

Signaling Revisited: Stock Repurchases in the 1990s

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Abstract: The purpose of this paper is trying to test whether open-market stock repurchase announcements are still a signaling event. Using tender-offers as a benchmark, the study looks at open-market repurchases from several perspectives. Evidence includes short-term and long-term market reactions, accounting fundamentals, insider trading behavior, and analysts' forecast revisions. The consensus of the evidence is that: although tender-offer repurchase announcements are still a signaling device, open-market repurchases have little if any signaling content. Open-market repurchase announcements appear to provide an incentive for managers to conduct earnings management.

Key words: stock repurchase; signaling; earnings management **JEL code:** G1

1. Background/Objectives and Goals

Stock repurchases have long been regarded as signaling mechanisms in corporate finance (Vermaelen, 1981; Bartov, 1989; Comment & Jarrell, 1991) due to their positive announcement returns. In the 1990s, at the same time when stock buybacks become even more popular than the past due to the widely use of stock options, much lower announcement returns were found (Kahle, 2002, Grullon & Michaely, 2002). It is natural to ask "Do stock repurchases still act as a signaling device?"

2. Hypothesis, Research Design and Sample

Hypothesis: Open-market stock repurchases are a signaling device in the 1990s.

To test this hypothesis completely, different tests are conducted from various perspectives. Market performance is introduced first. If open-market repurchases are a signaling device, the market should react positively both in short-term and long-term. Then second, the long-term reaction should also be reflected in accounting measures such as rate of returns on assets. Third, if repurchase announcements have favorable information content, we would expect analysts, as information intermediaries, to also react to announcements positively by revising their forecasts upward. Fourth, insiders, as private information carriers, should be expected to take actions to exploit their information advantage. Specifically, they would be predicted to buy more before

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and sell more after the announcements.

Our starting sample is comprised of 4417 repurchases from Securities Data Corporation. It includes 4014 open-market repurchases, 231 fixed price tender offers, and 202 Dutch auction repurchases. The starting open-market sample excludes the banking, utilities, real estate and insurance related companies since these industries have unique disclosure requirements. Second, to avoid overlapping effects, only the initial repurchase announcement for each company is included. After the initial filtering, the remaining repurchase announcements include 2186 open-market repurchases, 93 tender-offer ones, and 126 Dutch auction repurchases, for a total of 2405 repurchases. Of the 2405 repurchases, 2327 have data available on CRSP. These compose our initial sample.

Panel A: Time Distribution								
Year	Freq	%	Tender-Offer Freq					
1990	5	0.21%	0					
1991	5	0.21%	0					
1992	14	0.60%	0					
1993	46	1.98%	1					
1994	400	17.19%	25					
1995	287	12.33%	18					
1996	339	14.57%	32					
1997	370	15.90%	40					
1998	506	21.74%	36					
1999	355	15.26%	43					
All years	2327	100.00%	195					

Table 1 Sample Statistics and Data Char	racteristics for Stock Repurchases Sample
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Panel B: SIC Distribution

Industry	Codes	Freq	%
Food	1,2,7,20	62	2.66%
Mining and Minerals	10,12,14	16	0.69%
Oil and Petroleum Products	13,29	69	2.97%
Construction and Construction Materials	15, 16, 17, 22, 24, 32	64	2.75%
Drugs, Soap, Perfumes, Tobacco	21	5	0.21%
Textiles, Apparel & Footwear	23, 30, 31	56	2.41%
Chemicals	28	107	4.60%
Steel Works Etc	33	39	1.68%
Fabricated Products	34	41	1.76%
Machinery and Business Equipment	35, 36, 38, 39	448	19.25%
Automobiles	37	43	1.85%
Transportation	40, 42, 44, 45, 47	55	2.36%
Communications	48	37	1.59%
Utilities	49	26	1.12%
Wholesale	50, 51	100	4.30%
Retail Stores	52-59	171	7.35%
Financial services	60-67	481	20.67%
Other Services	72-89	401	17.23%
Everything Else	0, 25, 26, 27, 70	106	4.56%
All Firms		2327	100.00%

