10-2012

The Persistence of Long-Run Abnormal Returns: Evidence from Stock Repurchases and Offerings

Fangjian FU
Singapore Management University, fjfu@smu.edu.sg

Sheng HUANG
Singapore Management University, shenghuang@smu.edu.sg

Hu LIN
Peking University

The Persistence of Long-Run Abnormal Stock Returns: Evidence from Stock Repurchases and Offerings*

Fangjian Fu **Sheng Huang** **Hu Lin**

November 2011

Abstract

Prior studies have documented that stock returns are abnormally high during the years following share repurchases and abnormally low following seasoned equity offerings, relative to various benchmarks of expected returns. While we confirm this evidence in the event data as of 2002, we do not find robust long-run abnormal returns following either stock repurchases or issuances after 2002. Institutional ownership of event stocks has increased substantially in the recent decade, which helps to explain the disappearance of the abnormal performance following corporate stock transactions. The evidence seems consistent with the improved stock market efficiency in recent years, accompanied by reduced trading costs, popularization of algorithmic trading, and increased institutional investment activity, as documented by a number of recent studies. Also consistent with the improved market efficiency, fewer firms in the recent years conduct stock repurchases or seasoned equity offerings for the purpose of timing the market.

JEL classification: G12, G14, G32, G35
Keywords: Long-run abnormal returns, market efficiency, stock repurchases, seasoned equity offerings

*Fu is affiliated with Singapore Management University, fjfu@smu.edu.sg; Huang is affiliated with Singapore Management University, shenghuang@smu.edu.sg; and Lin is affiliated with Peking University, pkulinhu@gmail.com.

1. Introduction

A number of studies have shown that long run stock returns are abnormally high following stock repurchases and abnormally low following stock offerings.[1] Although in principle these findings could be due to the "bad" model of expected returns (Fama, 1998), the results appear robust across various benchmarks of expected returns.[2] The evidence of long-run abnormal returns following stock repurchases and offerings potentially implies market inefficiency. In particular, the results are consistent with the "market timing" hypothesis, whereby firms issue stock when overpriced and repurchase stock when undervalued. The hypothesis assumes that the market fails to incorporate information fully at the event announcement. As a result of investor underreaction at announcement, long run abnormal returns are observed as information is slowly incorporated into the stock price.

The stock market in the recent decade witnesses a substantial reduction in trading costs, a wide adoption of algorithmic trading, an aggressively rising institutional ownership, and a proliferation of hedge funds actively seeking for profitable opportunities. All of them contribute to an explosive increase in institutional investor trading and a more efficient stock market (Chordia, Roll, and Subramanyam, 2011). Given the dynamics of the market environment, in this study we further scrutinize the evidence of long-run abnormal returns. We employ several widely-used but different

[1] See Ritter (1991) for early documentation of negative long-run abnormal returns following IPOs, Loughran and Ritter (1995), Spiess and Affleck-Graves (1995) for early documentation of negative long-run abnormal returns following seasoned equity offerings, and Ikenberry, Lakonishok, Vermaelen (1995) for early documentation of positive long-run abnormal returns following stock repurchases.

[2] See Ritter (2003) for robust evidence on SEOs, and Peyer and Vermaelen (2009) for robust evidence on repurchases. The evidence of underperformance following IPOs is less robust, see, for instance, Gompers and Lerner (2003).

methods of long-run abnormal return estimation, and more importantly, extend the sample to the most recent years. For the estimation of long-run abnormal returns, we use the calendar-time portfolio approach (Mitchell and Stafford, 2000), Ibbotson's (1975) return across time and securities (IRATS), and the buy-and-hold returns relative to control firms matched on size, the book-to-market equity ratio, and the prior return (Barber, Lyon, and Tsai, 1999). Our sample is the most comprehensive to date, containing 14,538 stock repurchases in the period of 1985-2010 and 6,733 seasoned equity offerings (SEOs) in 1980-2010.[3]

We confirm previous studies as in the sample of events up to 2002, long-run abnormal returns are significantly positive following stock repurchases and significantly negative following SEOs. However, in the sample after 2002, we find neither outperformance following repurchases nor underperformance following SEOs. The results are robust to different methods of assessing abnormal returns[4] and different holding periods following the events. Since the sample of events in 2003-2010 contains 3,773 stock repurchases (26% of the total sample) and 1,671 SEOs (25% of the total sample) and moreover, abnormal performance exists for subsamples of similar size/time-span in the earlier periods, the results are not driven by low statistical power of our tests with the recent sample. That the results from the earlier periods fail to persist for both stock repurchases and issuances suggests a fundamental change in the stock market and the economics of corporate stock transactions.

[3] Most existing studies on this topic examine the data of repurchases and SEOs prior to 2002. For example, Peyer and Vermaelen (2009) examine repurchases during 1991-2001. Ritter (2003) surveys evidence on SEOs during 1970-2000.

[4] SEO stocks still underperform under IRATS, but both the economic magnitude and statistical significance of the underperformance reduce substantially in the sample after 2002.

Our findings are consistent with the stock market becoming more efficient in recent years. The improvement in market efficiency is likely a result of reduced trading costs, improved trading technology, and the increased institutional ownership and trading. Studies have shown that institutional ownership has been increasing over time, and more aggressively so in the recent decade (e.g., Friedman, 1996; Gompers and Metrick, 2001; Bennett, Sias, and Starks, 2003; Asquith, Pathak, and Ritter, 2005; Blume and Keim, 2008), and that stock price efficiency improves with higher institutional ownership (e.g., Badrinath, Kale, and Noe, 1995; Sias and Starks, 1997; Bartov, Radhakrishnan, and Krinsky, 2000; Nagel, 2003; Boehmer and Kelley, 2009). Meanwhile, the decimalization in 2001 significantly reduces trading costs and improves market quality (Bessembinder, 2003). Further, technology change has revolutionized the way of trading stocks. Algorithmic trading, which started just in the mid-1990s, is now responsible for over 70% of the total trading volume. Hendershott, Jones, and Menkveld (2011) suggest that algorithmic trading significantly improves liquidity and makes pricing more efficient. Chordia, Roll, and Subramanyam (2011) show that trading activity has increased substantially in the recent decade, especially for stocks with high institutional ownership. They further demonstrate that the stock market becomes more efficient over time, as a result of more institutional trading.

Echoing this general trend, we show that, in our event firms, institutional ownership becomes increasingly dominant in the post-2002 period. For example, only 34% of the repurchasing firms before 2002 have institutional ownership above 50%; it increases to 69% after 2002. Similarly, the percentage of SEO firms having a majority of institutional ownership increases from 23% before 2002 to 50% after 2002. We examine the long-run stock returns of the event stocks with high and low institutional ownership. Consistent with institutional activity improving market efficiency, we

find that high institutional ownership significantly reduces the chance and the magnitude of abnormal returns.

Improved market efficiency results in fewer market-timing opportunities. Indeed, we find that both repurchasing and SEO firms in the recent years indicate less of the features of market-timers. Compared with those in the early years, repurchasing firms have lower book-to-market ratios and higher returns and SEO firms have higher book-to-market ratios and lower returns prior to the announcements. This suggests that recent corporate stock transactions are more likely motivated by other incentives than exploiting mispricing. The market reactions to repurchase and SEO announcements are also consistent with the shift in firm motivation and suggest more efficiency of the market. In particular, compared with those in the early years, the announcement returns in the recent years are significantly less positive for repurchasing firms and less negative for SEO firms. In multiple regressions, we show that the differences in announcement returns between the early and later periods are well explained by proxies for event firms' motivations such as pre-event (mis)valuation, investment opportunities, profitability, and cash abundance. Instead of timing the market in the early years, more of the event firms in the recent years use repurchases to distribute excess cash and conduct SEOs to raise investment capital.

In sum, we document the disappearance of long-run abnormal returns following stock repurchases and SEOs in the recent years and suggest that the increased institutional activities and improved market efficiency are likely the contributing forces. Our study adds to the literature about the persistence of market anomalies. In the Abstract of his survey article, Schwert (2003) points out "*After they are documented and analyzed in the academic literature, anomalies often seem to disappear,*

reverse, or attenuate. …many of the well-known anomalies in the finance literature do not hold up in different sample periods." To illustrate this point, he presents empirical evidence to show that the size effect, the value effect, the weekend effect, the dividend yield effect, and the small-firm turn-of-the-year effect are such anomalies. He further suggests "*…the activities of practitioners who implement strategies to take advantage of anomalous behavior can cause the anomalies to disappear (as research findings cause the market to become more efficient)*". Chordia, Subrahmanyam, and Tong (2011) examine a large set of previously identified predictors of returns and find that cross-sectional predictability has decreased considerably in recent years, both statistically and economically. For instance, the profitability of momentum strategies shows no significance for liquid stocks in recent years. Other predictors such as share turnover, dispersion of analyst forecasts, post-earnings announcement drift, and accounting accruals are not consistently significant in later years and lose significance completely for NYSE/AMEX stocks.

