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Market underreaction to open market share repurchases

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Abstract

We examine long-run firm performance following open market share repurchase announcements, 1980–1990. We find that the average abnormal four-year buy-and-hold return measured after the initial announcement is 12.1%. For ‘value’ stocks, companies more likely to be repurchasing shares because of undervaluation, the average abnormal return is 45.3%. For repurchases announced by ‘glamour’ stocks, where undervaluation is less likely to be an important motive, no positive drift in abnormal returns is observed. Thus, at least with respect to value stocks, the market errs in its initial response and appears to ignore much of the information conveyed through repurchase announcements.

Key words: Stock repurchase

JEL classification: G14; G32

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1. Introduction

Corporations distribute substantial sums of wealth to shareholders by repurchasing their own stock. From 1980 to 1990, the aggregate value of stock repurchased on the New York Stock Exchange (NYSE), the American Stock Exchange (ASE), and the National Association of Securities Dealers Automated Quotations (NASDAQ) was about one-third of the value of dividends. Toward the end of the 1980s, the dollar value of stock repurchases increased substantially, becoming nearly half the amount paid as cash dividends. Framed differently, the dollar value of stock repurchases announced between 1985 and 1993 was nearly three times larger than that raised through initial public offerings (IPOs).¹ In 1994, stock buybacks continued at a rapid pace: more than \$65 billion were announced. Firms can reacquire shares through tender offers or through open market transactions. Historically, managers have chosen the latter approach by wide margins. For example, the dollar value of all share repurchases announced between 1985 and 1993 to be completed through open market transactions. In this paper, we examine the long-run performance of firms that chose this approach for repurchasing shares.

The literature provides a lengthy list of motivations for why a firm might repurchase their own shares: capital structure adjustment, tax deferral, signaling, excess cash distribution, substitution for cash dividends, and wealth expropriation from bondholders. While all of these reasons are plausible, signaling has emerged as one of the most prevalent explanations (Myers, 1981; Dann, 1981; Asquith and Mullins, 1986; Ofer and Thakor, 1987; Titmides and Grundy, 1989). The Traditional Signaling Hypothesis, motivated by asymmetric information between the marketplace and managers, states that if, in management's assessment, the firm is undervalued, managers will choose to buy back stock. Making such an announcement is thus serving a valuable signal to a less informed marketplace. If markets are efficient, prices should adjust immediately in an unbiased manner and the equilibrium price should fully reflect the 'true' value of the firm. In this case, no wealth transfer should occur between long-term shareholders and the firm selling shares to the firm.

When managers are asked why they repurchase shares on the open market, the most commonly cited reason is 'undervaluation' and that they believe the shares represent a 'good investment', two reasons seemingly consistent with the signaling hypothesis (Baker, Gallagher, and Morgan, 1981; Dann, 1983; Wansley, Lane, and

¹From 1985 to 1993, the total value of all announced share repurchases recorded by the Securities and Exchange Commission was \$334 billion (excluding REITs and closed-end funds). The comparable dollar value of initial public offerings over the same period was \$114 billion.

1989). Yet, paradoxically, if prices adjust instantaneously, how can the stock be a good investment for long-term shareholders? In an efficient market, the stock should no longer be undervalued after the announcement, thus eliminating the motivation to undertake the repurchase.

However, managers typically do not announce that they are canceling a repurchase program. This would suggest that the initial market reaction is too low. Given that the average market reaction is only on the order of 3%, this would indeed seem to be the case. It hardly seems plausible that managers would, first, have the ability to recognize such small valuation errors, and second, choose to react to such minor discrepancies. Placed in perspective, 3% is not that much greater than the daily standard deviation of returns for many stocks. If managers are reacquiring shares because of mispricing, it is likely that they perceive substantially greater valuation errors. For example, in October 1993, Midland Resources Inc., a U.S.-based oil and gas concern, announced an open market share repurchase for 5% of its shares. At the announcement, the chairman was quoted as saying: 'If you look at the amount of our reserves, we think (our stock) should be trading for about twice its current value. What it boils down to is, if you can buy a dollar for 50 cents, why not buy it?'

We hypothesize that the market treats repurchase announcements with skepticism, leading prices to adjust slowly over time. We refer to this as the Underreaction Hypothesis, or UH. Evidence consistent with this hypothesis has been documented in a study on fixed-price tender offer stock repurchases. Lakonishok and Vermaelen (1990) find that on average, prices remain at bargain levels for at least two years. Other examples of delayed market reactions include IPOs (Ritter, 1991), mergers (Agrawal, Jaffe, and Mandelker, 1992), proxy contests (Ikenberry and Lakonishok, 1993), and spinoffs (Cusatis, Miles, and Woolridge, 1993). In what is essentially the mirror image of a stock repurchase, Loughran and Ritter (1995) observe a sluggish response by the market to seasoned equity offerings.

