OPEN MARKET STOCK REPURCHASES: THE CANADIAN EXPERIENCE

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ABSTRACT

During the 1980s, U.S. firms announcing open market stock repurchase programs earned favorable long-run stock returns. Recently, concerns have been raised regarding the robustness of these findings. This comes at a time of explosive growth worldwide in the adoption of repurchase programs. This study further investigates long-run performance following repurchase announcements using a recent sample of Canadian programs. As in the U.S., the Canadian stock market seems to discount the information contained in repurchase announcements. Toronto Stock Exchange firms announcing repurchase programs between 1989 and 1995 show excess performance measured relative to a Fama-French (1993) three-factor model of approximately .5% per month over a period of three years following the announcement. Canadian value stocks announcing repurchase programs, as well as firms announcing large repurchase programs, have particularly favorable abnormal long-run performance. Interestingly, despite regulatory oversight in the approval of repurchase programs, the completion rate is low in Canada. Completion rates are higher among value stocks. For Canadian firms increasing shares outstanding, either through a seasoned equity offering or stock-financed acquisition, we observe a downward drift in returns.

1. Introduction

In recent years, corporations have dramatically increased the amount of capital devoted to repurchasing their own shares. In the mid-1980s, repurchase program announcements in the United States amounted to roughly $25 billion per year. Yet over the last three years, nearly 4,000 repurchase programs have been announced which, if fully completed, amount to over $500 billion. During 1997 alone, Securities Data Company reports more than 1,000 program announcements totalling nearly $180 billion. Interest in corporate repurchase programs is not limited to the U.S. as repurchase activity worldwide has grown in recent years. Most European countries, as well as countries such as Hong Kong and Japan, have implemented new regulations allowing companies for the first time to repurchase their shares.

The literature is rich with motives as to why firms might repurchase their own stock, ranging from taxation to signaling. Yet these reasons are not as popular with managers. Quite frequently when announcing buyback programs, managers claim that prevailing market prices undervalue the company, hence their stock is an attractive investment (Dann (1983) and Wansley, Lane, and Sarkar (1989)).

Several studies report evidence consistent with this managerial story of undervaluation and market underreaction to repurchase announcements. In a comprehensive examination of U.S. open market repurchase programs during the 1980s, Ikenberry, Lakonishok and Vermaelen (1995) find abnormal performance of about 3.5% in the days surrounding the announcement. However, the market response is not complete and they report annualized abnormal performance of 2.9% over a four-year period following the announcemencement. For value stocks, where a stronger case can be made for undervaluation as a motivating factor for the repurchase, the abnormal long-run returns were much higher. Firms ranked in the top quintile by book-to-market had an annualized abnormal return of 6.4% over a four-year post-announcement period. In an earlier paper on fixed-price tender offer repurchases, Lakonishok and Vermaelen (1990) also find evidence of underreaction lasting at least two years. In short,

these papers find results consistent with the claims of many managers, when announcing repurchase programs, that their stock is undervalued and thus a good investment.

However, one should view this evidence with some skepticism as data snooping is an important concern. To date, research regarding firms repurchasing stock has generally been limited to U.S. firms. In addition, open market programs did not become pervasive in the U.S. until the mid- to late-1980s. Therefore, the time period we have for evaluating long-run performance is not excessive. Although previous studies have examined hundreds of program announcements, the history of repurchase announcements is rather short. Thus, it is not entirely unreasonable to regard this evidence with some degree of suspicion. As Merton (1985) suggests, we are biased toward publishing "exciting" results.

Recent papers have also drawn into question the results of several studies that examine long-run stock performance and report evidence of underreaction to news.[1] Studies regarding stock repurchases have been included in this critique. It is well understood in studies which examine long-run stock returns that the results are sensitive to how performance is measured. For U.S. firms announcing repurchase programs, abnormal performance is lower using the Fama-French (1993) three-factor model in comparison to other widely used approaches.

Given the recent growth in repurchase announcements worldwide, fresh evidence would shed light on the debate about the long-run performance of repurchasing firms. While many countries now allow repurchases, the only country outside the U.S. which has a reasonable sample at this point is Canada.[2] Thus, we examine open market programs announced by firms trading on the Toronto Stock Exchange (TSE). Moreover, we examine programs announced between 1989 and 1995, a time period which generally follows the sample period examined in earlier U.S. studies. Our sample contains 341

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[1] For example, Fama (1998) and Mitchell and Stafford (1997).

[2] Aside from the U.S., Canada shows the next highest level of repurchase activity followed by the U.K. For other countries, repurchase activity is just getting started.

announcements made by TSE firms intending to repurchase up to $13.8 billion of their stock in open market transactions. This should provide at least some out-of-sample evidence regarding the behavior of stock prices following repurchase announcements. We supplement our analysis of share repurchases by also examining long-run stock performance following the issuance of shares. Specifically, we consider Canadian seasoned equity offerings and acquisitions that were at least partially financed with equity. A result consistent with repurchases would show a downward drift in stock performance after an announcement of an increase in shares outstanding.

A further appeal of studying repurchases in Canada is that the regulatory framework provides for a rather transparent assessment of actual repurchase activity, since, unlike the U.S., Canadian listed firms must report their trading activity on a monthly basis. This allows us to study the strategic trading behavior of managers with respect to the timing of their repurchases. Moreover, it allows us to unambiguously assess the extent to which firms actually repurchase stock, an important issue raised both by academics and practitioners. Studying this behavior should provide further insight into the motivations behind buyback programs. If companies are buying back stock because managers believe their shares are undervalued, one would expect completion rates to be higher. However, for cases where undervaluation is a motivating factor but stock prices jump up quickly, one would expect to find lower completion rates.

In this paper, we focus our analysis on a calendar-time trading strategy where performance is evaluated relative to the Fama-French (1993) three-factor model. Among the various techniques, this approach produced lower abnormal returns in studies of U.S. programs.[3] As a check, we also evaluate performance using a traditional event-time methodology as well as employing other strategies.

We find that undervaluation appears to be just as important a consideration for repurchasing shares in Canada as earlier findings suggest in the U.S. Using the Fama-French (1993) three-factor

[3] See for example, Ikenberry, Lakonishok and Vermaelen (1995) or Mitchell and Stafford (1997).

model, Canadian firms repurchasing shares show abnormal performance of .53% per month over a three-year period following the announcement. In the year prior to the announcement, abnormal returns are negative, -.49% per month. Such poor pre-announcement performance is consistent with undervaluation being a motivating factor for stock repurchase programs.

Firms repurchase shares for a variety of reasons, many of which may be unrelated to undervaluation. A stronger case for undervaluation as a motivating factor can be made for value stocks. Ikenberry, Lakonishok and Vermaelen (1995) report results consistent with this prediction; the long-run abnormal returns of value stocks making repurchase announcements are substantially higher than for growth stocks making such announcements. The results in Canada are similar to the U.S. findings. Canadian value stocks that announce open market programs have abnormal performance measured over a three-year period following the announcement of .58% per month. Growth firms show less evidence of abnormal performance over the same time-horizon, .22% per month. Moreover, Canadian firms announcing relatively large repurchase programs, those for 5% or more of shares outstanding, show better long-run performance than those announcing smaller programs.

Interestingly, firms buy back, on average, only 28% of the shares authorized in the program, although the completion rate is slightly higher in more recent years. Furthermore, managers appear to exercise discretion when repurchasing shares. There is evidence of higher completion rates among value stocks. There is also evidence of strategic trading behavior as to when repurchase programs are executed. In cases where no shares are repurchased, abnormal stock returns in the year following program authorization are quite high. However in later years, abnormal performance is relatively low. For firms repurchasing shares, abnormal returns are relatively low during the year the program is in effect, yet comparatively much higher in years 2 and 3 after the program has terminated. This is consistent with the hypothesis that managers' repurchase decisions depend on their perceived undervaluation of the company's shares. When prices are rising, the incentive to repurchase shares may be diminished.

Conversely, in those programs where stock prices are not rising rapidly, the incentive to repurchase might be higher.

As a final check, we also evaluate performance subsequent to an increase in shares when firms either issued seasoned equity or acquired other firms with stock. Here, the results are again consistent with the hypothesis that managers are sensitive to the market price of their stock. Overall, abnormal returns are high prior to an SEO or acquisition by TSE firms, yet subsequent abnormal return performance is poor.

The paper is organized as follows. Section 2 briefly describes the institutional setting surrounding repurchase programs announced by TSE firms and also describes our sample. Section 3 reviews the methodology used to evaluate long-run performance. Section 4 provides some descriptive information regarding sample programs and documents the short-run market reaction to repurchase announcements. Section 5 presents evidence on subsequent long-run performance. Section 6 examines long-run performance, taking into account the extent to which repurchase programs are completed. Section 7 provides some robustness checks, including results for SEOs and stock-financed acquisitions. Concluding remarks are provided in section 8.