Echoing the improved pricing efficiency, Chordia, Roll, and Subrahmanyam (2011) document an explosion in stock trading activities especially since 2002. They identify significant reductions in trading costs, improved trading technology, and the proliferation of hedge funds as the driving forces. More importantly, they suggest that the upswing of trading volume is mainly contributed by institutional investors. Further evidence suggests that institutions are able to trade more effectively both on private information and on findings about cross-sectional return predictability. As a result of the increased arbitrage activities, stock prices conform more closely to random walks and the market becomes more efficient in recent years. Consistent with their arguments, we confirm in this study the significant role by institutional investors in eliminating long-run abnormal returns following corporate stock transactions.

Our study is also close in spirits to Gompers and Lerner (2003). Given that the prior evidence on underperformance following IPOs is based on the post-Nasdaq data, they undertake an out-of-sample study by examining U.S. IPOs from 1935 to 1972. In contrast to the findings of IPO underperformance in the post-Nasdaq data, they find no robust abnormal performance following IPOs in the pre-Nasdaq period. Like them, we show that the abnormal performance following share repurchases and SEOs also depends on the time period examined, in addition to estimation methods. Unlike them, we argue that the recent improvement in market efficiency contributes to the disappearance of abnormal performance. The reminder of our paper proceeds as follows. Section 2 describes the data of share repurchases and SEOs, and introduces the various estimation methods of long-run abnormal returns. Section 3 presents the results of long-run abnormal returns. In Section 4, we explore potential explanations for the disappearance of long-run abnormal returns after 2002. Section 5 concludes the paper.

2. Data and empirical methodology

2.1. Sample of stock repurchases and SEOs

We obtain the sample of stock repurchases and seasoned equity offerings from Securities Data Company's (SDC) U.S. database. The sample is required to have monthly stock return data available in CRSP. Our sample of repurchases contains 14,538 open market repurchases of common stocks announced during the period from January 1985 to December 2010.[5] Repurchases by tender offers or privately negotiation are excluded in the sample. If a firm makes multiple announcements

[5] The earliest comprehensive data of share repurchases available in SDC start from 1985.

of open market repurchases in a year, only the first announcement is counted. Our sample of SEOs consists of 6,733 new issues of common stocks by industrial firms announced and completed during the period from January 1980 to December 2010. Repurchases and SEOs by financial institutions or utility firms are excluded in the sample. Table 1 presents the sample distribution by calendar years. Compared with the samples of previous long-run stock return studies on these two events, our sample is most comprehensive in terms of both the length of sample period and the number of event observations.

2.2. Estimation of long-run abnormal returns

The estimation of long-run abnormal returns has been controversial.[6] Given the lack of consensus on the best method and also for the purpose of result robustness, we employ three different methods to estimate long-run abnormal returns, respectively, 1) the calendar time portfolio approach (Mitchell and Stafford, 2000); 2) Ibbotson's (1975) returns across time and securities (IRATS); and 3) the buy-and-hold abnormal returns relative to the control firms matched on size, the book-to-market equity ratio, and the prior 6-month return (Barber, Lyon, and Tsai, 1999). All three methods are widely used in previous studies on long-run abnormal returns.

In the calendar time portfolio approach, in each month we construct an event portfolio of firms that have announced stock repurchases or issuances in the past T months, where T is the holding period. The portfolio is rebalanced monthly to add the event firms that have just announced a repurchase or an SEO and drop the firms that reach the end of the holding period. We compute the

[6] See Kothari and Warner (1997), Barber and Lyon (1997), Fama (1998), Mitchell and Stafford (2000), Eckbo, Masulis, and Norli (2000), Schultz (2003), Butler and Wan (2010) among others.

monthly equal-weighted portfolio excess returns and run a time-series regression of the portfolio excess returns on the Fama and French (1993) three factors,

$$R_{p,t} - r_{f,t} = a_p + b_p\left(R_{m,t} - r_{f,t}\right) + s_p SMB_t + h_p HML_t + e_{p,t}. \quad (1)$$

$R_{p,t}$ is the event portfolio return in calendar month t. The regression intercepts a_p measure the average monthly abnormal return for event portfolio p over the holding period.

In the Ibboston's (1975) return across time and security (IRATS) method, we run the following regression in each event month τ:

$$R_{i,t} - r_{f,t} = a_\tau + b_\tau\left(R_{m,t} - r_{f,t}\right) + s_\tau SMB_t + h_\tau HML_t + \varepsilon_{\tau,t}, \quad (2)$$

where $R_{i,t}$ is the return on stock i in the calendar month t that corresponds to the event month τ, $\tau \in [1, T]$, with $\tau = 0$ being the month of the event announcement. The reported abnormal returns during the holding period are sums of the regression intercepts, i.e., $\sum_{\tau=1}^{T} \alpha_\tau$. The standard error used to compute the *t*-statistic is the square root of the sum of the squares of the monthly standard errors.

We follow Barber, Lyon, and Tsai (1999) to estimate the buy-and-hold abnormal returns. First, we select a control firm for each sample firm. At the end of each June, we construct size deciles for the following 12 months based on the June market capitalization of NYSE stocks, and then assign AMEX and Nasdaq stocks into the appropriate NYSE size deciles based on their market cap in June. We further cut the smallest size decile into quintiles of equal number of stocks. As a result, we obtain 14 size portfolios in total. In the meantime, we sort all the firms at the end of June into deciles based on the book-to-market equity ratio (B/M), again using the breakpoints of NYSE firms. The book-to-market equity ratio is defined as the previous fiscal year end book value of equity divided

by the market capitalization at the previous calendar year end. The independent double-sorting results in 140 size and B/M portfolios. For each event firm, we select a control firm from the same size and B/M portfolio in the month before announcement that has the closest match on the prior 6-month return and has not involved in the same type of event (repurchase or SEO) in the prior 36 months. If the control firm is delisted before the end of the holding period, we use the second closet match firm as the replacement (and the third closet if the second closest is also delisted later). The long-run abnormal return is the difference in the buy-and-hold return between the event and the control firms:

$$BHAR_i^T = \prod_{\tau=1}^{T}(1 + R_{i,\tau}) - \prod_{\tau=1}^{T}(1 + R_{control,\tau}). \quad (3)$$

The skewness of buy-and-hold returns may lead to biased inferences when using standard parametric test (Barber, Lyon, and Tsai, 1999), we use the bootstrap method to conduct significance tests. In particular, we randomly select *n* observations from our original sample, with replacement to create new samples. Each new sample contains *n* elements, and we get the median of the new sample. We repeat the procedure for 1000 times, and the standard deviation is constructed from the 1000 subsample medians.

We examine the abnormal returns for the holding periods of 24, 36, and 48 months. Overall, the results are consistent for different holding periods using all three estimation methods of abnormal returns. For the sake of brevity, in the paper we only report the abnormal returns for the holding period of 36 months.

3. Empirical results of long-run abnormal returns

Table 2 reports the long-run abnormal return results. In the full sample, we confirm the findings of prior studies that the three-year abnormal stock returns are significantly positive following share repurchases and significantly negative following SEOs. All the three methods of long-run abnormal return estimation yield consistent results, even comparable in magnitude (the reported abnormal returns under the calendar time approach are monthly while those under the other two methods are for 36 months). Roughly speaking, in the three years following the announcement, repurchasing firms on average realize about 8-10% positive returns while SEO firms incur about 11-15% negative returns relative to the various benchmarks. Both are statistically significant at the 1% level regardless of the estimation methods.

However, a closer examination shows that the long-run abnormal returns are significant only in the sample up to 2002. In the sample of 2003-2010, we find neither significant outperformance following repurchases nor significant underperformance following SEOs, under almost all three methods of long-run abnormal return estimation (hereafter we denote the sample up to 2002 the early sample and the sample after 2002 the later sample). The only exception is the abnormal return of SEOs under IRATS where significant underperformance is still observed in the later sample, but the 36-month abnormal return drops from -15% to -9.5% in magnitude (the associated *t*-statistic drops from -9.44 to -2.50). Under IRATS, the abnormal returns following repurchases even become significantly negative in the later sample. Most existing studies on these two events end their sampling before 2002. For example, Ikenberry, Lakonishok, and Vermaelen (1995) examine open-market repurchases announced in the period of 1980-1990 and find significantly positive returns over several years following the announcement. Peyer and Vermaelen (2009) investigate open-market repurchases in the following period of 1991-2001 and claim the persistence of superior long-

run returns following repurchases during that period. After surveying a number of earlier studies, Ritter (2003) suggests that the return underperformance following SEOs in the period of 1970-2000 are robust. At the minimum, our study provides out-of-sample empirical results that sharply contrast to the earlier findings and cast doubt on the persistence of long-run abnormal returns over time.

