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Do managers time the market? Evidence from open-market share repurchases

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Abstract

A contentious debate exists over whether executives possess market timing skills when announcing certain corporate transactions. Pseudo-market timing, however, has recently emerged as an important alternative hypothesis as to why the appearance of timing might be evident when, in fact, none exists. We reconsider this debate in the context of share repurchases. Consistent with prior studies, we also report evidence of abnormal stock performance following buyback announcements. Pseudo-market timing, however, does not appear to be a viable explanation. Our results are more consistent with the notion that managers possess timing ability, at least in the context of share repurchases.

JEL classification: G30

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1. Introduction

One of the more contentious ideas in the finance literature is the extent to which corporate managers have the ability to time the market when executing important corporate

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transactions. Following the seminal study of Ritter (1991), many papers such as Loughran and Ritter (1995) report poor long-run stock performance after firms issue equity. These studies conclude that managers seem to time the stock market by taking advantage of "windows of opportunity" and issuing mis-priced equity to investors with overly optimistic expectations. Purnanandam and Swaminathan (2004) support this view by documenting that IPO firms have price multiples that are high relative to their industry peers. This apparent timing ability is not restricted to pure equity issues. In an issuance-like transaction, Loughran and Vijh (1997) show that acquiring firms earn negative long-run abnormal returns if the deal is financed with new stock. Rau and Vermaelen (1998) show that this negative drift is accentuated in growth firms who issue equity to finance a takeover.

Conversely, Ikenberry et al. (1995) and Ikenberry et al. (2000) find that firms which announce their intention to engage in the opposite transaction by initiating a share repurchase program tend to experience positive long-run abnormal stock performance. Studies regarding other corporate decisions, such as stock splits (e.g., Ikenberry and Ramnath, 2002) and debt offerings (e.g., Spiess and Affleck-Graves, 1999) report long-term abnormal return patterns that are seemingly indicative of managerial timing ability.

This idea of managerial timing is not inconsistent with statements we see in the popular press when companies increase or shrink their equity base.[1] Surveys of managers also support this view of timing. Graham and Harvey (2001) show that two-thirds of the CFOs they surveyed admit that the extent to which their stock is mis-priced is an important factor in issuing equity. In another widely cited survey of high-level executives, Brav et al. (2005) report that over 80% of corporations initiate stock repurchase programs when their stock is "a good value relative to other investments." In short, managers directly and indirectly indicate an ability to identify mis-pricing. Many executives, when announcing corporate financing decisions, seem to predicate many of their actions on this capability.

Yet this view of the "informed manager" is not universal. A growing literature challenges the empirical evidence on managerial timing by raising important questions that generally fall into one of two key categories. The first relates to empirical estimation issues or problems. These include concerns over appropriate benchmarks and how to measure abnormal performance and its significance. For example, Fama (1998) and Eckbo et al. (2000) argue that the results in some empirical studies which focus on long-horizon returns may not be robust due to the use of incorrect or flawed methodologies.[2] Papers by Brav and Gompers (1997), Brav et al. (2000) and Mitchell and Stafford (2000) all support this

[1] As an example, consider the comments of Harvey Sanders, the CEO of the men's sportsware company Nautica Enterprises, on May 18, 2000 who said, when announcing a $23 million share repurchase program, "This action demonstrates our confidence in Nautica's future and our continued commitment to improving shareholder value".

[2] Fama (1998), for example, focuses attention on the spin-off literature where Cusatis et al. (1993) find significantly positive long-term abnormal returns of spin-off firms. He suggests that the relatively low t-statistics of three-year buy-and-hold abnormal returns, which assume independence across observations, may not hold if adjustments were made for cross-sectional dependence. Later studies using more appealing methodologies, such as McConnell et al. (2001) and Veld and Veld-Merkoulova (2004), find either no, or at least weaker, evidence of long-term abnormal performance after spin-offs. Moreover, in their study on the long-run performance of seasoned equity offering firms, Eckbo et al. (2000) argue that the underperformance of equity issuers is not evident when a conditional asset pricing model is used to calculate abnormal returns.

view that long-run returns are sensitive to the choice of benchmark and/or the method used to measure abnormal performance.[3] Gompers and Lerner (2003) point out that some results are time-period sensitive; they conclude that IPO performance is not abnormal in the pre-NASDAQ era of 1935–1972 when a calendar-time estimation procedure is used. Barber and Lyon (1997) summarize the potential problems with conventional test statistics in long-term performance studies as well.

In sum, these papers raise question as to the underlying quality and reliability of long-horizon evidence. While these studies, when considered collectively, may provide a robust body of evidence, this controversy can never be fully resolved. However more recently, a second very important argument that has little to do with poor measurement problems has emerged. This hypothesis challenges, in a fundamental way, the basic notion of managerial timing. Schultz (2003) in a widely circulated paper develops the hypothesis of "pseudo-market timing." He argues that to the extent that managers condition important corporate decisions, such as equity issuance, on past stock market performance, researchers will observe abnormal stock performance when event-time methods are used, even when, ex-ante, there is no mis-pricing.

This initial work by Schultz has spawned several new papers. Supporting the importance of pseudo-market timing, Butler et al. (2005) argue that the close link between the portion of equity in new securities issues and future market returns is due to pseudo-market timing. This contrasts directly, though, with a recent paper by Baker et al. (2006). They present evidence that pseudo-market timing explains only a small portion of managerial decisions including equity issuance decisions. Similarly, papers by Viswanathan and Wei (2004) and Dahlquist and De Jong (2005) question the extent to which pseudo-market timing can explain the equity-issuance puzzle.

The notion of managerial timing is contentious. The introduction of pseudo-market timing as an innocent explanation offers a compelling alternative to carefully consider. Yet studies of the pseudo-market timing hypothesis have generally been limited to equity issuances, the context for which Schultz first envisioned this hypothesis. As such, we consider a timing scenario for a transaction which is the opposite of equity issuance, specifically, open market share repurchases. A rich literature suggests that mis-pricing is a key reason for buybacks and that managers often predicate their decision to repurchase stock on the extent to which they perceive the stock as undervalued.[4] This environment seemingly provides a fresh setting to examine this important question of pseudo-market timing.

We begin by considering the key implications of pseudo-market timing in the context of buybacks. We first evaluate the extent that observed patterns in announcement behavior are dependent on past market performance. We then follow this by evaluating a clear implication of pseudo-timing: event-time return analysis techniques compared to

[3] Regarding buybacks, Mitchell and Stafford (2000) show that long-term abnormal returns of buyback firms are sensitive to the estimation method used and that the significance of long-term abnormal returns decreases as cross-correlations are taken into account. In a different angle, Grullon and Michaely (2004) report that repurchasing firms experience a reduction in their cost of capital relative to non-repurchasing firms. To the extent this occurs, the resulting increase in stock price might explain why repurchasing firms outperform after buybacks are announced.

[4] See, for example, Vermaelen (1981); Dann (1981); Asquith and Mullins (1986); Comment and Jarrell (1991); Ikenberry et al. (1995) and Chan et al. (2004).

calendar-time techniques should produce very different results. To the extent that any post-announcement abnormal performance is observed, a critical distinguishing inference of pseudo-market timing is that subsequent long-run abnormal returns should be observed only in event-time methods, *but not* in calendar-time. Finally, we evaluate actual buyback activity as a separate lens with which to identify managerial timing ability. If managers are indeed endowed with an information advantage, their actual buyback activity should be consistent with the mis-pricing they perceive.