Is it possible that the market fully incorporates the information conveyed through an open market repurchase? If so, we should observe that stock prices following the announcement are unbiased, and that long-run performance is not above average. Or, alternatively, do managers in fact really know what they are doing and are correct in their assessment that their stock is a good investment, even after the repurchase announcement? These fundamental questions motivate the remainder of this paper.

We examine a sample of 1,239 open market share repurchases announced between January 1980 and December 1990 by firms whose shares traded on the NYSE, ASE, or NASDAQ. Similar to the findings reported in earlier research, the average market response to the announcement of an open market share repurchase is 3.5%. Furthermore, this initial reaction is consistent with several predictions of the TSH. For example, the market reacts more favorably to

announcements made by low market capitalization firms and by firms with large repurchase programs.

The most striking finding of this paper is that the information content of open market share repurchases is largely ignored. Managers of firms that repurchase their own shares appear to have been correct, on average, in assuming that they can buy shares at bargain prices to the benefit of long-term shareholders. Beginning in the month following the repurchase announcement, the average buy-and-hold return over the next four years is more than 12% above that of a control portfolio.

If undervaluation is an important motive overall, it should be particularly important for out-of-favor stocks, which tend to have high book-to-market ratios. Yet, surprisingly, the market reaction to repurchase announcements is similar across all book-to-market groups. Over the long run, the largest abnormal returns following buyback announcements are for high book-to-market firms. The average return over the next four years for a buy-and-hold portfolio of these stocks is 45.3% above that of a control portfolio of similar size and book-to-market firms. For low book-to-market firms, no abnormal performance is observed in long-run returns.

The remainder of the paper is organized as follows: In Section 2, we describe the data and our sample. Issues regarding performance measurement and significance tests are discussed in Section 3. In Section 4, we examine short-run returns surrounding the announcement of open market share repurchases. In Section 5, we examine long-run performance. In Section 6, we examine the determinants of long-run performance. In Section 7, we check the robustness of our findings. Conclusions are provided in Section 8.

2. Data

Our sample was formed by identifying all announcements reported in the *Street Journal* from January 1980 through December 1990 that stated the firm intended to repurchase its own common stock through open market transactions. We examine all open market share repurchase announcements without regard to whether the programs were actually completed. We further require that firms be included on the daily Center for Research in Security Prices (CRSP) NYSE and ASE tapes or daily CRSP NASDAQ tapes, as well as on the industrial Compustat file at the time of the announcement. For our analysis, we exclude all announcements made in the fourth quarter of 1987. Following the 1987 crash, 777 NYSE, ASE, and NASDAQ firms announced either new or increased share repurchase programs totalling over \$10 billion, largely in response to their low post-crash share prices. Although we include these announcements made during this period, these cases are not included in our results we report in order to avoid having this unusual period dominating our

Table 1 shows the distribution of the repurchase announcements by year, the average percentage of shares repurchased, and the dollar value of the repurchase announcements. These repurchases, if fully completed, would have totalled \$142 billion. Over the entire 11-year period, sample companies announced repurchases for, on average, 6.6% of their outstanding shares. This percentage generally rose over our sample period. Table 1 also shows the distribution of announcements according to firm size. Size deciles were determined in the month prior to the announcement, and were based on market equity value relative to the universe of all NYSE and ASE stocks covered by both CRSP and Compustat. Our sample has a bias favoring larger firms. Nearly one-third of our sample is ranked in the two largest size deciles.

3. Methodology

3.1. Performance measurement

We examine both short-term returns surrounding the announcement and long-term performance following the announcement. Short-term performance is calculated over various windows from 20 days before to 10 days following the announcement. When abnormal returns are calculated over such short intervals, the results are not overly sensitive to the benchmark used. Thus, we report results using a straightforward approach, calculating abnormal returns in relation to the CRSP equal-weighted index of NYSE and ASE firms. We also calculated short-term performance relative to other benchmarks, including the CRSP value-weighted index as well as a size-based approach, but the results were essentially the same.

Care must be taken when calculating long-run performance, because the findings can be sensitive to the procedures used (see Chopra, Lakonishok, and Ritter, 1992). In this paper, we pursue two different approaches. The first is the more common technique based on cumulative abnormal returns (CARs) relative to some benchmark. The second approach calculates long-run abnormal performance assuming a buy-and-hold strategy. For both of these methods, abnormal returns are calculated relative to four benchmarks: the CRSP equal- and value-weighted indices of NYSE and ASE firms, a size-based benchmark, and a size- and book-to-market-based benchmark. This last benchmark is motivated by the recent work of Fama and French (1992, 1993) and Lakonishok, Shleifer, and Vishny (1994).²

²To distinguish 'value' stocks from 'glamour' stocks, a variety of ratios exist aside from book-to-market. For example, Lakonishok, Shleifer, and Vishny (1994) find that classifying stocks by cash-flow-to-price produces an even larger spread in returns than does sorting by book-to-market. However, sorting on the basis of cash-flow-to-price poses some difficulties when cash flow becomes negative. Hence, we classify firms using book-to-market ratios.

