

# A Test of Market Efficiency based on Share Repurchase

## Announcements

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### Abstract

Capital markets play a central role in resource allocation in an economy. They must be efficient for optimal resource allocation. This study tests market efficiency using event study method. The results, based on share repurchase announcements (event), confirm some earlier findings and refute others. The results can be explained through behavioural models of under and over reaction. Sub sample analysis shows opposite results to existing literature. There is some evidence that market responds selectively to share repurchase announcement of firms depending upon their recent performance-firms with positive earnings growth in the year prior to repurchase announcement perform better than firms with negative earnings growth.

**Keywords:** Market Efficiency, Share Repurchase, Event Study, Efficient Market Hypothesis

### 1. Introduction

Capital markets play a central role in the allocation of ownership of an economy's capital stock. An ideal market provides resource allocation signals and investors can choose among securities that represent ownership of firm's activities. Thus capital markets have the key role of resource allocation and distribution of firm's ownership rights in an economy (Fama (1970)). So, an efficient capital market, in which prices reflect fundamental values, will by implication result in efficient resource allocation in the economy. But are capital markets really efficient?

A great debate was introduced in finance literature on the topic of Efficient Market Hypothesis (EMH) ever since it was presented by Fama back in the 1970s. Fama's hypothesis of efficient capital market was tested on the real world data for different time periods. Interestingly the results of such tests were mixed ones. Some found support for EMH while others came up with trading strategies that refute it.

### 2. Efficient Capital Market

The Efficient Market Hypothesis (EMH) first postulated by Fama in 1970 states that in an efficient capital market, prices "fully reflect" all available information. Alternatively we can say that given rational investors and no market frictions, the security's price always equals its "fundamental value". A direct implication of EMH is that no investment strategy can earn above average returns on a risk-adjusted basis. In order to test whether markets are efficient or not Fama categorized market efficiency in three forms;

**Weak form;** future prices cannot be predicted on the basis of past price movements.

**Semi-Strong form;** prices reflect all publicly available information.

**Strong form;** prices not only reflect all publicly available information but also private information.

Fama (1970) shows that empirical tests support market efficiency especially in its weak and semi-strong form. However, an important point here is the difficulty to directly test market efficiency. Market efficiency can only be tested with a model of market equilibrium, an asset-pricing model. So, any test of market efficiency is simultaneously a test of an asset pricing model and its assumptions (Fama (1977)). Therefore, any anomalous evidence on stock returns behaviour should be split between market inefficiency and bad model of market equilibrium (Fama (1991)).

Event studies provide a more direct test of market efficiency in the short term. Fama (1998) argues that this is because the joint hypothesis problem is less severe in this case as returns on a day are close to zero. They support EMH in general. However, long term analysis of event studies provide mixed results on EMH. Event studies are designed on corporate events such as mergers and acquisitions, dividend and earnings announcements, stock splits, share repurchases etc.

This study tests market efficiency considering the corporate event of stock buyback announcements. Stock buyback or share repurchase is an act of a company to repurchase its own shares from the market either by tender offer or by open market operation. According to EMH stock prices in an efficient market fully reflect all available information. If markets are efficient then news about a stock should immediately be incorporated in its price and there should be no abnormal return in the long run. However, EMH has been criticized in the past as there has been evidence of share repurchase firms doing better than non-repurchase firms. Ikenberry et al. (1995) report an average abnormal four-year buy-and-hold return of 12.1% after initial announcement and for low book-to-market (value) firms; the average abnormal return is 45.3%. Such findings refute the EMH.

### **3. Share Repurchase and Motivation for Test**

Finance literature mentions a long list of reasons that motivates managers to repurchase shares of their own company. Share repurchases are used for capital structure adjustments, signalling, substitution for cash dividend, distribution of excess cash, wealth expropriation from bondholders to shareholders (see Ikenberry et al. (1995)). They also provide tax benefits to shareholders as capital gain tax is lower than tax on cash dividend. According to Dittmar (2000) companies repurchase shares as a defence tool against hostile takeovers. Jagannathan et al. (2000) note that stock repurchases also provide flexibility to managers in terms of future cash outflows as they are optional not obligations. Although all of these reasons are plausible, according to Ikenberry et al. (1995) signalling has emerged as the most ubiquitous explanation. According to Traditional Signalling Hypothesis (THS)-a concept based on asymmetric information- if managers believe that the firm is undervalued, they may want to buyback. Such an announcement should thus provide valuable signal to less informed market. If markets are efficient then prices should adjust immediately in an unbiased manner and the new price should fully reflect true equilibrium price.