We form a comprehensive sample of 5508 US repurchase announcements from 1980 to 1996. Inconsistent with a key premise of pseudo-market timing, we do *not* observe a significant dependency on past market performance in the way in which buybacks are announced. Specifically, while there is a relative decline in the prevalence of buybacks after bullish periods of time, there is little evidence that as market performance falls, particularly after it has fallen substantially, there is any noticeable change in the propensity to buy back shares.[5]

As in previous studies we find robust and significant evidence of long-term stock return drifts after share repurchase announcements in the event-time. Moreover, when we evaluate the evidence using calendar-time techniques, we still observe positive abnormal returns following buyback program announcements. Further, the point estimates here differ only modestly from what is observed in an event-time setting.

Collectively, these results stand in contrast with the pseudo-market timing hypothesis and suggest that managers do have some timing ability. If we look deeper and consider actual buyback trading activity, the results are also consistent with the idea that managers, on average, are informed. When companies are more aggressive in buying back stock, abnormal performance grows substantially. Conversely, when no shares are repurchased, long horizon performance is lower than otherwise. This pattern is accentuated in value firms where one might expect that mis-pricing is more likely to be motivating the repurchase transaction.

In sum, we consider the robustness of the post-announcement buyback drift and the extent to which pseudo-market timing is, perhaps, an innocent explanation to what is an increasingly common corporate event. Pseudo-market timing seems to explain, at best, only a small portion of long-term abnormal performance after buyback announcements. Instead, the evidence is more consistent with managerial timing ability, at least with respect to share buybacks.

The remainder of the paper is organized as follows. Section 2 describes the data and the methods used in the paper. Section 3 examines the pseudo-market timing hypothesis. Section 4 describes the empirical results and Section 5 provides interpretations of the results and some concluding remarks.

[5] One noticeable exception to this is what happened after the 1987 market crash, which is not included in this study. After the crash, several hundred firms announced buyback programs. Despite the long period we examine, the intensity of these announcements was so great as to cause extreme clustering and possibly distort our findings on the basis of just a single month. In order that our work focus on explaining the more generally observed phenomenon (as opposed to more narrowly being affected by crash-motivated cases) and, further, to allow the results here to remain consistent with the previous literature, we exclude these crash-buyback cases. Separately though, we do not find that point estimates of long-horizon drift for this sub-sample are any different from those of other, more general non-crash cases.

2. Data and methods

2.1. Data

We obtain our sample from two sources. The first is the sample from Ikenberry et al. (1995) which consists of open market repurchase programs reported in the *Wall Street Journal* from January 1980 to December 1990. This is supplemented with announcements recorded at Securities Data Corporation over the full period, 1980 to 1996. As in previous studies, we ignore announcements that occurred in the fourth quarter of 1987. To mitigate skewness problems that can occur in long-horizon returns, we drop firms whose share price at the time of repurchase announcement is below $3 (see Loughran and Ritter, 1996).

We calculate company repurchase activity using quarterly cash flow statements on funds used to redeem stock adjusted for concurrent changes in preferred stock available on Compustat.[6] Stephens and Weisbach (1998) show that a substantial portion of the repurchase activity is completed within the first year. Thus, we focus on buying activity in the first year of the program.[7] Due to missing and incomplete data, we unfortunately lose about 25% of observations whenever we condition our sample on company buying activity.

Table 1 reports the summary statistics of our sample. The total number of buyback announcements in the sample is 5508. Compared to the 1980s, buybacks are much more prevalent in 1990s. Firms can announce multiple buyback programs in sequence, thus we report not only the number of cases but also the number of unique firms announcing buybacks during a given calendar year. We also report the percentage of firms showing actual buyback activity within one year after the announcement. On average, 89% of the firms with available actual buyback activity information repurchased at least some stock within a year after the announcement. The average market capitalization of our sample firm is around $2.5 billion in 1997 dollars. Even though there is variation in average market capitalization during our sample period, there is no consistent pattern over time. The average book-to-market equity ratio (B/M) is 0.68; the average B/M in the 1990s is a bit lower compared to the 1980s (0.79 vs. 0.60). Mean program size is 6.9% of the outstanding share base.

2.2. Methods

We measure long-term stock return performance using buy-and-hold returns (BHRs). Although a conventional cumulative abnormal return (CAR) approach is straightforward to estimate, this approach implicitly assumes frequent rebalancing, which induces an upward return bias due to bid–ask bounce (see Conrad and Kaul, 1993). To avoid this problem, we focus on buy-and-hold returns, BHRs. We calculate annual BHRs by compounding daily returns for annual windows defined as 252 trading days (or up to the delisting date if the stock terminates). We estimate abnormal performance up to four years subsequent to the repurchase announcement. For each event year, portfolio returns are

[6] Stephens and Weisbach (1998) and Jagannathan et al. (2000) evaluate different measures of buyback activity and discuss the merits and problems associated with each method.

[7] To the extent that mis-pricing is indeed motivating a repurchase, looking at activity near or about the time of the repurchase seems appropriate. We did investigate other time intervals, however the conclusions were stable.

Table 1
Summary statistics

Year	# of ann	# of firms	# of firms with buyback info	% of firms with actual buyback	Market capitalization (in 1997 $ million)	B/M ratio	Target ratio in %	Target amount (in 1997 $ million)
1980	79	76	1	0	1208	1.18	5.4	32
1981	80	70	1	0	2430	0.88	5.1	67
1982	117	112	0	0	1224	1.12	6.1	40
1983	50	46	31	68	1746	0.72	5.4	72
1984	216	197	171	89	1784	0.77	5.7	99
1985	138	127	116	84	2036	0.71	9.1	232
1986	202	180	166	90	4684	0.63	7.9	251
1987	117	112	93	89	5539	0.56	8.5	422
1988	230	210	206	92	3045	0.70	8.4	213
1989	411	389	355	93	2875	0.65	9.6	246
1990	628	573	537	89	1436	0.90	7.2	80
1991	195	187	172	86	2618	0.68	7.4	87
1992	319	294	291	90	2510	0.62	7.1	119
1993	324	304	282	91	2634	0.54	6.1	105
1994	655	585	501	86	2086	0.59	6.3	108
1995	729	630	509	90	2227	0.62	6.3	100
1996	1018	861	712	91	2908	0.61	6.3	138
1980–1990	2268	2092	1677	90	2454	0.79	7.6	164
1991–1996	3240	2861	2467	90	2504	0.60	6.4	115
All	5508	4953	4144	89	2483	0.68	6.9	134

