Who is Signalling Whom With Stock Repurchases?

Dr. Michael S. Long, Finance, University of Illinois at Chicago
Dr. John A. Polonchek, Finance, Oklahoma State University

Abstract

This research develops a model to justify share repurchase and presents consistent empirical data to justify the model. In the model signals travel both ways from the managers to the market and back from the market to the managers. Share repurchases result from the backward signals when managers receive signals from the market to revise expectations for future investment opportunities and reassess their beliefs downward. The excess cash that results from lower investment levels being undertaken than planned is used to repurchase their own stock.

Introduction

In the article, "Stock Repurchases and Market Signalling: An Empirical Study," Vermaelen [7] presented empirical evidence that inside managers use share repurchases to "signal" shareholders that the firm is undervalued. The observed excess return to shareholders after the repurchase is attributed to their upward reappraisal of the firm's value using the management's signal to them. The purpose of this paper is to present an alternative explanation of the excess returns from repurchasing. When the repurchasing firms are matched with similar sized, nonrepurchasing firms in the same industry, there is evidence that the signal is actual reversed. The impersonal market with no direct voice signals the firm of its low growth opportunities through a low market value and the firm's management reacts by repurchasing shares rather than expanding investments. This action creates the positive market response. If managers actually did possess positive inside information, they would not signal the market through share repurchases because they would need their currently excess cash to expand investments and exploit the new growth potential.

This paper begins with a development of the theory to show how "reverse" signalling works in the market as the market consensus on firm value signals the firm's management. Managers reassessing their investment alternatives as a

result of the signal, repurchase shares with excess cash. If one empirically compares the characteristics of firms repurchasing shares with those of a matched sample, the evidence indicates that it is likely that signalling occurs from the market to the managers.

In another paper on share repurchase, Kolodny and Malitz [3] viewed share repurchase as a form of divestiture. They argue that the firms repurchased their own stock rather than continuing their investment in short-term securities that, because of taxes, are negative NPV. By eliminating the short-term securities, Kolodny and Malitz observed excess empirical returns. The model and empirical evidence presented here are not to refute their view, but rather to give an explanation of how a few firms can get into a position that calls for share repurchases and present data from these firms consistent with that explanation.

Backwards Signalling

In the stock market, an important link exists when information is passed between the firm's managers and market participants who value securities. This information link takes the form of signalling. The firm emits signals to the investors on both its current investments and also its future plans and expectations. In valu-

ing the firm, these signals are integrated with the investors' expectations and preferences. And this consensus value, where supply and demand intersect, becomes the market price. This "forward" signalling is the rationale that Vermaelen uses to justify share purchases. However, there is a second information link in which the established market price is transmitted to the firm managers for use in their decision process: "backwards" signalling.⁽¹⁾ The transformation of information is a continual process which operates in both directions as expectations for investments in place and the future real investment opportunity set change over time. It is assumed that this information is not costlessly available to all, for the market participants must obtain and process information about the firm.

With the presence of costly information, different participants can be expected to have different information and derive different expectations from it. These participants can be broken into two sets. First, market participants form a collective demand that determines firm value and assesses firm risk. Second, firm's managers undertake real investment decisions, attempting to maximize the value of the firm. While the managers might have better information on some firm specific characteristics and individual new investments, the market is better able to aggregate other information (economy, industry, etc.) to assess certain firm specific information such as riskiness and the general level of growth opportunities. The manager thus signals new and unexpected information forward to the market when it becomes available to the firm. The manager observes the market to estimate risk and the firm's overall expected growth opportunities.

To better observe this process, the firm's value can be considered to consist of two parts: the value of its assets in place and the present value of its expected growth opportunities. The analysis considers the latter while the value of the former is measured the same for both managers and the market. How these growth opportunities become available, their potential size, or frequency can vary between firms. Further, the actual process of generating new projects has little effect on the informational process as long as discrete observations are available so that decisions can be made which are observable by the market.