Champeteristics	Open-Market		Ten	Tender-Offer		All Firms	
Characteristics	Mean	Median	Mean	Median	Mean	Median	
Market Cap. (millions)	1935.20	195.94	1389.17	222.89	1889.59	197.90	
Total percent of authorization (%)	12.10	7.37	28.01	17.69	13.45	8.02	
Total repurchased shares	6,004,822	803,792	5,118,555	1,800,000	5,925,723	902,650	
Repurchase percentage (%)	72.33	72.23	89.77	100.00	73.89	76.40	
Initial Authorization Value. (millions)	94.36	10.64	130.05	33.37	97.37	12.47	

Panel C: Repurchases Characteristics

Note: Market capitalization is obtained at the date of the first authorization of repurchase programs; Total percent of authorization is the total authorized shares divided by the most recent shares outstanding for each repurchase program; Repurchase percentage is the actual repurchased shares divided by the share authorized for each repurchase program; Initial authorization value is the value of authorized shared at the first authorization of each programs.

In Table 1, we report the sample statistics and the data characteristics for the initial sample firms. Panel A reveals the peak year of repurchases announcement is 1998 at 21.74% of the total sample. This is consistent with what is documented in prior literature on another wave of stock buybacks after 1995. In 1998, for the first time in history, U.S. corporations distributed more cash to investors through share repurchases than through cash dividends.

The SIC distribution in the Panel B of Table 1 indicates that the Financial services, Machinery and Business Equipment and Other Services account for a larger fraction of the sample repurchases. The repurchase characteristics are reported in Panel C of Table 1. The actual average repurchased shares for the sample programs is 5,925,723 shares which account for 73.89% of the shares authorized. Hence, most announced repurchases are implemented. The last row reports that the initial authorization value of the repurchase program is \$97.37 million on average which is around 5% of total market capitalization.

It is also worth noting that the initial sample is not exactly the sample used in the following analysis. Since data required for certain tests are not available for each company, the size of the sample varies across tests.

3. Empirical Results

3.1 Market Performance and Accounting Ratios

3.1.1 Short-term Market Reactions Surrounding the Announcements

Panel A of Table 2 provides the short-term market reaction for both open market and tender offer repurchases from 1990-1999.

The prior-event return is negative for open-market repurchases authorization but not for tender-offer authorization as documented before (Comment & Jarrell, 1991; Ikenberry, Lakonishok & Vermaelen, 1995). Market-adjusted returns at window (-20, -3) are -6.08% (-18.79) for the open-market repurchases and insignificantly different from 0 for tender offers.

The (-2, +2) average market-adjusted returns are 1.98% for open-market repurchases and 8.17% for tender-offers. For open-market repurchases, the average return is lower than what is found in the earlier studies of the 80s (3.5%, Ikenberry et al., 1995) and consistent with the results documented in the studies of the 90s (1.6%, Kahle, 2002). For tender offers, the short-term market reaction has the same magnitude as in the 80s.

In the short term, under-performance still precedes announcements of open-market repurchases. 1.98% of short-term market reaction to announcements, though lower than the evidence based on the repurchases in the 80s, is still not enough to exclude the signaling story without further analyzing the long-term performance.

Table 2 Market Performance and Accounting Performance for Stock Repurchase Firms

Panel A: Short-term Market Reaction on and around the Initial Announcements of Open-Market Share Repurchases and Tender Offers, 1990-1999

Short-term performance is calculated over various windows from 20 days before to 10 days following the announcements. Market-adjusted returns using value-weighted CRSP index and CAPM-adjusted returns are reported in the following table for both open-market repurchases and tender offer repurchases. The t-statistics is reported in the parentheses.

	Days Relative to Repurchase Announcement					
	(-20,-3)		(-2,+2)		(+3,+10)	
Open-Market Repurchases						
Ν	2011		2011		2011	
Market-Adjusted Returns	-6.08%	(-18.79)	1.98%	(7.60)	-0.21%	(-0.77)
Market-Model Adjusted Returns	-6.52%	(-19.74)	1.84%	(7.03)	-0.69%	(-2.38)
Tender-Offer Repurchases						
Ν	188		188		188	
Market-Adjusted Returns	-0.79%	(-0.91)	8.17%	(10.05)	-0.55%	(-0.99)
Market-Model Adjusted Returns	-1.50%	(-1.69)	7.95%	(9.76)	-1.27%	(-2.19)
Chow Test (MAR)	22.85		47.88		-0.32	
Chow Test (MM)	19.58		46.00		-0.09	