Note: We include all open market share repurchase announcements reported in the *Wall Street Journal* from 1980 to 1990 except the fourth quarter of 1987 and cases reported by Securities Data Corporation from 1980 to 1996, with available CRSP daily returns, market values of equity and book-to-market (B/M) ratios. Repurchase announcements are dropped from the sample if the stock price is less than $3.00 at the month-end prior to the announcement. "# of ann" refers to the number of buyback announcements in each period and "# of firms" shows the number of firms that have announced buyback during the period. "# of firms with buyback info" shows the number of buyback announcing firms with available information on the actual buyback amount and "% of firms with actual buyback" refers to the percentage of repurchasing firms with available buyback information that purchased at least one share during the one-year period after announcing a program. "Market capitalization" refers to the mean market capitalization at month-end prior to the announcement converted into 1997 million dollars using the US CPI and "B/M ratio" refers to the mean book-to-market equity ratio. "Target ratio" refers to the mean percentage of outstanding shares announced to repurchase and "Target amount" refers to Target ratio times market capitalization representing the target amount to repurchase in 1997 million dollars based on the market capitalization at the end of the month prior to the announcement.

computed based on BHRs of sample firms, assuming an equal-weighted investment strategy. Longer horizon returns are obtained by compounding annual portfolio returns over event time. Our method assumes annual rebalancing to reduce the possibility that any one firm will dominate the portfolio in later years. When considering control firms, we account for three factors: market-cap, book-to-market ratio (B/M) and exchange-listing. We follow Lee (1997) and Chan et al. (2004) and use five matching firms to reduce the noise that may occur when examining smaller sub-samples.[8] These control firms are selected by choosing non-repurchasing firms with the closest B/M ratios relative to the repurchase firm which also belong to the same size decile and which trade on the same exchange. If this process produces fewer than five matching firms, the exchange requirement is discarded.[9]

For statistical inferencing, we use an empirical simulation method or "bootstrap" to deal with potential problems that arise with standard parametric statistical tests when applied in long-term performance studies. This method is recommended by Lyon et al. (1999) as a way to avoid potential bias caused by skewness in long-horizon returns (Kothari and Warner, 1997). To execute the bootstrap procedure, we follow the same approach documented in many other studies (e.g., Lee, 1997) using size and B/M as controlling factors. For each inference, we compare point estimates of abnormal performance to empirical distribution randomly generated from 1000 trials.

As a robustness check, we also apply Ibbotson's (1975) regression across time and security (RATS) method. The RATS model we apply is modified to accommodate Carhart's (1997) four-factor model. This technique has been applied in several papers, including recently in Peyer and Vermaelen (2005).

2.3. Abnormal returns around repurchase announcements

Table 2 reports the abnormal returns of repurchasing firms during our sample period. Relative to matching firms, share repurchasing firms significantly underperform their benchmarks prior to a buyback announcement. After the announcement, however, they significantly outperform their benchmarks. At first glance, this result suggests managerial market timing ability whereby executives initiate buyback programs in response to mispricing. However, this result cannot be distinguished from pseudo-market timing where abnormal returns in the cross-section are positive even though managers cannot predict future returns.

3. Testing pseudo-market timing hypothesis

To address whether evidence of managerial timing ability may be innocently explained away by mechanical decision rules, we review the implications of the pseudo-market timing hypothesis proposed by Schultz (2003). We begin by constructing a simple example to

[8] The advantage of a single control-firm approach is that it reduces the impact of positive skewness on point estimates of long-horizon abnormal performance. However, when looking at smaller sub-samples, the single control firm approach introduces noise through higher measurement error, thus reducing power. As a check, we repeated the analyses here using a single control firm and find the results qualitatively similar.

[9] In 5508 announcements, only 87 have less than five matching firms when the exchange requirement is imposed.

Table 2
Buy-and-hold abnormal returns around repurchase announcements

Year	n	Prior one-year abnormal return in %	Post-announcement abnormal returns in %				
			First year	Second year	Third year	Fourth year	Four Years
All	5508	−8.46***	6.68***	2.41***	3.49***	1.50***	23.56***
1980–1990	2268	−6.29***	6.21***	−0.08	3.89***	1.59*	18.70***
1991–1996	3240	−9.97***	7.02***	4.17***	3.21***	1.43***	27.07***

Note: The sample includes all open market share repurchase announcements reported in the *Wall Street Journal* from 1980 to 1990 except the fourth quarter of 1987 and cases reported by Securities Data Corporation from 1980 to 1996, with available CRSP daily returns, market values of equity and book-to-market (B/M) ratios. Repurchase announcements are dropped from the sample if the stock price is less than $3.00 at the month-end prior to the announcement. n represents the number of announcements. All returns are annual buy-and-hold abnormal returns (except the last column) and expressed in %. Matching firms, matched based on market value of equity, B/M and exchange, are used to compute abnormal returns. The last column reports the four-year compounded abnormal return by compounding annual buy-and-hold portfolio returns for sample firms and comparing this to the corresponding match firm portfolio return calculated likewise. ***, **, * denote significance levels of 1%, 5%, and 10%, respectively, based on the bootstrapping p-values, as explained in the texts.

illustrate how the pseudo-market timing might operate in the context of share repurchases. We then empirically evaluate this possibility.

3.1. The pseudo-market timing hypothesis illustrated using repurchases

As in Schultz (2003), we use a two-period model where managers, by definition, do not have any ability to predict future returns and where the decision to buy back stock is solely determined on the basis of the current stock price. Following Schultz (2003), we assume that firms in this economy have returns which follow a binomial model; here, the price will either go up (U) or down (D) by 10% with equal propensity, thus implying that the expected return for all stocks and for the market overall is zero.[10] To simplify things, at time 0 we normalize all stock prices to $100. Suppose that in each period, no firms initiate buyback programs if their stock price is above $105, one firm initiates if the price is between $95 and $105, and three firms initiate if the price is below $95. This assumption captures the essence of the pseudo-market timing story where managers make important corporate decisions based only on past market performance. There are four possible paths with equal probability and the outcome of each path is shown in Table 3. As in Schultz (2003), we keep things simple and focus on the one-period abnormal stock return a "researcher" might estimate when conducting a study of post-announcement buyback performance.

To illustrate how this path-dependent announcement behavior might affect the empirical findings a researcher would observe, let us start with the third state, "DU", where market prices drop and then recover. At time 0, the market is priced at $100 and one firm announces a buyback. At the end of this period, in the DU state, the stock price for the one firm which announced a buyback at time 0 has dropped to $90 at time 1 and this

[10] Due to this assumption, abnormal returns are implicitly equal to raw returns.