Table 1
Descriptive statistics for open market share repurchase announcements between January 1980 and December 1990

This table reports the number of open market share repurchases announced in the *Wall Street Journal* by year for ASE, NYSE, and NASDAQ firms, the dollar value of these announcements, the percent of shares announced for repurchase, and the size decile rank of the firms when the announcement was made. In some cases, firms did not state the number of shares they intended to repurchase. Size decile rankings are determined relative to all ASE and NYSE firms on the annual industrial Compustat tape in the month prior to the repurchase announcement, where the smallest firms are ranked in decile 1.

Year	n	\$ (billion)	Mean % of share announced	Percent of shares announced for repurchase					Size decile rank at announcement				
				0 to 2.5%	2.5 to 5%	5 to 10%	Above 10%	Not stated	Small 1-2	3-4	5-6	7-8	Large 9-10
1980	86	1.429	4.73	31	20	27	6	2	9	15	16	18	28
1981	95	3.013	5.24	29	26	23	13	4	13	12	16	21	33
1982	128	3.106	5.74	25	38	42	18	5	22	14	35	21	33
1983	43	1.645	5.05	11	18	9	3	2	5	4	6	10	18
1984	203	10.105	5.57	34	78	53	24	14	35	39	50	28	51
1985	113	14.380	7.45	22	30	34	24	3	16	23	17	18	39
1986	145	17.189	7.12	30	36	37	33	9	17	27	26	29	46
1987	92	27.380	7.92	14	20	31	26	1	10	15	14	18	35
1988	121	14.967	7.15	20	30	38	26	7	17	15	23	24	42
1989	117	31.971	8.53	18	28	35	33	3	14	15	17	24	47
1990	96	17.403	7.84	10	28	37	21	0	14	18	15	18	31
All years	1239	142.587	6.64	244	352	366	227	50	172	197	235	229	406

3.1.1. The CAR approach

Under the CAR approach, abnormal returns are calculated each month relative to a benchmark, and then aggregated over time. This procedure assumes monthly rebalancing, with sample firms receiving equal portfolio weights each month. Furthermore, abnormal performance is not based on compounded returns. Although takeovers and bankruptcies reduce the number of firms in the sample as event-time progresses, these cases are not excluded from our analysis. Abnormal performance is measured using the returns to all companies existing in a given event month, even those that eventually depart the sample.

Calculating performance relative to the CRSP equal- and value-weighted indices is straightforward and requires no further discussion. To calculate abnormal returns adjusted for size, we form ten size-based portfolios at the end of April each year, using all NYSE and ASE firms on both CRSP and CompuStat. Monthly returns are calculated for these ten portfolios over the next year, assuming equal weighting. These returns are then used as benchmarks to measure abnormal performance. Each month, abnormal returns are calculated for each repurchase firm relative to its respective size benchmark. CARs are then calculated by averaging across all repurchase firms each month, and summing over time.

To calculate abnormal returns controlling for both size and book-to-market, each of the ten size deciles discussed above is further sorted by book-to-market ratio into quintiles. Quintile 1 contains the 20% of all stocks in a given size decile with the lowest book-to-market ratios. At the other extreme are the 20% of firms within a given size decile with the highest ratios. This sorting results in 50 benchmark portfolios for each month (10 size deciles times 5 book-to-market quintiles). As is done when we adjust only for size, all firms are ranked at the end of each April for the following 12 months. We assume a four-month lag in reporting financial results to avoid any look-ahead bias. Thus, for companies whose fiscal year ends in December, the book equity value will be recent. For firms with fiscal year-ends following December but preceding April, we calculate book-to-market ratios using book equity values from the prior year. Abnormal performance for each of the repurchase firms is then calculated using the appropriate size and book-to-market benchmark.³

³As a check on the validity of this approach, we examined whether a randomly drawn sample with the same size and book-to-market characteristics would also produce abnormal performance. We did this by pooling the announcement dates of all repurchases firms along with their corresponding size and book-to-market rankings. We then formed a random sample by arbitrarily drawing from this pool 2,500 times and assigning the announcement date to a randomly chosen NYSE or ASE firm that had the same size and book-to-market ranking at that point in time. In each of the 48 months following the 'event' month, the cumulative abnormal return for this random sample was less than $\pm 1.5\%$, using the size and book-to-market approach, and was always within one standard error. When performance was measured using the CRSP equal- or value-weighted index of NYSE and ASE stocks, CARs were in excess of two standard errors in many cases.