3.1.2 The Long-term Market Performance

Panel B of Table 2 shows the buy-and-hold returns up to 36 months following repurchase announcements. The first return column shows the mean raw return of repurchasing firms, beginning one year before and ending three years after the announcements. The middle return column is the market-adjusted return with t statistics. The CAPM adjusted return is reported in the third column along with t statistics. It is worth noting that Month 0 is the month that repurchase is announced. Hence, the annual buy-and-hold return in year 1 (month 0-11) includes the announcement effect.

Table 2Market Performance and Accounting Performance for Stock Repurchase FirmsPanel B: Annual Buy-and-Hold Returns Following Repurchase Announcements, 1990-1999

This table reports annual buy-and-hold returns (in percent) following open market share repurchase announcements for up to three years. Equal-weighted portfolios are formed for all announcements between 1990 and 1999. The reference portfolio is formed using value-weighted market portfolio and CAPM expected returns. The difference between repurchase and reference portfolio are reported and followed by the t-statistics.

Months	Ν	Raw Return	Market Adj., Value-Weighted		Market Model Adj.	
Open-Market Rep	urchases					
(-12, -1)	1639	2.77%	-15.29%	(-14.23)	-23.03%	(-15.48)
(0, 11)	1639	20.89%	-1.83%	(-1.10)	-9.23%	(-4.59)
(12, 23)	1583	20.86%	4.86%	(2.53)	-3.73%	(-1.59)
(24, 35)	1467	16.02%	7.96%	(4.65)	-2.26%	(-1.03)
Tender-Offer Repu	irchases					
(-12, -1)	175	2.10%	-18.87%	(-7.79)	-22.33%	(-6.67)
(0, 11)	175	27.91%	7.34%	(1.47)	3.88%	(0.69)
(12, 23)	156	17.05%	5.08%	(0.96)	-0.83%	(-0.14)
(24, 35)	139	10.90%	4.89%	(1.01)	-0.42%	(-0.08)

Using the value-weighted market portfolio as a benchmark, the tender-offer firms outperform the benchmark after repurchase announcements without exception. The differences in annual returns are 7.34% (1.47) for the first year, 5.08% and 4.89% in the years 2 and 3, respectively. However, the first year market-adjusted return for

open-market repurchases is -1.83% (-1.10), significantly different from the 2.04% reported in Ikenberry, Lakonishok and Vermaelen (1995). The observed short-term market reaction to repurchase announcements reversed in one year which contradicts the signaling story.

Turning to another benchmark predicted by the CAPM model, we get results similar to above. Open-market repurchases cannot beat the benchmarks in all three years, while tender-offers don't produce significant abnormal returns in the following years.

In sum, consistent with the findings in the 80s, tender-offer repurchases in the 90s are still a credible signaling mechanism. However, the short-term market reactions for open-market repurchasing firms is dissolved if the window is prolonged to one year, which could serve as evidence for a lack of signaling content to announcements.

3.1.3 Accounting Performance

The evolution of accounting fundamentals around the repurchases could provides us with a more complete picture of companies' performance following the repurchase events. Besides earning per share that we will talk about in later section, accounting income is another measure of companies' performance during a certain time period and closely related to stock price. Here, we pick ROA and COA to represent firms' accounting performance and investigate how they change prior to and after the stock repurchase announcements.

ROA = Net Income (Data 172)/Prior Total Asset (Data 6);

COA = Cash Flow from Operation (Data 308)/Prior Total Asset (Data 6);

To measure the repurchasing firms' performance relative to the industry average, for each firm we calculate the difference between the firm's ROA and its industry median ROA. A similar calculation is performed for COA. The results are reported in the Panel C of Table 2.