Given that the markets are efficient and prices adjust quickly and accurately to new information, then after such a signal managers should not actually repurchase as the stock will no longer be mispriced. However, managers typically do not cancel their repurchase program. The average market reaction is only around 3%. This suggests that market views such announcements sceptically and under reacts, which the Ikenberry et al. (1995) call the Underreaction Hypothesis.

Fama (1998) argues that these abnormal returns of stock repurchase firms are sensitive to the methodology used. Mitchell and Stafford (2000) and Bradford (2008) using calendar-time portfolio regression method find no evidence of any long-term abnormal return after the announcement of share repurchase firms. Assuming that repurchase announcement signals management's belief of strong future performance, it's worthwhile to differentiate the performance of firms that actually repurchase and the ones that do not. Lie (2005) finds that only firms that actually repurchased in the quarter after the announcements experience an improvement in their operating performance.

Since repurchase announcements serve as a costless signalling method for managers, there is potential danger of its misuse too. For example, Hribar et al. (2006) suggest that managers can also use stock repurchases as an earnings management device. In a recent paper Chan et al. (2010), using a sample of

firms where managers were under pressure to boost share prices, show that managers use such announcements opportunistically to mislead investors. Chan et al. (2007) using a decade's share repurchases data of US companies have shown that managers do possess timing ability and share repurchase firms do show abnormal returns. But the key question here is; are these abnormal returns due to managers timing ability, underpricing of such stocks or due to other reasons? Ikenberry et al. (1995) have attributed these abnormal returns of stock repurchase firms to their undervaluation at the time of announcement. Share repurchase announcement serves as a signal to the market of the undervaluation and these stocks later on generate abnormal returns.

#### 4. Data and Methodology

The data for the study has been hand collected for firms making stock buyback announcements using internet search engines. 28 firms making stock buyback announcements were randomly selected from NYSE, ASE and NASDAQ listed companies. For each of these firms another firm is selected within the same industry and with similar size and book-to-market value to create a benchmark portfolio. Since Banz (1981) and Fama and French (1992) have respectively shown that firm size and book-to-market value are related to firm returns. Size is inversely related to stock returns and book-to-market values have positive relation to stock returns. So it is important to control these variables. To select benchmark firms, firm size and book-to-market value is taken as the average market value and book-to-market value of the firm in last 12 months prior to announcement respectively. The data period ranges from 2000 to 2005. Short term and long term return results are obtained using EVENTUS. Both short term and long term returns are calculated for different windows (periods). The returns are calculated based on two approaches using EVENTUS function of Wharton Research Data Services.

##### 4.1 CAAR Approach

The Cumulative Average Abnormal Return (CAAR) approach calculates abnormal returns on monthly basis. According to Kothari and Warner (1994) abnormal returns are the excess returns achieved due to the announcement over unconditional (without announcement) expected returns

Where  $r_{it}$  is the abnormal return on security  $i$  at time  $t$ .  $r_{it}$  is the conditional return and  $r_{it}^u$  is the unconditional expected return? CAAR approach uses each month's average abnormal return (AAR) over a time horizon of  $t_1$  and  $t_2$ .

AAR <sub>$t$</sub>  is calculated as follows,

Where  $n$  is the number of firms in the sample.

Methodology becomes more crucial for long term performance measurement because of issues addressed by Franks et al. (1991). They show that use of different benchmarks lead to different conclusions. The results become highly sensitive to the model choice and benchmark selection. Following Ikenberry et al. (1995), BHAR Approach is used for long term performance analysis.