3.1.2. *The buy-and-hold approach*

The results obtained using the CAR approach should be re-descriptive in nature, since they do not represent a realistic investment strategy. However, our second approach presents a more feasible strategy. We use an equal-weighted buy-and-hold investment in all repurchase firms beginning the month following the announcement and continuing for 12 months. At the end of the year, the portfolio is rebalanced, thus reducing the possibility that a few firms will dominate the return calculations. The multi-year total return investment strategy is calculated by compounding average annual returns over time.

If a firm departs the sample prematurely, we assume the investment is liquidated at the last available price on CRSP, and that the proceeds from the sale are reinvested for the remainder of the year in that firm's benchmark portfolio. At the end of the year, the portfolio is rebalanced, using only the surviving firms. Firms used to calculate benchmark returns were treated similarly.

To calculate abnormal performance, we form four benchmarks similar in spirit to the four benchmarks created for the CAR approach. They are calculated in a manner consistent with the buy-and-hold investment strategy. To save space, we report results only for the size and book-to-market approaches. To form the reference portfolio, all firms listed on NYSE and ASE and also carried on Compustat are sorted each month into size and book-to-market portfolios, as described earlier. Beginning each month, the one-year buy-and-hold return is calculated for each firm's portfolio. The equal-weighted average of all annual returns in a given month is then used as a benchmark return for firms ranked in that particular book-to-market rank at that point in time. Thus, this procedure allows us to compute annual buy-and-hold returns for each of the 50 benchmark portfolios each calendar month.

In addition to annual returns, we also measure compounded performance for two, three, and four years following the repurchase announcement. To calculate a two-year abnormal return, we take the difference between the compounded two-year return to repurchase firms, assuming reinvestment after the first year, and that of the reference portfolio.⁴ Abnormal performance in years three and four is treated similarly.

3.2. *Significance testing*

Significance levels are calculated for daily, monthly, and annual returns. For daily cumulative abnormal returns, we use the event-time methodology

⁴The size and book-to-market ranking of a particular firm may change from year to year. To accommodate this, we also allow the benchmark used to compute abnormal performance to change over time.

by Brown and Warner (1985). Here, standard errors are estimated from the time series of daily portfolio abnormal returns calculated over days -250 to -21 relative to the repurchase announcement. Autocorrelation in daily abnormal returns in this study is low. Corrections we made for autocorrelation had essentially no impact on the results. Thus, we present t -tests that assume zero autocorrelation. To estimate significance levels for monthly CARs, we also use the event-time methodology described by Brown and Warner (1980). Standard errors are calculated in a similar fashion, using months -36 to $+48$ relative to the repurchase announcements. As before, we calculate t -tests assuming time independence, since corrections for autocorrelation had essentially no impact on the analysis.

For a variety of reasons, the approach described above is not appropriate when examining annual buy-and-hold or compounded multi-year returns. For example, estimating standard errors using an event-time approach requires a reasonable number of annual observations. Many firms simply do not have a long history of returns. Moreover, for those firms where the availability of returns is not an issue, it is questionable whether the return distribution is stable over such a long period of time. Further, since buy-and-hold returns are compounded rather than cumulated over time, multi-year standard errors cannot be simply inferred from annual standard errors. And finally, the skewness of long-run returns and the clustering of observations in time also pose problems for traditional significance tests.

Therefore, statistical inference of annual buy-and-hold and compounded multi-year returns is done via bootstrapping, as applied by Brock, Lakonishok, and LeBaron (1992) in their examination of technical trading strategies. Under this approach, we generate the empirical distribution of annual buy-and-hold and multi-year compounded abnormal returns under the null hypothesis. Specifically, for each repurchase announcement in our sample, we randomly select with replacement a firm listed on the NYSE or ASE that has the same size and book-to-market ranking at that point in time. We treat this randomly chosen company as if it had announced a repurchase on the same day as the corresponding repurchase firm. This matching process continues until each firm in our repurchase sample is represented in this pseudo-portfolio. This portfolio will have one randomly drawn firm for each actual repurchase firm, matched in time with similar size and book-to-market characteristics. After forming a single pseudo-portfolio, we estimate long-run performance in the same manner as we did for the repurchase sample. This yields one observation of the abnormal performance obtained from randomly forming a portfolio with the same characteristics as our repurchase sample. This entire process is repeated until we have 1,000 pseudo-portfolios, and thus 1,000 abnormal return observations. This provides us with an empirical approximation of the distribution of abnormal returns drawn under the null model specific to our sample. The null hypothesis is rejected at the α percent level if the abnormal return obtained from the

repurchase sample is greater than the $(1 - \alpha)$ percentile abnormal return served in the empirical distribution. The appeal of the bootstrap is that it avoids many of the problems that plague t -tests regarding a departure from normality, stationarity, and time independence of observations. These problems are especially worrisome for returns over long intervals, such as a year or more. To the extent that these problems exist in long-run returns, they are also present in our pseudo-portfolio returns and are controlled for in our tests.