2. Repurchases in Canada

a. Institutional aspects of repurchases in Canada

The regulatory environment affecting Canadian open market repurchase programs differs from that in the U.S. The oversight mechanism in Canada is largely provided by the exchanges. Unlike the U.S., Canadian firms must receive approval from the exchange before initiating a repurchase program. Open market programs are referred to as "Normal Course Issuer Bids." As in the U.S., these programs

are the most common mechanism firms use to repurchase shares.[4] Once authorized, open market repurchase programs last one-calendar year and are limited to the maximum of either 10% of public float or 5% of shares outstanding.[5]

On the TSE, the application process to repurchase stock is generally straightforward and is usually completed in a limited number of days. However, the TSE has discretion whether to approve an application. In cases where officials have doubt as to the firm's intentions to acquire shares, such as in cases where previous repurchase programs have gone unexercised, firms might be less likely to receive authorization for new programs. This is not the case in the U.S. where no approval is necessary before announcing a repurchase program. Moreover, it is not uncommon to find some U.S. firms subsequently repurchasing few, if any, shares (Stephens and Weisbach (1998), Netter and Mitchell (1989)). If the regulatory screening process is successful, one would expect that repurchase announcements made by Canadian firms would be a more credible signal of potential undervaluation in comparison to announcements made by U.S. firms.

The TSE also governs how listed firms execute their repurchase programs.[6] Similar rules do not exist per se in the U.S.[7] Briefly, these rules state that TSE firms may commence repurchasing stock two

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[4] Fixed-price tender offers, referred to as "Substantial Issuer Bids," are also permitted in Canada and do not have limits on the amount of stock that can be repurchased. As in the U.S., this form of repurchase is not common. Dutch-auction tender offers, though permitted by law, have only recently occurred in Canada. In this study, we only examine repurchase programs executed via open market transactions, or Normal Course Issuer Bids.

[5] Because a large number of Canadian firms are closely held, the alternative limit of 5% of outstanding shares is less onerous for some firms than the limitation of 10% of the public float. If a firm completes an authorized repurchase program within twelve-months, it may apply to extend the original program only up to the maximum limit allowed during a twelve-month period.

[6] See Part 28 of the Policies of the Toronto Stock Exchange.

[7] U.S. securities law governing stock repurchases has evolved gradually, adopting its present form in 1984 when Congress adopted S.E.C. Rule 10b-18, a "safe-harbor" provision relating to stock repurchases. This rule does not impose strict limits as is the case in Canada, but rather provides firms protection from legal liability for price manipulation when repurchasing stock if firms execute repurchase trades within certain limitations relating to price, volume and time-of-day. These provisions are not statutory rules. Companies often voluntarily repurchase shares outside of these limits (Cook, Krigman and Leach, 1997). Moreover, Rule 10b-18 does not apply to all types of

days after receiving approval from the TSE. Programs must be executed through a single broker. Cumulative repurchases over the trailing 30 calendar days must not exceed 2% of outstanding common stock. Firms are also restricted from repurchasing shares on an up-tick.

b. The Sample

Our sample of Canadian open market repurchase programs is obtained from Securities Data Co. which collects program announcements from the popular press. We select all TSE firms which announced an open market repurchase program for common stock during the period 1989 to 1995. Monthly returns are obtained from the TSE/University of Western Ontario database which is free of survivor bias since data for non-surviving firms are retained. However, returns from this database end in December 1995. Thus from January 1996 to March 1998, we extend our data set with monthly returns obtained from Compustat and Datastream.

Some of our analysis requires fundamental information, specifically the book-to-market ratio. Compustat was our primary source for this information. However, Compustat's coverage of Canadian firms is not complete. In addition, Canadian firms which are de-listed are not included in Compustat's research file. For these cases, we obtained book-equity values from a special file prepared for us by Standard and Poor's. This was further supplemented, where needed, with book-equity values obtained from Moody's International Manuals.

3. Methodology

a. Portfolio formation

Our examination of long-run performance focuses on portfolio returns produced in calendar-time. Several recent papers report evidence based on this approach including Ikenberry, Lakonishok and

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repurchase transactions including, for example, pension-plan related (ERISA) trades. In addition, at certain times (for example, following the crash of 1987), some of the Rule 10b-18 limitations are lifted.

Vermaelen (1995), Loughran and Ritter (1995), Womack (1996) and Mitchell and Stafford (1997). This technique is appealing in that it is more consistent with a real-time trading strategy in comparison to other approaches such as an event-time analysis.

To use this approach, we calculate a time-series of monthly returns for a portfolio containing repurchase firms. Firms making a repurchase program announcement are added to the portfolio at the beginning of the month following the announcement and retained for the next three years or until the stock no longer trades. The portfolio is rebalanced each month so that each stock has the same weight at the beginning of the month.[8] The number of stocks in the portfolio varies over time. In the early months of our sample period, the number of stocks in the portfolio tends to be small. To reduce the impact of idiosyncratic noise, months where the portfolio contains six stocks or less are dropped from our analysis.

The portfolio described above assumes that repurchase firms are held for three years, beginning in the month following the announcement. In addition to this, we separately calculate returns for portfolios which hold stocks for year 1, year 2 and year 3 following the announcement. The procedure is the same as above. For example, for the year 1 portfolio, a monthly time-series of returns is calculated for firms which announced a repurchase program in the previous 12 months. In a similar vein, we provide portfolio returns over years 1 and 2 together. And finally, we also calculate returns to a portfolio which holds firms during the year prior to the repurchase announcement, year -1.

For completeness, we also produce results using an event-time approach. Although this is less representative of a real-time investment strategy, an event-time approach is appealing in that it gives each sample firm equal weight in the analysis. The calendar-time approach gives proportionately more weight to those firms which make announcements in months where there are few observations. Similarly, firms

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[8] As a robustness check, in section 6 we re-examine the monthly rebalancing assumption by using a value-weighted procedure, an approach consistent with a buy-and-hold strategy.

receive less weight in months where relatively heavy announcement activity is observed. This may be of some concern in our study because many observations in our sample occur later in the sample period. A further advantage of the event-time approach is that it allows us to observe abnormal performance on a month-by-month basis and thus more closely follow the market's adjustment process to repurchase announcements.

b. Benchmark models and index returns

Using the calendar-time portfolio approach, we examine abnormal performance using a number of benchmarks. We first illustrate the calendar-time approach by comparing the returns of the repurchase strategy to a passive investment in the TSE index. Next, we evaluate performance using a standard CAPM approach. Here, we regress the time-series of monthly excess returns to the repurchase portfolio on excess market returns:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \epsilon_t \tag{1}$$

The variable $r_{p,t}$ represents the monthly return to a given calendar-time portfolio. The risk-free return in a given month, $r_{f,t}$, is the return to the 30-day Canadian government bill. Monthly returns to the TSE Index represent the market return, $r_{m,t}$. Abnormal performance is measured by α and is estimated via simple OLS regression.

The focus of our analysis relies on evaluating performance using the Fama-French (1993) three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t \tag{2}$$

Here, excess portfolio and market returns are defined the same as in equation (1). The first term in equation (2) controls for general market movements in a given month t. The last two terms in equation (2) are arbitrage portfolio returns which control for book-to-market and size effects. These arbitrage portfolios are calculated using BARRA's Canadian style factors for small-cap-value stocks, small-cap-

growth stocks, large-cap-value stocks, and large-cap-growth stocks.[9] For its Canadian indices, BARRA defines its large-cap universe as the largest 200 firms trading on the TSE. The next largest 300 TSE firms define the small-cap universe. These two groups are each subdivided into growth and value stocks. BARRA accomplishes this by calculating a measure which gives two-thirds weight to the market-to-book ratio and one-third weight to dividend yield. The small-cap and large-cap portfolios are each sorted separately on this measure and split into two groups so that the value and growth portfolios have the same total market capitalization. For the three-factor model above, the book-to-market factor is defined as the average return for BARRA's two value portfolios (large-cap-value and small-cap-value) minus the average return to BARRA's two growth portfolios (large-cap-growth and small-cap-growth). This factor is labeled as the value minus growth arbitrage portfolio, or vmg. Similarly, the size factor is obtained by taking the average return of BARRA's two small-cap portfolios (small-cap, value and small-cap, growth) and subtracting the average return of BARRA's two large-cap portfolios (large-cap-value and large-cap-growth). This arbitrage portfolio is labeled as small minus large, or sml. BARRA updates these style indices in January and July of each year. These series do not start until July 1990. Thus while we include repurchase programs announced in 1989 and during the first half of 1990, we do not begin measuring excess performance until July 1990.

Table 1 provides the mean and standard deviation of the three factors. From July 1990 to March 1998, the mean monthly return to the TSE above the risk-free return is .596%, representing an annual risk-premium of roughly 7% per year. Turning to the remaining factors, for vmg and sml the premiums are around 2% per year. While these premiums are modest relative to premiums reported in the U.S. during the period 1963-1990 (Fama and French (1993)), these premiums are consistent with U.S.

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[9] BARRA is a U.S.-based firm which provides software and information services to investment managers, pension fund consultants, plans sponsors and others in the investment community. The style indices used in this study were obtained from BARRA's Canadian internet site: www.barra.ca. In Appendix A, we examine the three-factor model using BARRA style indices as described above. Overall, the model appears to work well in Canada.

premiums during the 1990s.[10] Variability in both factors is substantial, roughly 2.5% per month.

4. The market reaction to open market share repurchase announcements

Panel A of Table 2 reports summary statistics for our repurchase sample. A large number of observations are concentrated later in the sample period. This is primarily a consequence of our data source, Securities Data Co., whose coverage of Canadian announcements early in this time period was limited to more notable programs. Looking at all years together, the 341 programs in our sample, if fully completed, amount to $13.8 billion. The mean program is for 5.28% of shares outstanding, similar in magnitude to the typical open market program in the U.S.