##### 4.2 BHAR Approach

Buy-and-Hold Abnormal Return (BHAR) approach is simple and intuitive. It simply compares the multi-year returns from buy-and-hold strategy of event and non-event firms. Thus the abnormal return of stock repurchase firms is simply the difference between their return and the return of comparable firms which do not repurchase (benchmark firms).

The returns are calculated for time  $T$  on security  $i$ .  $R_B$  is the return on the benchmark. In this approach portfolios are balanced at the end of the year so as to remove any bias that may arise in returns.

#### 5. Performance Evaluation

##### 5.1 Short Term Performance

Table 1 presents the short term returns of stock repurchase and benchmark firms for different windows. Panel A of the table presents Market Model Returns (MMR) while Panel B reports Market Adjusted Returns (MAR), where CRSP equally weighted portfolio represents market return. Since Ikenberry et al.

(1995) show that size and value effect also affect firm performance, to test this subgroups are formed based on firm's size and book-to-market value. Sub sample results are also presented in the table.

Portfolio of repurchase firms (repurchase portfolio) performs markedly different from benchmark portfolio in both panels of the table. As expected, repurchase portfolio does worse than the benchmark portfolio prior to stock repurchase announcement and better than the benchmark on and after the announcement date. In panel A, from 30 days to 1 day prior to announcement, repurchase portfolio earns a return of -3.04%, significant at 10% significance level, as compared to insignificant -0.35% return on the benchmark portfolio. However, repurchase portfolio earns a return of 2.39%, significant at 0.1% significance level, on the day of announcement compared to an insignificant return of only 0.49% on the benchmark portfolio. For a period of first six days from the date of announcement repurchase portfolio outperforms the benchmark portfolio by 2.89% and on a 30 day period by a return of 3.49%. Panel B (MAR), tells a similar story where repurchase portfolio generates more return compared to benchmark portfolio in all post-event windows and it underperforms benchmark portfolio in the pre-event windows.

These findings are in line with prior research. However, sub sample results are different from preceding studies. In contrast to Ikenberry et al. (1995), large firms perform better than small firms and firms with low book-to-market (B/M) value outperform high B/M value firms. In panel A; on the event day, small firms earn a return of 1.42% as compared to 3.35% of large firms, both significant at 0.1% significance level. The difference between the two portfolio's returns widen with the passage of time in short run as evidenced from returns presented in different short term windows. Panel B shows similar results about this differentiation.

Sub sample portfolios based on B/M value show that low B/M value firms perform better than high B/M value firms both before and immediately after the event. In panel A; on the event day, portfolio of low B/M value firms earns a return of 3.57%, significant at 0.1% significance level whereas portfolio of high B/M value firms earns a return of 1.2%, significant at 10% significance level. For a period of first six days after the event, the return difference between low and high B/M value portfolios is 1.43%. However, the trend reverses for a period of 30 days after the event and high B/M value portfolio earn a return of 6.28%, significant at 10% significance level as compared to insignificant return of 0.10% on low B/M value portfolio. Panel B shows similar results about this differentiation. This shows a more delayed reaction to the news for firms with high B/M value.

Before we explore the reasons for this abnormal return pattern of sub samples in short run, it is better to have a look at their long term performance first.

## 5.2 Long Term Performance

Table 2 below shows long term performance of event and benchmark firm's portfolios. The returns are calculated using buy-and-hold approach and are presented for different windows shown in the table, which range from 6 months prior to the event to 5 years after the event. Panel A of table 2 presents the raw returns of repurchase and benchmark portfolios in line 1 and 2 respectively and line 3 shows their difference. In panel B compounded holding period returns (starting from the event date) are presented for the two portfolios in line 1 and 2 and line 3 reports their difference.

These return patterns can be explained by behavioural models of under and overreaction. The results show that initially market reacts favourably to share repurchase announcements and in first year repurchase portfolio significantly outperforms benchmark portfolio by 2.35%. The performance of the two portfolios is almost similar in second year after the event. In the third year benchmark portfolio considerably outperforms the event firm portfolio. However, in the fourth and fifth year benchmark portfolio underperforms the event firm portfolio by 12.37% and 9.86% respectively. These differences are significant at 10% and 0.1% significance levels respectively. One can see a mean reversion in returns of these portfolios. There appear to be slight initial overreaction in the first year followed by market correction in the second and third year. However, in correction phase market overreacts again and this leads to abnormally high returns for event firms in the fourth and fifth year after the event. Figure 3 below shows the return pattern of event and non event firm's portfolios over a five year period.