We also examine long-run firm performance by time period as a function of book-to-market ranking at the time of the repurchase announcement. p -values are estimated by repeating the entire bootstrap procedure for each subsample. For example, when we report long-run performance for high book-to-market stocks announcing buybacks, the associated p -value is derived from the distribution of abnormal returns obtained from 1,000 portfolios specifically matched to this particular subsample.

4. The market reaction to open market share repurchase announcements

Table 2 provides a comprehensive analysis of short-term abnormal returns surrounding repurchase announcements in our sample. Looking at announcements overall, there are negative abnormal returns prior to the announcement, measured from days -20 to -3 , totalling -3.07% . The market reaction, measured from two days before through two days after publication of the announcement in the *Wall Street Journal*, is 3.54% . Following the announcement, returns appear on average to be quite similar to the market. This evidence is similar to the findings reported by other researchers examining repurchase announcements (for example, Vermaec, Comment and Jarrell, 1991).

The initial market reaction changes only slightly across subperiods, ranging from 4.25% between 1980 and 1983 to 2.33% in the period 1984-1990. Consistent with the TSH, larger share repurchase programs are received favorably by the market. For example, the mean announcement period abnormal return is 4.51% for programs which are for more than 10% of outstanding shares. For those programs which are for less than 2.5% of outstanding shares, the average market reaction is 2.58% .

Table 2 also reports short-term announcement returns according to the reason provided in the abstract of the *Wall Street Journal Index*. So care should be exercised here, since it is difficult to assess manager motivation for the repurchase by reading such abbreviated press releases. Furthermore, no reason was mentioned in nearly 85% of the cases. In the few cases in which a reason was mentioned, undervaluation was a common theme. For the 38 cases in which undervaluation was specifically mentioned,

both the negative drift prior to the announcement (-5.52%) and the market reaction at the announcement (5.31%) were comparatively large.

The size decile panel in Table 2 shows short-term performance by firm size. The market reaction shows clear differences across size groups. Firms ranked in the two smallest size deciles show the highest abnormal returns on average, 8.19% , more than double that observed overall. Those in the two largest size deciles exhibit an abnormal return of only 2.09% . If firm size is viewed as a proxy for information asymmetries, the observed relationship between size and abnormal returns is consistent with the TSH.

Separating the various motivations for undertaking an open market stock repurchase is difficult. One approach is to examine announcement returns in relation to book-to-market ratios. Firms with low book-to-market ratios are likely to repurchase shares for reasons other than undervaluation. At the other extreme, repurchases announced by firms with high book-to-market ratios, or value stocks, are more likely to have undervaluation as their primary motivation. However, we see in Table 2 that the market reaction to the repurchase announcement is similar across the five book-to-market quintiles. The average market reaction for firms in quintile 1 (glamour stocks) is 3.36% , while it is 3.56% for firms in quintile 5 (value stocks).

To further clarify the nature of announcement returns, we regressed announcement returns on various firm characteristics. To control for the possibility that positive announcement returns reflect mean reversion arising from negative returns observed prior to the announcement, we also included in the regression the CAR from days -20 to -3 . Although not reported here, the results are consistent with the evidence reported in Table 2, even after controlling for the impact of return reversals. As the percentage of shares announced for repurchase increases, the market reaction increases, and as firm size increases, announcement returns decline substantially. Yet, as before, the regression results provide no indication that the book-to-market ratio has any impact on the market reaction to repurchase announcements.

5. The long-term performance of firms repurchasing their own shares

Fig. 1 plots CARs up to 48 months following a repurchase announcement, using four different benchmarks. These CARs are calculated beginning in month 1, and thus exclude the initial market reaction to the announcement. The picture that emerges is that firms that announce an open market stock repurchase tend to perform abnormally well in the long run. Focusing on size-adjusted returns, the CAR from month 1 to 36 is 8.69% ($t = 2.50$). Following month 36, abnormal returns are close to zero. This positive drift cannot be explained by the book-to-market effect. When returns are adjusted for both size and book-to-market, the CAR from month 1 to 36 is nearly the same, 8.17% ($t = 2.37$). Focusing only on

Table 2
Abnormal returns on and around the announcement of open market share repurchases, 1980 to 1990

The table reports abnormal returns (in percent) measured with respect to the CRSP equal-weighted index over days -20 to -3, -2 to +2, and +3 to +10 relative to the announcement of an open market share repurchase made during the period January 1980 through December 1990 (*t*-statistics reported in parentheses). Abnormal returns are reported for all sample firms and by time period, the percentage of shares announced for repurchase, the reason stated by the company for the repurchase (if any), the size decile rank, and the book-to-market quintile rank in the month prior to announcement.