Table 3
Pseudo-market timing on share repurchase returns

Time 0		Time 1			Time 2		Overall			
Market Level at time 0	Number of buybacks announced at time 0	New market level at time 1	Post-ann. one-period abnormal return of firms that announced buybacks at time 0 (%)	New programs announced at time 1	New Market level at time 2	Post ann. one-period abnormal return of firms that announced buybacks at time 1 (%)	Total number of buybacks announced at time 0 and 1	Number of buybacks followed by ± return	Mean post-ann. one-period abnormal return of firms that announced buybacks at times 0 or 1 (%)	State
100	1	110	10	0	121	10	1	1/0	10	UU
					99	−10	1	1/0	10	UD
		90	−10	3	99	10	4	3/1	5	DU
					81	−10	4	0/4	−10	DD
Expected one-period abnormal return			0			0			3.75	

Note: This table illustrates Schultz's (2003) pseudo-market timing hypothesis in the context of stock repurchases. Suppose that all firms initially have a normalized price of 100 and that in any period, prices can either increase or decrease by 10% with equal likelihood. As such, the expected return among all stocks and the market overall is zero. Suppose that managers have no insight into mis-pricing but use a simple decision rule where no repurchases are announced if prices are above 105; one repurchase is announced if prices are between 95 and 105, and three occur if prices fall below 95. The table reports abnormal returns for two sub-periods for each of four possible price paths; each price path is equally likely. This example illustrates overall that if managers make announcements in a path-dependent manner, cross-sectional returns calculated using an "event-time" method where each firm receives equal weight in the analysis will be non-zero even though ex-ante expected returns are zero. Performance estimated using a "calendar-time" method (where each period receives the same weight) will report no abnormal return.

one repurchasing firm earns an abnormal return of −10% in the post-announcement period. However, given that the market at time 1 is now below 95, three new firms will initiate buyback programs. By definition, the price at time 2 increases by 10% along the "DU" path and therefore, each of these three new repurchasing cases generates a 10% abnormal return in their respective post-announcement periods. Along this "DU" path, we will have four observations in the sample: one case initiated at time 0 with a post-event abnormal return of −10%, and the other three cases initiated at time 1 with a post-event abnormal return of +10% for each observation. Following typical long-run performance studies that rely on event-time methods (e.g., Loughran and Ritter, 1995), we attach equal weight to each of the four observations in the sample. As such, the cross-sectional average one-period abnormal return subsequent to the repurchase announcement for this "DU" path will be 5% (=[−10% × 1 + 10% × 3]/4). The average abnormal return for the remaining three states can be computed in a similar fashion.

If we assume that there is an equal ex-ante chance of these four price paths occurring, we now see that the *expected* cross-sectional one-period abnormal return for any event-time study of post-announcement performance is not zero, but rather 3.75% (=[10% + 10% + 5% + (−10%)]/4). Consistent with Schultz's (2003) illustration using equity offerings, a researcher evaluating ex-post buyback abnormal returns in this contrived environment would actually expect to observe a positive drift *even though the ex-ante expected abnormal return in each period is zero and managers have, by assumption, no timing skill whatsoever*. This outcome results from the fact that the impact of observations with poor (good) ex-post returns are diluted (exaggerated) because of how managers are subsequently assumed to condition future decisions based on past market performance. For example, in price-path states "UU" and "UD", the weight of the buyback observation announced at time 0 with an ex-post abnormal return of +10%, is 100% since it is the only observed data point. In states "DU" and "DD", however, the weight of this same first data point comprises only 25% of the sample, thus diluting its impact on the analysis.

An important implication of pseudo-market timing hypothesis that is readily apparent in this simple illustration is that abnormal performance is only observed in event-time where *each sample observation* is given the same weight. If performance is evaluated in calendar-time, where *each month* receives equal weighting, the mean abnormal return should be zero. Here, the appeal of a calendar-time approach is that high and low volume months have the same impact on the analysis, thus breaking any path dependency in the analysis.

3.2. Is the assumption of pseudo-market timing valid?

The key premise for the pseudo-market timing hypothesis is that managers announce price contingent decisions. In Table 4, we consider whether buybacks have this property by linearly regressing the number of share repurchase announcements in each month against past market returns over different trailing horizons. The slope coefficients reported in Panel A (using all months in our sample) are consistently negative, a result necessary to support pseudo-market timing.

On the other hand, if we examine the robustness of this result more carefully, the conclusion changes. Fig. 1 plots the mean number of repurchase announcements in a given month conditional on past market performance for trailing three- and six-month horizons. In the context of share repurchases, while one expects fewer buybacks in bullish periods,

Table 4
Share repurchases announcements on past market performance

Horizon of past market return	Equally weighted			Value-weighted		
	a	*b*	Adj R^2 (%)	*a*	*b*	Adj R^2 (%)
Panel A: Full sample period						
One month	29.57	−146.59	6.60	29.05	−110.99	2.51
	(16.50)	(−3.89)		(15.60)	(−2.48)	
Two months	30.30	−95.62	7.67	30.42	−102.59	4.73
	(16.57)	(−4.20)		(15.63)	(−3.30)	
Three months	30.22	−63.69	6.04	30.35	−69.82	3.52
	(16.18)	(−3.72)		(15.09)	(−2.88)	
Six months	30.44	−35.11	4.31	30.50	−38.08	2.17
	(15.43)	(−3.16)		(13.92)	(−2.33)	
One year	31.11	−20.99	3.38	30.59	−19.34	0.95
	(14.33)	(−2.83)		(11.94)	(−1.71)	
Four years	36.97	−10.33	5.80	42.51	−20.41	3.45
	(11.82)	(−3.65)		(7.63)	(−2.85)	
Panel B: Months in the highest past return quintile are excluded						
One month	30.30	−94.38	1.02	30.21	−8.56	−0.62
	(15.10)	(−1.63)		(14.61)	(−0.12)	
Two months	31.58	−30.66	−0.23	30.79	−32.87	0.33
	(15.45)	(−0.79)		(14.69)	(−0.69)	
Three months	31.30	−3.57	−0.62	30.68	1.80	0.63
	(15.16)	(−0.12)		(14.42)	(0.05)	
Six months	29.93	−9.95	−0.46	29.41	19.47	−0.29
	(14.59)	(−0.53)		(12.53)	(0.73)	
One year	29.41	−5.49	−0.51	29.46	−10.74	−0.35
	(13.66)	(−0.43)		(11.24)	(−0.66)	
Four years	25.55	10.13	1.78	32.15	−1.97	−0.62
	(6.35)	(1.97)		(3.52)	(−0.14)	

Note: This table reports results of the following regression equation:

$$\text{Number of repurchase announcements} = a + b * \text{ Trailing total market return} + e$$

The number of share repurchase announcements in each month (from 1980 to 1996) is regressed on some measure of past market return (excluding the fourth quarter of 1987). Evidence is reported separately for two measures of past market performance; one using the CRSP equally weighted index and the other the value-weighted index. Numbers in parentheses are *t*-statistics. Panel A reports evidence using all 201 monthly data points and Panel B reports evidence after excluding months classified in the highest past return quintile. Past return quintiles are formed independently for different holding periods ranging from one month to four years and for both indices.

pseudo-market timing clearly suggests that when prices fall, we should find an increased frequency of buyback announcements. No matter which horizon we use to measure past performance, we do not observe a systematic negative relationship between past market returns and the number of new buyback cases. While there is a relative absence of cases in bullish markets, it is hard to conclude from Fig. 1 that a wave of buyback increases in declining markets.