Panel B of the table shows that on compounded buy-and-hold return strategy, repurchase portfolio outperforms benchmark portfolio by around 2% in first two years. A return reversal of 10.9% is observed in the third year. Finally, the trend reverses again and repurchases portfolio beats the benchmark portfolio by 18.18% on 5-year holding period.

Table 3 on next page shows long term performance analysis of subsample based on firm size. Large event firms do extremely well in the first two years after the event as compared to small firms. They produce a return of around 28% in first year after the event as compared to benchmark return of only 12.7%. Although they were not doing well before the event, the market tends to perceive their announcement of share repurchase more favourably than that of smaller firms. The finance literature points out that information asymmetry is higher for smaller firms and any new information should produce a higher price adjustment for smaller firms. In contrast to this, one can also argue that due to higher information asymmetry for smaller firms, investors are more cautious about their news as compared to large, well established firms. With higher information asymmetry, there is a higher likelihood that management may engage in opportunistic behaviour. So, such news of share repurchases is discounted by the market and under reaction is the outcome thus resulting in lower returns for small firms. With the momentum and feedback trading such lower, although positive, returns for smaller firms continue for the next year or so.

A reversion of returns is observed after the third year as the market realises that these stocks have become undervalued. So in fourth and fifth year these small firms do well compared to the benchmark and the large firms. An opposite behaviour of returns is observed for large firms. Their announcement of stock repurchase is perceived more favourably by market due to less information asymmetry and their higher capacity/ability<sup>1</sup> to fulfill their commitment of share repurchases. So the market overreacts to the news and also due to momentum effect and feedback trading these large firms outperform the benchmark in the first two year by 15.3% and 3.7% respectively. This results in overvaluation of these stocks so a mean reversion of returns is observed for these stocks as they under perform the benchmark in third and fourth year by around 5% and 10% respectively. In fourth year, although they continue to produce negative return but as compare to benchmark they perform better.

Table 4 below shows long term performance analysis of subsample based on B/M value. The results highlight some interesting findings. In contrast to Ikenberry et al. (1995) low B/M value firms perform better than high B/M value firms in the first two years. But from third year onwards they perform worse. In the first year low B/M value firms earn a return of more than 30% on buy-and-hold strategy as compared to a return of around 10% for high B/M value firms. After adjusting for benchmark performance, low B/M value firms significantly outperform high B/M value firms by around 12%. But from third year onwards the high B/M value firms outperform low B/M value firms after adjusting for benchmark performance by 3.2%, 15.95% and 9% in third, fourth and fifth year respectively.

The key question here is why value (high B/M) firms underperform glamour (low B/M) firms in the first two years especially in the first year. There can be several reasons for this; i) This may be due to underreaction; where market underreacts to the new information for firms with high B/M value; ii) A momentum effect may explain such behaviour; where value firms continue to loose and glamour firms continue to win initially followed by return reversal or mean reversion as predicted by DeBondt and Thaler (1985); iii) Market may respond differently to news depending upon the reason given in announcement for repurchase Ikenberry et al. (1995); iv) Chan et al. (2010) believe that market may discount the news effect if they perceive opportunistic management intentions behind the news.

Since we have seen this earlier in short term performance that market under reacts to stock repurchase news

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<sup>1</sup> Normally large firms have more cash generating units (ability) and they are in a better negotiating position with lenders as compared to small firms.

for high B/M value firms and here too we find evidence that in the first year high B/M value firms underperform low B/M value firms. So, based on momentum effect and market's selective response to different firms, I investigate this matter further.

Two new sub samples are created based on firm's earnings growth in the year prior to the stock repurchase announcement. The idea behind this division is based on selective market response to different firms and the momentum effect in returns. Repurchase announcements by firms with negative earnings growth in the year prior to announcement will be viewed more skeptically and as a way to mislead investors as market expects such firms to continue to do badly and fail to repurchase shares as per their announcement<sup>2</sup>. Similarly based on momentum effect, firms with negative earnings growth will continue to lose in the short run and positive effect of share repurchase announcement may be reduced by feedback traders. The better performance from third year onwards can be explained based on the idea of mean reversion in returns. The results of this sub sample are presented in table 5 on next page.