The mean market reaction to open market programs in our sample is presented on the right side of panel A. Overall, the average abnormal return relative to the TSE index in the month the program is announced is 1.46%.[11] This is similar in scale to the market reaction observed for U.S. announcements (for example, see Ikenberry, Lakonishok and Vermaelen (1995) or Stephens and Weisbach (1998)).

Panel B reports the mean market reaction for various program sizes. A substantial number of programs cluster right at 5% of shares outstanding. There is little apparent difference in the market reaction between large and small programs. The mean abnormal return for programs between 0 and 2.5% of shares outstanding is 1.52%. For the largest programs in our sample, those for 7.5% or more of shares outstanding, the mean market reaction is slightly negative, -.34%. This result differs from what is observed in the U.S. where the market reacts somewhat more favorably to larger buyback programs.

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[10] For U.S. stocks over the period July 1989 to March 1998, the mean monthly premium for vmg is .31%. The mean monthly premium for sml is -.08%.

[11] As a check, we also calculated the market reaction adjusting for book-to-market and size effects. Using Ibbotson's (1975) RATS technique, the market reaction is nearly the same as obtained using the simple market-adjusted approach, 1.48%.

If managers of Canadian firms are choosing to deliberately signal undervaluation through stock repurchase programs, particularly for larger programs, it is not entirely clear the message is received in the marketplace. The modest return observed in the announcement month is consistent with either management being overly optimistic about their firm's value or, alternatively, the market underreacting to the repurchase signal. An investigation of the long-term performance of repurchasing firms is one way to sort out the two conflicting hypotheses.

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

A. The general case

In Figure 1, we plot the compounded return on both the repurchase strategy and the TSE index, dividend inclusive. Here we use the calendar-time portfolio approach and assume that repurchase firms are held for three years subsequent to the repurchase announcement. Overall, the repurchase portfolio did well. The annualized return is 21.0% relative to 13.2% for the TSE index. This is, of course, a simplistic comparison for it does not control for differences the two portfolios have with respect to their exposure to market factors.

In Table 3, we report performance of the repurchase strategy using both a one-factor and three-factor model. Assuming a three-year holding period, we observe abnormal performance using the one-factor model of .69% per month. Using a two-year holding period, our estimate of abnormal performance is slightly higher, .86% per month. Abnormal performance is positive in each of the three years following the announcement.

However the one-factor model does not control for size and book-to-market. Even after making adjustments for these two factors, we continue to observe evidence of favorable long-run performance subsequent to repurchase announcements. The three-year holding period portfolio shows abnormal performance of .53% per month (t = 3.80) or more than 6% per year. In general, the results from the

one-factor model and the three-factor model are not that different. This is not surprising given the relatively small premiums associated with size and book-to-market factors during our sample period.

As mentioned earlier, managers when announcing open market repurchase programs often refer to the firm's stock price as "too low" or that the stock represents a "good investment." While the positive long-term post-announcement drift is consistent with this story, further evidence is also reported in Table 3. In the year prior to the repurchase announcement, abnormal performance is -.49% per month using the three-factor model, a result consistent with managers' claims of undervaluation.

A calendar-time approach weighs each month equally in the analysis even though the number of companies in the portfolio can vary substantially over time. Thus in Table 4, we report evidence using an event-time approach where each program receives the same weight. Here, we apply Ibbotson's Returns Across Time and Securities (RATS) procedure (1975) and, as before, measure abnormal performance using a three-factor model. The cumulative abnormal return obtained from this approach is plotted in Figure 2. Using this procedure, we continue to observe evidence of long-run abnormal performance following repurchase announcements in Canada. Twelve months following the announcement, the CAR is 6.16% (t = 2.38). By the end of year 2, the CAR has increased to 14.50% (t = 3.99). After three years, the total cumulative abnormal return is 23.31% (t = 4.88).[12] These results are similar in magnitude to that obtained under the calendar-time technique. Using the event-time RATS approach, the mean monthly abnormal return over the entire 36-month post-announcement period is .65% per month. Using the calendar-time approach, the result is .53% per month.

Figure 2 illustrates more clearly the market's delayed adjustment to the news of a repurchase program. During the first six months following the announcement, there is little evidence of abnormal performance; the cumulative abnormal return at this point is nearly zero. Yet during the second half of

[12] The standard errors used to calculate significance levels under the RATS approach assume independence in monthly abnormal returns. Since abnormal returns are calculated using a three-factor model, this assumption should not be too problematic.

year 1, positive abnormal performance is observed. Further evidence of abnormal performance is observed in years 2 and 3. This delayed market response is similar to what Ikenberry, Lakonishok and Vermaelen (1995) observed for U.S. repurchase programs where abnormal performance in year 1 was less impressive than in later years.

B. Cross-sectional differences in long-run performance

i. Program size

Although firms repurchase shares for a variety of reasons, managers often claim that undervaluation is a primary motivation for the repurchase program. Thus, we extend our analysis by trying to separate those cases where undervaluation may have been more of a motivating factor than other reasons. We begin by evaluating performance on the basis of program size. Recall that the results reported in Table 2 show no apparent relation between program size and short-term announcement returns. In Table 5, we use the calendar-time portfolio approach and report long-run performance by program size. We define three groups. A large number of programs are for exactly 5% of shares, thus we treat them as a single group. All programs for more than 5% of shares are treated as a second group and programs for less than 5% of shares are treated as a third group.

Using the three-factor model, the three-year holding period abnormal return for large program announcements is 0.87% per month. This compares to 0.66% per month for 5% programs and 0.04% per month for programs of less than 5% of shares outstanding. In the year prior to the announcement, we also see evidence consistent with the undervaluation story. Firms announcing large programs tend to experience more negative abnormal performance during this period: -.67% per month for those programs authorizing repurchases for more than 5% of shares and -.61% for 5% authorizations. For smaller programs, the year -1 abnormal return is positive, .20% per month.

ii. Value versus growth

Perhaps a more appealing way to separate the various motivations managers might have for

repurchasing stock is to use the book-to-market ratio.[13] Here, in June of each year, we obtain the book-to-market ratios (assuming a three-month reporting delay following fiscal year-end for book-equity values) for all TSE-listed firms for which we have data. This universe is sorted each year by book-to-market ratio. The book-to-market ratio of each firm making a repurchase announcement is compared to the median value of the universe. Those firms with above median book-to-market ratios are called value stocks, while those with below average ratio values are labeled growth stocks. For each of these two groups, we estimate long-run performance using the calendar-time approach, the results of which are reported in Table 6.

Value stocks account for a large portion of the abnormal performance observed overall in repurchasing firms. Assuming a three-year holding period, the abnormal monthly return for value stocks using the Fama-French (1993) three-factor model is .58%. As in earlier tables, we see evidence of a delayed market response. During the first year following the announcement, the abnormal return for value stocks is .41% per month. In years 2 and 3, the excess return increases to .94% and 1.16% per month, respectively. This is consistent with the performance of value stocks that announced repurchases in the U.S. (Ikenberry, Lakonishok and Vermaelen (1995)). For growth stocks, returns are lower. Assuming a three-year holding period, the abnormal return is a statistically insignificant .22% per month. Moreover, looking at the three post-announcement years separately, we see that point estimates for abnormal returns are only positive in year 1 and negative in years 2 and 3.

Prior to the announcement, we again see evidence consistent with the undervaluation story for value stocks. Here, value firms which perform well subsequent to initiation of the programs were performing poorly in the year prior to the announcement; the abnormal monthly return from the three-

[13] Our primary source for book-to-market ratios was Compustat. However, because of limitations in Compustat, we supplemented this with book-values obtained from a tape prepared for us by Standard & Poor's that was free of survivor bias. Additionally, information from Moody's International Manuals was also used. From these sources, book-to-market ratios were available for approximately 85% of our firms.

factor model is -0.88% per month. Growth firms perform well in the year prior to the announcement with abnormal performance of .49% per month. Following the program announcement, growth stocks experience abnormal returns close to zero. These might be firms which are returning capital to shareholders for reasons unrelated to undervaluation.

6. Actual share repurchase activity in Canada

Canadian law differs from the U.S. in that all Canadian firms with authorized programs must report their repurchase activity every month. For TSE-listed stocks, this information is subsequently published in *The Daily Record*. From this source we obtained the trading activity for each firm in our sample during the announcement month and the subsequent 12 months.

This information is summarized in Table 7. The fraction of shares actually repurchased is surprisingly low. Panel A reports that at termination of the repurchase program, roughly a quarter of the sample did not buy any shares. Less than 10% of sample firms fully complete their repurchase program. Overall, the mean completion rate is 28%. For comparison, Stephens and Weisbach (1998) report one-year completion rates ranging between 46% and 75% for a sample of 450 U.S. repurchase programs announced between 1981 and 1995.[14] Considering the stated goals of the Canadian regulatory approval process, such a low completion rate by Canadian firms seems surprising and raises some doubt as to the efficacy of the Canadian approval process.