Table 2 Market Performance and Accounting Performance for Stock Repurchase Firms

Panel C: Time Series Profile of Net Income and Cash Flow from Operations from Year-3 to +3 Relative to the Repurchase Announcements (year 0) in Period of 1990-1999 (as % of lagged asset)

This table presents two measures of accounting variables, net income and cash flow from operations, from years -3 to +3 relative to the stock repurchases announcement. All the numbers shown are sample average with winsorization of top 1% and bottom 1% to remove the outlier effect. The first row is net income scaled by prior total assets (ROA) minus the industry median ROA. The second row is the cash flow from operation scaled by prior total asset (COA) minus the industry median. The third and the fourth rows present the change of the first and second rows relative to its prior year to reflect the change of performance relative to its own past.

Year	Year-3	Year-2	Year-1	Year0	Year1	Year2	Year3				
Accounting Performance around Open-Market Repurchase Announcements											
Ν	1434	1608	1810	1868	1762	1605	1244				
ROA _i -Industry Median	1.78^{***}	2.35^{***}	4.25^{***}	3.23***	2.39^{***}	2.31***	2.65^{***}				
COA _i - Industry Median	2.80^{***}	2.88^{***}	4.47^{***}	4.35***	4.31***	4.25^{***}	4.60^{***}				
Change of Row1 Relative to Prior Year		0.32	1.42^{***}	-0.73**	-1.03***	-0.39	-0.12				
Change of Row2 Relative to Prior Year		1.03^{*}	1.95^{***}	0.06	-0.23	-0.37	0.15				
Accounting Performance around Tend	ler-Offer R	epurchase An	nouncements	;							
Ν	146	155	159	148	134	116	76				
ROA _i -Industry Median	2.77^{***}	1.90^{***}	2.07^{***}	3.01***	3.19***	2.46^{***}	3.07**				
COA _i - Industry Median	4.04^{***}	3.78^{***}	3.85***	4.12^{***}	4.78^{***}	3.80***	4.75^{***}				
Change of Row1 Relative to Prior Year		-0.88	0.17	0.84	-0.32	-0.45	0.50				
Change of Row2 Relative to Prior Year		-0.31	0.33	0.35	0.07	-0.69	0.73				

Note: The means are trimmed at +/- 1%; *, **, *** denote significance at the 10%, 5% and 1% levels (for a two-sided test), respectively; Compustat data items for the variables are:

Return on Assets (ROA) = Net Income (Data 172)/Prior Total Asset (Data 6);

Cash Flow on Assets (COA) = Cash Flow from Operation (Data 308)/Prior Total Asset (Data 6).

It is easy to see from Panel C of Table 2 that all the repurchasing firms generally perform better than their industry average. For open-market repurchasing firms, ROA reaches its highest average, 4.25% higher than industry in the year -1, and then goes down to 2.31% in the year 2. At the same time, COA ratio keeps its high level of 4.47% above the industry from year -1 onwards. The different trend in COA and ROA change over time suggests investigating whether managers engage in earnings management around the repurchases announcements. We will talk about this issue in detail in section 3.4. Now turning to our benchmark of tender-offer repurchases in the last decade, above-average ROA and COA both show a mild increase following the announcements.

Echoing the long-term stock return results, we found that ROA is increasing following tender-offer repurchases, but decreasing following open-market repurchases. Meanwhile, COA doesn't follow the same pattern as ROA for open-market repurchasing firms. The discrepancy between ROA and COA will be further investigated in Section 3.4.

3.2 Analysts' Earnings Forecasts

3.2.1 Data and Methodology

The objective is to investigate how analysts change their forecasts from "before" to "after". To calculate the post-announcement median forecast, we use the first post-announcement forecast for each given company and each analyst, providing that the forecast was made no later than four months following the announcement. The "after" median post-announcement forecast is determined from those individual forecasts.

The forecast revision is derived by subtracting the "before" forecast from the "after" forecast; i.e., $\Delta FE_i = FE_{i,+} - FE_{i,-}$. The revision is also standardized by its earlier price and earlier EPS.

Analysts' forecasts within four months from repurchase announcements could only be found for 1151 of 2327 repurchase companies in I/B/E/S. The sample for this part of study is composed of these 1151 announcements including 1081 open-market repurchases and 70 tender-offer repurchases.