As expected market perceives stock repurchase announcement of firms with prior year's positive earnings growth more favourably. They earn highly significant return of 2.69% on the day of the announcement and a return of 4.42%, significant at 5% significance level, in the first week of the announcement. On the other hand, firms with negative earnings growth also earn a positive return but much lower than firms with positive earnings growth. They earn a return of only 1.32%, significant at a significance level of 10%, on the day of announcement. In the first week these firms earn an insignificant and less than half of the return as that of firms with positive earnings growth. This proves the initial hypothesis that market perceives the announcements of firms with relatively poor performance in the prior year more skeptically and under reacts or discounts their cash flows at a higher rate. This may also be due to higher likelihood of such firms to make share repurchase announcements to artificially boost up the prices.

In the long run, the two sub samples perform differently in different years. But by looking at Panel C, it becomes clear that, on a compounded four-year holding period return basis, firms with positive earnings growth do better than firms with negative earnings growth. The difference between their returns is around 20%.

The year by year returns in panel B can be explained by using behavioural models of under/overreaction and mean reversion of returns. Positive earnings growth firms generate higher returns prior to event and in the first year after the event. In the second year they underperform and in third and fourth year they again outperform firms with negative earnings growth. Finally in the fifth year they produce negative returns while negative earnings growth firm's portfolio earns positive return. The portfolio comprising firms with negative earnings growth shows an opposite return behaviour to the portfolio of firms with positive earnings growth. These findings also support our initial hypothesis that the announcement of stock buyback news by firms with positive (negative) earnings growth is perceived more favourably (sceptically) as a result they earn higher (lower) return in the first year. Later on, the trend of returns is determined by momentum and feedback trading with mean reversion of returns after about every two years.

## 5. Conclusion

Share repurchase announcement has a positive effect on firm's performance in the short run. In line with earlier studies these firms experience, on average, an abnormal return of around 2% on the day of the announcement. In the long run, on a 5-year buy-and-hold strategy, repurchase firms earn an abnormal return of around 18%.

Subsample analysis, contrary to prior research, shows that large firms perform better than small firms on

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<sup>2</sup> Negative earnings growth firm's portfolio contains 73% low book-to-market value and 63% high market value firms from the event firms. This means it contains more than 50% of stocks which performed poorly in the earlier subsamples relative to their counterpart portfolios. So, the same hypothesis goes true for these subsamples as well.

share repurchase announcement. Similarly low B/M value firms perform better than high B/M value firms. The effect is due to market under reaction to repurchase news due to higher information asymmetry and low level of trust on management of small firms. For high B/M value firms, the effect of share repurchase announcement might be lower due to momentum effect and feedback trading initially and lower level of trust on management's intentions due to the current poor performance. A sub sample created on earnings growth rate in the year prior to the event year supports the idea that market views repurchase announcements of firms with negative earnings growth in the prior year more skeptically and discounts the news effect.

The year by year returns are characterised by market under/overreaction and mean reversion of returns. The reversion of return is first observed in the third year after the event and the trend reverses again in the fourth year. This kind of trend is observed, in general, for event firm's portfolio, subsample portfolios and even the benchmark portfolios. This shows that market sometimes under/overreacts and corrects it after sometime and the cycle continues. Market however does discount the share repurchase announcement depending on firms' past performance, its capacity and perceived management's intentions of repurchase announcements.

However, such results are based on a small sample of 28 firms and may not be generalize-able to the entire population of stocks in the economy. Besides, matching firms were randomly selected within a range of 20% standard deviation from the average size and book-to-market value, which may induce some bias in the benchmark firm selection and hence benchmark portfolio returns. The firms are however selected randomly and thus they represent the market phenomenon. A large sample study may provide more conclusive evidence on the subject.

