	0.817	0.803
t-stat.	18.48a	21.54a	22.77a	23.02a	15.91a	18.93a	20.14a	20.49a	15.57a	19.77a	21.08a	21.71a
h	0.166	0.196	0.216	0.237	0.140	0.196	0.233	0.256	0.215	0.188	0.167	0.178
t-stat.	4.67a	6.18a	7.11a	7.95a	3.94a	6.22a	7.71a	8.65a	3.79a	4.14a	3.85a	4.31a
u	-0.255	-0.229	-0.211	-0.206	-0.222	-0.203	-0.185	-0.179	-0.329	-0.294	-0.282	-0.286
t-stat.	-11.99a	-12.09a	-11.61a	-11.56a	-10.44a	-10.80a	-10.23a	-10.10a	-9.69a	-10.80a	-10.85a	-11.53a
N	276	276	276	276	276	276	276	276	276	276	276	276
R^2	0.91	0.91	0.91	0.93	0.92	0.93	0.92	0.93	0.90	0.90	0.90	0.91

Table 4: Mean and Median Values of Matching Criteria for Repurchase Firms and Matched Firms

The non-event benchmark firms are chosen using the following matching criteria: (1) firm size, measured as the market value of equity in the month prior to the repurchase announcement; (2) firm size and two digit SIC code; (3) size and book to market ratio (B/M is measured as of the end of the fiscal year prior to the announcement date); (4) size and performance (measured as the monthly compounded returns in the 12 months prior to the repurchase announcement month; (5) EarningsΔ, the percentage change in earnings before extraordinary items (IB in COMPUSTAT) of the announcement year relative to the prior year; and (6) size and earnings. For matching by size (by earnings) we require that the size (earnings) of the matched firm be between 60% and 140% of the market value of equity (earnings) of the repurchasing firms. For matching by size and B/M, we select the matched firm which has smallest difference in B/M from all firms which have size between 60% and 140% of the market value of equity of the repurchasing firms. Similar procedures are applied for matching by size and performance; and by size and earnings. If a matched firm is delisted, we replace it by the next-best matched firm. The matched firms cannot have any repurchase announcements 4 years before and 4 years after the event year.

			Size (Mil.$)		B/M		Performance		Earnings	
	N		Mean	Median	Mean	Median	Mean	Median	Mean	Median
Size	6,311	Event firms	2136.14	402.94	0.53	0.40	0.10	0.05	0.13	0.08
	6,311	Matched firms	2100.57	402.66	1.70	0.47	0.08	0.05	-0.28	0.07
Size-Industry	6,311	Event firms	2136.14	402.94	0.53	0.40	0.10	0.05	0.13	0.08
	6,311	Matched firms	2175.52	402.47	1.56	0.41	0.09	0.05	-0.18	0.06
Size-B/M	6,311	Event firms	2136.14	402.94	0.53	0.40	0.10	0.05	0.13	0.08
	6,311	Matched firms	2212.00	392.00	0.52	0.39	0.08	0.05	-0.22	0.09
Size-Performance	6,311	Event firms	2136.14	402.94	0.53	0.40	0.10	0.05	0.13	0.08
	6,311	Matched firms	2127.00	402.32	1.72	0.56	0.10	0.05	-0.11	0.09
ΔEarnings	6,311	Event firms	2136.14	402.94	0.53	0.40	0.10	0.05	0.13	0.08
	6,311	Matched firms	2738.33	475.32	1.14	0.41	0.09	0.04	0.13	0.08
Size-EarningsΔ	6,311	Event firms	2136.14	402.94	0.53	0.40	0.10	0.05	0.13	0.08
	6,311	Matched firms	2013.65	400.23	1.51	0.49	0.09	0.05	0.12	0.08

Table 5: Post-Announcement Long-Term Buy-and-Hold Average Abnormal Returns Estimated Using the Matching Method

The holding period abnormal return is computed using $BHAR_{(i,a,b)}=\prod_{t=a}^{b}(Rit+1)-\prod_{t=a}^{b}(Rmt+1)$, where $BHAR_{(i,a,b)}$ is the buy-and-hold abnormal return for event firm i over the holding period from a to b, R_{it} is the return on stock i in month t, and R_{mt} is the return on the matched firm in month t. The buy-and-hold average abnormal returns (BHAAR) are measured from 12 months up to 48 months following the event. The BHAR is winsorized at the 1 and 99 percentiles. If an event firm is delisted before the end of a holding period, we keep its returns and replace the missing values by the matched firm's returns. We use both t-tests and Wilcoxon tests to determine statistical significance. a, b, c denote significance at the 1, 5, and 10% levels, respectively.

		Full sample [6,311]				**Repurchasing firms [4,603]**				**Non-repurchasing firms [1,708]**			
Matching criteria		**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**
Size	BHAR	0.058	0.100	0.134	0.162	0.065	0.120	0.189	0.245	0.037	0.049	-0.012	-0.056
	t-stat.	8.15a	9.32a	9.77a	10.27a	8.21a	9.92a	12.34a	13.84a	2.52b	2.15b	-0.44	-1.73c
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.21	0.23	0.04
Size-Industry	BHAR	0.053	0.113	0.131	0.151	0.065	0.132	0.198	0.257	0.033	0.047	-0.011	-0.055
	t- stat.	8.17a	9.31a	9.69a	10.18a	8.18a	9.41a	12.61a	13.51a	2.50b	2.17b	-0.46	-1.76c
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.26	0.23	0.04
Size-B/M	BHAR	0.039	0.068	0.099	0.113	0.047	0.085	0.143	0.189	0.018	0.026	-0.014	-0.084
	t- stat.	5.37a	6.29a	7.11a	6.88a	5.73a	6.90a	9.01a	10.13a	1.19	1.14	-0.48	-2.48b
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.20	0.70	0.06
Size-performance	BHAR	0.002	0.040	0.068	0.091	0.012	0.055	0.100	0.136	-0.023	0.001	-0.014	-0.027
	t- stat.	9.11a	5.13a	6.08a	6.70a	6.40a	6.15a	7.72a	8.61a	-6.72a	0.07	-0.63	-1.04
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.79	0.35
EarningsΔ	BHAR	0.025	0.042	0.051	0.080	0.024	0.055	0.099	0.154	0.029	0.007	-0.073	-0.115
	t- stat.	2.06b	2.45b	3.81a	2.51b	2.09b	2.49b	3.42a	2.51b	0.99	0.34	-2.72a	-3.67a
	W-val.	0.03	0.02	0.01	0.03	0.02	0.04	0.01	0.04	0.45	0.68	0.00	0.00
Size-EarningsΔ	BHAR	-0.003	0.013	0.006	0.005	0.001	0.013	0.021	0.021	-0.015	0.014	-0.031	-0.038
	t- stat.	-2.25b	1.74	0.55	0.57	0.86	1.50	1.55	1.30	-5.12a	0.88	-1.39	-1.20
	W-val.	0.00	0.15	0.66	0.93	0.20	0.22	0.13	0.15	0.00	0.46	0.72	0.93

Table 6: Post-Announcement Average Abnormal Returns for Repurchasing Firms in Different Sub-Periods

Table 6 presents the post-announcement average abnormal returns for repurchasing firms only. Panel A shows the abnormal monthly returns estimated using the calendar-time method for sub-periods. The bubble (crisis) years are defined as 1999-2001 and 2007-2009, respectively. For every month, we calculate the equally weighted returns for the portfolio of all repurchasing firms that made a stock repurchase announcement during the preceding 12, 24, 36 or 48 calendar months. In panel A, we estimate the portfolio's monthly abnormal returns (αp) using Fama and French (1993) three-factor model $R_{p,t} - R_{f,t} = \alpha_p + \beta_p (R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + e_{p,t}$. $R_{p,t}$ is the return of the event portfolio in month t; $R_{f,t}$ is the 1-month U.S. Treasury bill rate in month t; $R_{m,t}$ is the return on the value-weighted index of all NYSE, AMEX, and NASDAQ listed stocks in month t; SMB_t is the difference between the returns on portfolios of small and big stocks in month t; and HML_t is the difference between the returns on portfolios of high and low B/M value of equity ratio in month t. The intercept αp is the monthly abnormal return of the event portfolio of 12, 24, 36, or 48.