Since the standard errors used to evaluate the significance of abnormal returns would decline with a longer time series of data, there is a concern that the lack of significance in the late period might be due to lack of statistical power. Our sample of 2003-2010 is perhaps not long, but it is not short either. It has eight years out of the total of 24 years for repurchases and the total of 29 years for SEOs. In terms of the number of observations, the later sample consists of 26% of the total repurchase sample and 24.8% of the total SEO sample. Nevertheless, we conduct two checks to address this concern. First, we separate the early sample into subsamples with eight years of data, and then re-estimate the abnormal returns of the subsamples. In untabulated results, we confirm the significance of the abnormal performance for both events in the subsamples. In fact, earlier studies that document these two anomalies do not have long time-series event data. Second, we compare the standard errors of the abnormal returns across the early and later periods. While the standard errors for SEOs are slightly higher in the later period, those for repurchases are not significantly different in the two periods. More importantly, we do observe significant reductions in the magnitude of abnormal returns. Some even flip the signs. Overall, the lack of statistical power does not seem to explain the disappearance of abnormal performance of the sample firms after 2002.

Moreover, stock repurchases and offerings are important corporate stock transactions with many opposite features. We observe the disappearance of both outperformance and

underperformance following these two contrasting events. This complexity also mitigates the concern of our findings being a data-snooping outcome.

4. What explains the disappearance of long-run abnormal returns?

It is intriguing that significant long-run abnormal returns are not observed following the announcements of the repurchases and SEOs after 2002. In this section, we explore potential reasons and argue that the disappearance is consistent with the increased stock market efficiency in this later period, evidenced by (1) increased arbitrage activities by institutional investors and (2) reduced market-timing motivations for corporate stock transactions.

4.1. More effective arbitrage by institutional investors

Institutional ownership of U.S. stocks has been increasing in the last few decades (Friedman, 1996; Gompers and Metrick, 2001; Bennett, Sias, and Starks, 2003; Asquith, Pathak, and Ritter, 2005; Blume and Keim, 2008; among others). As illustrated in Figure 1, the median institutional ownership for CRSP stocks has increased steadily from less than 4% in March 1980 to 40% by the end of 2010. In particular, the increase during this time period is from about 10% to 50% for NYSE and AMEX stocks and from almost nil to 40% for NASDAQ stocks. The financial markets in the last decade are also marked by a proliferation of hedge funds that actively search for profit opportunities. In his AFA presidential address, French (2008) shows that the assets managed by hedge funds grow from $456.4 billion in 2000 to $1464.5 billion in 2007, or by 320%. The active investment activities by hedge funds are supposed to make the market prices more efficient.

The cost of trading stocks has been declining during this time period (see, e.g., French, 2008). In 2001, the NYSE, subsequently followed by the Nasdaq Stock Market, adopted a change to reduce the minimum price increment, or tick size, to one cent (a move commonly referred to as "decimalization"). This regulatory change significantly reduces trading costs and improves market quality (Bessembinder, 2003). Based on proprietary data of some large institutions trading NYSE stocks, Chakravarty, Panchapagesan, and Wood (2005) show institutional trading costs decline substantially following the decimalization, especially for those orders not demanding immediate liquidity. Further, the advent of technology has facilitated institutions to execute automated algorithmic trading, which was first implemented in the mid-1990s but has grown to be responsible for as much as 73% of the total trading volume of U.S. stocks in 2009.[7] Hendershott, Jones, and Menkveld (2011) suggest that algorithmic trading substantially improves liquidity, facilitates hedging, and makes stock prices more efficient. Chordia, Roll, and Subramanyam (2011) show that, as a result of the lower cost and the improved technology, stock trading activity explodes in recent years and the upswing is primarily contributed by institutional investors. Further evidence suggests the stock market becomes more efficient as a result of more institutional trading. Intraday volatility has decreased and stock prices conform more closely to random walks in recent years.

The evidence that institutional investors improve market efficiency is ubiquitous. Institutional investors arguably are more effective than individual investors in collecting and processing information. Institutional trading speeds up price adjustment to new information (Badrinath, Kale, and Noe, 1995; Sias and Starks, 1997). D'Avolio (2002) shows that stock loans are primarily supplied by institutions and thus stocks with low institutional ownership are more short-sale constrained.

[7] See "SEC runs eye over high-speed trading," *Financial Times*, July 29, 2009.

Mispricing of stocks with low institutional ownership is more difficult to arbitrage away. Consequently, stocks with higher institutional ownership are more efficiently priced, suggested by prices conforming more to random walks (Boehmer and Kelley, 2009), and the less likelihood of cross-sectional return anomalies (Nagel 2005). Similarly, Bartov, Radhakrishnan, and Krinsky (2000) show that high institutional ownership significantly mitigates the post earnings announcement drift, while Ke and Ramalingegowda (2005) provide evidence that transient institutional investors trade actively to exploit such a drift.

Inspired by these studies, we examine whether the sharp increase in institutional activities helps to explain the disappearance of long-run abnormal returns. Being the marginal investor of stocks, institutional investors might improve pricing efficiency in two ways: (1) a stock with a high level of institutional ownership has a lower chance of mispricing in the first place; (2) in case mispricing occurs, institutional investors can be more effective in identifying it and then arbitraging it away. Due to the lack of detailed institutional trading data, we are not ambitious to examine how institutions prevent and eliminate mispricing. Rather, we try to identify the potential relations between institutional ownership and the findings of long-run abnormal returns, and examine how the pattern has changed after 2002.

We obtain the quarterly data of institutional ownership from Thomson Financial's 13f. For each event stock, we compute its aggregate institutional ownership (IO) at the end of the quarter before the announcement. Figure 1 presents the time-series median IO respectively for repurchasing and SEO firms, along with the median IO of all CRSP firms. As the market median IO rising, it is not surprising to observe that the median IO for both repurchasing and SEO firms also increase

substantially over time. Interestingly, they both passed above the level of 50% since 2003 (but the median IO of SEO firms drops sharply in 2009-10).

Without loss of generality, we assume that institutional investors are able to deliver a reasonably good job of arbitrage for a stock (i.e., prevent and correct mispricing) if they in aggregate hold over 50% of this stock.[8] We classify our sample into two groups, high IO group and low IO group, based on if the stock's institutional ownership in the quarter before the announcement is above or below 50%. Panel A of Table 3 shows the number of event firms in the two groups over calendar years. Not surprisingly, in the early years, more of the sample firms fall into the low IO group. But the pattern changes over time. In the recent years, more of the sample, both repurchasing and SEO firms, fall into the high IO group (SEOs in the last two years are an exception). As summarized in Panel B, in the early sample of 1985-2002, institutional investors in aggregate hold the majority of shares in only 34% of the repurchasing firms and this ratio increases to 69% for the repurchasing firms in 2003-2010. Similarly, in the period of 1980-2002, institutional investors are the majority shareholders for only 23% of the SEO firms, while they are the majority shareholders for over 50% of the SEO firms in 2003-2010.

Next we examine whether the long-run abnormal returns are related to the stocks' institutional ownership. Table 4 presents the long-run abnormal returns, respectively for the low and high IO groups, in the full sample and further in the early and later subsamples. A clear message emerges from the results: high institutional holding significantly mitigates the long-run mispricing of event stocks. For share repurchases, the positive long-run abnormal returns are much less in magnitude in

[8] Our following results are robust to alternative levels of cutting, such as 40% or 45%.

the high IO group than in the low IO group, both in the full and early samples. In the later sample, the positive abnormal returns disappear in both the high and the low IO groups. Similarly, for SEO firms with high IO, the long-run abnormal returns are either less negative (in the early period), or completely disappear (in the later period). In contrast, the low-IO SEO firms incur negative abnormal returns both in the early and the later periods. The results largely hold across different estimation methods. Since 66% of the repurchasing firms and 77% of the SEO firms in the early sample have low IO (as illustrated in Panel B of Table 3) and they realize significant long-run abnormal returns (as illustrated in Table 4), they dominate in the early sample and produce positive abnormal returns following repurchases and negative abnormal returns following SEOs. In the later sample of 2003-2010, however, 69% of the repurchasing firms and over 50% of the SEO firms have high IO and incur neither outperformance nor underperformance following these two events, they dominate in the later sample and thus produce no or at least less significant long-run abnormal performance on average.