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**Table 1**

**Short Term Returns of Stock Repurchase and Benchmark Firms**

This table reports Cumulative Average Abnormal Returns (CAAR) for firms announcing share repurchase (Portfolio) and Firms having similar characteristics to that of share repurchase firms (Benchmark Firms). A sample of 56 firms is taken, 28 firms in the category of share repurchase firms and 28 firms in the category of benchmark firms. The sample period is taken from 2000 to 2005. The CAAR are presented after adjusting returns on market model in panel A and after adjusting for market returns (Using CRSP equally weighted returns) in Panel B. Differentiation among stock repurchase firms is made on the basis of firm size and book-to-market value and their results are also reported in both panels, A and B. Each subgroup in this differentiation contains 14 firms. Median value is used to divide firms into subgroups. The table shows return for both pre and post announcement period where 0 is the announcement day. The Z-statistic is given in the parenthesis.

<b>CAAR</b>				
<b>Panel A: Market Model Returns</b>				
	Days (-30 to -1)	Days (0 to 0)	Days (0 to +5)	Days (+1 to +30)
Portfolio	-3.04% (-1.53\$)	2.39% (4.74***)	4.76% (3.59***)	3.19% (-0.56)
Benchmark	-0.35% (-0.97)	0.49% (0.82)	1.87% (1.76*)	-0.30% (-0.32)
Small Firms	1.61% (-0.99)	1.42% (3.26***)	2.67% (2.32**)	-1.70% (-1.28)
Large Firms	-4.57% (-1.17)	1.89% (3.45***)	-4.98% (2.75**)	2.84% (2.06*)
High B/M	-5.06% (-1.23)	1.20% (1.51\$)	4.04% (1.74*)	6.28% (1.45\$)
Low B/M	-1.03% (-0.93)	3.57% (5.19***)	5.47% (3.33***)	0.10% (-0.67)
<b>Panel B: Market Adjusted Returns</b>				
Portfolio	-9.67% (-3.56***)	1.97% (3.97***)	3.33% (2.76**)	-0.21% (-0.94)
Benchmark	-3.24% (-2.82**)	3.25% (0.03)	-5.04% (0.96)	5.00% (-1.05)
Small Firms	-14.29% (-2.63**)	1.67% (2.46**)	-0.96% (1.51\$)	2.78% (-2.28*)
Large Firms	-3.24% (-2.41**)	3.25% (3.15***)	-5.04% (2.39**)	5.00% (0.96)
High B/M	-14.30% (-3.19***)	0.69% (0.96)	1.67% (0.89)	2.77% (0.17)
Low B/M	-5.04% (-1.84*)	3.25% (4.66***)	5.00% (3.02**)	-3.20% (-1.49\$)

The symbols \$,\*,\*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively.

**Table 2**

**Long Term Returns of Stock Repurchase and Benchmark Firms**

The table reports the compounded average abnormal returns (CAAR) for stock repurchase firms in long term period before and after the event date (announcement date). Event windows are taken as: i) a period of last 6 months before the event, ii) a period of 0 – 12 months (first year after the event), iii) a period of 13 – 24 months (the second year after the event), iv) a period of 25 – 36 months (the third year after the event), v) a period of 37 – 48 months (the fourth year after the event) and vi) a period of 49 – 60 months (the fifth year after the event). Abnormal returns are calculated using BHAR approach. Raw returns are calculated for both the repurchase and benchmark portfolios and reported in line 1 and 2, respectively. Then a difference between their returns is calculated in line 3. Z-statistics are shown in parenthesis. T-statistic is reported for the difference between the two portfolio returns. In Panel B: the table reports compounded holding period returns for both the stock repurchase and benchmark firms and their difference is also reported in line 3 with T-statistics.