Panel B shows the buy-and-hold average abnormal returns estimated using the matching method for repurchasing firms only. The holding period abnormal return is computed using $BHAR_{(i,a,b)}=\prod_{t=a}^{b}(Rit+1)-\prod_{t=a}^{b}(Rmt+1)$, where $BHAR_{(i,a,b)}$ is the buy-and-hold abnormal return for event firm i over the holding period from a to b, R_{it} is the return on stock i on month t, and R_{mt} is the return on the matched firm on month t. The buy-and-hold average abnormal returns (BHAAR) are measured from 12 months up to 48 months following the event. The BHAR is winsorized at the 1 and 99 percentiles. If an event firm is delisted before the end of a holding period, we keep its returns and replace the missing values by the matched firm's returns. We use both t-tests and Wilcoxon tests to determine statistical significance. a, b, c denote significance at the 1, 5, and 10% levels, respectively.

Panel A: Abnormal Monthly Returns Estimated Using the Calendar-Time Method for Repurchasing Firms Only

	1988-2000				2001-2010				Exclude Bubble/crisis years			
	1 yr	2 yrs	3 yrs	4 yrs	1 yr	2 yrs	3 yrs	4 yrs	1 yr	2 yrs	3 yrs	4 yrs
α_p(%)	0.265	0.315	0.329	0.296	0.625	0.638	0.640	0.620	0.299	0.311	0.322	0.312
t- stat.	1.63	2.01b	2.52b	2.39b	3.40a	3.58a	3.63a	3.50a	2.47b	2.74a	3.07a	2.77a
Beta	0.973	0.995	0.973	0.962	1.090	1.132	1.146	1.155	0.974	0.966	0.960	0.957
t- stat.	21.35a	23.58a	28.14a	29.01a	28.10a	30.14a	30.80a	30.57a	34.83a	38.11a	38.44a	37.22a
s	0.507	0.602	0.559	0.538	0.693	0.679	0.686	0.684	0.471	0.512	0.516	0.527
t- stat.	10.69a	11.74a	14.84a	10.04a	13.16a	10.16a	10.38a	10.19a	12.22a	15.62a	16.05a	15.26a
h	0.335	0.352	0.392	0.375	-0.217	-0.192	0.306	-0.154	0.256	0.277	0.375	0.426
t- stat.	5.50a	6.15a	8.26a	8.27a	-3.71a	-3.39a	-3.14a	-2.70a	4.69a	7.11a	8.08a	9.18a
N	156	156	156	156	120	120	120	120	156	156	156	156
R^2	0.80	0.82	0.86	0.86	0.92	0.93	0.93	0.93	0.91	0.92	0.92	0.93

Panel B: Post-Announcement Long-term Buy-and-Hold Average Abnormal Returns Estimated Using the Matching Method for Repurchasing Firms Only

		1988-2000 [2,779]				2001-2010 [1,824]				Exclude crisis years [3,074]			
		1 yr	2 yrs	3 yrs	4 yrs	1 yr	2 yrs	3 yrs	4 yrs	1 yr	2 yrs	3 yrs	4 yrs
Size	BHAR	0.076	0.150	0.232	0.304	0.048	0.073	0.122	0.152	0.044	0.086	0.147	0.211
	t-stat.	7.26a	9.29a	11.23a	12.75a	3.97a	4.05a	5.46a	5.90a	4.72a	5.79a	7.79a	9.81a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Size-Industry	BHAR	0.075	0.133	0.241	0.315	0.007	-0.001	-0.054	0.031	0.048	0.080	0.124	0.202
	t-stat.	7.13a	8.10a	10.12a	11.26a	3.94a	4.00a	5.11a	5.57a	4.61a	5.62a	6.12a	9.13a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Size-B/M	BHAR	0.050	0.103	0.177	0.224	0.042	0.055	0.088	0.134	0.027	0.056	0.109	0.149
	t-stat.	4.61a	6.23a	8.37a	8.81a	3.40a	3.11a	3.75a	5.05a	2.82a	3.75a	5.62a	6.56a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Size-performance	BHAR	0.013	0.066	0.124	0.177	0.012	0.037	0.061	0.072	0.013	0.047	0.092	0.137
	t-stat.	5.61a	5.47a	7.00a	8.07a	5.99a	2.88a	3.39a	3.35a	5.27a	4.26a	5.83a	7.08a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EarningsΔ	BHAR	0.024	0.066	0.126	0.191	0.024	0.036	0.057	0.095	0.014	0.026	0.063	0.120
	t-stat.	2.25b	2.38b	3.14a	2.79a	2.00b	2.00b	2.50b	2.37b	1.46	1.74b	2.38b	2.48b
	W-val.	0.02	0.04	0.01	0.04	0.03	0.03	0.00	0.05	0.02	0.01	0.00	0.04
Size- EarningsΔ	BHAR	0.001	0.010	0.018	0.020	-0.005	0.016	-0.011	-0.020	-0.001	0.012	0.007	0.004
	t-stat.	0.73	1.41	1.56	1.20	-0.31	0.73	0.85	0.73	-0.27	0.31	0.44	0.21
	W-val.	0.25	0.19	0.12	0.14	0.22	0.17	0.11	0.12	0.22	0.50	0.72	0.69

Table 7: Post-Announcement Average Abnormal Returns for Repurchasing Firms Divided in Subsamples by Size, B/M, Performance, and Earnings Terciles.

Table 7 presents the post-announcement average abnormal returns for repurchasing firms only, divided in subsamples by Size, B/M, Performance, and Earnings terciles. We place firms into size terciles based on their sizes (measured as the market value of equity in the month prior to the repurchase announcement) relative to the sizes of all Compustat/CRSP firms in the month prior to the announcement month. B/M terciles are based on the B/M ratio of the repurchasing firm at the fiscal year-end prior to the repurchase announcement relative to the B/M ratio of all Compustat firms in that particular year. A firm's performance tercile is based on its performance (measured as monthly compounded returns for 12 month prior to the announcement months) relative to all Compustat/CRSP firms in that month. Firms are divided into earnings terciles based on their EarningsΔ relative to all Compustat/CRSP firms in that month. The calendar-time portfolio method is used to estimate the abnormal monthly returns for repurchasing firms. For every month, we calculate the equally weighted returns for the portfolio of all repurchasing firms that made a stock repurchase announcement during the preceding 12, 24, 36 or 48 calendar months. We estimate the portfolio's monthly abnormal returns (αp) using Fama and French (1993) three-factor model $R_{p,t} - R_{f,t} = \alpha_p + \beta_p (R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + e_{p,t}$. The buy-and-hold average abnormal returns are estimated using the matching by Size and Earnings. The holding period abnormal return is computed using $BHAR_{(i,a,b)}=\prod_{t=a}^{b}(Rit+1)-\prod_{t=a}^{b}(Rmt+1)$, where $BHAR_{(i,a,b)}$ is the buy-and-hold abnormal return for event firm i over the holding period from a to b, R_{it} is the return on stock i on month t, and R_{mt} is the return on the matched firm on month t. If an event firm is delisted before the end of a holding period, we keep its returns and replace the missing values by the matched firm's returns. The BHAR is winsorized at the 1 and 99 percentiles. We use both t-tests and Wilcoxon tests to determine statistical significance. a, b, c denote significance at the 1, 5, and 10% levels, respectively.