Table 3 Changes in Analysts' EPS Forecast for Companies Announcing Stock Repurchases

The following forecasts of EPS are taken from *I/B/E/S* for a sample of companies announcing stock repurchases over the period 1990 to 1999. Median EPS forecasts preceding the announcement that a company initially announced stock repurchases are compared with EPS forecasts following the announcements to calculate the change in EPS forecasts. Change in EPS forecasts for all other contemporaneous firms are used as benchmark. The Mean difference is derived from the average of the difference between the sample firms and corresponding benchmark. *, *** denote significance of difference at the 10%, 5% and 1% levels respectively. *Panel A*: Changes in Current-Year^a EPS Forecasts around Repurchase Announcements

		Mean Difference between Sample Firms and Market			Winsorized Mean Difference bet. Samp Firms and Market		
Column	1	2	3	4	5	6	7
Sample	Sample Size	Mean Δ EPS forecast for sample firms	Mean Δ EPS forecast for all other firms	Mean Difference	Winsor. mean of col 2	Winsor. mean of col 3	Winsor. mean of col 4
Open-Market Repur	chases						
EPS forecast change	1081	-\$.1088	-\$.0691	-\$.0397	-\$.0653	-\$.0691	\$.0033
EPS forecast change scaled by price	1080	-1.12%	-0.65%	-0.47%	-0.51%	-0.65%	0.14**
EPS forecast change scaled by EPS	1077	-8.73%	-5.46%	-3.27%	-6.30%	-5.46%	-0.86%
Tender-Offer Repurc	hases						
EPS forecast change	70	-\$.045	-\$.0715	\$.0265	-\$.0447	-\$.0715	\$.0271
EPS forecast change scaled by price	70	-1.03%	-0.68%	-0.35%	-0.46%	-0.68%	0.22%
EPS forecast change scaled by EPS	70	-2.11%	-5.49%	3.38% ***	-2.18%	-5.47%	3.34% ***

Open-Market Repur	chases						
EPS forecast change	279	-\$.0956	-\$.0633	-\$.0323***	-\$.0942	-\$.0633	-\$.0309**
EPS forecast change scaled by price	279	-0.82%	-0.52%	-0.31% **	-0.80%	-0.52%	-0.28%**
EPS forecast change scaled by EPS	279	-9.80%	-3.75%	-6.05%	-8.60%	-3.73%	-4.84%***
Tender-Offer Repure	chases						
EPS forecast change	17	\$.0529	-\$.0541	\$.107***	\$.049	-\$.0542	\$.1063 ^{***}
EPS forecast change scaled by price	17	0.39%	-0.46%	$0.85\%^{***}$	0.34%	-0.46%	0.82% ***
EPS forecast change scaled by EPS	17	4.00%	-3.20%	7.20% ***	3.59%	-3.18%	7.44%***

Panel B: Changes in One-Year-Ahead EPS Forecasts around Repurchase Announcements

3.2.2 Results

As shown in the Panel A of Table 3, the mean (of the median) revision in current year EPS forecasts for the firms that initially announce the open-market stock repurchases is lower than the market by -0.0397 (p-value = 0.1474). The standardized revisions are all smaller than the market for both mean and winsorized mean except the winsorized revision standardized by price.

With respect to the one-year-ahead forecasts revision shown in the Panel B of Table 3, analysts tend to lower their forecasts more than the market does. The mean differences of revision are significantly negative at -0.0323 (p-value = 0.0186) in raw change, and -0.31% and -6.05% for standardized change. The winsorized results reveal the same trend.

Faced with the tender-offer repurchase announcements, analysts react differently compared with the open-market repurchase announcements. Compared to the market downward revision trend, the revision for the tender-offer repurchasing firms is smaller at 0.0265 in the raw case and 0.028 (p-value = 0.0175) in the EPS standardized case. The winsorized sample gives similar results. Similar to the revision trend for the current year forecast, the one-year-ahead forecast revisions are also higher than the market which is negative in all cases.

Once more, we see that there is discrimination between two forms of repurchases even from analysts' viewpoint. The fact that analysts raise their forecasts after tender-offer announcements and depress them following open-market repurchase announcements implies that tender-offers, but not open-market repurchases convey the favorable information to analysts.