<b>Panel A: BHAR</b>						
	Months (-6 to 0)	Months (0 to 12)	Months (13 to 24)	Months (25 to 36)	Months (37 to 48)	Months (49 to 60)
1.Portfolio	-12.12%	20.25%	12.86%	-5.49%	5.55%	-5.52%
	(-0.59)	(2.21*)	(1.33\$)	(-0.95)	(1.76*)	(-0.74)
2.Benchmark	-0.17%	17.90%	13.43%	4.06%	-6.82%	-15.38%
	(0.06)	(2.74**)	(0.46)	(-1.07)	(0.67)	(-3.76***)
3.Difference (1-2)	-11.95%	2.35%	-0.57%	-9.55%	12.37%	9.86%
	(-3.54**)	(3.46***)	(-1.17)	(-8.02**	(2.12\$)	(6.98***)
				*)		
<b>Panel B: Compounded Holding Period Returns</b>						
	1 Year	2 Year	3 Year	4 Year	5 Year	
1.Portfolio	20.25%	35.71%	28.26%	35.38%	27.91%	
2.Benchmark	17.90%	33.73%	39.16%	29.67%	9.73%	
3.Difference	2.35%	1.98%	-10.90%	5.71%	18.18%	
	(3.63**)	(3.21**)	(-5.53***)	(6.26***)	(0.78)	

The symbols \$,\*,\*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels respectively.

**Table 3**

**Size Effect on Long Term Performance**

The table reports the compounded average abnormal returns (CAAR) for high and low Market value (Size) stock repurchase firms and the matched benchmark firms for long term holding period before and after the event date (announcement date). Event windows are taken as: i) a period of -6 – 0, last 6 months before the event, ii) a period of 0 – 12 months (first year after the event), iii) a period of 13 – 24 months (the second year from the event), iv) a period of 25 – 36 months (the third year after the event), v) a period of 37 – 48 months (the fourth year after the event) and vi) a period of 49 – 60 months (the fifth year after the event). Abnormal returns are calculated using BHAR approach. Raw returns are calculated for both the repurchase

and benchmark firms reported in line 1 and 2, respectively. Then a difference between their returns is calculated in line 3. Z-statistics are shown in parenthesis. T-statistic is reported for the difference between the two portfolio returns.

		<b>BHAR</b>					
		Months (-6 to 0)	Months (0 to 12)	Months (13 to 24)	Months (25 to 36)	Months (37 to 48)	Months (49 to 60)
<b>High MV</b>	1.Portfolio	-18.90% (-0.81)	27.94% (2.14*)	19.88% (1.45\$)	-5.05% (0.44)	-12.50% (0.82)	-3.56% (-0.39)
	2.Benchmark						
	k	-4.70% (0.71)	12.66% (1.27)	16.17% (0.03)	-0.08% (-0.92)	-2.32% (0.93)	-15.52% (-1.38\$)
	3.Difference (1-2)	-14.20% (-4.53***)	15.28% (5.66***)	3.71% (1.59)	-4.97% (-5.47***)	-10.18% (-6.78***)	11.96% (6.65***)
	1.Portfolio	-5.34% (0.02)	12.56% (0.98)	5.84% (0.43)	-5.93% (-1.78**)	22.30% (3.18***)	-7.48% (-1.54\$)
	2.Benchmark						
<b>Low MV</b>	k	4.36% (-0.65)	23.14% (1.65**)	10.49% (1.06)	9.86% (0.76)	-13.83% (0.78)	-15.19% (-2.2**)
	3.Difference (1-2)	-9.70% (1.08)	-10.58% (-7.69***)	-4.65% (-1.62)	-15.79% (-4.76***)	36.13% (3.61***)	7.71% (5.77***)

The symbols \$, \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels respectively.

**Table 4**  
**Book-to-Market Effect on Long Term Performance**

The table reports the compounded average abnormal returns for high and low book-to-market stock repurchase firms and the matched benchmark firms for long term holding period before and after the event date (announcement date). Event windows are taken as: i) a period of last 6 months before the event, ii) a period of 0 – 12 months (first year after the event), iii) a period of 13 – 24 months (the second year from the event), iv) a period of 25 – 36 months (the third year after the event), v) a period of 37 – 48 months (the fourth year after the event) and vi) a period of 49 – 60 months (the fifth year after the event). Abnormal returns are calculated using BHAR approach. Raw returns are calculated for both the repurchase and benchmark firms reported in line 1 and 2, respectively. Then a difference between their returns is calculated in line 3. Z-statistics are shown in parenthesis. T-statistic is reported for the difference between the two portfolio returns.