For simplicity, assume that the potential growth opportunities for the firm are generated by a poisson distribution across time at the rate λ . Over any short-time interval, h , there is a λh probability of an opportunity becoming available and a $1 - \lambda h$ probability of no opportunities occurring. The management either accepts the project [$A = 1$] if it will increase wealth or rejects it [$A = 0$]. Scaling the time interval, h , to 1, and the risk free rate, r , accordingly, the value of the firm can be expressed as:

$$V = V_0 + \sum_{t=1}^{\infty} \lambda e^{-rt} A_t V_t$$

where V_0 represents the value for assets in place and the second term is the value of the firm's growth opportunities. Since the values of the growth opportunities already incorporate risk considerations, that is, they represent certainty equivalents, the risk free discount rate is used.

The value of each potential growth opportunity can be determined as the present value of future expected net cash flows minus the net investment outlay. These certainty equivalent cash flows are risk adjusted using a percentage of expected cash flows that management estimates from market information. The net investment outlay includes any adjustments for potential market imperfections such as issuing costs or tax shields from debt. Assuming perpetual projects, the value can be expressed now as:

$$V = V_0 + \sum_{t=1}^{\infty} \lambda e^{-rt} A_t \left[\frac{C_t}{r} - I_t \right]$$

where C_t is the certainty equivalent annual cash flow, and I_t is the investment outlay.

Both the aggregate market and the managers use the same general procedures to evaluate the firm, but they do not necessarily agree on the value. They can disagree in two areas: the rate at which potential growth opportunities will occur and their specific value. In valuing the growth opportunities, a bias exists distinguishing the groups. The growth opportunities are ranked similarly, but different acceptance levels exist as management estimates different values than the market in accepting projects.

The management tries to signal information to the market to support its position and is cogni-

zant of the market response. While they might feel that they have better information in the short run or view fluctuations of project availability as temporary, management's beliefs will change if differences in valuation continue to exist. When this occurs, large imbalances in cash could result, requiring a shift, through for example a share repurchase, to match fund needs with new expectations for investment opportunities. This results from the market's signal to the management instead of the managements' signal to the market.

Suppose $V_{mkt} > V_{mgt}$; either the management initially is undervaluing the project or underestimating the rate of new projects. Management might believe that the market is overly optimistic and continue with its own original estimates of the parameters. Based on these, it will project investment outlays over some period T . After the time period, management will reassess and make changes accordingly. Perhaps management has systematically undervalued the projects and invested less than optimal amounts. In this case management should lower the cutoff criteria and plan for additional investment in future periods. Or management could have underestimated the rate of growth opportunities, undertaken more investments than initially planned between times 1 and T , and experience a capital shortage situation. To correct either of these parameter shifts, they could signal the market by obtaining additional capital for use in future periods.

Suppose $V_{mgt} > V_{mkt}$ so that management feels that the market is under-valuing the firm. Initially, they are unlikely to believe that the market is correct but rather will continue with their investment plans while waiting for the market to have more information on which to base their valuation. If after some time period T , management still finds that the market is undervaluing the firm, they must reassess their position. Again, there are two possibilities. Management might have systematically overvalued future investment opportunities and invested more than optimal amounts. In order to correct this condition managers should lower their future investment and either increase dividends or reduce borrowing. Or management might have overestimated the rate of growth opportunities so that there would be less investment than originally planned, leaving the firm with excess cash. In

this case increasing dividends would be impractical because the higher dividend level could not be maintained. Therefore, management might undertake a share repurchase to eliminate the excess cash that signals the market of their lower λ estimate.

The question still must be answered as to why this action would generate excess market returns. When management reacts to its excess cash, three alternative explanations are available in the market. First, λ has not decreased, but merely more negative valued opportunities occurred in the total time period, which requires no managerial action since it is self-correcting. The excess planned for investments would remain in marketable securities until needed. Unfortunately these are negative wealth investments since corporate taxes must be paid on the interest income. Second, management could determine that its cutoff criterion for the acceptance of projects is too high. Lowering the cutoff level would allow more projects to be undertaken, but these additional projects would also have a negative wealth effect on the firm. Third, management could determine that the market's estimate of λ is too high. When reduced to the market's estimate, the excess cash would not be required, allowing share repurchase. The markets show a positive excess return on average to share repurchases since the alternatives in some cases either maintain excess zero NPV cash, or in other cases undertake negative NPV projects.