Panel B reports cumulative repurchase activity at various points during the program. Roughly half of the shares actually repurchased occurs during months 0 to 3. The completion rate has increased slightly between 1989 and 1995. Perhaps the most interesting result concerns the difference in completion rates between value and growth stocks. Value stocks have a higher completion rate, 29.3%, in

[14] Because U.S. firms are not required to disclose repurchase activity in a straightforward manner, Stephens and Weisbach (1998) use a variety of approaches to estimate completion rates for U.S. stocks.

comparison to growth stocks, 23.9%. However, more striking results are obtained for extreme cases. Extreme value stocks, defined as companies in the top book-to-market quintile, have an average completion rate after 12 months of 34.6%. Extreme growth stocks, however, have an average completion rate of only 14.1%. This result is consistent with undervaluation being an important factor for repurchasing stock.

In Table 8, we consider long-run performance conditional on the completion rate. We examine two scenarios: those cases where firms repurchased at least some shares versus cases where they repurchased no shares. For both groups, the three-year abnormal return is similar, roughly .50% per month, suggesting that managers may have initiated a program in response to perceived undervaluation. However, the timing of these abnormal returns appears to differ between those cases where firms do, and do not, repurchase shares. For those cases where firms repurchase at least some stock, abnormal returns are insignificant in year 1 but increase substantially in years 2 and 3. However, for firms which repurchase no shares, abnormal performance in year 1 is very high, 1.33% per month. In years 2 and 3, abnormal returns are substantially lower and not statistically significant. One interpretation of this finding is that following an increase in stock prices, managers find repurchases to be less attractive.[15] This is consistent with the undervaluation story. The results are also consistent with the hypothesis that managers are better able than the market in assessing the value of their firm's shares.

7. Robustness checks

a. Value-weighted calendar-time portfolios

Another popular approach when measuring abnormal performance is to value-weight the stocks rather than equal-weight them as we have done to this point (e.g., Fama and French (1993), Mitchell and

[15] Such strategic repurchasing behavior by managers is consistent with Ikenberry and Vermaelen (1996) who model the inherent flexibility afforded managers with authorized open market repurchase programs.

Stafford (1997)). For large institutional investors, a value-weighted investment strategy might be more informative. Moreover, the value-weighted approach is more consistent with a long-term buy-and-hold strategy. And, finally, this approach is also a more conservative test as larger stocks are typically thought to be more efficiently priced relative to smaller stocks.

However, implementing such a value-weighted strategy can be problematic for it may result in undiversified portfolios during some periods of time. For example, in some months, a large portion of the portfolio can be invested in a single stock, such as Seagrams in our sample. Such an undiversified trading strategy is unrealistic from an investor's point of view. To address these issues, we form value-weighted portfolios in calendar-time, but limit the maximum weight that any one stock can receive in a given month to 10 times the average weight of all the stocks in the portfolio.

Table 9 reports evidence using value-weighted portfolios for all repurchase programs as well as evidence for value and growth stocks separately. Overall, for the three-year holding period, abnormal performance continues to be positive, .35% per month (t = 2.31). Looking at each year separately, a value-weighted approach shows poor performance in year -1, positive (though insignificant) abnormal performance in year +1 (.29% per month), and significantly positive abnormal performance in years 2 and 3 (.50% and .43% per month, respectively).[16]

Consistent with the results in Table 6, repurchase programs announced by value stocks generate subsequently higher abnormal performance compared to growth stocks. For value stocks, abnormal returns for years 1 to 3 are positive, 0.51% per month, and significant. For growth stocks, the years 1 to 3 abnormal return is -0.10% per month.

b. Weighted least squares

We have estimated abnormal performance with the Fama-French three-factor model using

[16] We also estimated the value-weighted approach without placing any constraint on the maximum weight a firm might have in a given month. The point estimates are similar to that reported in Table 9. However, as expected, the standard errors of the estimated coefficients are somewhat higher.

ordinary least squares where each month in our analysis is treated equally. While we have eliminated months where a given portfolio has 6 or fewer stocks, there remains substantial variability in the number of stocks in the portfolio over time.[17]

To address the potential problem of heteroscedasticity, we estimate abnormal performance for the three-factor model using weighted least squares, the results of which are reported in Table 10. Here, the impact of each month on the analysis is proportional to the number of firms in the portfolio in a given month. For the sample overall, the findings are essentially the same. For example, using the three-year holding period, the abnormal return is .656% per month (t = 4.61). This is slightly higher than the corresponding result of .533% using ordinary least squares. Looking at each of the years measured separately, the results obtained using weighted least squares are consistent with that observed earlier. Table 10 also reports evidence using weighted least squares for portfolios formed separately for value stocks and growth stocks. Again, the results are consistent with that reported earlier using ordinary least squares.

c. Equity issuance

As a final check, we contrast our findings for cases where Canadian firms reacquired shares with cases where Canadian firms issued shares. Thus, we examine the issuance of seasoned equity and the issuance of shares for acquisitions by TSE-listed firms. A result consistent with the repurchase evidence would show a downward drift in stock prices subsequent to an issuance of shares. Using U.S. data, several studies reported downward drifts following seasoned equity offerings, including Loughran and Ritter (1995 and 1998) and Spiess and Affleck-Graves (1995). Following U.S. acquisitions, papers such as Agrawal, Jaffe, and Mandelker (1992) and Rau and Vermaelen (1998) also report a deterioration in performance.

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[17] For example, the maximum number of stocks held in the three-year portfolio for the overall sample occurred in December 1995, when the portfolio held 201 stocks. The smallest number of stocks was 22 which occurred early in our sample period, July, August and September of 1990.

As before, we examine cases during the 1989 to 1995 time period and obtain our sample from Securities Data Co. For both offerings and acquisitions, we limit our sample to cases where the transaction involved at least $10 million. Moreover, because we are focusing on the issuance of equity, we remove acquisitions where stock comprised less than one-third of the financing in the transaction. Over our sample period, there were 134 offerings and 27 completed acquisitions for which we could obtain return data.[18]

Table 11 reports long-run abnormal performance using the three-factor model for offerings and stock acquisitions together as well as separately. Using both events together, abnormal performance during the three-year post-announcement period is -.538% per month (t = -2.60). This is strikingly similar, though opposite in sign with those cases where managers are repurchasing shares (.533% per month). Prior to the announcement, we see positive and significant abnormal performance, 1.111% per month (t = 1.98). This compares with negative abnormal performance prior to the announcement of a stock repurchase. Looking at equity offerings and acquisitions separately, the results are consistent with the overall sample. For equity offerings, the results appear to be more dramatic. Prior to the announcement, abnormal returns are higher in comparison to acquisitions. Following the announcement, abnormal performance is comparatively lower.

Overall, this evidence is consistent with the hypothesis that managers' decisions depend on the market valuation of their firm's stock. In cases where prices appear to be cheap, managers tend to repurchase shares. Conversely, when prices are high, managers tend to issue shares.

8. Conclusions

Stock repurchases are an important corporate event and have been announced with increasing

[18] Securities Data reports many more acquisitions than included here. Nearly all of these deals were cash deals or involved the acquisition of very small firms.

frequency in recent years. In the U.S., companies have announced nearly 4,000 repurchase programs amounting to $400 billion between mid-1994 to mid-1997. This trend is apparent worldwide as countries have recently adopted new laws allowing firms to more easily acquire their shares through open market programs. Earlier research reports evidence of a long-run, abnormal drift in prices subsequent to open market repurchase announcements in the U.S., suggesting that markets underreacted to the news in repurchase programs. These observations motivate a further investigation of long-run performance subsequent to repurchase announcements using evidence from outside the U.S. and from a recent time period.

In this paper, we examine evidence for 341 Canadian firms listed on the Toronto Stock Exchange which announced open market repurchase programs totaling $13.8 billion during the period 1989 to 1995. The Canadian experience with respect to open market repurchases is similar to that observed in the U.S. The announcement return to repurchase programs is small, roughly 2% in the month the program is announced. The market, on average, seems to underestimate the information contained in repurchase announcements. Using a three-factor model, abnormal performance over a three-year holding period is .53% per month or roughly 6% per year. Alternative estimation procedures yield similar results. Thus, the evidence regarding repurchases seems consistent with the managerial story of mispricing. For comparison, we also examine cases where Canadian firms issued shares. Specifically, we estimated long-run performance subsequent to Canadian seasoned equity offerings and stock-financed acquisitions. Consistent with well-documented findings using U.S. data, long-run abnormal stock returns for these cases are negative.

However, undervaluation is not the only motive managers have for repurchasing stock. Other considerations may also be at work. Better long-run performance is expected from repurchases that are driven more by undervaluation than by other motives. Thus, for value stocks, one might expect undervaluation to be a more important factor for buying back shares than for growth stocks. Our results

are consistent with this hypothesis. Companies with high book-to-market ratios (value stocks) that announced a repurchase program tend to experience higher abnormal returns over a three-year holding period in comparison to low book-to-market firms. Furthermore, one might also expect large repurchase programs to be driven more by undervaluation than smaller programs. Indeed, here we also find that larger repurchase programs are associated with higher abnormal returns than are smaller programs.

Interestingly, the completion rate for Canadian repurchase programs is low. On average, Canadian firms in our sample repurchased only 28% of the shares stated in their programs, although completion rates are higher among value stocks where undervaluation may be a more important consideration for repurchasing stock. One reason for such low completion rates may be the strategic behavior by management as to when, and if, shares are repurchased. There is some evidence that a run-up in prices following implementation of a repurchase program leads managers to repurchase fewer shares.