Panel A: Size		**Small**				**Medium**				**Large**			
		1 yr	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**
Calendar-Time Method	Alpha(%)	1.182	1.008	0.888	0.823	0.323	0.306	0.331	0.374	0.166	0.213	0.252	0.233
	t-stat.	3.46a	3.24a	3.04a	2.83a	1.91c	2.04b	2.40b	2.86a	1.32	1.82c	2.23b	2.08c
	N	276	276	276	276	276	276	276	276	276	276	276	276
Matching by Size-EarningsΔ	BHAR	0.001	0.004	0.007	0.011	0.004	0.004	0.015	0.003	0	0.021	0.028	0.034
	t-stat.	0.16	0.33	0.41	0.9	0.23	0.23	0.56	0.8	0.44	0.48	0.47	0.49
	W-val.	0.13	0.12	0.16	0.15	0.17	0.74	0.61	0.86	0.62	0.65	0.75	0.72
	N	740	740	740	740	1,352	1,352	1,352	1,352	2,511	2,511	2,511	2,511

Panel B: Post-Announcement Long-term Buy-and-Hold Average Abnormal Returns Estimated Using the Matching Method for Repurchasing Firms Only

		1988-2000 [2,779]				2001-2010 [1,824]				Exclude crisis years [3,074]			
		1 yr	2 yrs	3 yrs	4 yrs	1 yr	2 yrs	3 yrs	4 yrs	1 yr	2 yrs	3 yrs	4 yrs
Size	BHAR	0.076	0.150	0.232	0.304	0.048	0.073	0.122	0.152	0.044	0.086	0.147	0.211
	t-stat.	7.26a	9.29a	11.23a	12.75a	3.97a	4.05a	5.46a	5.90a	4.72a	5.79a	7.79a	9.81a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Size-Industry	BHAR	0.075	0.133	0.241	0.315	0.007	-0.001	-0.054	0.031	0.048	0.080	0.124	0.202
	t-stat.	7.13a	8.10a	10.12a	11.26a	3.94a	4.00a	5.11a	5.57a	4.61a	5.62a	6.12a	9.13a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Size-B/M	BHAR	0.050	0.103	0.177	0.224	0.042	0.055	0.088	0.134	0.027	0.056	0.109	0.149
	t-stat.	4.61a	6.23a	8.37a	8.81a	3.40a	3.11a	3.75a	5.05a	2.82a	3.75a	5.62a	6.56a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Size-performance	BHAR	0.013	0.066	0.124	0.177	0.012	0.037	0.061	0.072	0.013	0.047	0.092	0.137
	t-stat.	5.61a	5.47a	7.00a	8.07a	5.99a	2.88a	3.39a	3.35a	5.27a	4.26a	5.83a	7.08a
	W-val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EarningsΔ	BHAR	0.024	0.066	0.126	0.191	0.024	0.036	0.057	0.095	0.014	0.026	0.063	0.120
	t-stat.	2.25b	2.38b	3.14a	2.79a	2.00b	2.00b	2.50b	2.37b	1.46	1.74b	2.38b	2.48b
	W-val.	0.02	0.04	0.01	0.04	0.03	0.03	0.00	0.05	0.02	0.01	0.00	0.04
Size- EarningsΔ	BHAR	0.001	0.010	0.018	0.020	-0.005	0.016	-0.011	-0.020	-0.001	0.012	0.007	0.004
	t-stat.	0.73	1.41	1.56	1.20	-0.31	0.73	0.85	0.73	-0.27	0.31	0.44	0.21
	W-val.	0.25	0.19	0.12	0.14	0.22	0.17	0.11	0.12	0.22	0.50	0.72	0.69

Table 8: Post-Announcement Average Abnormal Returns for Repurchase Announcement Firms: Controlling for Earnings Momentum and the Fama-French Three Factors

This table examines whether the repurchase announcement firms exhibit post-announcement abnormal returns that are significantly different from the returns of firms that experienced similar earnings change but did not make repurchase announcements. We first obtain excess monthly returns by subtracting the monthly returns of the matched firms based on earnings from the monthly returns of repurchase announcement firms. Then we create a rolling portfolio using the excess monthly returns and use the Fama-French three factor model to estimate the abnormal return. The statistical significance of each of the average abnormal monthly returns is tested using the parametric t-test. a, b, c denote significance at the 1, 5, and 10% levels, respectively, in two-tailed test.

	Full sample				**Repurchasing firms**				**Non-repurchasing firms**			
	1 yr	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**	**1 yr**	**2 yrs**	**3 yrs**	**4 yrs**
α_p(%)	-0.054	0.010	0.004	0.012	0.020	0.053	0.050	0.062	-0.183	-0.007	-0.033	-0.049
t-stat.	-0.58	0.12	0.05	0.15	0.20	0.60	0.61	0.76	-1.08	-0.05	-0.27	-0.41
Beta	-0.025	-0.041	-0.037	-0.032	-0.048	-0.057	-0.054	-0.054	0.051	0.030	0.048	0.080
t-stat.	-1.12	-2.01b	-1.87c	-1.64	-2.05b	-2.70a	-2.74a	-2.77a	1.27	0.92	1.59	2.80
s	-0.016	-0.013	0.003	0.005	-0.051	-0.044	-0.020	-0.013	0.103	0.101	0.107	0.099
t-stat.	-0.57	-0.49	0.13	0.20	-1.68c	-1.63	-0.79	-0.53	1.97b	2.42b	2.75a	2.67a
h	0.031	0.028	0.024	0.024	-0.004	0.011	0.021	0.012	0.110	0.059	0.025	0.061
t-stat.	0.99	0.97	0.87	0.86	-0.11	0.38	0.75	0.45	1.96b	1.32	0.59	1.53
N	276	276	276	276	276	276	276	276	276	276	276	276
R^2	0.01	0.02	0.01	0.01	0.02	0.00	0.01	0.03	0.02	0.02	0.03	0.05

Table 9: Cross-Sectional Regressions: Explaining Post Repurchase Abnormal Returns

Table 9 reports the results of the cross-sectional regression analysis of the post-announcement buy-and-hold size-adjusted abnormal return of the repurchase announcement firms on several determinant factors. $BHAR_i$ = the post-announcement buy-and-hold abnormal return of the repurchase announcement firm i– the corresponding return of its size-matched firm. BHAR1, BHAR2, BHAR3, BHAR4 are the buy-and-hold size-adjusted abnormal returns of the repurchase announcement firms for 1 year, 2 years, 3 years, and 4 years following the repurchase announcements respectively. AdjSizei is the ratio of the market value of equity of repurchase announcement firm i in the month prior to the repurchase announcement month to the mean market value of all firms on CRSP during the event year. B/M is the equity book value to its market value of the event firm i where book value is of the fiscal year prior to the announcement year and market value is the market value of equity at December of the year prior to announcement year. EarningsΔ is the percentage change in earnings before extraordinary items (IB in COMPUSTAT) in the announcement year relative to the prior year. Performance is measured as the monthly compounded return for 12 months prior to the repurchase announcement. RiskΔ is the change in the systematic risk of the firm and equals to the beta estimate for [+30, +250] window minus the beta estimate for [-250, -30] window using the market model. Real_RP is the dummy variable which receives a value of 1 if the firm is a repurchasing firm and 0 otherwise. $Earnings\Delta_i cReal\_RP_i$ is the interaction term between Earnings and Real_RP. $Market_i$ is the market return minus the risk-free return during the announcement month (measured by the value-weighted CRSP index and the rate on the 1-month U.S. Treasury bill, respectively). The statistical significance of the parameter estimates is tested using the White (1980) corrected t-stat. (in parentheses). N is the number of observations. a, b, c denote significance at the 1, 5, and 10% levels, respectively, in two-tailed test.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BHAR1	**BHAR1**	**BHAR2**	**BHAR2**	**BHAR3**	**BHAR3**	**BHAR4**	**BHAR4**
EarningsΔ	0.020	0.018	0.017	0.012	0.012	0.009	0.012	0.008
	3.06a	2.87a	2.31b	2.22b	1.96b	1.93b	1.82b	1.85b
EarningsΔcReal_RP		0.005		0.004		0.002		0.001
		2.68a		2.06b		1.65c		1.51
Real_RP	0.063	0.064	0.071	0.071	0.083	0.084	0.083	0.085
	4.31a	4.36a	4.50a	4.52a	7.50a	7.51a	8.96a	8.98a
AdjSize	-0.068	-0.068	-0.088	-0.088	-0.117	-0.117	-0.129	-0.129
	-2.18b	-2.17b	-2.67a	-2.67a	-2.51b	-2.51b	-2.67a	-2.67a
B/M	0.011	0.010	0.039	0.039	0.069	0.069	0.099	0.100
	1.65c	1.68c	1.73c	1.73c	1.76c	1.76c	2.13b	2.14b
Performance	-0.041	-0.041	-0.043	-0.043	-0.042	-0.042	-0.041	-0.041
	-9.53a	-9.55a	-10.28a	-10.27a	-8.08a	-8.06a	-7.63a	-7.63a
RiskΔ	-0.005	-0.005	-0.010	-0.010	-0.012	-0.012	-0.010	-0.010
	-1.37	-1.36	-1.47	-1.47	-1.65c	-1.66c	-1.73c	-1.71c
Market	0.060	0.059	0.024	0.024	0.027	0.027	0.024	0.024
	0.42	0.42	1.02	1.03	0.25	0.25	0.72	0.73
Intercept	-0.040	-0.040	-0.059	-0.058	-0.513	-0.513	-0.518	-0.518
	-2.33b	-2.32b	-2.14b	-2.13b	-3.56a	-3.56a	-4.13a	-4.13a
Year_dummies	Y	Y	Y	Y	Y	Y	Y	Y
N	6,311	6,311	6,255	6,255	6,015	6,015	6,015	6,015
Adjusted R^2	0.26	0.26	0.13	0.13	0.08	0.08	0.07	0.07