Thus, we report additional regression evidence in Panel B of Table 4 after excluding months classified in the highest past market return quintile. For pseudo-market timing to hold, particularly with high-return states excluded, we would continue to find a negative relation. Yet the results change abruptly; none of the coefficient estimates are significantly

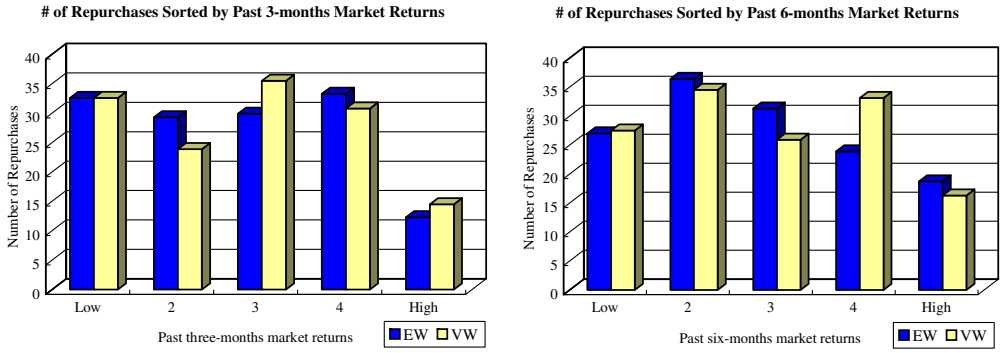

Fig. 1. Average number of repurchase announcements per month sorted by past market return quintiles. This figure shows the average monthly number of repurchase announcements sorted by past market return quintile. EW represents the case where the equally weighted CRSP index return is used as the market return while VW is the case where the value-weighted CRSP index return is used.

negative at traditional confidence levels. To the extent there is any path dependency, it is not pervasive and does not extend beyond the most bullish market periods. Overall, the results, at best, only weakly support the fundamental premise behind pseudo-marketing timing.

3.3. Calendar-time portfolio return evidence

A key implication of pseudo-market timing is that while abnormal performance may exist when measured in event-time, this result should not exist when evaluated in calendar-time.[11] We test this implication by estimating the Carhart (1997) four-factor model for share repurchasing firms.[12] Each month, we form portfolios of firms that announced share repurchases in the preceding four years.[13] We then calculate monthly portfolio returns in calendar time and use these returns as the dependent variable in an OLS regression model. Here, each month receives equal weight. Given that the number of firms in a given month fluctuates, the weight of each company in our analysis now varies. Under the null hypothesis of no abnormal performance presumed under pseudo-market timing, we anticipate that the intercept should be zero.

In each month, we use three different methods, equal-weight, value-weight and log value-weight, to compute portfolio returns to check the sensitivity of the results. The equal-weight approach is more likely to detect the abnormal performance, if any, since small firms tend to show more abnormal performance as shown in previous studies (e.g., Mitchell and Stafford, 2000; Loughran and Ritter, 2000). Moreover, this approach also tends to produce more diversified portfolios with less noise, thus also enhancing the power of these tests. The last approach we use assumes a log value-weighted invest-

[11] Loughran and Ritter (2000) discuss the weakness of the calendar-time portfolio approach in detecting mis-valuation, especially when assuming a value-weighted investment strategy as mis-valuation may be more endemic among smaller firms.

[12] We also estimated the Fama and French (1993) three-factor model. The results are similar and, thus, not reported here.

[13] Because this approach requires a four-year look back window, we start portfolio formation in January 1984.

Table 5
Calendar-time analysis of abnormal performance

		Intercept	$R_m - R_f$	SMB	HML	WML	Adj-R^2
OLS	EW	0.28	103.81	58.27	16.96	−10.34	0.967
		(4.24)	(57.57)	(21.00)	(5.93)	(−4.53)	
	LW	0.26	104.36	40.69	11.98	−7.28	0.976
		(4.79)	(69.89)	(17.71)	(5.06)	(−3.85)	
	VW	0.25	96.22	−22.43	−2.40	−3.88	0.948
		(3.35)	(46.81)	(−7.09)	(−0.74)	(−1.49)	
WLS	EW	0.31	101.89	52.09	17.90	−11.83	0.970
		(4.78)	(58.28)	(19.29)	(5.63)	(−4.89)	
	LW	0.29	103.29	37.49	12.25	−9.70	0.978
		(5.24)	(68.49)	(16.10)	(4.47)	(−4.64)	
	VW	0.24	97.74	−25.21	− 7.70	−3.97	0.963
		(3.79)	(56.10)	(−9.37)	(−2.43)	(−1.65)	

Note: This table reports calendar-time evidence (in % per month) for repurchasing firms using the Carhart (1997) four-factor pricing model. In each calendar month from January 1984 to December 1996 (156 months, excluding cases announced in the last quarter of 1987), a portfolio is formed from sample firms which announced a share repurchase within the past four years. EW assumes an equally weighted investment strategy while VW portfolios represent a value-weighted portfolio strategy. LW represents a log market-cap weighted portfolio strategy. The following time-series regression is estimated for each portfolio strategy,

$$R_{p,t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + \mathrm{sSMB}_t + \mathrm{hHML}_t + \mathrm{wWML}_t + e_t$$

where $R_m - R_f$ is market risk premium, R_m is market return and R_f is the risk free rate. SMB represents the small minus big firm return premium and HML represents the high book-to-market equity ratio (B/M) minus low B/M return premium during each month. The WML factor is defined by high momentum stocks (winners) return minus low momentum stocks (loser) return where momentum is measured based on past one-year return. Results are reported for both ordinary least squares (OLS) assuming equal calendar month weighting and weighted least squares (WLS). In WLS, the number of firms in the repurchase portfolio in each month is used as the weight and thus is similar to the underlying assumption in an event-time approach. *T*-statistics are reported in parentheses. The minimum number of share repurchases in the portfolio in a given month is 299 and the maximum is 2500; the mean is 1082.

ment strategy. This approach lessens the problem of only a few extremely large firms dominating the results (and also the generally unappealing implied investment decisions that a value-weighted method imposes).[14]

As shown in Panel A of Table 5, no matter which portfolio formation technique we adopt, the intercept from the Carhart four-factor model is significantly positive, suggesting that our results are not mainly driven by small firms. Given that OLS analysis breaks the path dependency underlying pseudo-market timing, the fact that we continue to observe positive alphas is seemingly consistent with managerial timing ability. To check how much of the post-announcement drift can be attributed to pseudo-market timing, we use the same calendar approach but now applying weighted least squares (WLS). Because each month is now weighted according to the number of share repurchases in the portfolio in each month, an event-time principle is now restored thus allowing us to estimate the explanatory power of pseudo-market timing as the difference in intercepts between the WLS and OLS models.

[14] Ikenberry and Ramnath (2002) also use these same three implied investment approaches in evaluating the robustness of their calendar-time portfolio analyses.

Table 5 shows that intercept changes between the two methods are small. For example, the intercept using a value-weighted investment assumption changes from 0.25% per month to 0.24% per month for OLS and WLS, respectively. Here, the impact of pseudo-market timing is hard to distinguish from noise. For equally weighted (EW) and log-value-weighted (LW) portfolios, the respective changes in alpha are also modest.

After controlling for any path dependency in announcements, the relative scale of the post-announcement drift changes only slightly; we still observe significant abnormal return drift subsequent to the announcement of a share repurchase. This result seems to favor managerial timing ability over the alternative of pseudo-market timing. We investigate this notion more carefully by evaluating actual buyback behavior.