Empirical Evidence on Signals and Incentives

If our backward signalling rationale is correct, the following characteristics should be expected. The managers, after adjusting their λ downward to reflect a change in beliefs about their firms' opportunities, would find their firms in the following position when compared to other similar firms that did not repurchase. First, the repurchasing firms would have more cash since a higher investment level had been anticipated. Second, they either would be paying lower dividends to conserve cash for previously anticipated future investments, or they would undertake a lower level of capital expenditures because not enough good opportunities were generated.

Vermaelen (7) and others [Dann (1), Kolodny and Malitz (3), Masulis (5)] studied empirically the effect of open market and/or tender offer

repurchases on a firm's share returns. Using event studies, they all found share repurchases created excess positive returns. In an earlier study, Marks (4) found share repurchases to create no excess return.

Event studies, such as Vermaelen's, measure a firm's excess returns around the occurrence of some specific event. Excess returns are the returns after subtracting the expected return for a security with the same beta for the particular trading period. Since these excess returns should on average be zero, a significantly positive or negative return over many securities encountering the same event, though on different calendar dates, provides evidence that the event alters the value of the firm. Vermaelen analyzed the announcement period returns of domestic firms which repurchased common stock via tender offers between 1962 and 1978. He found an average positive excess return of 17.5% accruing to the firm's current share holders around the announcement date of the tender offer.

To test empirically our alternative explanation, Vermaelen's data base was expanded to include firm characteristics.(2) The repurchasing sample used all firms that extended tender offers for their own shares during the period 1970 to 1977, giving data for 68 repurchases by 60 firms. Firms repurchasing shares via tender-offers were chosen because their average repurchases were larger, repurchasing an average of 16.5% of outstanding shares, than open market repurchases that averaged 7.2% of the outstanding shares, giving the greatest potential for differences.

For a comparison study, a group of nontender-offering firms is required. A matched firm sample was used to avoid possible industry and size effects between tender-offering and nontender-offering firms. The base for selection was first, the same four digit standard industrial classification code, and second, those firms having the closest sales level to the repurchase firm.(3) Where duplicate repurchases occurred, the earliest date was used for comparison. For comparing firm characteristics, the data used in this analysis were taken from the firms' annual reports for the year prior to the repurchase.

To test for differences between the two groups of firms, the Wilcoxon test was preformed on the pairs of firms. The direction of the average

differences between the matched pairs in the sample is computed and each difference is then weighted by its absolute rank. The sign of the difference is then added and the signed ranks are summed. If there is no difference between the two populations, then the sums will be equal. If two or more differences are of the same magnitude, they are assigned the average of the ranks they would have otherwise received. As the sample size becomes large, as in this study, the distribution of the test statistic approaches that of the standard normal.(4) The results from the Wilcoxon test indicate that except for the selection criterion, sales, and long-term debt to total assets, the other financial characteristics of repurchase and matched groups are significantly different. Most important, the repurchasing firms had significantly more cash, paid less dividends, and undertook a lower rate of capital expenditures than the corresponding non-repurchasing firms. Table 1 presents these comparisons along with several additional relationships.

The market value to book value of equity measured at the end of the fiscal year prior to the repurchase was selected to estimate the firms' growth opportunities. As can be seen, the repurchasing firms were valued significantly lower than their matched firms. A possible alternative explanation for the firms which repurchase stock could be a decline in the market's assessment of growth opportunities. We assumed that the managers reassessed their opinion of the firm's actual value after viewing the market's position across time. To check this, the market returns over the year prior to repurchase were compared between the firms. Of the sixty paired observations, 29 repurchase firms had a greater return than their matched firms over the time period. Therefore a larger decline in value did not trigger the repurchase.

Considering the two groups as separate samples, multiple discriminant analysis was run also.(5) Its results were in line with those of the nonparametric tests (See Table 2.). Cash to total assets, market to book value, beta and dividend yield were the variables in the discriminant function. Because of multicollinearity, the level of capital expenditures was not significant enough to enter. The variables that did not enter all had the sign that the Wilcoxon test would predict. The function itself was highly significant.(6)