	<i>n</i>	Days relative to repurchase announcement			
		-20 to -3	-2 to +2	+3 to +10	(<i>t</i> -statistics)
All firms	1239	-3.07 (-9.91)	3.54 (21.72)	0.21	(1.00)
<i>Time period</i>					
1980 to 1983	352	-3.59 (-6.40)	4.25 (14.37)	0.91	(2.42)
1984 to 1986	461	-2.86 (-6.47)	4.12 (17.71)	-0.03	(-0.09)
1987 to 1990	426	-2.86 (-5.79)	2.33 (8.94)	-0.12	(-0.36)

Percent intended to repurchase

<i>Stated reason</i>						
Undervalued	38	-5.52	(-3.38)	5.31	(6.17)	-1.29 (-1.18)
Anti-takeover	7	6.79	(2.09)	5.50	(3.21)	3.76 (1.74)
ESOP or stock option	82	-1.69	(-1.70)	3.00	(5.71)	0.24 (0.36)
Acquisition	9	-3.87	(-1.39)	2.56	(1.75)	1.49 (0.80)
General corp. purposes	16	-1.32	(-0.67)	1.83	(1.77)	2.27 (1.73)
Other	27	-2.79	(-1.73)	2.52	(2.98)	-1.19 (-1.11)
Not disclosed	1060	-3.18	(-9.57)	3.57	(20.40)	0.23 (1.03)
<i>Size decile</i>						
1-2 (small firms)	172	-3.91	(-3.12)	8.19	(12.41)	0.70 (0.83)
3-4	197	-5.71	(-6.62)	4.67	(10.27)	-0.76 (-1.32)
5-6	235	-2.99	(-4.50)	3.08	(8.79)	0.20 (0.46)
7-8	229	-3.53	(-6.08)	2.13	(6.96)	0.70 (1.80)
9-10 (large firms)	406	-1.21	(-3.61)	2.09	(11.84)	0.19 (0.86)
<i>Book-to-market quintile</i>						
1 (glamour stocks)	201	-3.53	(-3.78)	3.36	(6.84)	0.11 (0.18)
2	260	-4.30	(-6.72)	3.14	(9.32)	0.48 (1.12)
3	276	-2.72	(-4.50)	4.07	(12.80)	0.15 (0.37)
4	230	-2.54	(-4.06)	3.46	(10.51)	0.21 (0.49)
5 (value stocks)	241	-2.17	(-3.76)	3.56	(11.71)	0.07 (0.18)

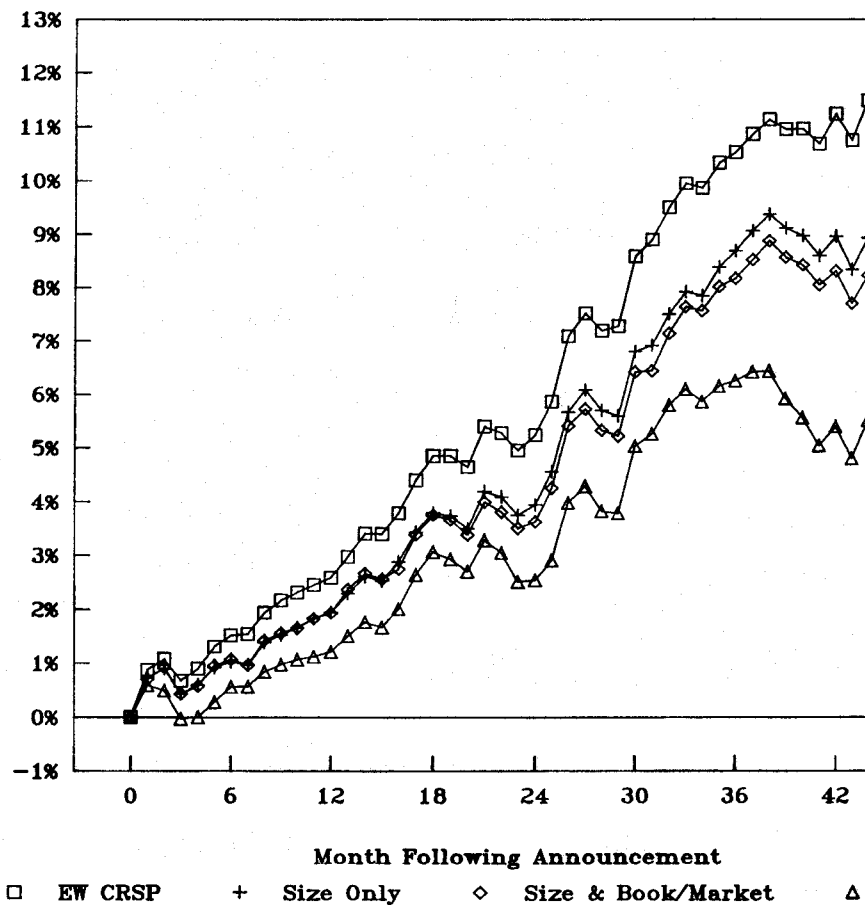


Fig. 1. Comparative monthly cumulative abnormal returns following open market share repurchase announcements, 1980-1990.