Although evidence clearly suggests that high institutional ownership diminishes long-run abnormal returns, it would be too hasty to give full credits to the increase in institutional ownership for the disappearance of long-run abnormal returns. In the early sample, even for the subsample of event firms with above 50% of IO, we still observe significantly positive abnormal returns following repurchases and negative abnormal returns following SEOs. We argue that the relatively higher trading cost in the early period as a limit to arbitrage is daunting for active trading even to many institutional investors. As discussed earlier, Chordia, Roll, and Subramanyam (2011) find that the more recent increase in trading is most significant for firms with high institutional ownership. The relatively lower liquidity could explain the existence of the anomalies even in firms with above 50%

of IO in the early period, which is consistent with Chordia, Roll, and Subramanyam (2008) who suggests that liquidity facilitates market efficiency.

As a robustness check, we also examine another measure of limit to arbitrage - idiosyncratic volatility (IV) – and see how it is related to the long-run abnormal returns. We use the median IV of all CRSP stocks in the early period and divide sample firms into two groups: high (above the median) and low (below the median) IV firms. Intuitively, we expect that the abnormal performance is more significant in high IV firms because the cost of arbitrage is higher with greater idiosyncratic volatility. Indeed, we find similar results (not reported for brevity) as using institutional ownership above. The effect of IV on the abnormal performance is more pronounced in the later sample – abnormal performance disappears in the event stocks with relatively low IV.

4.2. Change in firm motivations

Market timing has been a popular explanation for the findings of long-run abnormal returns following corporate stock transactions. Managers with information advantage time the market by selling new shares when they are overpriced and buying back stocks when they are undervalued. The market is not efficient enough to eliminate the mispricing – investors underreact to the information at announcement. As a result, we observe abnormally positive returns following repurchases and abnormally negative returns following SEOs. Market timing is often regarded as one important motivation for firms to repurchase and issue shares.

If the market becomes more efficient in recent years, there should be less market timing opportunity for firms to sell overpriced shares or buy back underpriced shares. We test this prediction by investigating whether fewer of the event firms after 2002 are market timers relative to

those in the early years and whether other motivations than market timing prevail for the repurchases and SEOs in the recent years.

4.2.1 Univariate analysis

Evidence used to support the market timing hypothesis includes that (1) repurchasing (SEO) firms are often under- (over-) valued at the time of announcement, as indicated by their abnormally high (low) book-to-market equity ratio (B/M), and (2) repurchasing (SEO) firms tend to have abnormally poor (superior) returns in the year before the announcement, which lead to the mispricing and managers' decision of the event. The reasons of using B/M and the prior stock return to infer event firm mispricing are straightforward. Market value of equity being the denominator, we expect to observe an abnormally high (low) B/M for an undervalued (overvalued) firm. Mispricing is more of a temporary phenomenon (that's why it is often described as "windows of opportunity"); an undervalued (overvalued) firm is thus expected to have experienced abnormally low (high) returns in the preceding year. Peyer and Vermaelen (2009) show that the prior-year return is the best predictor of the future long-run returns in the case of share repurchases, and deem it a strong support of the market timing hypothesis. We examine whether these two patterns established in the prior literature have changed after 2002.

Brav, Geczy, and Gompers (2000) show that the underperformance following equity issuances is most evident in small firms. Since small firms are more likely to be mispriced than large firms (asset pricing anomalies are often more significant in small firms), we also examine if firm size, measured as market capitalization as of the month prior to the announcement, plays a role in the disappearance of long-run abnormal returns.

We compare the B/M, prior 12-month return, and the market cap of the event firms with their contemporaneous industry median. Both the book value and the market value of equity are measured before the announcement, specifically, the book value of equity at the previous fiscal year end and the market value at the previous month end. The prior 12-month return is the buy-and-hold return in the 12 months immediately before the announcement. Market capitalization is measured at the end of the month before the announcement, adjusted by the CPI to December 2002 dollars and expressed in logarithm. Firms are classified into 48 industries following Fama and French (1997). For each industry in each month, we also compute the median B/M and market capitalization (CPI-adjusted, in logarithm) and the value-weighted portfolio return as the benchmarks for the event firms. Table 5 shows the means of these three industry-adjusted characteristics, respectively for the full sample, and the early and later subsamples.

The results can be summarized as follows. In the full as well as the early samples, repurchasing firms on average have a significantly higher B/M ratio than their industry median before the announcement, suggesting undervaluation a possible trigger for the repurchases. More importantly, if we compare the early with the later samples, the average difference in B/M between the repurchasing firm and its industry median reduces substantially, from 0.07 to 0.01, and the drop is statistically significant at the 1% level. In the later sample after 2002, repurchasing firms on average do not have a significantly higher B/M ratio than their industry median. The evidence on the prior 12-month returns is also informative. In the early sample, repurchasing firms on average incur 9% more negative return in the year before the announcement than their contemporaneous industry return, indicating possible undervaluation of repurchasing firms. Repurchasing firms after 2002, however, do not realize significantly lower returns than the industry on average. Together with the

B/M evidence, we argue that, in the recent years, fewer repurchases than those in the early years are motivated by market timing, as they do not seem undervalued in the first place.

The evidence on SEOs leads us to make a similar conclusion – fewer of the SEOs in the recent years are carried out for the purpose of timing the market. We find that, compared with the SEO firms in the early years, recent SEO firms have significantly higher B/M ratios and lower returns in the year before announcements. The B/M ratios of SEO firms in the recent years are not significantly different from their industry peers. However, SEO firms in the later sample still realize significantly higher prior returns than their industry average. Stock overvaluation might still be a trigger for some SEOs, but compared to the early years, market timing becomes less important as a motivation.

Regarding firm size, both repurchasing and SEO firms appear to be larger than their industry median. This pattern remains for repurchasing firms over time but the size dominance over industry median shrinks for SEO firms in the later sample, suggesting more small firms conduct SEOs in the recent years. Since mispricing is more likely to occur in small firms, repurchasing firm size remaining the same and the reduction of SEO firm size do not explain the overall disappearance of long-run abnormal returns in the recent years, they, however, might explain why the disappearance for SEO firms is not as significant as that for repurchasing firms.

To further examine firm motivations over time, we assign all event firms into quintiles based on each of the above three characteristics (B/M, the prior 12-month return, and size). The quintile breakpoints are constructed from all CRSP firms in the same month (NYSE firms for the size quintiles). Consequently, the distribution of event firms across quintiles is not even. We examine the

distributions before and after 2002 and try to infer whether firms' motivations for the events have changed over the two time periods. Panel B of Table 5 presents the percentage distribution of event firms in quintiles sorted on B/M, the prior return, and the market cap, respectively.

If stock undervaluation (overvaluation) is a primary motivation for share repurchases (SEOs), we would expect to observe that more of the repurchasing (SEO) firms fall into the high (low) B/M quintiles, and the low (high) prior-return quintiles. The evidence seems so for SEO firms but not much so for repurchasing firms. Almost a half of the SEO firms belong to the lowest B/M quintile, and if quintiles are sorted on the prior 12-month return, more than a half of the SEO firms fall into the highest prior-return quintile. The distribution of repurchasing firms is fairly even across both the B/M quintiles and the prior-return quintiles, with the middle three quintiles (quintile 2, 3, and 4) having slightly more observations. Exploiting mispricing, as a potential motivation for corporate stock transactions, seems more plausible for SEOs than for repurchases. Comparing the distribution after 2002 with that of the early years, we find that even fewer of the repurchasing firms fall into the high B/M quintiles (quintile 4 and 5) and fewer of the SEO firms fall into the low B/M quintiles (quintile 1 and 2), which presumably host suspects of market timers. The percentage of SEO firms belonging to the highest prior-return quintile drops from 58.63% in the early sample to 45.14% in the later sample (The distribution for repurchasing firms over the prior-return quintiles does not change much over the two periods). In short, if exploiting mispricing was an important motivation for these two events in the early years, it becomes less important after 2002.