This paper adds to a growing literature which finds that the market appears to be sluggish in how it adjusts to information. Firms repurchasing stock in open market transactions show evidence of abnormal long-run performance, suggesting that the initial market response to the program announcement is not complete. Of course, studies which examine long-term stock returns should be treated with caution since the results are sensitive to the benchmark used. On the other hand, unleashing numerous benchmarks on a trading strategy and concluding that the strategy does not work because it failed to outperform one of the benchmarks is also dangerous. In this paper, we revisit the literature on long-run evidence regarding stock repurchase programs that studied U.S. programs announced during the 1980s. Here, we focus on data from a different country and from a more recent time period. Moreover, we use a benchmark that, for U.S. programs, was found to produce lower abnormal returns. Overall, the evidence in Canada is consistent with earlier findings in the U.S. and supports the hypothesis that the market discounts the news contained in repurchase announcements and only slowly adjusts to this information over time.

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Table 1
Monthly Factor Returns in Canada

This table reports the mean and standard deviation of monthly factor returns (in %) for Canadian stocks using the Fama-French three-factor model during the period July 1990 to March 1998. The market excess return, $r_m - r_f$, is the monthly excess return to the TSE Index over Canadian treasury bills. The value minus growth factor (vmg) and small-cap minus large-cap (sml) factor are calculated from four style indices provided from BARRA: Small-cap-value, small-cap-growth, large-cap-value, and large-cap-growth. Among the 500 largest firms on the TSE, BARRA defines large stocks as the 200 largest firms in this set. The remaining 300 firms in this group define the small stock portfolio. Value and growth indices are calculated as a function of book-to-market and dividend yield for both small- and large-firm portfolios. The vmg factor is calculated by differencing the average of the two value indices (small-cap-value and large-cap-value) with the average of the two growth indices (small-cap-growth and large-cap-growth). Similarly, the sml factor is determined by differencing the average of the two small-cap indices with the average of the two large-cap indices.

	$r_m - r_f$	vmg	sml
Monthly mean	.596	.166	.142
Monthly standard deviation	3.446	2.318	2.506

Table 2

Summary Information
Open Market Stock Repurchase Programs Announced by TSE-listed Firms
1989 to 1995

This panel reports summary information for TSE-listed firms, obtained from Securities Data Co., which announced an open market stock repurchase program (normal course issuer bid) during the period 1989 to 1995. Reported is the number of firms, the mean percentage of outstanding shares announced for repurchase, the cumulative dollar amount (Canadian $ million), the mean abnormal announcement return and its associated *t*-statistic. The mean abnormal announcement return is the average total return for sample firms in the announcement month adjusted for the respective TSE index total return. Panel A reports this summary information by year. Panel B reports it by program size.

Panel A: *By Year*

Year	n	Mean % Announced for Repurchase	Dollar Amount	Mean Abnormal Announcement Return (%)	*t*-stat
1989	13	5.65	1,948.6	0.93	(1.15)
1990	20	5.64	2,420.0	0.63	(0.24)
1991	39	5.12	1,351.0	4.25	(1.89)
1992	57	4.90	1,001.7	2.64	(2.00)
1993	39	5.09	1,139.1	1.51	(0.64)
1994	71	5.53	2,655.0	-0.18	(-0.16)
1995	102	5.33	3,238.0	1.10	(0.92)
All	341	5.28	13,753.4	1.46	(2.35)

Panel B: *By Program Size*

0 up to 2.5%	32	1.42	1,176.1	1.52	(2.09)
2.5% up to 5%	62	4.38	2,296.2	0.82	(0.52)
5%	157	5.00	6,057.2	2.07	(2.15)
5%+ up to 7.5%	43	6.35	2,222.8	2.08	(1.08)
7.5% and above	47	9.04	2,001.1	-0.34	(-0.22)
All	341	5.28	13,753.4	1.46	(2.35)

Table 3

Long-run Performance of TSE-listed Firms Announcing Open Market Stock Repurchase Programs 1989 to 1995

Portfolios are formed in calendar time for TSE-listed firms which announce an open market stock repurchase program. As time proceeds, firms are introduced to a portfolio at various points relative to the announcement. For example, for the portfolio labeled year 1, firms are included in the portfolio at the beginning of the month following the announcement (month 1) and remain in the portfolio until month 12. Portfolios are also formed for year 2 (months 13 to 24), year 3 (months 25 to 36), years 1 to 2 (months 1 to 24), years 1 to 3 (months 1 to 36) and year -1 (months -12 to -1). Excess performance (in %) is measured using both a one-factor CAPM approach and a three-factor model as suggested by Fama and French (1993):

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \epsilon_t$$

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-cap-value and large-cap-value indices and the average small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
All Firms	α	-0.302 (-0.84)	0.789 (2.64)	0.844 (2.78)	0.630 (1.97)	0.857 (3.55)	0.693 (3.26)
	β_m	0.76 (-2.09)	0.78 (-2.36)	0.74 (-2.85)	0.73 (-2.96)	0.77 (-3.28)	0.78 (-3.65)
	R^2	.41	.48	.43	.45	.57	.64
	α	-0.489 (-1.73)	0.541 (2.29)	0.618 (2.37)	0.474 (1.61)	0.631 (3.40)	0.533 (3.80)
	β_m	0.88 (-1.23)	0.92 (-1.10)	0.84 (-2.00)	0.81 (-1.92)	0.87 (-2.35)	0.88 (-2.73)
	β_{vmg}	0.00 (0.00)	0.03 (0.23)	0.05 (0.42)	-0.08 (-0.52)	0.09 (1.00)	0.03 (0.42)
	β_{sml}	0.74 (5.90)	0.71 (6.48)	0.65 (5.68)	0.53 (3.54)	0.65 (7.66)	0.64 (10.03)
	R^2	.64	.69	.61	.58	.76	.85

Table 4
Long-run Performance for TSE-listed Firms Announcing Repurchases 1989 to 1995: RATS Adjusted Approach

Monthly returns (in %) for sample firms are aligned in event-time, where month 0 represents the announcement month. Performance is measured with Ibbotson's (1975) Returns Across Time and Securities, or RATS, methodology using the Fama-French (1993) three-factor model:

$$r_{i,t} - r_{f,t} = \alpha_t + \beta_t(r_{m,t} - r_{f,t}) + \beta_{vmg,t}(r_{value,t} - r_{growth,t}) + \beta_{sml,t}(r_{small,t} - r_{large,t}) + \epsilon_t$$

Here, $r_{i,t} - r_{f,t}$ is the excess return to firm i in month t. For that same month, $(r_{m,t} - r_{f,t})$ is the excess return to the TSE, $(r_{small,t} - r_{large,t})$ is the return for the size factor and $(r_{value,t} - r_{growth,t})$ is the return to the book-to-market factor respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth indices defined by BARRA using the 500 firms included in the TSE index. The value minus growth factor is calculated by taking the difference between the average small-cap-value and large-cap-value indices and the average small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Using this approach, α_t is our estimate of abnormal return (AR) which is estimated each month and cumulated over time (CAR).

Month	AR	*t*-stat	CAR	*t*-stat
1	0.22	(0.36)	0.22	(0.36)
2	1.22	(1.29)	1.44	(1.27)
3	0.01	(0.02)	1.45	(1.07)
4	-0.64	(-1.14)	0.81	(0.55)
5	-0.33	(-0.53)	0.48	(0.30)
6	-0.77	(-1.18)	-0.29	(-0.35)
9	1.00	(0.94)	3.04	(1.35)
12	0.75	(1.05)	6.16	(2.38)
15	0.88	(1.35)	7.34	(2.59)
18	0.52	(0.63)	9.46	(3.04)
21	0.88	(0.90)	12.71	(3.65)
24	1.11	(1.44)	14.50	(3.99)
27	1.04	(1.21)	18.62	(4.66)
30	-0.46	(-0.63)	19.47	(4.62)
33	1.30	(1.20)	21.59	(4.85)
36	-1.08	(-1.07)	23.31	(4.89)

Table 5
Long-run Performance of Small versus Large Repurchase Programs for TSE-Listed Firms 1989 to 1995