**BHAR**

	Months (-6 to 0)	Months (0 to 12)	Months (13 to 24)	Months (25 to 36)	Months (37 to 48)	Months (49 to 60)
<b>High B/M</b>						
1.Portfolio	-17.74% (-0.90)	10.11% (1.00)	12.59% (0.71)	-5.09% (-1.60\$)	8.43% (2.03*) -11.79	-11.88% (-0.94)
2.Benchmark	7.34% (0.51)	13.77% (0.52)	15.05% (0.01)	2.96% (-0.91)	% (0.36)	-25.82% (-2.01*)
3.Difference (1-2)	-25.08% (-3.65***)	-3.66% (-1.68)	-2.46% (0.70)	-8.05% (-4.85***)	20.22% (7.04** *)	13.94% (5.88***)
<b>Low B/M</b>						
1.Portfolio	-6.49% (0.07)	30.38% (2.12*)	13.12% (1.16)	-5.88% (0.24)	2.87% (0.54)	-0.07% (-0.13)
2.Benchmark	-7.68% (-0.57)	22.03% (2.39**)	11.70% (1.00)	5.36% (0.48)	-1.40% (0.15)	-4.95% (-1.38\$)
3.Difference (1-2)	1.19% (-0.70)	8.35% (1.50)	1.42% (0.61)	-11.24% (-7.87***)	4.27% (-0.92)	4.88% (5.65***)

The symbols \$,\*,\*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels respectively.

**Table 5**

**Prior Year's Earnings Growth Effect on Short and Long-term Performance**

Panel A of the table shows the short term Market Adjusted Returns by using Cumulative Average Abnormal Return approach for different windows. +ve Earnings Growth and -ve earnings growth represent positive and negative earnings growth in the year prior to the announcement of stock repurchase. There are 15 firms with positive earnings growth and 11 firms with negative earnings growth in the two subsamples respectively.

Panel B of the table reports the long term returns of these two subsamples of event firms using Buy and Hold Average Return approach. See table 9 for explanation of return windows used. Line 1 and 2 present the raw returns with Z-statistics in parenthesis. Line 3 presents the difference between the returns of line 1 and line 2, with t-statistics in parenthesis.

Panel C shows the compounded holding period returns for both the positive and negative earnings growth firms' portfolio in line 1 and 2 respectively and also their difference in line 3 with t-statistics.

**CAAR**

**Panel A: Market Adjusted Returns**

	Days (-30 to -1)	Days (0 to 0)	Days (0 to +5)	Days (+1 to +30)
+ve Earnings Growth	-7.22% (-1.67*)	2.69% (3.72***)	4.42% (1.79*)	6.71% (-0.98)
-ve Earnings Growth	-15.27%	1.32%	2.10%	4.01%

	(-2.38**)	(1.50\$)	(1.14)	(-0.49)
<b>BHAR</b>				
<b>Panel B: Buy and Hold Average Returns</b>				
	Months	Months	Months	Months
	(-6 to 0)	(0 to 12)	(13 to 24)	(25 to 36)
	(37 to 48)			
1.+ve Earnings Growth	-4.96%	18.66%	12.09%	-4.66%
	(-0.23)	(1.71*)	(0.87)	(-1.65*)
2.-ve Earnings Growth	-26.87%	11.65%	18.62%	-9.75%
	(-1.29\$)	(0.65)	(1.04)	(-0.33)
3.Difference(1-2)	21.91%	7.01%	-6.53%	5.09%
	(12.35***)	(6.20***)	(-4.99***)	(1.59)
				(0.55)
<b>Panel C: Compounded Holding Period Returns</b>				
	1 Year	2 Year	3 Year	4 Year
1.+ve Earnings Growth	18.66%	33.01%	26.81%	42.87%
2.-ve Earnings Growth	11.65%	32.44%	19.53%	38.51%
3.Difference (1-2)	7.01%	0.57%	7.28%	0.94%
	(7.74***)	(4.96***)	(4.80***)	(5.16***)

The symbols \$,\*,\*\*, and \*\*\* denote statistical significance at the 10%, 5%, 1% and 0.1% levels respectively.

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