Table 1
Firm Data Comparisons

	Ties	Number of Cases Repurchase Value Exceeds Match	Number of Cases Match Value Exceeds Repurchase	Level of Significance (One Tail Wilcoxon Test)
BETA	0	40	20	.007
Cash/ Total Assets	1	39	20	.0025
Net Plant/ Total Assets	1	21	38	.0035
Long-Term Debt/ Total Assets	2	28	30	.264
Income/ Total Assets	1	23	36	.033
Capital Expenditure/ Total Assets	2	19	39	.005
Dividend Yield	11	16	33	.017
Market Value Over Book	1	20	39	.0005
Sales	2	28	30	.43
Total Assets	1	35	24	.026

Table 2
Discriminant Analysis
Group Means

I. Variable	Repurchase Firm	Matched Firm	Individual F-Statistic
BETA	1.69746	1.49312	3.993**
Cash/Total Assets	.11494	.07554	6.416**
Net Plant/ Total Assets	.2806	.35975	3.798*
Long-term Debt/Total Assets	.19830	.21822	.478
Income/Total Assets	.04569	.05816	2.569
Capital Expenditures/ Total Assets	.05319	.06862	2.756*
Dividend Yield	.02069	.02761	2.258
Market Value Over Book Value	.82208	1.41236	6.142**
Sales	798.9	550.4	.5785
Total Assets	868.667	499.0667	1.008
II. Variables in Discriminant Function	Standardized Coefficients	Overall F-Statistic	
Cash/Total Assets	+.78927	6.321**	
Market Value over Book Value	-.83118		
BETA	+.29845		
Dividend Yield	-.29209		

*Significant at the .10 level.

**Significant at the .05 level.

Conclusions

This research develops a model to justify share repurchase and presented consistent empirical data to justify the model. In the model signals travel both ways from the managers to the market and back from the market to the managers. Share repurchases result from the backward signals when managers receive the signal to lower investment opportunities and reassess their beliefs downward. The excess cash that results from lower investment levels being undertaken than planned is used to repurchase their own stock.

Empirically, this idea is supported in comparing repurchase firms with similar sized nonrepurchasing firms in the same industry. The repurchasing firms prior to the announcement of a tender offer have higher levels of cash to total assets but significantly lower capital expenditures levels, dividend yield and net plant to total assets. As a result, prior to repurchase the market valued these firms lower, as the market to book value indicated, and managers reacted to the market signal by repurchasing shares to reduce excess cash to a level consistent with the lower expected rate of investment growth opportunities.

Footnotes

- 1 Eytan (2) develops the full concept of forward and backward signalling. Though no empirical evidence is presented, he noted that share repurchase could provide a good example of backward signalling.
- 2 Theo Vermaelen kindly provided us with this list that he compiled for his dissertation.
- 3 None of the matched firms repurchased by tender offer or open market purchases more than 2% of its total shares outstanding in the years surrounding the repurchase firm's repurchase operation.
- 4 The similar Sign test was also run, but since it considers only the direction of the differences, it is the weaker test. Results using the Sign test were similar to the results using the Wilcoxon test.
- 5 Since the values are all stated as ratios, parametric tests can be used as the magnitude problem from different sized firms is eliminated.
- 6 Kolodny and Malitz split their repurchasing firms into those with low and high excess returns. The firm characteristics of their two groups of repurchasing firms are similar to ours where our repurchase firms parallel with their high positive excess return firms and our holdout firms are similar to their low return firms.

References

- 1 Dann, L. "Common Stock Repurchases: An Analysis of Returns to Bond-holders and Stockholders," *Journal of Financial Economics*, 9, 1981, 113-138.
- 2 Eytan, H. "Learning from the Market and the Information Context of Securities," Unpublished working paper, M.I.T., 1982.
- 3 Kolodney, R. and I. Malitz. "Repurchase for Divestiture: A New Interpretation at Market Reaction," Unpublished paper, University of Maryland, 1983.
- 4 Marks, K. "The Stock Price Performance of Firms Repurchasing Their Own Shares," *The Bulletin*, New York University, 1976.
- 5 Masulis, R. "Share Repurchase by Tender Offer: An Analysis of the Causes of Common Stock Price Changes," *Journal of Finance*, 35, May 1980, pp. 305-319.
- 6 Siegel, S. *Nonparametric Statistics for the Behavioral Sciences*, McGraw-Hill Book Company, 1956.
- 7 Vermaelen, T. "Stock Repurchases and the Market Signalling: An Empirical Study," *Journal of Financial Economics*, 9, 1981, pp. 139-183.