3.3 Insider Trading Behavior

3.3.1 Data and Methodology

The comparison firm benchmark is chosen by certain criteria to control the effects of firm size and industry. First, for each sample firm, eight comparison firms matched by industry and the closest market value are selected. Then, the contemporaneous trades by managers of comparison firms are calculated and compared with those of the sample firms. Eight firms are needed because we conduct a stratified randomization test to assess the statistical significance¹ of the differences between trading for repurchasing and comparison firms.

¹ The significance level of the difference between percentages or averages of repurchasing and comparison firms are determined by stratified randomization. It represents the proportion of 1000 differences between sample statistics obtained from randomizing the pooled data that exceeds the actual difference between percentages or averages. The detailed randomization procedure is described in Noreen (1989, pp. 28-30).

Table 4 Insider Trading Behavior around Repurchase Announcements

Following table presents percentages and averages of firms with at least one open-market trade ten quarters around the announcements of both open-market and tender offer stock repurchases. Repurchases are by NY, AMEX and NASDAQ exchange firms in the period 1990-1999. Tender-offer sample includes both fixed price and Dutch auction offers. Repurchases Source: *SDC database*.

Panel A: Frequency of Managers' Trading around Repurchases, 1990-1999

Ota	Open-Marke	et Repurchases	Tender-Offer Repurchases		
Qu.	Sample $(\%)^{a}$ (N = 1708)	Control $(\%)^{b}$ (N = 13412)	Sample (%) (N = 147)	Control (%) (N = 1162)	
-5	55.80****	52.53	53.74	50.09	
-4	58.31***	53.47	57.82 [*]	52.07	
-3	62.65***	54.70	60.54**	54.04	
-2	64.87***	56.29	53.06	54.39	
-1	63.00****	57.07	50.34	53.53	
1	62.94***	57.11	60.54**	53.27	
2	59.72***	55.21	59.18 [*]	53.87	
3	60.13***	54.18	50.34	51.46	
4	60.25***	53.06	52.38	48.71	
5	59.78***	52.67	48.98	47.59	

Panel B: Number of Purchases and Number of Sales by Managers around Repurchase, 1990-1999

	Open-Market Repurchases ($N = 1708$)					Tender-Offer Repurchases ($N = 147$)		
	Purchases		Sales		Purchases		Sales	
Qtr	Sample ^a	Control ^b	Sample	Control	Sample	Control	Sample	Control
-5	2.0^{*}	2.4	5.7^{***}	4.6	3.8**	2.4	2.4	3.0
-4	2.2	2.3	5.6^{***}	4.7	2.4	2.8	1.9	2.5
-3	3.1	2.7	5.3**	4.7	2.6	2.8	2.3	2.9
-2	2.2	2.6	5.1^{*}	4.6	2.6	2.9	2.0	2.9
-1	2.7	2.9	4.1	4.1	2.1	2.6	2.0^{*}	3.0
1	2.6	2.7	4.1^{*}	4.5	2.5	2.2	5.3**	3.5
2	2.9^{*}	2.5	4.7	5.0	3.0	2.6	5.0	3.6
3	3.0	3.0	5.1	4.9	2.9	3.3	2.7	3.5
4	2.8	2.6	4.9	5.0	2.7	2.9	3.0	4.2
5	2.5	2.7	5.6*	5.1	2.0	3.3	5.4	3.8

Panel C: Proportions of Firms with Net Buying or Net Selling by Managers around Repurchases, 1990-1999

	Open-Ma	arket Repurchases	Tender-Offer Repurchases		
	Sample $(\%)^{a}$ (N = 1708	3) Control (%) ^b (N = 13412)	Sample (%) (N = 147)	Control (%) (N = 1162)	
Quarter -2					
%Net buyer	37.27**	40.33	56.41	54.59	
%Net seller	58.75**	56.09	37.18	40.98	
Quarter -1					
%Net buyer	46.38*	44.33	41.89**	51.77	
%Net seller	50.09^{*}	52.18	51.35**	42.60	
Quarter 1					
%Net buyer	46.51***	43.04	25.84***	50.08	
%Net seller	49.12***	53.21	70.79***	47.01	
Quarter 2					
%Net buyer	40.69	41.24	43.68	50.48	
%Net seller	55.10	55.21	54.02*	46.49	

Note: *, **, *** denote significance at the 10%, 5% and 1% levels respectively.