Portfolios are formed in calendar time for TSE-listed firms which announce an open market stock repurchase program during the period 1989 to 1995. Large programs are those announced for 5% or more of shares outstanding. Small programs are those announcing for less than 5% of shares. Excess performance (in %) is measured using a three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-ca-value and large-cap-value indices and the small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
Large	α	-0.669 (-1.39)	0.852 (2.08)	1.327 (2.43)	0.616 (1.16)	1.149 (3.14)	0.872 (3.32)
Repurchase	β_m	0.98 (-0.10)	1.09 (0.62)	0.74 (-0.26)	0.90 (-0.60)	0.80 (-1.75)	0.86 (-1.75)
Programs	β_{vmg}	-0.26 (-1.10)	-0.45 (-1.95)	-0.51 (-1.96)	-0.40 (-1.36)	-0.44 (-2.47)	-0.44 (-3.40)
(above 5%)	β_{sml}	0.65 (3.05)	0.56 (2.56)	1.01 (3.99)	0.76 (2.75)	0.67 (4.00)	0.66 (5.50)
	R^2	.44	.55	.37	.43	.50	.68
Repurchase	α	-0.611 (-1.84)	0.553 (1.47)	0.642 (1.78)	0.668 (1.47)	0.699 (2.42)	0.657 (2.75)
Programs	β_m	0.90 (-0.86)	0.72 (-0.28)	0.92 (-0.69)	0.74 (-1.86)	0.80 (-2.13)	0.80 (-2.61)
for 5%	β_{vmg}	-0.20 (-1.16)	-0.10 (-0.56)	0.20 (1.08)	-0.05 (-0.21)	0.13 (0.96)	0.07 (0.61)
	β_{sml}	0.72 (4.89)	0.63 (3.68)	0.52 (2.87)	0.32 (1.46)	0.60 (4.68)	0.57 (5.39)
	R^2	.60	.38	.50	.39	.52	.61
Small	α	0.204 (0.39)	0.491 (1.20)	0.449 (1.03)	0.099 (0.22)	0.047 (0.14)	0.044 (0.16)
Repurchase	β_m	0.86 (-0.81)	0.96 (-0.26)	0.80 (-1.50)	0.66 (-2.49)	1.04 (0.35)	1.04 (0.44)
Programs	β_{vmg}	0.24 (0.93)	0.16 (0.73)	0.17 (0.79)	-0.02 (-0.08)	0.48 (3.01)	0.45 (3.27)
(Less than 5%)	β_{sml}	0.55 (2.38)	0.48 (2.28)	0.71 (3.20)	0.09 (0.41)	0.76 (5.14)	0.80 (6.22)
	R^2	.28	.42	.39	.39	.56	.62

Table 6

Long-run Performance of Value versus Growth Repurchase Programs for TSE-Listed Firms 1989 to 1995

Portfolios are formed in calendar time for TSE-listed firms which announce an open market stock repurchase program during the period 1989 to 1995. In June of each year, value and growth cut-off values are determined by sorting TSE-listed stocks into two groups on the basis of book-to-market. Those with relatively low book-to-market ratios are labeled Growth Stocks while the rest are labeled Value Stocks. Excess performance (in %) is measured using a three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-cap-value and large-cap-value indices and the small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
Value Stocks	α	-0.875 (-2.45)	0.409 (1.23)	0.939 (3.23)	1.164 (3.16)	0.541 (2.40)	0.575 (2.85)
	β_m	0.82 (-1.50)	0.97 (-0.03)	0.77 (-2.36)	0.66 (-2.90)	0.88 (-1.75)	0.86 (-2.20)
	β_{vmg}	0.00 (0.00)	0.17 (1.01)	0.09 (0.61)	-0.35 (-1.81)	0.18 (1.68)	0.11 (1.14)
	β_{sml}	0.49 (3.07)	0.78 (5.12)	0.65 (4.36)	0.32 (1.67)	0.70 (6.77)	0.68 (7.37)
		.45	.54	.52	.47	.68	.71
Growth Stocks	α	0.490 (1.57)	0.185 (0.58)	-0.029 (-0.08)	-0.144 (-0.29)	0.207 (0.95)	0.221 (1.11)
	β_m	0.88 (-1.19)	0.82 (-1.68)	0.82 (-0.81)	0.94 (-0.38)	0.87 (-1.89)	0.88 (-1.96)
	β_{vmg}	-0.20 (-1.29)	0.04 (0.26)	0.03 (0.15)	0.07 (0.26)	0.08 (0.75)	0.07 (0.69)
	β_{sml}	0.58 (4.18)	0.50 (3.44)	0.51 (3.30)	0.46 (1.80)	0.59 (5.94)	0.53 (5.77)
		.60	.46	.46	.35	.68	.72

Table 7
Cumulative Trading Activity
For TSE-Listed Repurchase Programs 1989-1995

This table reports cumulative share purchase activity (in %) by month for sample firms. Normal course issuer bids are defined to last exactly one year. Thus, months 0 and 12 are partial months. This table reports activity for all firms, including those which departed the sample prior to one full year. Repurchase activity is reported overall, by year, by program size, by market-capitalization, and by whether the firm is ranked as value or growth. Market-cap is determined using June cut-off values each year for all TSE-stocks. Firms below median market-cap in a given June are labeled as Small-cap while those with above median market-cap are labeled Large-cap. Similarly, each June, all TSE-listed firms are used to determine book-to-market cut-off values. Those repurchase firms whose book-to-market ratio is below median are labeled Growth while those above median are labeled Value. Extreme value and Extreme growth are those firms whose book-to-market ratio ranks them in the highest or lowest quintiles respectively compared to all TSE-listed stocks in a given June.

Panel A: Completion rate (in %) after 12 months

Portion of program completed	n	Mean
No shares repurchased	82	0.0
0 to 5%	46	1.9
5 to 10%	23	7.3
10 to 25%	53	17.8
25 to 50%	60	35.3
50 to 75%	31	63.1
75 to 100%	46	94.6
All firms	341	28.2

Panel B: Cumulative Trading Activity

	Program Size (%)	% of Program Completed by Month						
		0	1	2	3	6	9	12
All programs	5.28	2.6	6.0	9.2	12.3	19.8	25.2	28.2
Years 1989-90	5.65	2.2	6.4	8.1	11.2	15.4	18.6	19.6
Years 1991-92	4.99	1.3	3.7	5.8	8.3	14.6	19.5	22.3
Years 1993-94	5.37	2.5	6.1	10.4	14.3	23.2	28.9	32.3
Years 1995	5.38	4.0	7.9	11.3	14.0	22.1	28.5	32.0
Program < 5%	3.37	3.2	7.3	10.8	14.8	25.2	31.6	35.2
Program = 5%	5.00	2.0	4.7	7.7	10.6	17.3	22.3	25.1
Program > 5%	7.75	3.1	7.0	10.1	12.6	18.3	23.7	26.4
Small-cap	5.57	2.9	6.2	9.3	12.4	19.3	25.1	28.1
Large-cap	4.74	2.1	5.3	8.4	11.3	19.9	24.6	27.6
Growth	5.07	2.3	5.4	7.9	9.9	16.3	21.6	23.9
Value	5.41	2.5	5.9	9.2	11.9	20.0	25.4	29.3
Extreme growth	4.91	2.4	6.8	9.0	10.1	11.9	13.5	14.1
Extreme value	5.56	4.0	8.8	12.1	15.1	24.1	30.6	34.6

Table 8
Long-run Performance by Completion Rate
for TSE-Listed Firms 1989 to 1995

Portfolios are formed in calendar time for TSE-listed firms which announced an open market stock repurchase program during the period 1989 to 1995. Firms are sorted into two portfolios according to whether they did, or did not, repurchase any shares. Excess performance (in %) is measured using a three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-ca-value and large-cap-value indices and the small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
No shares repurchased during program	α	-0.649 (-1.62)	1.335 (2.68)	0.470 (0.81)	-0.284 (-0.39)	0.770 (2.16)	0.503 (1.68)
	β_m	0.68 (-2.46)	1.16 (1.00)	1.16 (0.86)	1.09 (0.42)	1.06 (0.57)	1.05 (0.56)
	β_{vmg}	-0.15 (-0.76)	-0.15 (-0.62)	0.03 (0.09)	0.46 (1.21)	-0.14 (-.81)	-0.02 (-0.16)
	β_{sml}	0.19 (1.11)	0.87 (3.87)	0.89 (2.80)	0.58 (1.57)	0.73 (4.49)	0.69 (5.01)
	R^2	.34	.51	.40	.29	.57	.63
At least some shares repurchased	α	-0.271 (-0.94)	0.257 (1.14)	1.064 (3.53)	0.932 (3.03)	0.560 (2.71)	0.525 (3.05)
	β_m	0.96 (-0.44)	0.90 (-1.38)	0.74 (-2.73)	0.76 (-2.46)	0.82 (-2.81)	0.84 (-3.05)
	β_{vmg}	-0.08 (-0.55)	0.06 (0.55)	0.03 (0.21)	-0.23 (-1.40)	0.14 (1.43)	0.04 (0.56)
	β_{sml}	0.78 (5.98)	0.62 (5.94)	0.58 (4.35)	0.63 (4.08)	0.64 (6.79)	0.65 (8.24)
	R^2	.67	.69	.50	.60	.69	.77

Table 9
Long-run Performance using Value-weighted Portfolios for TSE-Listed Firms 1989 to 1995