Table 10: Distribution of the Number of Firm-Year Repurchases.

Repurchase data and other accounting control variables are from Compustat's annual data over the period from 1988 to 2011. IPO data is obtained from the Securities Data Corporation (SDC) New Issues Database. The sample includes Compustat firms, excluding utilities, financial firms, ADRs, tender-offers, and privately negotiated repurchases. **Repurchasers** (**Rp_dummy**=1) are defined as firms which repurchase at least 0.25% of its market value of equity in that specific fiscal year, and **Non-repurchasers** (**Rp_dummy**=0) if otherwise. **Dollar repurchases** for each fiscal year are computed as the yearly repurchase of common and preferred stocks (prstkc) less any decrease in preferred stock. Preferred stocks are measured as, in order of preference, redemption value (pstkr), liquidating value (pstkl), or carrying value (pstk).

Year	N	Repurchasers	Percentage	Non-repurchasers	Percentage
1988	1,532	689	0.56	843	0.44
1989	1,473	560	0.38	913	0.62
1990	1,453	632	0.43	821	0.57
1991	1,366	446	0.32	920	0.68
1992	1,307	410	0.31	897	0.69
1993	1,386	605	0.44	781	0.56
1994	1,436	499	0.35	937	0.65
1995	1,557	593	0.38	964	0.62
1996	1,550	687	0.44	863	0.56
1997	1,652	803	0.49	849	0.51
1998	1,939	1,110	0.62	719	0.38
1999	1,898	1,179	0.62	719	0.38
2000	1,692	992	0.59	700	0.41
2001	1,655	752	0.45	903	0.55
2002	1,490	669	0.45	821	0.55
2003	1,381	666	0.48	751	0.52
2004	1,302	610	0.47	692	0.53
2005	1,354	723	0.47	631	0.47
2006	1,374	789	0.57	585	0.43
2007	1,391	822	0.59	569	0.41
2008	1,508	875	0.58	633	0.42
2009	1,219	488	0.40	731	0.60
2010	1,208	573	0.47	635	0.53
2011	1,322	730	0.55	592	0.45
	35,445	16,719	0.47	18,729	0.53

Table 11: Descriptive Statistics.

Dollar repurchases (mil.$) are the repurchase of common and preferred stocks (prstkc) less any decrease in preferred stock. Preferred stocks are measured as, in order of preference, redemption value (pstkr), liquidating value (pstkl), or carrying value (pstk). **Rp_Percentage** is Dollar repurchases at year t divided by market value of equity at year t-1. **Rp_dummy** takes on value of 1 when a firm repurchases at least 0.25% of its market value of equity and zero otherwise. **Total_IPOs** is the total number of IPOs that occur in the same three-digit SIC code industry in the previous six months of the current year. **Adjusted_IPOs** is Total IPOs divided by total number of firms in the same three-digit SIC code industry. **Total_Proceeds** is the sum of all IPO proceeds scaled by the sum of market value of all equity in the same three-digit SIC code industry. **RIPO_E** is the equally weighted first-day returns of all IPOs in the previous six months in the same three-digit SIC code industry. **RIPO_P** is proceeds weighted first-day returns of all IPOs in the previous six months in the same three-digit SIC code industry. **High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P** are all dummies and take on value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20 percentile and zero otherwise, respectively. **Past_return** is the firm's market adjusted return as the return of the previous year minus the return of the CRSP equally-weighted portfolio. **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of a firm. **M/B** is market value of stock divided by its book value. **Debt/Equity** is long-term debt divided by total equity. **Operating income** is operating income divided by total assets. **Non-operating income** is non-operating income divided by total assets. **P/E** is stock price divided by earnings per share at the end of fiscal year. Capital expenditures is capital expenditure divided by the total assets. **Cash holdings** is cash and equivalents (cheq) divided by total assets. **Cash flows** are computed as sales (saleq) minus cost of goods sold (cogsq) minus selling, general, and administrative expenses (xsgaq) minus the change in working capital. **Concentration** is computed based on the Herfindahl index, measured as sum of the squared market share of each firm in the same industry during a year.

Variable	N	Mean	Median	SD	P1	P99
Repurchase variables						
Dollar repurchases (Mil.$)	35,445	99.669	1.176	628.458	0.000	1684.000
Rp_Percentage	35,445	2.754	0.008	5.464	0.000	24.975
Rp_dummy	35,445	0.471	1.000	0.493	0.000	1.000
IPO variables						
Total_IPOs	35,445	1.856	0.000	6.030	0.000	24.000
Adjusted_IPOs	35,445	0.133	0.110	0.261	0.000	0.952
Total_Proceeds	35,445	8.105	1.374	54.211	0.000	65.659
RIPO_E	35,445	17.151	8.820	27.623	-11.428	116.244
RIPO_P	35,445	17.937	9.627	29.850	-11.427	135.477
IPO dummies						
High_IPOs	35,445	0.217	0.000	0.402	0.000	1.000
High_AdIPOs	35,445	0.211	0.000	0.368	0.000	1.000
High_Proceed	35,445	0.195	0.000	0.398	0.000	1.000
High_RIPO_E	35,445	0.210	0.000	0.317	0.000	1.000
High_RIPO_P	35,445	0.196	0.000	0.342	0.000	1.000
Controls						
Past_return	35,445	0.056	-0.033	0.692	-0.866	2.231
Dividend ratio	35,445	0.520	0.087	6.587	0.000	3.796
Size	35,445	5.004	5.705	2.002	1.602	10.559
M/B	35,445	4.403	1.962	19.836	0.374	17.711
Debt/Equity	35,445	0.737	0.238	6.418	0.000	5.549
Operating income	35,445	0.140	0.144	0.131	-0.306	0.433
Non-operating income	35,445	0.011	0.006	0.026	-0.022	0.078
P/E	35,445	22.966	15.761	114.31	-87.000	256.944
Capital expenditures	35,445	0.062	0.045	0.064	0.001	0.315
Cash holdings	35,445	0.152	0.076	0.182	0.000	0.785
Cash flows	35,445	0.126	0.131	0.147	-0.297	0.471
Concentration	35,445	0.252	0.196	0.205	0.044	1.000

Table 12: Univariate Tests.

Repurchasers (**Rp_dummy**=1) are defined as firms which repurchase at least 0.25% of its market value of equity in that specific fiscal year and **Non-repurchasers** (**Rp_dummy**=0) if otherwise. Other variables are defined in Table 2 and Appendix.