4. Long-run stock performance and actual buyback activity

4.1. Buy-and-hold abnormal returns (BHAR) conditional on actual buyback activity

Open market programs, by definition, allow substantial flexibility even after they are announced (see Ikenberry and Vermaelen, 1996; Jagannathan et al., 2000). In fact, some firms choose not to repurchase any shares at all (see Stephens and Weisbach, 1998). Thus, even if there is seeming dependency on when buyback programs are announced, we may gain more insight into whether managers seem to be making buyback decisions in mechanical, uniformed ways by looking into their actual trading behavior.

To the extent that managers are responding to undervaluation but the market does not fully react to the news of a buyback announcement, we expect informed managers to exploit this mis-pricing by actually repurchasing stock. In other cases where undervaluation may be less of a driving issue or the market fully incorporates the information content of share repurchases at the announcement, we expect to see lower repurchase activity. As such, this analysis supplements what we have observed to this point regarding pseudo-market timing.

In Table 6 we examine the relation between long-term abnormal performance and actual buyback activity. We sort sample firms (with available information) into three groups: firms not buying any shares at all (*Non-Buy*), firms repurchasing 4% or less of shares outstanding (*Buy-Less*), and firms buying more than 4% of their equity (*Buy-More*) in the year following the repurchase announcement.[15] Overall, when companies repurchase more stock (*Buy-More*), point estimates of abnormal performance increase along with significance; the abnormal return drift increases from 4.85% in year one to 33.54% after four years. In cases where no shares are repurchased (*Non-Buy*), the pattern in abnormal performance is different. Here, the abnormal return in the first year is comparatively much higher, 9.24%, a result consistent with the notion that managers may feel less compelled to buy back stock when the mis-pricing that initially motivated the buyback no longer exists.[16] While the four-year return drift for this sub-group is positive (14.63%)

[15] We also repeat the analyses using an alternative classification criteria based on the percentage of shares repurchased relative to the target percentage of outstanding shares to repurchase at the announcement. Due to missing target percentage data, we lose 305 observations when this approach is used. In unreported results, we find that the qualitative results are similar to those reported in the paper.

[16] This result is consistent with Ikenberry et al. (2000) who find that Canadian companies tend to buy back fewer shares when abnormal stock returns are high.

Table 6
Abnormal buy-and-hold returns conditioned on actual company repurchase

Event year	Non-Buy			Buy-Less			Buy-More			Buy-More vs. Non-Buy
	n	DIFF (%)	*p*-value	*n*	DIFF (%)	*p*-value	*n*	DIFF (%)	*p*-value	
Panel A: All										
−1	439	−10.94	1.000	2168	−13.52	1.000	1537	−10.38	1.000	0.309
1	439	9.24	0.001	2168	5.23	0.000	1537	4.85	0.002	0.938
2	422	9.51	0.008	2125	6.47	0.000	1521	9.41	0.000	0.642
3	400	11.34	0.022	2049	10.86	0.000	1465	20.51	0.000	0.116
4	379	14.63	0.002	1934	13.60	0.000	1386	33.54	0.000	0.032
2–4	379	−0.17	0.075	1934	4.32	0.000	1386	21.29	0.000	0.000
Panel B: Low B/M										
−1	99	−6.45	0.934	646	−19.05	1.000	263	−18.99	1.000	0.873
1	99	9.41	0.072	646	5.73	0.004	263	9.79	0.020	0.643
2	97	4.34	0.300	633	11.12	0.002	261	24.22	0.003	0.069
3	94	−1.53	0.404	615	18.00	0.000	251	40.55	0.000	0.004
4	90	−11.81	0.298	586	24.08	0.000	240	47.05	0.000	0.000
2–4	90	−20.35	0.639	586	12.70	0.000	240	26.52	0.000	0.000
Panel C: Mid B/M										
−1	257	−10.91	1.000	1208	−10.74	1.000	965	−9.49	1.000	0.296
1	257	13.04	0.000	1208	5.50	0.000	965	3.33	0.070	0.993
2	247	16.03	0.001	1182	7.72	0.000	955	5.00	0.045	0.978
3	231	19.27	0.008	1141	10.99	0.000	919	11.99	0.000	0.793
4	221	30.76	0.002	1076	12.72	0.000	865	23.10	0.000	0.803
2–4	221	7.40	0.029	1076	3.23	0.002	865	14.83	0.000	0.231
Panel D: High B/M										
−1	83	−16.39	1.000	314	−12.87	1.000	309	−5.82	0.368	0.011
1	83	−2.75	0.419	314	3.20	0.118	309	5.36	0.066	0.246
2	78	−4.73	0.494	310	−8.54	0.645	305	10.49	0.017	0.122
3	75	2.97	0.367	293	−5.82	0.282	295	30.56	0.002	0.064
4	68	0.26	0.357	272	−6.12	0.279	281	56.54	0.000	0.007
2–4	68	4.04	0.347	272	−8.96	0.606	281	37.91	0.000	0.011

Note: This table reports compounded return differences (DIFF) in % between repurchasing and matching firms. For each sample firm, annual BHRs are first calculated by compounding the daily returns for 252 days, or up to the delisting date (whichever is earlier). Portfolio annual returns are then computed assuming an equal weight basis. Long-run returns are compounded, with annual portfolio rebalancing, starting in event year +1. For each sample firm, there are five control firms matched on the basis of size, B/M and exchange. *n* is the number of firms in each category. DIFF is the abnormal BHR, the difference between BHRs of repurchasing and corresponding matching firms. *p-value* is from an empirical bootstrap simulation procedure and represents the percentage of 1000 trials of randomly formed abnormal portfolio returns greater than abnormal portfolio return observed in the sample. *Buy-More* (*Buy-Less*) refers to those repurchasing firms that repurchased more than (less than or equal to) 4% of outstanding shares during the one-year period after the repurchase announcement. *Non-Buy* refers to those firms that did not repurchase any shares in the year after the repurchase announcement. Sample firms with missing actual repurchasing information on Compustat are excluded. In *Buy-More* vs. *Non-Buy* column, the *p-value* obtained from the bootstrap simulation to test the differences in mean BHARs between *Buy-More* and *Non-Buy* firms is reported. *Low B/M*, *mid B/M*, and *high B/M* are composed of the bottom B/M quintile, the next three quintiles, and the top quintile, respectively.

and significant, the point estimate is less than half that observed for high-intensity buyers. These firms, in fact, do not show any significant positive abnormal performance during three years starting from the second year after buyback announcements.

When we partition the data further on value versus growth companies, if managerial timing exists, one might expect to observe even higher drifts among value stocks who are more active repurchasers. This is indeed the case; the four-year abnormal return point estimate for value companies classified as *Buy-More* is 56.54%. For growth companies who were also classified as aggressive buyers, the four-year abnormal return point estimate is 47.05%. In value or growth firms where managers chose not to buy any shares, we find no reliable evidence of abnormal performance.