Value-weighted portfolios are formed in calendar time for TSE-listed firms which announce an open market stock repurchase program during the period 1989 to 1995. The weight of any stock is limited to 10 times the average weight of all firms a portfolio in a given month. Portfolios are formed using all repurchase stocks, value stocks and growth stocks. In June of each year, value and growth cut-off values are determined by sorting all TSE-firms into two groups on the basis of book-to-market. Those stocks with ratio values below median are labeled Growth Stocks while the remainder are labeled Value Stocks. Excess performance (in %) is measured using a three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-ca-value and large-cap-value indices and the small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
All Repurchase Programs	α	-0.192 (-0.53)	0.287 (1.42)	0.499 (2.28)	0.429 (1.93)	0.428 (2.31)	0.347 (2.31)
	β_m	0.73 (-2.20)	0.85 (-2.24)	0.82 (-2.56)	0.88 (-1.67)	0.82 (3.14)	.85 (-3.30)
	β_{vmg}	0.12 (0.68)	0.03 (0.35)	0.04 (0.40)	0.01 (0.05)	0.11 (1.22)	0.02 (0.26)
	β_{sml}	0.05 (0.33)	0.00 (0.00)	-0.22 (-2.34)	-0.01 (-0.11)	-0.15 (-1.75)	-0.03 (-0.45)
	R^2	.36	.71	.69	.73	.74	.81
Value stocks	α	-0.451 (-1.27)	0.388 (1.25)	0.292 (0.97)	0.774 (2.07)	0.465 (2.19)	0.506 (2.63)
	β_m	0.88 (-0.99)	0.77 (-2.26)	0.79 (-2.04)	0.85 (-1.22)	0.72 (-4.29)	0.73 (-4.51)
	β_{vmg}	0.41 (2.29)	0.47 (3.06)	0.22 (1.40)	0.26 (1.36)	0.37 (3.62)	0.30 (3.17)
	β_{sml}	0.29 (1.85)	0.16 (1.12)	0.20 (1.31)	0.26 (1.38)	0.06 (0.58)	0.10 (1.20)
	R^2	.46	.45	.48	.45	.60	.64
Growth stocks	α	0.074 (0.15)	0.138 (0.30)	0.485 (1.21)	-0.227 (-0.54)	0.449 (1.25)	-0.102 (-0.30)
	β_m	0.84 (-1.06)	0.91 (-.58)	1.03 (0.26)	0.91 (-0.67)	1.05 (0.43)	0.96 (-0.33)
	β_{vmg}	-0.38 (-1.59)	-0.44 (-2.01)	-0.18 (-0.95)	-0.31 (-1.40)	-0.22 (-1.27)	-0.31 (-1.87)
	β_{sml}	-0.31 (-1.47)	-0.26 (-1.27)	-0.46 (-2.54)	-0.06 (-0.29)	-0.37 (-2.29)	-0.12 (-0.76)
	R^2	.37	.42	.56	.51	.59	.56

Table 10
Long-run Performance of TSE-listed Firms 1989-1995 using Weighted Least Squares

Equal-weighted portfolios are formed in calendar time for TSE-listed which announce an open market stock repurchase program during the period 1989 to 1995. Excess performance (in %) is estimated using weighted least squares where the weight that a given month has in the analysis is proportional to the number of firms in the portfolio at that point in time. Thus, months where the portfolio holds few firms have proportionately less impact on the analysis than otherwise. Portfolios are formed using all repurchase stocks, value stocks and growth stocks. In June of each year, value and growth cut-off values are determined by sorting all TSE-firms into two groups on the basis of book-to-market. Those stocks with ratio values below median are labeled Growth Stocks while the remainder are labeled Value Stocks. Excess performance (in %) is measured using a three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-ca-value and large-cap-value indices and the small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
All Repurchase Programs	α	-0.406 (-1.77)	0.537 (2.44)	0.771 (3.22)	0.684 (2.62)	0.643 (3.62)	0.656 (4.61)
	β_m	0.87 (-1.67)	0.93 (-0.92)	0.86 (-1.99)	0.75 (-3.16)	0.89 (1.84)	.85 (3.28)
	β_{vmg}	-0.09 (-0.79)	-0.02 (-0.20)	-0.01 (-0.11)	-0.13 (-0.93)	-0.01 (-0.16)	-0.04 (-0.55)
	β_{sml}	0.63 (5.81)	0.64 (5.89)	0.71 (6.12)	0.47 (3.59)	0.67 (7.70)	0.62 (8.76)
	R^2	.72	.70	.68	.66	.77	.83
Value stocks	α	-0.923 (-3.15)	0.208 (0.71)	0.851 (3.26)	0.922 (2.69)	0.484 (2.33)	0.584 (3.14)
	β_m	0.80 (-1.88)	0.95 (-0.45)	0.79 (-2.79)	0.64 (-3.66)	0.86 (-1.99)	0.80 (-3.30)
	β_{vmg}	0.01 (0.02)	0.15 (0.98)	0.05 (0.38)	-0.27 (-1.55)	0.11 (1.11)	0.02 (0.26)
	β_{sml}	0.44 (2.94)	0.62 (4.22)	0.64 (4.85)	0.37 (2.26)	0.63 (6.15)	0.57 (6.26)
	R^2	.53	.54	.64	.56	.69	.73
Growth stocks	α	0.582 (2.00)	0.250 (0.78)	0.130 (0.38)	0.266 (0.59)	0.196 (0.87)	0.260 (1.28)
	β_m	0.85 (-1.52)	0.78 (-1.94)	0.92 (-0.68)	0.89 (-0.80)	0.85 (1.92)	0.85 (-2.20)
	β_{vmg}	-0.19 (-1.31)	-0.02 (-0.17)	0.06 (0.37)	0.02 (0.08)	0.02 (0.18)	0.03 (0.27)
	β_{sml}	0.60 (4.56)	0.42 (2.72)	0.61 (3.76)	0.39 (1.69)	0.52 (4.78)	0.47 (4.68)
	R^2	.63	.43	.51	.41	.64	.68

Table 11
Long-run Performance of TSE-listed
Seasoned Equity Offerings and Completed Stock Acquisitions
1989 to 1995

Equal-weighted portfolios are formed in calendar time for TSE-listed firms which made either a seasoned equity offering or completed a stock (or partial stock) acquisition of another company during the period 1989 to 1995. For acquisitions, only cases where common stock was used to finance at least one-third of the transaction are retained. Firms where the market value of the offering or acquisition was less than $10 million are excluded. The resulting sample includes 134 offerings and 27 acquisitions. Excess performance (in %) is measured using a three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-ca-value and large-cap-value indices and the small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. Calendar-time portfolios are constructed beginning July 1990 and ending March 1998. Months where the portfolios contained 6 or fewer stocks are ignored. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

		Year -1	Year 1	Year 2	Year 3	Years 1 to 2	Years 1 to 3
SEOs	α	1.111 (1.98)	-0.661 (-1.83)	-0.387 (-1.07)	-0.443 (-1.22)	-0.352 (-1.29)	-0.538 (-2.60)
and	β_m	1.38 (2.05)	0.78 (-1.85)	0.90 (-0.89)	0.96 (-0.35)	0.81 (-2.30)	.89 (1.74)
acquiring	β_{vmg}	-0.42 (-1.51)	-0.44 (-2.48)	0.12 (0.71)	-0.24 (-1.39)	-0.14 (-1.05)	-0.22 (-2.16)
firms	β_{sml}	0.50 (2.00)	0.35 (2.10)	0.20 (1.20)	0.16 (0.95)	0.20 (1.63)	0.24 (2.60)
together	R^2	.51	.46	.43	.53	.55	.73
SEOs	α	1.469 (2.58)	-0.981 (-2.51)	-0.799 (-1.25)	-1.283 (-2.36)	-1.131 (-2.11)	-1.453 (-2.92)
only	β_m	1.36 (1.89)	0.78 (-1.56)	0.95 (-0.27)	1.07 (0.39)	0.93 (-0.44)	1.01 (0.05)
	β_{vmg}	-0.54 (-1.90)	-0.45 (-2.09)	-0.02 (-0.08)	-0.02 (-0.06)	-0.14 (-0.52)	-0.19 (-0.78)
	β_{sml}	0.56 (2.22)	0.24 (1.11)	0.13 (0.46)	0.13 (0.45)	0.22 (0.90)	0.26 (1.13)
	R^2	.51	.45	.25	.43	.28	.36
Acquiring	α	0.439 (0.71)	-0.385 (-0.62)	-0.645 (-1.26)	-0.061 (-0.09)	-0.396 (-0.94)	-0.372 (-1.13)
firms	β_m	1.02 (0.09)	0.66 (-0.34)	0.81 (-1.21)	0.84 (-0.74)	0.72 (0.43)	0.77 (-2.33)
only	β_{vmg}	-0.37 (-1.04)	-0.42 (-1.40)	0.28 (1.11)	0.06 (0.18)	0.00 (0.00)	0.08 (0.50)
	β_{sml}	0.23 (0.70)	0.57 (2.02)	0.42 (1.77)	0.30 (1.02)	0.46 (2.33)	0.43 (2.88)
	R^2	.38	.22	.23	.51	.27	.40