	Repurchasers		**Non-repurchasers**		**Difference**	
	N	**Mean (1)**	**N**	**Mean (2)**	**(1)-(2)**	**t-stat.**
Repurchase variables						
Rp_ Percentage	16,719	5.623	18,729	0.193	5.430	4.36
Dollar repurchases (Mil.$)	16,719	203.900	18,729	6.624	197.300	21.95
IPO related variables						
Total_IPOs	16,719	1.990	18,729	1.736	0.254	7.50
Adjusted_IPOs	16,719	0.143	18,729	0.125	0.017	8.11
Total_Proceeds	16,719	8.250	18,729	7.971	0.279	5.23
RIPO_E	16,719	18.440	18,729	15.930	2.500	4.18
RIPO_P	16,719	19.410	18,729	16.540	2.880	4.59
IPO Dummies						
High_IPOs	16,719	0.245	18,729	0.192	0.053	11.87
High_AdIPOs	16,719	0.229	18,729	0.195	0.034	7.93
High_Proceeds	16,719	0.219	18,729	0.175	0.044	4.78
High_RIPO_E	16,719	0.277	18,729	0.151	0.126	4.69
High_RIPO_P	16,719	0.251	18,729	0.147	0.104	9.13
Controls						
Past_return	16,719	0.030	18,729	0.097	-0.067	-8.97
Dividend ratio	16,719	0.371	18,729	0.694	-0.322	-2.08
Size	16,719	4.215	18,729	5.708	-0.104	4.39
M/B	16,719	3.827	18,729	4.917	-1.090	4.87
Debt/Equity	16,719	0.785	18,729	0.661	0.124	0.89
Operating income	16,719	0.142	18,729	0.136	0.007	4.23
Non-operating income	16,719	0.011	18,729	0.010	0.001	2.97
P/E	16,719	20.672	18,729	26.640	-5.968	-4.65
Capital expenditures	16,719	0.059	18,729	0.066	-0.007	-9.09
Cash holdings	16,719	0.167	18,729	0.127	0.040	18.56
Cash flows	16,719	0.133	18,729	0.115	0.018	10.17
Concentration	16,719	0.242	18,729	0.268	-0.027	-10.94

Table 13: Correlation Matrix of Measures for IPO Threat

High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and **High_RIPO_P** are all dummies and take on a value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E, and RIPO_P are in their top 20th percentile and zero otherwise, respectively. **Total_IPOs** is the total number of IPOs that occur in the same three-digit SIC code industry in the previous six months of the current year. **Adjusted_IPOs** is Total IPOs divided by total number of firms in the same three-digit SIC code industry. **Total_Proceeds** is sum of all IPO proceeds scaled by sum of market value of all equity in the same three-digit SIC code industry. **RIPO_E** is the equally weighted first-day returns of all IPOs in the previous six months in the same three-digit SIC code industry. **RIPO_P** is the proceeds weighted first-day returns of all IPOs in the previous six months in the same three-digit SIC code industry

	High_IPOs	**High_AdIPOs**	**High_Proceeds**	**High_RIPO_E**	**High_RIPO_P**
High_IPOs	1				
High_AdIPOs	0.613 [0.000]	1			
High_Proceeds	0.600 [0.000]	0.790 [0.000]	1		
High_RIPO_E	0.561 [0.000]	0.528 [0.000]	0.500 [0.000]	1	
High_RIPO_P	0.570 [0.000]	0.527 [0.000]	0.494 [0.000]	0.936 [0.000]	1

Table 14: Decision to Repurchase: Tobit Regressions

This table reports the marginal effects of tobit models. All continuous regressors are standardized to have a mean of zero and a standard deviation of one.The dependent variable is **$Rp\_Percentage_t$**, which equals the dollar repurchases at year t divided by market value of stocks at year t-1. **IPO_threat** is measured by different proxies including High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P which are dummy variables and take on a value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20th percentile and zero otherwise, respectively. **Past_return** is the firm's market adjusted return, equal to the return of the previous year minus the return of the CRSP equally-weighted portfolio for that year (Dittmar, 2000). **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of the firm. **M/B** is equal to market value of stock divided by its book value. **Debt/Equity** is equal to long-term debt divided by total equity. **Operating income** is equal to operating income divided by total assets. **Non-operating** income is equal to non-operating income divided by total assets. **P/E** is equal to stock price divided by earnings per share at the end of fiscal year. **Capital expenditures** is equal to capital expenditure divided by the total assets. **Dollar repurchases, Cash flows and Concentration** are described in the Appendix. Standard errors are corrected for clustering by firms and in parentheses. a, b, c denote significance at 1%, 5% and 10% level, respectively.

	High_IPOs	**High_AdIPOs**	**High_Proceeds**	**High_RIPO_E**	**High_RIPO_P**
IPO_threat	0.5180a	0.5086a	0.4162a	0.5280a	0.6237a
	[0.124]	[0.1305]	[0.1219]	[0.1425]	[0.1413]
Past_return	-0.2840a	-0.2783a	-0.2750a	-0.2714a	-0.2717a
	[0.0474]	[0.0474]	[0.0471]	[0.0478]	[0.0476]
Size	-0.1710a	-0.1662a	-0.1007a	-0.1042a	-0.1012a
	[0.0263]	[0.0251]	[0.0391]	[0.0395]	[0.0344]
M/B	-0.1220a	-0.1210a	-0.1253a	-0.1282a	-0.1285a
	[0.0510]	[0.0601]	[0.0701]	[0.0613]	[0.0635]
Dividend ratio	-0.0953a	-0.0496c	-0.0495c	-0.498c	-0.0501c
	[0.0297]	[0.0292]	[0.0299]	[0.0299]	[0.0281]
Debt/Equity	-0.0604	-0.0189	-0.0013	-0.0046	-0.0011
	[0.1691]	[0.1699]	[0.0014]	[0.0033]	[0.0024]
P/E	-0.0022a	-0.0041a	-0.0040a	-0.0024a	-0.0027a
	[0.0004]	[0.0001]	[0.0001]	[0.0004]	[0.0001]
Non-operating income	0.1170b	0.1177b	0.1223a	0.1361a	0.1823a
	[0.0523]	[0.0520]	[0.0514]	[0.0314]	[0.0316]
Operating income	0.8342a	0.8351a	0.7451a	0.8051a	0.8817a
	[0.0839]	[0.0814]	[0.0648]	[0.0621]	[0.0625]
Capital expenditures	-0.7235a	-0.721a	-0.7319a	-0.7751a	-0.7212a
	[0.0658]	[0.0615]	[0.0627]	[0.0515]	[0.0812]
Cash holdings	0.4235a	0.4782a	0.5138a	0.5718a	0.5163a
	[0.0411]	[0.0413]	[0.0412]	[0.0432]	[0.0414]
Cash flows	0.7621a	0.666a	0.6246a	0.6452a	0.6133a
	[0.0559]	[0.0511]	[0.0514]	[0.0519]	[0.0545]
Intercept	0.8238a	0.8195a	0.9522a	0.9732a	0.9568a
	[0.1923]	[0.2179]	[0.3455]	[0.3002]	[0.3090]
Industry and year dummies	Yes	Yes	Yes	Yes	Yes
Psuedo-R squared	0.0412	0.0532	0.0487	0.0417	0.0485
N	35,445	35,445	35,445	35,445	35,445

Table 15: Decision to Repurchase-Tobit Regressions with Interaction Variables

This table reports the marginal effects of tobit models. The dependent variable is **$Rp\_Percentage_t$**, which is equal to the dollar repurchases at year t divided by market value of stocks at year t-1. **IPO_threat** is measured by different proxies including High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P which are dummy variables and take on value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20 percentile and zero otherwise, respectively. **Past_return** is the firm's market adjusted return which is equal to the return of the previous year minus the return of the CRSP equally-weighted portfolio for that year (Dittmar (2000)). **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of the firm. **M/B** is equal to market value of stock divided by its book value. **Debt/Equity** is equal to long-term debt divided by total equity. **Operating income** is equal to operating income divided by total assets. **Non-operating** income is equal to non-operating income divided by total assets. **P/E** is equal to stock price divided by earnings per share at the end of fiscal year. **Capital expenditures** is equal to capital expenditure divided by the total assets. **Dollar repurchases, Cash flows and Concentration** are described in the Appendix. Standard errors are corrected for clustering by firms and in parentheses. a, b, c denote significance at 1%, 5% and 10% level, respectively.