This figure plots the cumulative abnormal return (CAR) up to 48 months following the announcement of an open market share repurchase. Abnormal returns are calculated using four methods; market-adjusted returns using the CRSP equal-weighted index of ASE and (EW CRSP), size-adjusted returns using equal-weighted portfolio returns of NYSE firms from the same size decile (Size Only), size and book-to-market adjusted returns using equal-weighted portfolio returns of NYSE and ASE firms from the same size decile and book-to-market ratio (Size & Book/Market), and market-adjusted returns using the CRSP value-weighted index of ASE firms (VW CRSP).

the initial market reaction (3.5%), about 70% of the total valuation increase was ignored.

The picture is slightly different when the CRSP value-weighted index is used as a benchmark. Although post-announcement abnormal returns are lower than when either the size-only or size and book-

benchmarks are used, and are about half that observed using the CRSP equal-weighted index. This occurs because large firms substantially outperformed smaller firms during the latter portion of our sample period.

Although the CAR approach is straightforward, the analysis is best regarded as descriptive in nature. A more appealing approach is the buy-and-hold procedure described earlier. The results using such an approach are reported in Table 3.⁵ The left-hand side of Table 3 shows mean annual returns from buying an equal-weighted portfolio of repurchasing firms, beginning in the month following the announcement and for the subsequent four years. To the right of this column are returns to the reference portfolio, calculated using the size and book-to-market benchmarks corresponding to the repurchase sample. The right side of Table 3 reports total compounded buy-and-hold returns up to four years, allowing for annual rebalancing. Results are also presented for two subperiods; announcements made in years 1980 to 1985 and those made in years 1986 to 1990.

The average return in the first year following the repurchase announcement is 20.80%, 2.04% more than the reference portfolio. This difference in annual returns increases to 2.31% and 4.59% in years 2 and 3, respectively. As we observed in Fig. 1, the phenomenon appears to dissipate by year 4, when the difference is close to zero. Although not reported in the tables, we also examined performance in year 5 and again found abnormal returns close to zero (–0.13%).

Turning to compounded returns, the difference in performance after four years is substantial, 12.14%. The *p*-value associated with this abnormal return is 0.012. In Fig. 2, we plot the empirical distribution of four-year compounded abnormal returns under the null hypothesis based on our bootstrapping procedure, using 1,000 replications. From this figure, we see that the probability that a random portfolio will exhibit abnormal performance as high as our repurchase sample is remote. In our case, only 12 of the 1,000 pseudo-portfolios demonstrated compounded abnormal returns higher than 12.14% after four years. Focusing on year 3, the difference in compounded returns between the repurchase and the reference portfolio is 12.60% with a corresponding *p*-value of 0.000, meaning that none of the 1,000 pseudo-portfolios performed as well. Apparently, investing in companies that announce buybacks is a profitable long-run strategy, at least over the decade of the 1980s.

When we turn our attention to the two subperiods, we observe some differences in long-run performance. In the early subperiod, 1980–1985, the compounded abnormal return is 16.02% in year 3. This value decreases slightly to

⁵Because book-equity values were not available for some firms, the number of firms in this table differs slightly from that reported in Table 2.

Table 3
Annual buy-and-hold returns following open market share repurchase announcements, 1980 to 1990

This table reports annual and compounded buy-and-hold returns (in percent) following open market share repurchase announcements for up to four years. Equal-weighted portfolios are formed for all announcements between 1980 and 1990, and for two subperiods, 1980 through 1985 and 1986 through 1990. The reference portfolio is formed using benchmark returns corresponding to the repurchase sample, matched on the basis of size and book-to-market ranking. Compounded holding-period returns assume annual rebalancing. Significance levels are determined via bootstrapping.