3.3.2 Evidence on Managers' Trading

Before separating trading behavior between buys and sells, we first examine the overall trading intensity for repurchasing and control firms in ten quarters surrounding the announcements. The percentage of repurchasing firms and that of comparison firms with at least one open market trade in each quarter are reported in Panel A of Table 4. The significance level of difference is denoted by the superscript stars. For example, 5% significance level means that less than 5 percent of the 1000 randomizations generated a difference greater than the actual difference between sample and control group.

Contrary to the findings in Lee, Mikkelson and Partch (1992), we find here that both open-market and tender-offer repurchasing firms are more active in insider trading than the comparison firms for most of the times. Repurchasing firms involve even heavier trades around the announcement dates. The similar trend is also found for the comparison firms.

Panel B of Table 4 presents the average purchases and sales by managers of repurchasing and comparison firms. When open-market repurchasing firms are compared with control firms, we find no significant results to support the hypothesis of heavy buying before and excessive selling after announcements. On the contrary, the repurchasing firms are found to slightly buy less in the -5^{th} quarter and mildly buy more in the $+2^{\text{nd}}$ quarter.

Managers in tender-offer repurchasing firms, by contrast, are more likely to take advantage of their private information revealed by repurchases. While we find no significant buying before announcements except in -5th quarter, we do show that insiders delay their selling till after the announcements. In the first and second quarter after the announcements, the average numbers of sales are 5.3 and 5.0, respectively, both significantly larger than the average of control firms.

In Panel C of Table 4, we present the percentages of firms whose officers and directors as a group are net buyer or net sellers. Managers of a firm are classified as net buyer if their total number of purchases exceeds their total number of sales. This percentage measure is less likely to be influenced by large amounts of trading in only a few firms so it is a better measure to indicate the pervasiveness of trading behavior across firms. The results are consistent with the previously reported measures.

By and large, the open-market repurchasing firms have lower percentage of net buyers and higher proportion of net sellers compared to the comparison firms. However, in the -1^{st} quarter, this situation reversed. The percentage of net buyers is significantly higher for sample firms, while at the same time the percentage of net sellers is significantly smaller. The reversal pattern is even more apparent in the $+1^{st}$ quarter, which is inconsistent with a signaling explanation.

Turning to the tender-offer repurchasing firm column, net sellers dominate net buyers most of the time. This phenomenon is especially noticeable in the quarter after the announcements where the percentage of net buyer is 25% lower than that of non-repurchasing firms and the fraction of net sellers is 23% higher. These results support conclusion that managers do delay their sales to the quarters after the announcements to make good use of their information advantage over the tender-offer repurchase.

In sum, consistent with hypothesis based on signaling story, our benchmark tender-offer repurchasing firms' managers do delay their selling of stocks to the quarters following the announcements. Not only do more net sellers appear at this time, but also managers increase their average number of trades to take advantage of their private information. Following the repurchase announcements, the private information becomes public and managers unload their holdings immediately. For open-market repurchasing firms' insiders, we find heavy buying rather than selling *following* announcements which cannot be explained by a signaling/private information hypothesis.

3.4 Extension Analysis on Accruals

Given that the results above don't support the signaling hypothesis, we conduct other tests to see whether managers attempt to manipulate accruals in the repurchasing process as time repurchases to take advantage of lower prices that might accompany low earnings.

Accruals are a commonly used proxy to evaluate the role of earnings management. Here, total accruals are defined as the difference between earnings before extraordinary items and discontinued operations (EBXI: Compustat #123) and operating cash flows (Compustat #308-Compustat #124). As emphasized in Hribar and Collins (2002), this definition of total accruals includes additional accruals that are omitted from the traditional measure of operating accruals derived from balance sheet method and thus "going forward, will often be a more appropriate measure to use in accrual-based research."

TAC = EBXI - CFO = Data 123 - (Data 308 - Data 124)

Given industry-related and firm-specific business conditions, some accrual adjustments are necessary, and indeed expected by investors. To extract those non-discretionary accruals that are dictated by firm conditions and independent of managerial manipulation, we use cross-sectional modified Jones (1991) model to derive the discretionary accruals. Basically, accruals are regressed on the change in sales and change in PPE using all firms in the same two-digit SIC code as the repurchaser (but excluding the repurchaser). The cross-sectional regression is performed for each fiscal year, and all variables are scaled by prior year total assets. After the regression, the estimated coefficients are applied to each repurchaser to get the estimated total accruals which is termed as the non-discretionary accruals. The difference between the total accruals and the non-discretionary accruals is the discretionary accruals we use.