	High_IPOs	**High_AdIPOs.**	**High_Proceeds**	**High_RIPO_E**	**High_RIPO_P**
IPO_threat	0.4583a	0.4527a	0.3814a	0.4252a	0.4712a
	[0.1185]	[0.1328]	[0.1239]	[0.1312]	[0.1397]
IPO_threatcConcentration	0.1324b	0.1474c	0.1352c	0.1359c	0.1334c
	[0.0612]	[0.0755]	[0.0801]	[0.0813]	[0.0816]
IPO_threatcPast_return	-0.2131a	-0.2415a	-0.2316a	-0.2273b	-0.2315b
	[0.0714]	[0.0798]	[0.0802]	[0.1143]	[0.1141]
Concentration	-0.2515a	-0.3741a	-0.3232a	-0.3225a	-0.3561a
	[0.0495]	[0.0495]	[0.0496]	[0.0476]	[0.0495]
Past_return	-0.2254a	-0.2183a	-0.2150a	-0.2314a	-0.2317a
	[0.0531]	[0.0474]	[0.0471]	[0.0478]	[0.0476]
Size	-0.1651a	-0.1612a	-0.1009a	-0.1042a	-0.1022a
	[0.0263]	[0.0271]	[0.0381]	[0.0313]	[0.0347]
M/B	-0.1220a	-0.1210a	-0.1253a	-0.1272a	-0.1286a
	[0.051]	[0.061]	[0.070]	[0.061]	[0.061]
Dividend ratio	-0.0957a	-0.0486c	-0.0148	-0.0478	-0.0510c
	[0.0297]	[0.0291]	[0.0297]	[0.0295]	[0.0283]
Debt/Equity	-0.0611	-0.0180	-0.0011	-0.0046	-0.0013
	[0.1690]	[0.1690]	[0.0013]	[0.0034]	[0.0023]
P/E	-0.0021a	-0.0042a	-0.0043a	-0.0024a	-0.0027a
	[0.0004]	[0.0001]	[0.0001]	[0.0000]	[0.0000]
Non-operating income	0.1171b	0.1175b	0.1214a	0.1360a	0.1822a
	[0.0533]	[0.0540]	[0.0514]	[0.0313]	[0.0315]
Operating income	0.8345a	0.8352a	0.7452a	0.8052a	0.8819a
	[0.0840]	[0.0824]	[0.0648]	[0.0631]	[0.0627]
Capital expenditures	-0.7237a	-0.719a	-0.7320a	-0.7755a	-0.7222a
	[0.0658]	[0.0616]	[0.0625]	[0.0614]	[0.0611]
Cash holdings	0.4237a	0.4785a	0.5141a	0.5721a	0.5166a
	[0.0410]	[0.0411]	[0.0410]	[0.0430]	[0.0412]
Cash flows	0.7622a	0.667a	0.6231a	0.6451a	0.6131a
	[0.0560]	[0.0511]	[0.0512]	[0.0520]	[0.0542]
Intercept	0.8258a	0.8175a	0.9523a	0.9712a	0.9588a
	[0.1923]	[0.2179]	[0.3455]	[0.3005]	[0.3091]
Industry and year dummies	Yes	Yes	Yes	Yes	Yes
Psuedo-R squared	0.0417	0.0522	0.0466	0.0447	0.0495
N	35,445	35,445	35,445	35,445	35,445

Table 16: Decision to Repurchase-Probit Regressions

This Table reports the marginal effects of probit models. All continuous regressors are standardized to have a mean of zero and a standard deviation of one. **The dependent variable is Rp_dummy, which** takes on a value of 1 when a firm repurchases at least 0.25% of its market value of equity and zero otherwise**. IPO_threat** is measured by different proxies including High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P which are dummy variables and take on value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20 percentile and zero otherwise, respectively. **Past_return** is the firm's market adjusted return which is equal to the return of the previous year minus the return of the CRSP equally-weighted portfolio for that year (Dittmar (2000)). **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of the firm. **M/B** is equal to market value of stock divided by its book value. **Debt/Equity** is equal to long-term debt divided by total equity. **Operating income** is equal to operating income divided by total assets. **Non-operating income** is equal to non-operating income divided by total assets. **P/E** is equal to stock price divided by earnings per share at the end of fiscal year. **Capital expenditures** is equal to capital expenditure divided by the total assets. **Dollar repurchases, Cash flows and Concentration** are described in the Appendix. Standard errors are corrected for clustering by firms and in parentheses. a, b, c denote significance at 1%, 5% and 10% level, respectively.

	High_IPOs	**High_AdIPOs**	**High_Proceeds**	**High_RIPO_E**	**High_RIPO_P**
IPO_threat	0.0776a	0.0781a	0.0524b	0.0593a	0.0546a
	[0.0214]	[0.0211]	[0.0216]	[0.0225]	[0.0205]
Past_return	-0.0489a	-0.0488a	-0.0486a	-0.0482a	-0.0488a
	[0.0085]	[0.0084]	[0.0084]	[0.0085]	[0.0085]
Size	-0.0547a	-0.0541a	-0.0546a	-0.0546a	-0.0543a
	[0.0091]	[0.0090]	[0.0094]	[0.0094]	[0.0094]
M/B	-0.0356c	0.0359c	0.0359c	0.0357c	0.0357c
	[0.0195]	[0.0196]	[0.0195]	[0.0195]	[0.0195]
Dividend ratio	-0.0230a	-0.0231a	-0.0230a	-0.0230a	-0.0230a
	[0.0005]	[0.0005]	[0.0005]	[0.0005]	[0.0004]
Debt/Equity	0.0493	0.0493	0.0492	0.0492	0.0492
	[0.0330]	[0.0330]	[0.0331]	[0.0332]	[0.0331]
P/E	-0.0779a	-0.0778a	-0.0775a	-0.0776a	-0.0776a
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Non-operating income	0.0331a	0.0329a	0.0323a	0.0333a	0.0333a
	[0.0098]	[0.0098]	[0.0095]	[0.0097]	[0.0096]
Operating income	0.0343a	0.0343a	0.0342a	0.0344a	0.0344a
	[0.0018]	[0.0018]	[0.0015]	[0.0017]	[0.0017]
Capital expenditures	-0.0923a	-0.0923a	-0.0923a	-0.0927a	-0.0927a
	[0.0034]	[0.0033]	[0.0033]	[0.0034]	[0.0034]
Cash holdings	0.0649a	0.0649a	0.0649a	0.0649a	0.0649a
	[0.0073]	[0.0071]	[0.0071]	[0.0073]	[0.0073]
Cash flows	0.0927a	0.0927a	0.0927a	0.0927a	0.0927a
	[0.0094]	[0.0094]	[0.0091]	[0.0092]	[0.0092]
Intercept	0.4443	0.4443	0.4444	0.4443	0.4444
	[0.2821]	[0.2823]	[0.2822]	[0.2821]	[0.2822]
Industry and year dummies	Yes	Yes	Yes	Yes	Yes
Psuedo-R squared	0.044	0.0557	0.0457	0.0457	0.0485
N	35,445	35,445	35,445	35,445	35,445

Table 17: Decision to Repurchase: Probit Regressions with Interaction Variables

The dependent variable is Rp_dummy, which takes on a value of 1 when a firm repurchases at least 0.25% of its market value of equity and zero otherwise. **IPO_threat** is measured by different proxies including High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P which are dummy variables and take on value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20 percentile and zero otherwise, respectively. **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of the firm. **M/B** is equal to market value of stock divided by its book value. **Debt/Equity** is equal to long-term debt divided by total equity. **Operating income** is equal to operating income divided by total assets. Non-operating income is equal to non-operating income divided by total assets. **P/E** is equal to stock price divided by earnings per share at the end of fiscal year. **Capital expenditures** is equal to capital expenditure divided by the total assets. Standard errors are corrected for clustering by firms and in parentheses. a, b, c denote significance at 1%, 5% and 10% level, respectively.