In untabulated results, we also compute long-run abnormal returns for event firms in each quintile, and find that, from the low to high B/M quintiles in the early sample, the abnormal returns

become more positive and significant for repurchases and become less negative and significant for SEOs. In other words, the superior return performance following repurchases is concentrated more in firms with high B/M, and the underperformance following SEOs is concentrated more in firms with low B/M. While the pattern for SEO firms remains after 2002 to some extent, the magnitude becomes significantly weaker. The pattern completely disappears for repurchasing firms. Under IRATS and BHAR, the abnormal returns following repurchases even become negative. Similar return results are found in quintiles sorted on the prior 12-month returns.

4.2.2 Multivariate analysis of repurchase and SEO decisions

In addition, we analyze firms' market-timing incentives in repurchase and SEO decisions in a multivariate framework. In particular, we run logit regressions on data for the full set of industrial firms in Compustat to assess whether the probability of a firm launching a repurchase (an SEO) is related to its industry-adjusted B/M equity ratios, the prior 12-month and future three-year stock returns in excess of the contemporaneous industry. For a given firm in a given year, the dependent variable equals 1 if it has made a repurchase (an SEO) announcement in that year and 0 otherwise. The three explanatory variables are often used in previous studies as proxies for managers' perception of mispricing (e.g., DeAngelo, DeAngelo, and Stulz, 2010). For the purpose of our research interest, we also include a post-2002 dummy (which equals one if the repurchase/SEO is announced after 2002 and zero otherwise) and interact the dummy with the three market-timing variables. If firms time the market in their SEO decision, we expect to observe a positive coefficient for the prior excess return and negative coefficients for the B/M ratio and the future excess returns;

and the opposite is expected to hold for repurchases. If event firms' market timing incentive weakens in the recent years, we expect these coefficients to subdue in magnitude.

Table 6 presents the logit regression results. For SEOs, we find that the coefficient estimates on the three market-timing variables have signs consistent with the market-timing hypothesis – a firm is more likely to conduct an SEO if its B/M is lower, its prior return is higher, and its future return is lower. However, the interaction of market-timing variables with the post-2002 dummy yield significant coefficient estimates with opposite signs. This suggests that firms' incentive of conducting SEOs to time the market becomes weaker after 2002. In fact, the prior and future excess returns fail to explain firms' decision of SEOs in the recent years. The variable of B/M could also measure the firm's investment opportunities. For the decision of share repurchases, among the three market-timing variables, only the positive coefficient estimate on the future excess return is consistent with the market-timing hypothesis. Nevertheless, even this coefficient turns to be zero in the later period as the interaction term with the post-2002 dummy has the opposite sign with the identical magnitude. So we argue that market timing does not seem a convincing motivation for repurchases in the first place; if any, it also decays over time.

Combining the evidence in Tables 5 and 6, we argue that market timing becomes not as important as before as a motivation for either share repurchases or SEOs. In the recent years, we have fewer of undervalued repurchasing firms and fewer of overvalued SEO firms before the announcements. Moreover, even for those event firms still appearing to be under- or over-valued, we do not find that they consistently realize positive or negative abnormal returns in the long run.

The evidence suggests that corporate stock transactions in the recent years are perhaps done for purposes other than market timing.

Besides the possibility of timing the market, firms distribute excess cash to shareholders through share repurchases. Recent studies, such as Grullon and Michaely (2002), DeAngelo, DeAngelo, and Skinner (2008), and Skinner (2008), show that over time firms rely more on repurchases than dividends in payout to shareholders. Similarly, firms conduct SEOs perhaps for the purpose of raising investment capital (Kim and Weisbach, 2008) or saving cash (McLean, 2010), rather than timing the market. McLean (2010) even argues that the precautionary motives in saving cash are strengthened in recent years.

4.3. The implication of announcement returns

If the market becomes more efficient recently, the information content of the repurchase/SEO announcement declines. That is, part of the information has been already incorporated in the stock prices upon the announcement because institutions would trade on their information about the firm value before the announcement. As such, it is possible to observe less significant price reactions at the announcement. Furthermore, firms' weaker capability in timing the market as a result of improved market efficiency would also suggest a reduction in the information content of event announcements, which contributes to the subdued market response as well. We examine event announcement returns to explore the answers.

We calculate the three-day cumulative abnormal returns around the repurchase and SEO announcement date, i.e., CAR[-1, +1], using the market model and the CRSP value-weighted return as the market return. Table 7 reports the results of CARs. Consistent with previous studies on the

announcement returns of these two events, we find that repurchasing firms realize positive returns and SEO firms incur negative returns at announcement. Both are statistically significant at the 1% level. Further, we find that both the mean and median CARs for repurchases (SEOs) after 2002 become less positive (negative) than those in the early sample. The differences, except that of the mean CARs for SEOs, are statistically significant. This evidence is consistent with the reduced information content of these corporate stock transactions. More firms refrain from using SEOs and repurchases to time the market, perhaps as a rational reaction to the improved market efficiency.

To further pin down how the weaker market response is related to the change in firms' market-timing incentives, we run a multiple regression of announcement returns on market-timing variables (prior 12-month return and M/B), together with firm and deal characteristics that help to explain the variation in announcement returns. In particular, the independent variables include the event firm size, industry, investment opportunity, cash holding, leverage, profitability, return in the previous year, return volatility, capital expenditure, as well as the deal size. Our key variable of interest is the post-2002 dummy. We expect that the market responses before and after 2002 would not differ significantly after controlling for market-timing and characteristic variables. That is, the univariate difference in CARs before and after 2002 is fully subdued by the change in market-timing variables over the periods. Table 8 presents the regression results. Indeed, the coefficient of the post-2002 dummy is not statistically different from zero. Our evidence confirms the shifting incentives of corporate stock transactions.

Overall, our finding that the market responds to repurchase/SEO announcements less significantly, combined with the disappearance of the long-run price drift documented earlier, is consistent with an improvement in market efficiency more recently.

5. Conclusion

Early studies have documented significant stock return outperformance following repurchases and underperformance following SEOs. The evidence is robust to various estimation methods of long-run abnormal returns, and is often explained jointly by market inefficiency and firms' incentive of market timing. Firms buy back shares when undervalued and sell additional stocks when overvalued. Investors in the market fail to incorporate the information fully at the announcement, and as a result, significant long-run abnormal returns are observed, in particular, outperformance following repurchases and underperformance following SEOs.

In this study, we find that the long-run abnormal returns largely disappear in the sample after 2002. Neither outperformance following repurchases nor underperformance following SEOs is consistently observed. The evidence is also robust to different estimations of long-run abnormal returns. Further analyses suggest that the stock market becomes more efficient in the recent years. The substantially increased stock ownership and trading activities by institutional investors, facilitated by the reduced trading costs and the improved trading technology, help to prevent and eliminate mispricing and make the pricing more efficient in general. In response to the improved market efficiency, fewer repurchases and SEOs are conducted for the purpose of timing the market. The findings of long-run abnormal returns do not persist over time. The players in the stock market,

the incentives of corporations, and the market itself evolve over time. Our findings suggest a more dynamic view on the stock market and the market efficiency.

References

Amihud, Y., LI, K., 2006. The declining information content of dividend announcements and the effects of institutional holdings. Journal of Financial and Quantitative Analysis 41, 637-660.

Asquith, P., Pathak, P., Ritter, J., 2005, Short interest, institutional ownership, and stock returns, *Journal of Financial Economics* 78, 243–276.

Badrinath, S. G., Kale, J. R., Noe, T. H., 1995. Of shepherds, sheep, and the cross-autocorrelations in equity returns. Review of Financial Studies 8, 401-430.

Barber, B., Lyon, J., 1997. Detecting long-run abnormal stock returns: the empirical power and specification of test statistics. Journal of Financial Economics 43, 341-372.

Barber, B., Lyon, J., Tsai, C., 1999. Improved methods for tests of long-run abnormal stock returns. Journal of Finance 54, 165-201.

Barberis,N., Shleifer,A., and Vishny,R., 1998. A model of investor sentiment. Journal of Finance Economics 49, 307-343.

Bartov, E., Radhakrishnan, S., Krinsky, I., 2000. Investor sophistication and patterns in stock returns after earnings announcements. Accounting Review 75, 43-63.

Bates, T. W., Kahle, K. M., Stulz, R. M., 2009. Why do firms hold so much more cash than they used to be? Journal of Finance 64, 1985-2021.

Bennett, J., Sias, R., Starks, L., 2003, Greener pastures and the impact of dynamic institutional preferences, *Review of Financial Studies* 16, 1203-1238.

Bessembinder, H., 2003. Trade execution costs and market quality after decimalization. Journal of Financial and Quantitative Analysis 38, 747-777.