Total Accruals (TAC) = Non-discretionary Accruals (NDTAC) + Discretionary Accruals (DTAC)

 Table 5
 Time Series Profile of Total and Discretionary Accruals from Year-3 to +3 Relative to Repurchase Announcements (year 0) in Period of 1990-1999 (as % of lagged asset)

This table presents two measures of accounting accurals, total accruals and discretionary accruals, from years -3 to +3 relative to the stock repurchases announcements. All the numbers shown are sample average with winsorization of top 1% and bottom 1% to remove the outlier effect. The first row is the total accruals scaled by lagged total assets (ROA). The second row is the discretionary accruals derived by cross-sectional Jones (1991) model scaled by lagged total asset. The third and the fourth rows present the changes of the first and third rows relative to its prior year to reflect the change of performance relative to its own past.

Time	Year-3	Year-2	Year-1	Year0	Year1	Year2	Year3
Accruals and Changes around Open-Market Repurchase Announcements							
N	1434	1608	1810	1868	1762	1605	1244
Total Accruals	-3.51***	-3.19***	-2.91***	-4.36***	-5.58^{***}	-6.50***	-6.64***
Discretionary Accruals	0.70	1.29^{***}	5.71^{***}	2.84^{***}	-1.21	-6.21***	-4.61***
Change of Row1 Relative to Prior Year	D	-0.41	-0.34	-1.20****	-1.25***	-1.15***	-0.99***
Change of Row2 Relative to Prior Year	C	0.13	3.96***	-3.05***	-4.50***	-6.39***	-2.33***
Accrual and Change around Tender-Offer Repurchase Announcements							
Ν	146	155	159	148	134	116	76
Total Accruals	-4.11***	-4.06***	-4.91***	-4.34***	-4.72***	-5.07***	-4.42***
Discretionary Accruals	0.43	-0.37	1.73	0.31	-0.48	-2.36	-10.65
Change of Row1 Relative to Prior Year		-0.19	-0.62	0.73	-0.49	-0.35	0.10
Change of Row2 Relative to Prior Year		-0.72	2.15	-0.51	-0.65	-2.61	-14.36

Note: The means are trimmed at +/- 1%; *, **, *** denote significance at the 10%, 5% and 1% levels (for a two-sided test), respectively.

Table 5 reports two accruals measures in the six years surrounding the repurchase year. Total accruals (TAC) are always negative since EBXI is lower in general than CFO due to the effect of depreciation. However, after taking out the non-discretionary part, the discretionary accruals are not always less than zero. What is worth mentioning here is that for open-market repurchasing firms, the discretionary accruals reach the highest point at year -1 but experience visible reversal after announcements. This evidence is consistent with the fact of higher profitability ratio before and lower ratio after announcements which is reported in the Section 3.1.3. Also, it offers support for the prospect that firms time repurchases to correspond to periods when accruals hence earnings are lower than normal, rather than to resolve information asymmetries. Compared with the open-market repurchasing firms, we are unable to detect a similar change for the tender-offer firms.

4. Conclusion and Future Research

This study is intended to answer the question of whether open-market stock repurchase announcements are a signaling event in the 1990s. By investigating short-term and long-term market reactions, accounting fundamentals, insider trading behavior, and analysts' forecast revisions around stock repurchase announcements, we reach the conclusion that in the 90s, although tender-offer repurchases still act as a signaling device as they did in the 80s, open-market repurchases have little signaling content. This diminishing signaling content confirms previous survey results that conclude stock repurchases are more likely to be used to reduce financial slack and service stock option plans. As an extension, we find evidence that open-market repurchasing firms may use discretionary accruals to manage earnings prior to the repurchase announcements. This finding helps explain the negative earnings surprise following the repurchase announcements. It is also possible that managers time the earnings reversals to their actual repurchases to reduce the repurchase cost.

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