4.2. Cumulative abnormal returns (CARs) based on the RATS method

As mentioned earlier, studies of long-horizon return evidence may be sensitive to the method used. Thus as a robustness check on whether managers appear to have timing ability, we report in Table 7 abnormal returns estimated using Ibbotson's (1975) regression across time and security (RATS) method. Here, we apply Carhart's four-factor pricing model. For each *event month*, we run the four-factor regression model. Cumulative abnormal returns (CARs) are calculated by summing intercepts from the cross-sectional (event-time) regressions over the relevant event windows. The results in the first two columns show that with this alternative method, we continue to observe significant abnormal performance for repurchasing firms in the four-year post-announcement period. For the *Buy-More* group, we observe similar outperformance as for the total sample. For the *Non-Buy* group, however, the significance of abnormal returns drops substantially. In addition, the percentage of intercepts which are statistically significant for this sub-group is only around 13% for the four-year post-announcement period. Beyond the first year, *Non-Buy* firms generally do not outperform whereas *Buy-More* firms generally do, as verified in the last two rows of the table.

Overall, the results in Tables 6 and 7 suggest that long-term performance is related to actual buyback activity. This is especially true when buyback activity is aggressive. When firms do not buy any shares, they tend to generate lower abnormal returns beyond the first year of the program. While this evidence is generally consistent with managerial timing, we next check in a multivariate setting whether the link between long-term performance and actual buyback activity still holds after controlling for other factors known to affect manager behavior.

4.3. The multivariate evidence

Table 8 reports regression results where the long-horizon return evidence we formerly evaluated on a univariate basis is now considered in a multivariate setting, thus allowing us to control for other factors known to affect manager behavior. We regress one-year, four-year and year 2 to 4 abnormal returns on various control variables such as size, book-to-market equity ratio (B/M), prior one-year abnormal return, abnormal return during the first year after announcements and target percentage of outstanding shares to be repurchased as well as year dummy variables. We consider both a dummy variable to indicate firms that bought back at least some shares during the one-year period after announcements, *Buy dummy*, as well as a continuous measure of how many shares com-

Table 7
Cumulative abnormal monthly returns calculated using RATS

Event window	All		Non-Buy		Buy-Less		Buy-More		Buy-More vs. Non-Buy
	CAR (%) (*t*-stat)	% pos [% sig]	CAR (%) (*t*-stat)	% pos [% sig]	CAR (%) (*t*-stat)	% pos [% sig]	CAR (%) (*t*-stat)	% pos [% sig]	*t*-stat [*z*-stat]
(−12, −1)	−4.05	50.0	−3.10	50.0	−4.24	58.3	−5.16	41.7	−0.43
	(−8.23)	[33.3]	(−1.56)	[8.3]	(−5.09)	[33.3]	(−5.42)	[8.3]	[−0.55]
(0, +11)	4.94	100.0	6.75	66.7	3.37	91.7	3.84	91.7	−0.87
	(9.54)	[75.0]	(3.23)	[33.3]	(3.82)	[33.3]	(3.93)	[16.7]	[−0.95]
(0, +23)	8.39	100.0	6.43	66.7	5.09	75.0	9.37	91.7	0.70
	(6.08)	[66.7]	(2.03)	[16.7]	(3.75)	[16.7]	(6.59)	[33.3]	[0.86]
(0, +35)	12.32	100.0	8.17	63.9	9.11	83.3	15.32	91.7	1.52
	(12.16)	[61.1]	(1.93)	[13.9]	(5.33)	[16.7]	(8.16)	[36.1]	[1.75]
(0, +47)	15.32	100.0	14.62	62.5	12.33	79.2	20.16	93.8	0.86
	(12.39)	[52.1]	(2.68)	[12.5]	(5.98)	[14.6]	(8.83)	[35.4]	[1.67]
(+12, +47)	10.39	100.0	7.86	61.1	8.96	75.0	16.32	94.4	1.54
	(9.25)	[44.4]	(1.56)	[5.6]	(4.80)	[8.3]	(7.91)	[41.7]	[2.67]

Note: This table reports monthly cumulative average abnormal returns (CARs) calculated using the Ibbotson (1975) returns across time and security (RATS) method and applying the Carhart (1997) four-factor pricing model. For each event month during −12 and +47 months around the month of buyback announcement, the following regression is estimated,

$$R_{it} - R_{f,it} = \alpha_t + \beta_t(R_{m,it} - R_{f,it}) + s_t\mathrm{SMB}_{it} + h_t\mathrm{HML}_{it} + w_t\mathrm{WML}_{it} + e_{it},$$

where R_{it} is the monthly return on security i in event month t, with $t = 0$ being the month of the buyback announcement. $R_m - R_f$ is market risk premium, where R_m is the market return and R_f is the risk free rate. SMB stands for small firm return premium and HML stands for high minus low book-to-market equity ratio return premium each month. WML is high momentum stock (winner) return minus low momentum stock (loser) return where momentum is measured based on the past one-year return. Here, $R_{f,it}$, $R_{m,it}$, SMB_{it}, HML_{it}, and WML_{it}, refer to the values of respective factors at event time t for firm i. In columns "*All*", "*Non-Buy*", "*Buy-Less*" and "*Buy-More*", we report the results for the overall sample, firms without any actual buying activity during the one-year period after announcements, firms that repurchase less than or equal to 4% of outstanding shares and firms that repurchase more than 4% during the one-year period after announcements, respectively. "*CAR* (%)" is the cumulative abnormal percentage return for a given estimation window, which is estimated by summing intercepts of monthly cross-sectional regressions α_t over the corresponding event-time windows. "(*t*-stat)" is the *t*-statistics for the test of CAR and is calculated using standard errors of intercepts from monthly cross-sectional regressions. "% pos" is the percentage of monthly intercepts in each event-window with positive values and "[% sig]" is the fraction of these intercepts which are significantly positive at the 0.10 significance level. In the last column, we report *t*-statistics on top and *z*-statistics in square brackets for a test of differences in means and medians of intercepts from monthly regressions during each event window, respectively between the Buy-More and Non-Buy groups.

panies actually have repurchased in the post-announcement year, namely, log (1 + % actual repurchase). We also include a *Buy-More* dummy to indicate if firms bought back more than 4% of outstanding shares during the first year after repurchase announcements. We interact this variable with the high B/M dummy indicator to examine whether actual buyback activity plays different roles for value versus growth stocks.

We begin by evaluating abnormal returns in the first year subsequent to the repurchase announcement (models 1–6). Here, some of the independent variables are measured during the interval when dependent variables are measured. As such, it is important to view these analyses as not *predicting* returns but rather simply understanding the concurrent