Billett, M., Flannery, M. J., Garfinkel, J. A., 2011. Frequent issuers' influence on long-run post-issuance returns. Journal of Financial Economics 99, 349-364.

Blume, M., Keim, D., 2008, Trends in institutional stock ownership and some implications, Working paper, University of Pennsylvania, Philadelphia.

Boehme, R. D., Sorescu, S. M., 2002. The long-run performance following dividend initiations and resumptions: underreaction or product of chance? Journal of Finance 57, 871-900.

Boehmer, E., Kelley, E. K., 2009. Institutional investors and the informational efficiency of prices. Review of Financial Studies 22, 3563-3594.

Brandt, M. W., Brav, A., Graham, J. R., Kumar A., 2010. The idiosyncratic volatility puzzle: time trend or speculative episodes? Review of Financial Studies 23, 863-899.

Brav, A., Geczy, C., Gompers, P. A., 2000. Is the abnormal return following equity issuances anomalous? Journal of Financial Economics 56, 209-249.

Butler, A. W., Wan, H., 2010. Stock market liquidity and the long-run stock performance of debt issuers. Review of Financial Studies 23, 3966-3995.

Chakravarty, S., Panchapagesan, V., Wood, R., 2005. Did decimalization hurt institutional investors? Journal of Financial Markets 8, 400-420.

Chordia, T., Roll, R., Subrahmanyam, A., 2001. Market liquidity and trading activity, Journal of Finance 56, 501-530.

Chordia, T., Roll, R., Subrahmanyam, A., 2008. Liquidity and market efficiency. Journal of Financial Economics 87, 249-268.

Chordia, T., Roll, R., Subrahmanyam, A., 2011. Recent trends in trading activity and market quality. Journal of Financial Economics 101, 243-263.

Chordia, T., Subrahmanyam, A., Tong, Q., 2011. Trends in the cross-section of expected stock returns. Working paper.

D' Avolio, G., 2002. The market for borrowing stock. Journal of Financial Economics 66, 271-306.

Daniel, K., Hirshleifer,D., Subrahmanyam,A., 1998. Investor Psychology and Security Market under- and Overreactions. Journal of Finance 53, 1839-1885.

DeAngelo, H., DeAngelo, L., Skinner, D. J., 2008. Corporate payout policy. Foundations and Trends in Finance, Vol. 3, Nos. 2-3, 95-287.

DeAngelo, H., DeAngelo, L., Stulz, R. M., 2010. Seasoned equity offerings, market timing, and the corporate lifecycle. Journal of Financial Economics 95, 275-295.

Dittmar, A., Dittmar, R., 2008. The timing of financing decisions: an examination of the correlation in financing waves. *Journal of Financial Economics* 90, 59-83.

Eckbo, B. E., Masulis, R. W., Norli, O., 2000. Seasoned public offerings: resolution of the 'new issue puzzle'. Journal of Financial Economics 56, 251-291.

Fama, E., 1998. Market efficiency, long-term returns, and behavioral finance. Journal of Financial Economics 49, 283-306.

Fama, E., French, K., 1997. Industry cost of capital. Journal of Financial Economics 43, 153-193.

French, K., 2008. The cost of active investing. Journal of Finance 63, 1537-1573.

Friedman, B., 1996. Economic implications of changing share ownership. *Journal of Portfolio Management 22,* 59-70.

Gompers, P., Lerner, J., 2003. The really long-run performance of initial public offerings: the pre-Nasdaq evidence. Journal of Finance 58, 1335-1392.

Gompers, P., Metrick, A., 2001. Institutional investors and equity prices. Quarterly Journal of Economics 116, 229-259.

Grullon, G. and R. Michaely, 2002. Dividends, share repurchases, and the substitution hypothesis. *Journal of Finance* 57, 1649-1684.

Hendershott, T., Jones, C., Menkveld, A., 2011. Does algorithmic trading improve liquidity? Journal of Finance 66, 1-33.

Ibbotson, R. G., 1975. Price performance of common stock new issues. Journal of Financial Economics 2, 235-272.

Ikenberry, D., Lakonishok, J., Vermaelen, T., 1995. Market underreaction to open-market share repurchases. Journal of Financial Economics 39, 181-208.

Ke, B., Ramalingegowda, S., 2005. Do institutional investors exploit the post-earnings announcement drift? Journal of Accounting and Economics 39, 25-53.

Kim, W., Weisbach, M., 2008. Motivations for public share offers: An international perspective. Journal of Financial Economics 87, 281-307.

Korthari, S., Warner, J., 1997. Measuring long-horizon security price performance. Journal of Financial Economics 43, 301-339.

Loughran, T., Ritter, J., 1995. The new issues puzzle. Journal of Finance 50, 23-51.

McLean, R. D., 2010. Share issuance and cash saving. Journal of Financial Economics 99, 693-715.

Michaely, R., Thaler, R. H., Womack, K. L., 1995. Price reactions to dividend initiations and omissions: Overreaction or drift? Journal of Finance 50, 573-608.

Mitchell, M., Stafford, E., 2000. Managerial decisions and long term stock price performance. Journal of Business 73, 287-329.

Nagel, S., 2005. Short sales, institutional investors and the cross-section of stock returns. Journal of Financial Economics 78, 277-309.

Peyer, U., Vermaelen, T., 2009. The nature and persistence of buyback anomalies. Review of Financial Studies 22, 1693-1745.

Ritter, J., 1991. The long run performance of initial public offerings. Journal of Finance 46, 3-27.

Ritter, J., 2003. Investment Banking and Securities Issuance, In G. Constantinides, M. Harris, and R. Stulz (eds.), Chapter 5 of *Handbook of the Economics of Finance* p.253-304. Elsevier, North-Holland.

Schultz, P., 2003. Pseudo market timing and the long-run performance of IPOs. Journal of Finance 58, 483-518.

Schwert, G., 2003. Anomalies and Market Efficiency, In G. Constantinides, M. Harris, and R. Stulz (eds.), *Handbook of the Economics of Finance.* Elsevier, North-Holland.

Sias, R. W., Starks, L. T., 1997. Return autocorrelation and institutional investors. Journal of Financial Economics 46, 103-131.

Skinner, D. J., 2008. The evolving relation between earnings, dividends, and stock repurchases. *Journal of Financial Economics* 87, 582-609.

Spiess, K., Affleck-Graves, 1995. The long-run performance following seasoned equity offerings. Journal of Financial Economics 38. 243-267.

Table 1
The distribution of stock repurchases and seasoned equity offerings by calendar years

This table presents the distribution of our sample stock repurchases and seasoned equity offerings (SEOs) by calendar years. Our sample of repurchases contains 14,538 open-market repurchases of common stocks during the period from January 1985 to December 2010. Repurchases by tender offers or private negotiation are excluded from the sample. If a firm makes multiple announcements in a year, only the first announcement is counted. Our sample of SEOs includes 6,645 issues of common stocks by industrial firms (not by financial institutions or utility firms) during the period from January 1980 to December 2010.

Year	Repurchases	SEOs
1980		211
1981		214
1982		168
1983		473
1984		101
1985	115	191
1986	165	208
1987	689	154
1988	223	63
1989	439	117
1990	696	80
1991	265	254
1992	418	231
1993	420	298
1994	742	216
1995	759	329
1996	1010	394
1997	870	333
1998	1399	196
1999	1083	269
2000	616	272
2001	509	156
2002	347	134
2003	352	174
2004	433	182
2005	494	147
2006	459	145
2007	719	128
2008	770	79
2009	201	403
2010	345	325
Total	14,538	6,645

Table 2
Long-run abnormal returns following share repurchase and SEO announcements

This table reports the abnormal returns in 36 months following the repurchase and SEO announcements. Long-run abnormal returns are estimated using three methods: (1) calendar-time portfolio approach; (2) Ibbotson's (1975) return across time and securities (IRATS); and (3) the buy-and-hold abnormal return (BHAR) relative to the control firms matched on size and the book-to-market equity ratio. The estimation details can be found in Section 2.2. The long-run abnormal returns are estimated for the full sample, i.e., 1985-2010 for repurchases and 1980-2010 for SEOs, as well as separately for the early sample (as of 2002) and the later sample (2003-2010). The associated t-statistics are reported in the parentheses. The last column reports the number (and the percentage) of sample observations in each sample period. Panel A is for repurchasing firms and Panel B for SEO firms.