	High_IPOs	**High_AdIPOs**	**High_Proceeds**	**High_RIPO_E**	**High_RIPO_P**
IPO_threat	0.0525a	0.0511a	0.0412b	0.0453b	0.0466b
	[0.0173]	[0.0181]	[0.0210]	[0.0205]	[0.0205]
IPO_threatcConcentration	0.0480a	0.0378a	0.0199c	0.0284c	0.0274c
	[0.0203]	[0.0119]	[0.0105]	[0.0158]	[0.0158]
IPO_threatcPast_return	-0.0753a	-0.0352b	-0.0621a	-0.0438a	-0.0687a
	[0.0242]	[0.0187]	[0.0178]	[0.0094]	[0.0178]
Concentration	-0.0419a	-0.0419a	-0.0421a	-0.0419a	-0.0419a
	[0.0094]	[0.0094]	[0.0095]	[0.0093]	[0.0093]
Past return	-0.0485a	-0.0485a	-0.0487a	-0.0483a	-0.0483a
	[0.0085]	[0.0085]	[0.0086]	[0.0085]	[0.0085]
Size	-0.0547a	-0.0542a	-0.0547a	-0.0546a	-0.0544a
	[0.0091]	[0.0091]	[0.0093]	[0.0094]	[0.0093]
M/B	-0.0357c	0.0355c	0.0358c	0.0357c	0.0356c
	[0.0195]	[0.0196]	[0.0194]	[0.0193]	[0.0193]
Dividend ratio	-0.0233a	-0.0230a	-0.0232a	-0.0235a	-0.0235a
	[0.0004]	[0.0004]	[0.0005]	[0.0005]	[0.0004]
Debt/Equity	0.0491	0.0491	0.0492	0.0492	0.0492
	[0.0331]	[0.0331]	[0.0331]	[0.0331]	[0.0331]
P/E	-0.0780a	-0.0776a	-0.0775a	-0.0776a	-0.0776a
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Non-operating income	0.0332a	0.0331a	0.0324a	0.0333a	0.0334a
	[0.0097]	[0.0097]	[0.0096]	[0.0097]	[0.0097]
Operating income	0.0345a	0.0345a	0.0342a	0.0344a	0.0343a
	[0.0017]	[0.0019]	[0.0014]	[0.0017]	[0.0017]
Capital expenditures	-0.0921a	-0.0923a	-0.0921a	-0.0929a	-0.0928a
	[0.0033]	[0.0033]	[0.0033]	[0.0034]	[0.0034]
Cash holdings	0.0647a	0.0646a	0.0645a	0.0649a	0.0649a
	[0.0072]	[0.0072]	[0.0071]	[0.0072]	[0.0072]
Cash flows	0.0926a	0.0926a	0.0927a	0.0927a	0.0927a
	[0.0093]	[0.0093]	[0.0091]	[0.0093]	[0.0092]
Intercept	0.4447	0.4447	0.4444	0.4444	0.4444
	[0.2822]	[0.2823]	[0.2822]	[0.2822]	[0.2822]
Industry and year dummies	Yes	Yes	Yes	Yes	Yes
Psuedo-R squared	0.044	0.0557	0.0467	0.0487	0.0485
N	35,445	35,445	35,445	35,445	35,445

Table 18: The Repurchase Decision: Controlling for Economic Conditions

This table reports the marginal effects of tobit models using only High_IPOs as a measure for IPOs competitive threats. All continuous regressors are standardized to have a mean of zero and a standard deviation of one. **The dependent variable is Rp_Percentage$_t$**, whichequals the dollar repurchases at year t divided by market value of stocks at year t-1. **IPO_threat** is measured by different proxies including High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P which are dummy variables and take on value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20th percentile and zero otherwise, respectively. **Past_return** is the firm's market adjusted return which is equal to the return of the previous year minus the return of the CRSP equally-weighted portfolio for that year (Dittmar (2000)). **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of the firm. **M/B** is equal to market value of stock divided by its book value. Debt/Equity is equal to long-term debt divided by total equity. **Operating income** is equal to operating income divided by total assets. **Non-operating income** is equal to non-operating income divided by total assets. **P/E** is equal to stock price divided by earnings per share at the end of fiscal year. **Capital expenditures** is equal to capital expenditure divided by the total assets. National Bureau of Economic Research (NBER) defined recessionary economies as in July 1981 –Nov 1982, July 1990 –Mar 1991, March 2001–Nov 2001, and Dec 2007 – June 2009. Internet bubble years are 1999 and 2000. a, b, c denote significance at 1%, 5% and 10% level, respectively.

	Economic Recession		**Economic Expansion**		**Without Bubble Years**	
High_IPOs	0.4814b	0.4412b	0.5214a	0.4621a	0.5113a	0.4611a
	[0.2283]	[0.2250]	[0.1104]	[0.1105]	[0.1224]	[0.1126]
High_IPOscConcentration		0.0960a		0.1113c		0.1301b
		[0.0371]		[0.0611]		[0.0613]
High_IPOscPast_return		-0.1315c		-0.2012a		-0.2441a
		[0.0713]		[0.0728]		[0.0745]
Concentration		-0.2113a		-0.2523a		-0.2601a
		[0.0456]		[0.0485]		[0.0414]
Past_return	-0.2601a	-0.2311a	-0.2932a	-0.2110a	-0.2834a	-0.2251a
	[0.0421]	[0.0422]	[0.0593]	[0.0524]	[0.0469]	[0.0532]
Size	-0.1510a	-0.1530a	-0.1810a	-0.1810a	-0.1771a	-0.1713a
	[0.0265]	[0.0263]	[0.0203]	[0.0202]	[0.0267]	[0.0264]
M/B	-0.1310a	-0.1310a	-0.1171a	-0.1175a	-0.1221a	-0.1220a
	[0.048]	[0.047]	[0.053]	[0.049]	[0.049]	[0.051]
Dividend ratio	-0.0976a	-0.0978a	-0.1230a	-0.1170a	-0.0961a	-0.0956a
	[0.0295]	[0.0295]	[0.0297]	[0.0296]	[0.0295]	[0.0299]
Debt/Equity	-0.0502	-0.0505	-0.0852	-0.0853	-0.0612	-0.0611
	[0.1823]	[0.1816]	[0.1722]	[0.1721]	[0.1690]	[0.1692]
P/E	-0.0045a	-0.0045a	-0.0018a	-0.0018a	-0.0021a	-0.0021a
	[0.0016]	[0.0014]	[0.0010]	[0.0010]	[0.0004]	[0.0004]
Non-operating income	0.1032b	0.1033b	0.1214b	0.1214b	0.1171b	0.1170b
	[0.0523]	[0.0524]	[0.0523]	[0.0525]	[0.0524]	[0.0532]
Operating income	0.5188a	0.5191a	0.8712a	0.8712a	0.8339a	0.8346a
	[0.0845]	[0.0823]	[0.0861]	[0.0857]	[0.0837]	[0.0841]
Capital expenditures	-0.6651a	-0.6650a	-0.8110a	-0.8111a	-0.7235a	-0.7240a
	[0.0847]	[0.0845]	[0.0758]	[0.0758]	[0.0655]	[0.0657]
Cash holdings	0.3772a	0.3768a	0.4621a	0.4622a	0.4232a	0.4233a
	[0.0445]	[0.0440]	[0.0403]	[0.0402]	[0.0413]	[0.0411]
Cash flows	0.7621a	0.7611a	0.7621a	0.7620a	0.7623a	0.7622a
	[0.0759]	[0.0745]	[0.0563]	[0.0562]	[0.0557]	[0.0561]
Intercept	1.1142a	1.1108a	0.7255a	0.7257a	0.8237a	0.8236a
	[0.2366]	[0.2322]	[0.1542]	[0.1544]	[0.1920]	[0.1922]
Industry and year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Psuedo-R squared	0.0412	0.0412	0.0488	0.0488	0.0488	0.0488
N	6,627	6,627	28,818	28,818	29,449	29,449