Table 8
Cross-sectional regressions of abnormal returns

Model	One-year abnormal return						Four-year abnormal return						Year 2–4 abnormal return					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Intercept	0.091	0.130	0.092	0.093	0.129	0.099	0.013	−0.116	−0.020	−0.030	−0.081	0.028	−0.226	−0.422	−0.257	−0.272	−0.386	−0.240
	(2.85)	(3.33)	(2.91)	(2.92)	(3.29)	(3.03)	(0.14)	(−0.93)	(−0.20)	(−0.28)	(−0.64)	(0.26)	(−2.92)	(−4.53)	(−3.33)	(−3.51)	(−4.15)	(−3.03)
Size decile	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.022	0.022	0.022	0.022	0.023	0.022	0.022	0.022	0.022	0.022	0.022
	(0.17)	(0.17)	(0.17)	(0.20)	(0.17)	(0.17)	(2.50)	(2.48)	(2.49)	(2.54)	(2.53)	(2.57)	(3.37)	(3.32)	(3.36)	(3.43)	(3.40)	(3.45)
B/M quintile	−0.007	−0.008	−0.007	−0.007	−0.007	−0.009	−0.017	−0.016	−0.024	−0.024	−0.023	−0.048	−0.002	−0.001	−0.009	−0.009	−0.008	−0.023
	(−1.26)	(−1.29)	(−1.18)	(−1.18)	(−1.25)	(−1.47)	(−0.87)	(−0.83)	(−1.26)	(−1.25)	(−1.22)	(−2.37)	(−0.10)	(−0.00)	(−0.60)	(−0.66)	(−0.57)	(−1.51)
Target ratio	0.085	0.086	0.102	0.100	0.092	0.102	0.829	0.828	0.529	0.590	0.600	0.617	0.518	0.516	0.237	0.260	0.283	0.275
	(0.87)	(0.88)	(1.02)	(1.01)	(0.93)	(1.03)	(2.45)	(2.45)	(1.61)	(1.77)	(1.80)	(1.83)	(1.99)	(2.00)	(0.94)	(1.01)	(1.10)	(1.06)
Prior return	0.082	0.082	0.083	0.082	0.082	0.082	0.087	0.088	0.077	0.081	0.082	0.077	−0.011	−0.010	−0.021	−0.018	−0.016	−0.020
	(2.99)	(2.98)	(3.01)	(3.01)	(2.99)	(2.99)	(0.93)	(0.94)	(0.82)	(0.87)	(0.87)	(0.82)	(−0.17)	(−0.14)	(−0.30)	(−0.26)	(−0.24)	(−0.28)
1st year return													−0.009	−0.004	−0.006	−0.005	−0.003	−0.007
													(−0.17)	(−0.10)	(−0.14)	(−0.10)	(−0.00)	(−0.14)
Buy dummy		−0.044			−0.041			0.141			0.058			0.214			0.129	
		(−1.76)			(−1.60)			(1.79)			(0.71)			(3.56)			(2.08)	
Log(1 + % actual repurchase)			−0.104						1.814						1.696			
			(−0.73)						(3.10)						(4.04)			
Buy-more dummy				−0.013	−0.006	−0.019				0.211	0.201	0.152				0.228	0.206	0.195
				(−0.84)	(−0.37)	(−1.17)				(3.86)	(3.55)	(2.63)				(5.54)	(4.86)	(4.46)
Buy-more * High B/M dummy						0.033						0.331						0.186
						(0.92)						(2.53)						(2.00)

Note: This table reports cross-sectional regressions of abnormal returns on various explanatory variables. The dependent variable is either the one-year, four-year, or year 2 to 4 abnormal return defined as the difference in buy-and-hold returns between a sample firm and its corresponding five matching firms. *Size decile* (1 being the smallest) is based on the market value of equity at the month-end prior to the repurchase announcement. *B/M quintile* (1 being the lowest) is based on the ratio of the book equity value at the previous fiscal year-end to total market value at month-end prior to the announcement. Target ratio is the percentage of announced repurchase shares relative to total outstanding shares at month-end prior to the announcement. *Prior return* (*1st year return*) is the one-year (i.e., 252 days) buy-and-hold return prior to (after) the announcement between the sample firm and its corresponding five matching firms. *% actual repurchase* represents the percentage of shares that firms bought during the one-year period after the repurchase announcement. *Buy* dummy (*Buy-More dummy*) is 1 if *% actual repurchase* is greater than 0 (0.04) and 0 elsewhere. *High B/M dummy* is 1 for top B/M quintile, and 0 elsewhere. Year dummy variables are included, but not reported in this table. Numbers in parentheses are White (1980) heteroskedasticity-adjusted *t*-statistics.

relationship between returns and these explanatory variables. Size, B/M, and program size are not significantly related to the first year return. Regarding the role of actual buyback activity, we continue to see that firms with at least some buyback activity experience marginally lower returns compared to those without any repurchases. However, neither the aggressive buying indicator variable nor its interaction term with High B/M dummy is significant. This suggests that price pressure from actual repurchase activity is not likely contributing to the first-year drift after repurchase announcements. On the other hand, the coefficients of prior one-year abnormal return are significantly positive, suggesting that firms with better stock performance prior to buyback announcements continue to do well during the first year after announcements.

Turning to the four-year abnormal return evidence (models 7–12), we see some evidence supportive of firms repurchasing shares due to undervaluation. For example, we see significant results for the size of the repurchase program; larger programs appear to be significantly associated with a larger drift in four-year returns (models 7 and 8). When firms repurchased at least some shares, their long-run performance is marginally higher (model 8). The more stock managers bought, the better the abnormal performance (model 9) is, especially for those firms that repurchased more than 4% of shares outstanding during the first post-announcement year (models 10 and 11). Further, when we consider value firms where undervaluation is more likely to be a motivating factor, we find significant results associating actual repurchase activity with a higher post-announcement drift (model 12).

In the last six columns, we re-examine the relationship between actual repurchase activity and three-year stock performance after the first year of the buyback program. Here, since each explanatory variable is available in "real-time," these tests do provide some insight into whether managers have forecasting ability when making actual buyback decisions. Each of the results from the previous six models also holds here. For example, firms with buyback activity perform better and enjoy even higher abnormal returns if they buy back more stock. The outperformance of firms with actual repurchase activity is especially true in value firms.

5. Discussions and conclusions

A controversial literature has developed as to whether managers initiate certain corporate actions to take advantage of windows of mis-pricing and, further, whether the stock market is slow to adapt to this information. The list of transactions is long and includes, for example, dividend initiations, exchange listings, stock splits and mergers.

Recently, pseudo-market timing has been suggested as an innocent explanation as to why researchers might draw the conclusion of market timing ability when, in fact, none might exist. Such a situation casts a completely different light on an otherwise rich literature which finds economically material and statistically significant long-horizon return drifts.

We offer an extensive examination of the long-horizon evidence following share repurchase announcements and revisit this idea as to whether managers are knowingly aware of mis-pricing and are able to time the market. Further, we estimate the extent to which pseudo-market timing explains at least some portion of the long-run return performance of buyback firms using a sample of 5508 programs announced by US firms between 1980 and 1996.

Pseudo-market timing is predicated on a dependency in announcement behavior with past market performance. We check this key underlying characteristic and find the evidence weak. While there are fewer repurchases announced following bull markets, we do not find pervasive evidence of buyback announcements following bearish markets. This result is inconsistent with a critical premise of the pseudo-market timing story.

We also compare calendar- and event-time methods to estimate long-horizon abnormal return performance. If pseudo-market timing is driving the abnormal performance we observe as researchers by using an event-time method, such performance will not occur once we control for any dependency in announcements. Yet using a calendar-time approach, we still observe significant outperformance; changes in the alpha point estimates between calendar- and event-time methods suggest that pseudo-market timing can explain, at best, only a small portion of the buyback return drift. When we examine manager behavior using actual buyback activity, the evidence is seemingly consistent with managers possessing some timing ability.

In sum, the evidence presented here does not support pseudo-market timing as a viable explanation for the positive long-term abnormal stock return drift observed, on average, in buyback firms; instead, the evidence is more consist with the notion that managers possess market timing abilities when announcing and executing buyback decisions.

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