Panel A: Long-run abnormal returns following stock repurchases

Sample period	Calendar time	IRATS	BHAR(median)	N (%)
1985-2010	0.24%***	11.95%***	10.37 %	14,538 (100%)
	(2.91)	*(15.67)*	*(10.58)*	
1980-2002	0.22%**	13.41%***	14.50%	10,765 (74.0%)
	(2.29)	*(14.75)*	*(12.23)*	
2003-2010	0.05%	1.49%	-2.31%	3,773 (26.0%)
	(0.40)	*(1.03)*	*(-1.25)*	

Panel B: Long-run abnormal returns following SEOs

Sample period	Calendar time	IRATS	BHAR(median)	N (%)
1980-2010	-0.38%***	-20.09%***	-11.32%	6,645 (100%)
	(-3.08)	*(-13.85)*	*(-7.74)*	
1980-2002	-0.40%***	-21.96%***	-12.67%	5,062 (76.2%)
	(-2.89)	*(-13.78)*	*(-8.45)*	
2003-2010	-0.19%	-6.46%*	-4.65%	1,583 (23.8%)
	(-0.74)	*(-1.68)*	*(-1.09)*	

Table 3

Institutional ownership of repurchasing and SEO firms over time

The table presents the number and the percentage of event firms whose institutional ownership at the quarter end before the announcement is below 50% (low IO) or above 50% (high IO). Institutional ownership is the percentage of outstanding shares held by institutions in aggregate. Panel A reports the distributions by calendar years, and Panel B summarizes them into the full, the early, and the later sample periods.

Panel A: The distribution by calendar years

Year	Repurchases				SEOs			
	N(low IO)	N(high IO)	%(low IO)	%(high IO)	N(low IO)	N(high IO)	%(low IO)	%(high IO)
1980					170	6	96.6%	3.4%
1981					195	11	94.7%	5.3%
1982					152	13	92.1%	7.9%
1983					424	40	91.4%	8.6%
1984					93	5	94.9%	5.1%
1985	90	25	78.3%	21.7%	174	11	94.1%	5.9%
1986	110	54	67.1%	32.9%	181	21	89.6%	10.4%
1987	509	177	74.2%	25.8%	123	29	80.9%	19.1%
1988	159	63	71.6%	28.4%	54	7	88.5%	11.5%
1989	318	121	72.4%	27.6%	99	16	86.1%	13.9%
1990	520	175	74.8%	25.2%	68	10	87.2%	12.8%
1991	192	73	72.5%	27.5%	191	61	75.8%	24.2%
1992	263	152	63.4%	36.6%	172	57	75.1%	24.9%
1993	263	154	63.1%	36.9%	219	74	74.7%	25.3%
1994	500	241	67.5%	32.5%	145	66	68.7%	31.3%
1995	499	259	65.8%	34.2%	222	107	67.5%	32.5%
1996	657	350	65.2%	34.8%	291	100	74.4%	25.6%
1997	533	335	61.4%	38.6%	242	91	72.7%	27.3%
1998	899	495	64.5%	35.5%	128	65	66.3%	33.7%
1999	688	388	63.9%	36.1%	168	95	63.9%	36.1%
2000	364	250	59.3%	40.7%	175	97	64.3%	35.7%
2001	306	200	60.5%	39.5%	71	85	45.5%	54.5%
2002	176	171	50.7%	49.3%	49	84	36.8%	63.2%
2003	174	177	49.6%	50.4%	86	88	49.4%	50.6%
2004	144	289	33.3%	66.7%	82	100	45.1%	54.9%
2005	132	360	26.8%	73.2%	65	81	44.5%	55.5%
2006	125	332	27.4%	72.6%	64	81	44.1%	55.9%
2007	176	543	24.5%	75.5%	50	78	39.1%	60.9%
2008	214	555	27.8%	72.2%	22	57	27.8%	72.2%
2009	71	129	35.5%	64.5%	209	189	52.5%	47.5%
2010	74	271	21.5%	78.5%	229	94	70.9%	29.1%

Panel B: The distribution by the early and later sample periods

Sample	Repurchases				SEOs			
	N(low IO)	N(high IO)	%(low IO)	%(high IO)	N(low IO)	N(high IO)	%(low IO)	%(high IO)
Full sample	8156	6339	56.27%	43.73%	4613	1919	70.62%	29.38%
Early sample	7046	3683	65.67%	34.33%	3806	1151	76.78%	23.22%
Later sample	1286	2827	31.27%	68.73%	807	768	51.24%	48.76%

Table 4

Institutional ownership and long-run abnormal returns

Event firms are classified into the low IO and high IO groups based on if their institutional ownership (IO) in the quarter before the announcement is below or above 50%. The long-run abnormal returns are separately reported for the low and high IO groups, in the full, the early, and the later samples. The statistical significance is marked by *, **, and ***, corresponding to the significance level of 10%, 5%, and 1%, respectively.

	Calendar time		IRATS		BHAR (median)	
	Low IO	High IO	Low IO	High IO	Low IO	High IO
Panel A: Repurchases						
Full sample	0.29%***	0.18%**	15.31%***	5.88%***	13.32%***	6.58%***
Early sample	0.32%***	0.10%	18.18%***	8.37%***	16.32%***	11.54%***
Later sample	-0.04%	0.06%	-10.86%***	-0.73%	-9.08%*	-0.99%
Panel B: SEOs						
Full sample	-0.49%***	-0.19%	-22.81%***	-9.22%***	-13.09%***	-10.20%***
Early sample	-0.40%**	-0.31%*	-21.59%***	-19.31%***	-15.84%***	-10.22%***
Later sample	-0.54%	0.05%	-20.86%***	5.39%	-8.45%*	1.20%

Table 5

Panel A: The industry-adjusted B/M, prior 12-month return, and size of event firms

This table presents the industry-adjusted book-to-market equity ratio, prior 12-month return and market capitalization of event firms. B/M is constructed using the book value of equity in the previous fiscal year end and the market capitalization in the previous month end before the announcement. The prior 12-month return is the buy-and-hold return in the 12 months before the announcement. Size is measured as the market capitalization in the previous month end, in logarithm. We adjust the event firm B/M and market cap by subtracting the contemporaneous industry median, and adjust the prior 12-month return by subtracting the contemporaneous buy-and-hold value-weighted industry portfolio return. The last row reports the difference in these three variables between the later and early samples. T-tests are used to test the significance of means and the difference in means. The statistic significance is marked by *, **, and ***, corresponding to the significance level of 10%, 5%, and 1%, respectively.

Samples	Repurchases			SEOs		
	B/M	Prior return	Market cap	B/M	Prior return	Market cap
Full sample	0.05***	-0.07***	1.12***	-0.12***	0.66***	0.88***
Early sample	0.07***	-0.09***	1.13***	-0.14***	0.70***	1.10***
Later sample	0.01	-0.01	1.11***	-0.04*	0.51***	0.22***
Difference	-0.05***	0.08***	-0.01	0.10***	-0.20***	-0.88***

Table 5
Panel B: Firm distribution across characteristic quintiles

This table presents the distribution of event firms across firm characteristics quintiles. We assign event firms into quintiles based on their characteristics – B/M equity ratio, prior 12-month return, and market capitalization, one at a time. The breakpoints for size quintiles are constructed from NYSE firms in the same month as the announcement of the event The breakpoints for B/M and prior 12-month return quintiles are constructed from all CRSP firms.

Repurchases						SEOs				
B1: Percent of observations in B/M quintiles						B1: Percent of observations in B/M quintiles				
	B/M lowest	B/M 2	B/M 3	B/M 4	B/M highest	B/M lowest	B/M 2	B/M 3	B/M 4	B/M highest
Full sample	17.58%	24.52%	24.39%	21.94%	11.57%	46.08%	25.98%	15.29%	8.77%	3.88%
Early sample	15.85%	24.01%	25.08%	22.68%	12.37%	46.37%	27.11%	15.25%	7.78%	3.48%
Later sample	22.34%	25.94%	22.47%	19.90%	9.35%	45.11%	22.30%	15.40%	12.01%	5.18%
B2: Percent of observations in prior-return quintile						B2: Percent of observations in prior-return quintiles				
	Lowest prior-return	Prior-return 2	Prior-return 3	Prior-return 4	Highest prior-return	Lowest prior-return	Prior-return 2	Prior-return 3	Prior-return 4	Highest prior-return
Full sample	15.70%	23.44%	23.17%	22.32%	15.37%	7.76%	8.43%	10.15%	18.46%	55.21%
Early sample	15.64%	23.03%	23.38%	22.93%	15.01%	4.05%	7.28%	10.10%	19.93%	58.63%
Later sample	15.85%	24.56%	22.58%	20.65%	16.36%	18.94%	11.91%	10.28%	14.01%	44.86%
B3: Percent of observations in size quintiles						B3: Percent of observations in size quintiles				
	Smallest size	Size 2	Size 3	Size 4	Largest size	Smallest size	Size 2	Size 3	Size 4	Largest size
Full sample	33.81%	16.81%	14.60%	14.87%	19.91%	28.43%	27.42%	21.79%	14.97%	7.40%
Early sample	36.35%	16.42%	14.31%	14.14%	18.77%	26.71%	26.01%	23.12%	16.21%	7.95%
Later sample	26.56%	17.94%	15.41%	16.95%	23.15%	33.84%	31.87%	17.59%	11.05%	5.65%