Table 19: Probability of Repurchase: Controlling for Economic Conditions

The dependent variable is Rp_dummy, which takes on a value of 1 when a firm repurchases at least 0.25% of its market value of equity and zero otherwise. **IPO_threat** is measured by different proxies including High_IPOs, High_AdIPOs, High_Proceeds, High_RIPO_E and High_RIPO_P which are dummy variables and take on value of 1 when Total_IPOs, Adjusted_IPOs, Total_Proceeds, RIPO_E and RIPO_P are in their top 20 percentile and zero otherwise, respectively**. Past_return** is the firm's market adjusted return which is equal to the return of the previous year minus the return of the CRSP equally-weighted portfolio for that year (Dittmar (2000)). **Dividend ratio** is total dividends divided by the net income available to common stockholders. **Size** is logarithm of total assets of the firm. **M/B** is equal to market value of stock divided by its book value. **Debt/Equity** is equal to long-term debt divided by total equity. **Operating income** is equal to operating income divided by total assets. **Non-operating income** is equal to non-operating income divided by total assets. **P/E** is equal to stock price divided by earnings per share at the end of fiscal year. **Capital expenditures** is equal to capital expenditure divided by the total assets. National Bureau of Economic Research (NBER) defined recessionary economies as in July 1981 –Nov 1982, July 1990 –Mar 1991, March 2001–Nov 2001, and Dec 2007 – June 2009. Internet bubble years are 1999 and 2000. a, b, c denote significance at 1%, 5% and 10% level, respectively. Standard errors are corrected for clustering by firms and in parentheses. a, b, c denote significance at 1%, 5% and 10% level, respectively.

	Economic recession		**Economic expansion**		**Without Bubble Years**	
High_IPOs	0.0522b	0.0311c	0.0781a	0.0652a	0.0713a	0.0518a
	[0.0244]	[0.0184]	[0.0212]	[0.0166]	[0.0215]	[0.0163]
High_IPOscConcentration		0.0412b		0.0487a		0.0465a
		[0.0208]		[0.0201]		[0.0207]
High_IPOscPast_return		-0.0551b		-0.0771a		-0.0615a
		[0.0246]		[0.0236]		[0.0232]
Concentration		-0.0338a		-0.0474a		-0.0433a
		[0.0065]		[0.0099]		[0.0091]
Past_return	-0.0461a	-0.0421a	-0.0501a	-0.0491a	-0.0490a	-0.0455a
	[0.0085]	[0.0094]	[0.0085]	[0.0082]	[0.0085]	[0.0071]
Size	-0.0512a	-0.0501a	-0.0581a	-0.0561a	-0.0547a	-0.0547a
	[0.0075]	[0.0112]	[0.0098]	[0.0091]	[0.0093]	[0.0091]
M/B	-0.0311c	-0.0322	-0.0372c	-0.0388c	-0.0355c	-0.0351c
	[0.0163]	[0.0205]	[0.0199]	[0.0197]	[0.0193]	[0.0194]
Dividend ratio	-0.0221a	-0.0218a	-0.0214a	-0.0210a	-0.0209a	-0.0201a
	[0.0009]	[0.0004]	[0.0005]	[0.0005]	[0.0005]	[0.0005]
Debt/Equity	0.0322	0.0472	0.0475	0.0496	0.0471	0.0492
	[0.0345]	[0.0521]	[0.0341]	[0.0329]	[0.0331]	[0.0331]
P/E	-0.0611a	-0.0613a	-0.0791a	-0.0791a	-0.0783a	-0.0781a
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Non-operating income	0.0300a	0.0222b	0.0366a	0.0475a	0.0329a	0.0365a
	[0.0081]	[0.0105]	[0.0097]	[0.0089]	[0.0098]	[0.0096]
Operating income	0.0317a	0.0315a	0.0364a	0.0373a	0.0341a	0.0342a
	[0.0009]	[0.0011]	[0.0021]	[0.0019]	[0.0020]	[0.0019]
Capital expenditures	-0.0715a	-0.0772a	-0.0977a	-0.0974a	-0.0926a	-0.0923a
	[0.0052]	[0.0054]	[0.0022]	[0.0029]	[0.0035]	[0.0035]
Cash holdings	0.0511a	0.0551a	0.0687a	0.0727a	0.0655a	0.0627a
	[0.0052]	[0.0072]	[0.0070]	[0.0071]	[0.0072]	[0.0072]
Cash flows	0.0718a	0.0658a	0.0966a	0.0994a	0.0941a	0.0974a
	[0.0065]	[0.0066]	[0.0095]	[0.0091]	[0.0092]	[0.0091]
Intercept	0.4102	0.421	0.4451	0.4625	0.4452	0.4427
	[0.2011]	[0.2712]	[0.2917]	[0.2852]	[0.2817]	[0.2819]
Industry and year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Psuedo-R squared	0.0412	0.0412	0.0488	0.0488	0.0488	0.0488
N	6,627	6,627	28,818	28,818	29,449	29,449

Appendix B: Variable Description:

Repurchase Variables:

Dollar repurchases (mil.$): The repurchase of common and preferred stocks (prstkc) less any decrease in preferred stock. Preferred stocks are measured as, in order of preference, redemtion value (pstkr), liquidating value (pstkl), or carrying value (pstk).

Percent repurchases: Dollar repurchases at year t divided by market value of stocks at year t-1.

Repurchase dummy: Dummy variable takes on value of 1 when a firm repurchases at least 1% of its value (percent repurchases>=1) and zero otherwise

Total payout (mil.$): Sum of repurchases and dividends

Repurchases/Total payout: Dollar repurchases divided by Total payout

IPO Related Variables:

Total_IPOs: The total numbers of IPOs that occur in the same three-digit SIC code industry in the previous six months of the current year.

IPOs_Pct: Total IPOs divided by total number of firms in the same three-digit SIC code industry

Total_Proceed_Pct: Total IPO proceeds divided by the total of market value of stocks in the same three-digit SIC code industry. Total IPO proceeds is sum of proceeds of IPOs that occur in the same three-digit SIC code industry in the previous six months of the current year.

RIPO_E: Equally weighted first-day returns

RIPO_P: Proceeds weighted first-day returns

High_IPOs: Dummy variable takes on value of 1 when Total_IPOs is on its top 20th percentile and zero otherwise.

High_IPOs_Pct.: Dummy variable takes on value of 1 when IPOs_Pct is on its top 20th percentile and zero otherwise.

High_Proceed_Pct.: Dummy variable takes on value of 1 when Total_Proceed_Pct is on its top 20th percentile and zero otherwise.

High_RIPO_E: Dummy variable takes on value of 1 when RIPO_E is greater than mean value, and zero otherwise.

High_RIPO_P: Dummy variable takes on value of 1 when RIPO_P is greater than mean value, and zero otherwise.

Control Variables:

Past return: The compounded monthly return for the previous year

Dividend ratio: Total dividends divided by the net income available to common stockholders

Size: The logarithm of the total assets of the firms

M/B: Market value of stock divided by its book value

Market value (mil.$): Market value of stock at the end of the fiscal year

Debt/Equity: Long-term debt divided by total equity

Operating income: Operating income divided by total assets

Non-operating income: Non-operating income divided by total assets

P/E: Stock price divided by earnings per share at the end of fiscal year

Capital expenditures: Capital expenditure divided by the total assets

Cash holdings: Cash and equivalents (cheq) divided by total assets

Cashflows: Cashflow is computed as sales (saleq) minus cost of goods sold (cogsq) minus selling, general, and administrative expenses (xsgaq) minus the change in working capital. Working capital is defined as accounts receivable (rectq) plus inventory (invtq) plus other current assets (acoq) minus the sum of accounts payable, income taxes payable (txpq), and other current liabilities (lcoq). Selling, general, and administrative expenses are decreased by one-quarter of the annual value of research and development (xrd) and advertising expenses (xad), when available.

Concentration: Based on Herfindahl index which is measured as sum of the squared market share of each firm in the same industry during a year. Market share is defined as the total sales of the firm in a given year divided by the total sales of the industry in the year. The industry is defined at the three digit SIC code (SICCD) level. Sales are measured as moving average over the past three years.