	Annual buy-and-hold returns				Compounded holding-period returns				
	<i>n</i>	Repurchase firms	Reference portfolio	Diff.	<i>p</i> -value	Repurchase firms	Reference portfolio	Diff.	<i>p</i> -value
<i>All firms</i>									
Year 1	1208	20.80	18.76	2.04	0.064	20.80	18.76	2.04	0.064
Year 2	1188	18.12	15.81	2.31	0.098	42.69	37.53	5.16	0.011
Year 3	1047	21.77	17.18	4.59	0.002	73.75	61.15	12.60	0.000
Year 4	893	8.56	9.51	-0.96	0.892	88.62	76.48	12.14	0.012
<i>1980 to 1985</i>									
Year 1	646	32.36	28.89	3.47	0.029	32.36	28.89	3.47	0.029
Year 2	637	25.23	21.76	3.47	0.017	65.75	56.93	8.82	0.002
Year 3	615	21.79	18.43	3.36	0.035	101.87	85.85	16.02	0.000
Year 4	583	10.38	12.07	-1.68	0.938	122.83	108.28	14.55	0.024
<i>1986 to 1990</i>									
Year 1	562	7.52	7.11	0.41	0.444	7.52	7.11	0.41	0.444
Year 2	551	0.01	8.03	0.07	0.338	18.17	16.68	1.49	0.240

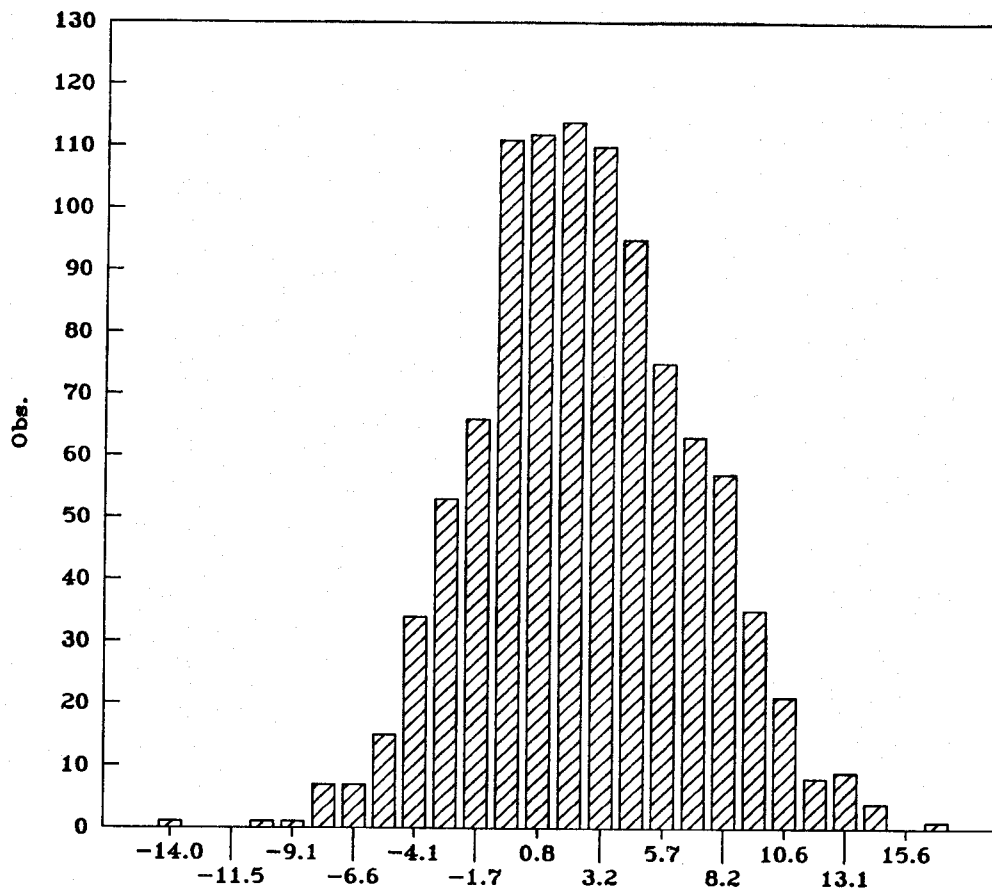


Fig. 2. Compounded four-year abnormal performance (in percent) adjusted for size and book-to-market under the null hypothesis for open market share repurchase announcements between January 1980 and December 1990.

This histogram plots the empirical distribution of four-year compounded abnormal returns for 1000 bootstrap portfolios specific to our sample of repurchase announcements. Each portfolio is formed by taking the post-announcement returns for a given sample firm and replacing them with the returns to a firm randomly chosen from the NYSE or ASE with the same size and book-to-market classification at that point in time. This is done for each firm in the sample, thus forming a single portfolio. This entire process is then repeated until 1000 such portfolios are formed. The compounded abnormal performance from these randomly formed portfolios provides us with an empirical estimate of the distribution relevant to the entire sample of repurchase announcements in our study. The empirical distributions for subsamples are unique and are therefore estimated separately.

14.55% in year 4. In both years, abnormal performance is statistically significant at traditional confidence levels. In the later subperiod, 1986–1990, compounded abnormal performance after year 3 is 9.21% and is highly significant. In year 4, compounded abnormal performance increases slightly to 10.24%, but is only