Table 6
Logit regression of SEO and repurchase decisions

The table presents the results of logit regressions of SEO and repurchase decisions in a given year on the firm's most recent industry-adjusted book-to-market equity ratio, industry-adjusted stock returns over the prior year and the subsequent three years, and a year dummy, which equals 1 for firms after 2002 and 0 otherwise, and also the interaction of the year dummy with the other variables. For a given firm in a given year, the dependent variable equals 1 if it has made an SEO (a repurchase) announcement in that year and 0 otherwise. Industry-adjusted B/M is the firm's raw B/M divided by the median B/M for all firms in the same industry for the fiscal year end that falls closet to, but no later than, December 31 of the prior year. Prior (Future) excess return is the compound stock return of the prior 12 months (the following three years) minus the contemporary value-weighted industry return. Firms in the regression are required to have at least 7 non-missing monthly returns in a year, from the pool of all firm-year observations for all CRSP/Compustat industrial firms. The table reports the estimated coefficients and the associated *t*-statistics in the parentheses. The sample period is 1980-2007 for SEOs and 1985-2007 for repurchases.

	Repurchases	**SEOs**
Intercept	**-2.24**	**-2.68**
	(-87.63)	*(-59.07)*
Ind-adj B/M	**-0.16**	**-0.65**
	(-14.79)	*(-22.32)*
Prior excess return	**0.03**	**0.02**
	-14.89	*-9.88*
Future excess return	**0.01**	**-0.03**
	-5.3	*(-8.04)*
Dummy (Year>=2003)	**0.30**	**-0.35**
	-4.36	*(-2.65)*
B/M*Dummy	**-0.13**	**-0.04**
	(-4.45)	*(-0.46)*
Prior return*Dummy	**-0.01**	**-0.02**
	(-3.56)	*(-2.45)*
Future return*Dummy	**-0.01**	**0.04**
	(-2.33)	*(-3.42)*
Number of observations	117,468	

		136,588
Pseudo R-squared (%)	1.10	102

Table 7
Cumulative abnormal returns at announcement

This table reports the mean and median three-day cumulative abnormal returns around the announcement date for repurchasing and SEO firms, i.e., CAR[-1, +1]. Abnormal return is estimated using the conventional market model with the CRSP value-weighted return as the market portfolio. The announcement cumulative abnormal returns are estimated for the full sample, i.e., 1985-2010 for repurchases and 1980-2010 for SEOs, as well as separately for the early sample (as of 2002) and the later sample (2003-2010). The last row reports the difference in CAR between the later and early samples. We test the significance of means and the difference in means by t-test, the significance of medians by Wilcoxon signed ranks test, and the significance of difference in medians by Wilcoxon rank sum test. The statistic significance is marked by *, **, and ***, corresponding to the significance level of 10%, 5%, and 1%, respectively.

Samples	Repurchases		SEOs	
	Mean	Median	Mean	Median
Full sample	2.43%***	1.60%***	-2.77%***	-2.74%***
Early sample	2.65%***	1.76%***	-2.85%***	-2.87%***
Later sample	1.82%***	1.27%***	-2.55%***	-2.38%***
Difference	-0.82%***	-0.49%***	0.30%	0.49%**

Table 8
Regression of the cumulative abnormal return at announcement

This table reports the regression results. The dependent variable of the regression is CAR[-1, +1], the three-day cumulative abnormal return at announcement. The explanatory variables include a time dummy (Post-2002), which is set to be 1 if the announcement occurs in 2003-2010 and to be 0 otherwise, Total assets in logs, B/M (the book-to-market equity ratio, in which the book value is measured at the fiscal year end before the announcement and the market value is measured as the month end before the announcement), Cash/Assets (cash and marketable securities divided by total assets in the previous fiscal year), Debt/Assets (long-term debt divided by total assets), EBITDA/Assets, Prior 12-month return (the compound return in the 12 months before the announcement), Return volatility (the standard deviation of daily returns in the previous 12 months), CAPX/Assets (the sum of capital expenditures in the following three years divided by total assets in the previous fiscal year), Proceeds/ME (transaction value scaled by market capitalization before announcement), and industry dummies. Industries are classified as in Fama and French (1997). The top and bottom 0.5% of observation values in each year are replaced by the value at the 99.5 and 0.5 percentiles. The associated *t*-statistics are reported in parentheses.

	Repurchases	**SEOs**
Intercept	2.60	-4.62
	(5.31)	*(-7.20)*
Post-2002 dummy	0.06	0.17
	(0.38)	*(0.61)*
Log(Assets)	-0.13	0.12
	(-3.46)	*(11.56)*
B/M	0.85	0.55
	(5.99)	*(2.77)*
Cash/Assets	-0.25	0.08
	(-0.40)	*(0.14)*
Debt/Assets	0.18	0.55
	(0.35)	*(0.98)*
EBITDA/Assets	-2.64	0.41
	(-4.96)	*(2.15)*
Prior 12-month return	-2.46	-0.27
	(-15.22)	*(-43.82)*
Return volatility	96.36	-4.06
	(18.02)	*(-0.78)*
3-year CAPX/Assets	0.26	0.15
	(0.72)	*(1.37)*
Proceeds/ME	5.28	2.63
	(6.11)	*(4.63)*
Industry dummy	yes	yes
Number of observations	14463	5421
R-squared (%)	7.69	1.46

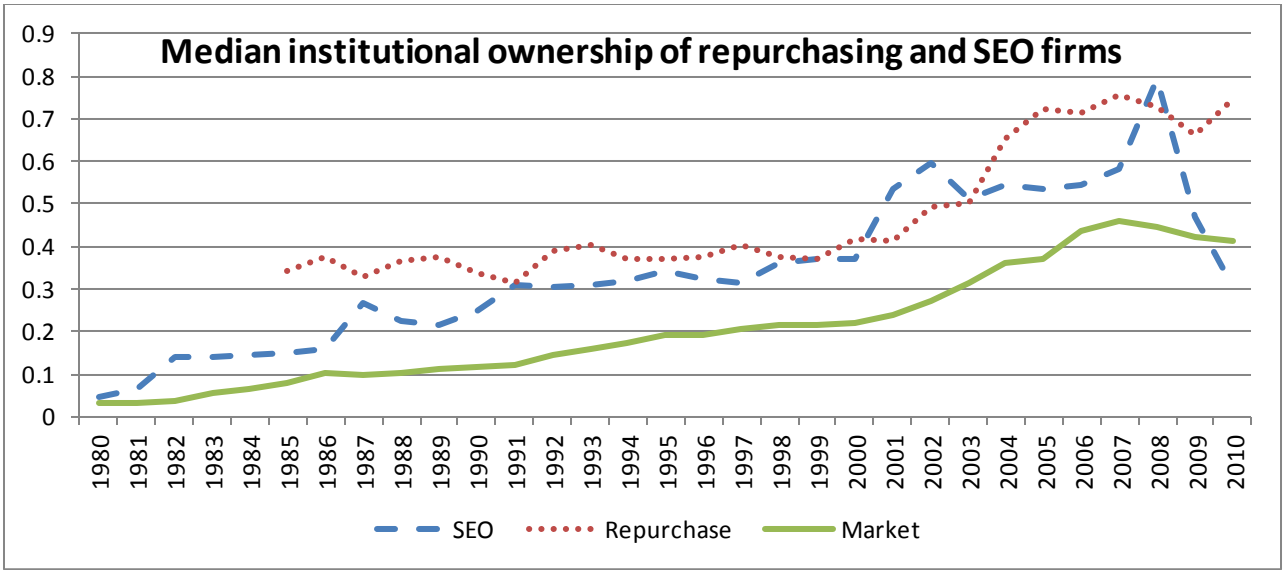

Figure 1
The time series of institutional ownership in 1980-2010

This figure plots the median institutional ownership of repurchasing and SEO firms, measured at the quarter end before the announcement, and the median institutional ownership of all CRSP stocks during the period 1980-2010. The data is based on Thomson Financial's 13f.