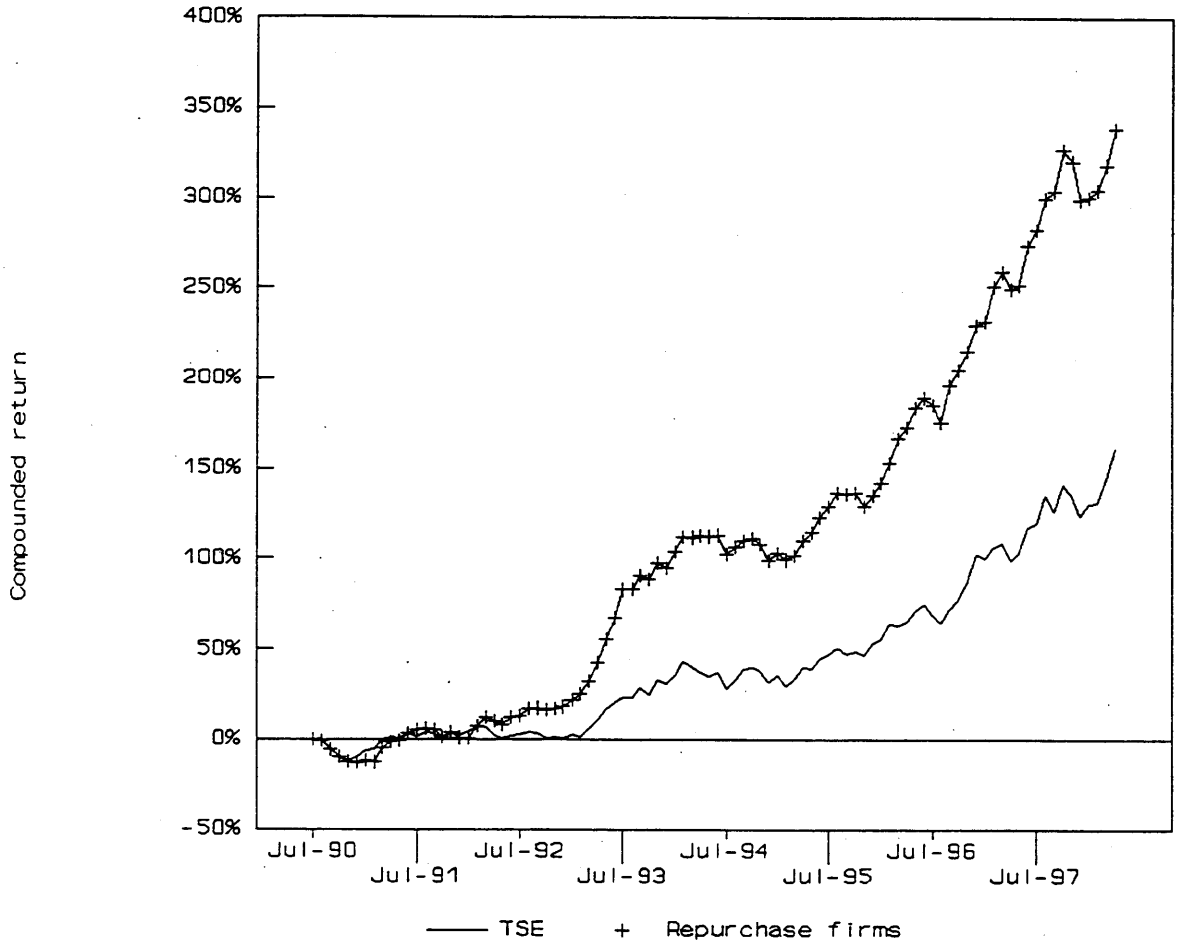

Figure 1 Calendar-time portfolio returns compared to the TSE. This graphs plots the compounded portfolio return of an investment strategy implemented between July 1990 and May 1998 that buys TSE-listed firms announcing open market repurchase programs. Using announcements between 1989 and 1995, firms are added to the portfolio in calendar time in the first month following the repurchase announcement and retained for 36 months. Each month, the portfolio is rebalanced to accommodate new firms entering the portfolio and old firms departing. The compounded performance of the TSE index over the same time period is also plotted.

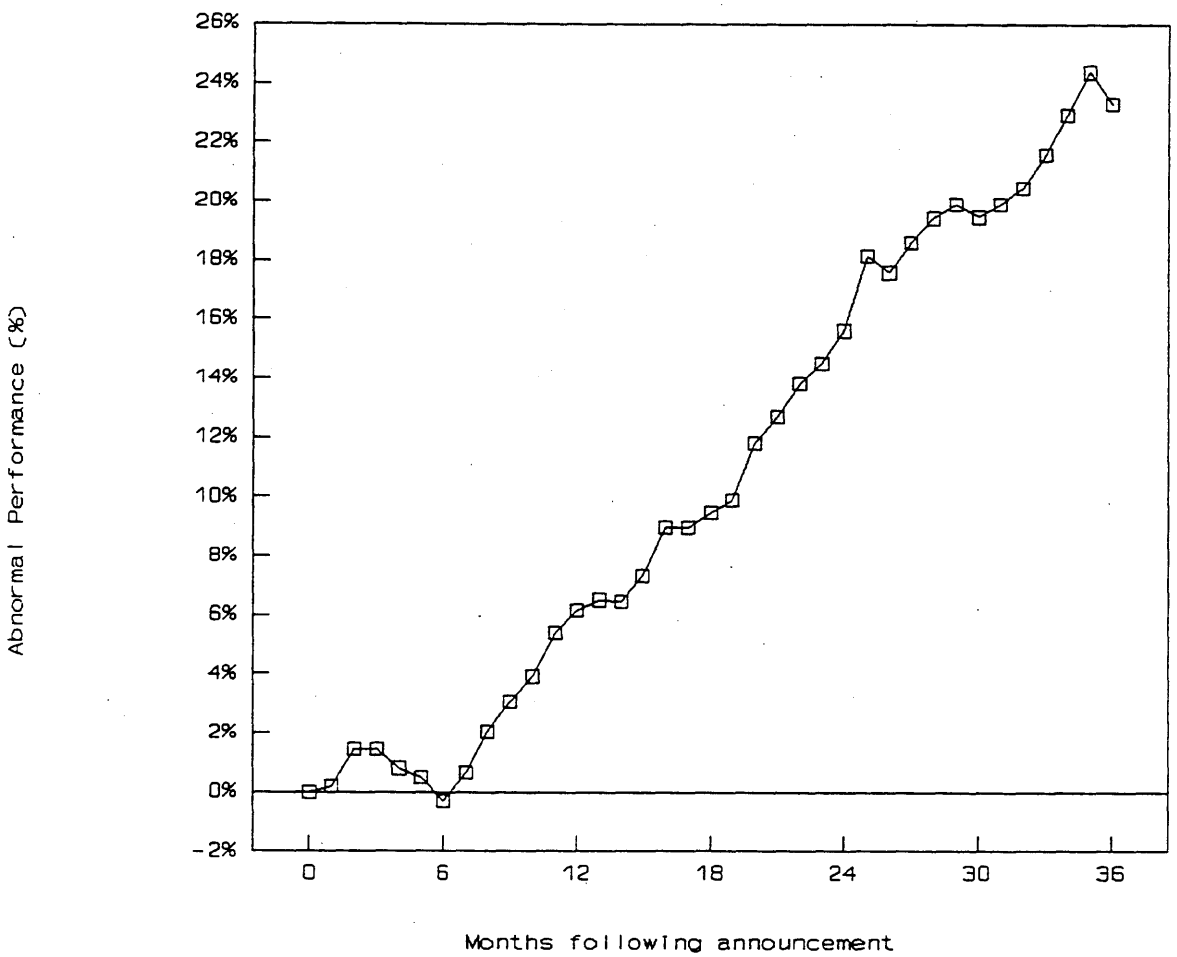

Figure 2 Abnormal performance by month. Abnormal performance is estimated using Ibbotson's (1975) RATS approach, applying the three-factor Fama-French (1993) model. Monthly returns are organized in event-time relative to the repurchase announcement and excess performance is estimated cross-sectionally each event-month. The plot above shows the cumulation of alphas over time relative to the announcement month.

Appendix A

General Specification of the Fama-French Three-Factor Model for TSE Stocks

Here we examine the robustness of the Fama-French three-factor model applied using BARRA Canadian style. Such an examination requires both accounting and return information for a broad cross-section of stocks. Because of the de-listing bias present in Compustat for Canadian stocks, we obtained a specially prepared tape from Standard and Poor's containing book-equity values that was free of survivor bias. To execute this test, we form monthly returns for an equal-weighted portfolio of all TSE firms with a market-cap of at least $5 million, beginning in July 1990 when BARRA style-indices are first available. This time-series continues through December 1995, the last month for which we have survivor-bias free return data from the TSE/University of Western Ontario database.

Next, monthly returns for sub-groups are calculated. Because of the limited number of TSE firms with equity market values above $5 million (roughly 600 to 750 firms in any given month), we form three groups on the basis of either book-to-market or market-cap. These groups are formed in June of each year and define portfolios for the subsequent 12 months. Because of the prevalence of small firms relative to firms comprising the TSE-Index, the small and middle market-cap groups are combined in a single group. Each subsequent June, the cross-section of TSE firms is re-sorted and new portfolios are defined for the next 12 months. The resulting series extend from July 1990 to December 1995.

Each time-series of monthly portfolio returns is regressed on the Fama-French three-factor model:

$$r_{p,t} - r_{f,t} = \alpha + \beta_m(r_{m,t} - r_{f,t}) + \beta_{vmg}(r_{value,t} - r_{growth,t}) + \beta_{sml}(r_{small,t} - r_{large,t}) + \epsilon_t$$

where $r_{p,t} - r_{f,t}$ is the excess portfolio return in month t, $(r_{m,t} - r_{f,t})$ is the monthly excess return to the TSE. In the three-factor model, $(r_{small,t} - r_{large,t})$ and $(r_{value,t} - r_{growth,t})$ are size and book-to-market factors respectively. Both factors are derived from large-cap-value, large-cap-growth, small-cap-value and small-cap-growth style indices defined by BARRA using 500 TSE-listed firms. The value minus growth factor is calculated by taking the difference between the average small-cap-value and large-cap-value indices and the average small-cap-growth and large-cap-growth indices. Likewise, the small minus large factor is calculated by differencing the average small-cap-value and small-cap-growth indices with the average large-cap-value and large-cap-growth indices. *t*-statistics are provided in parentheses and test the hypothesis that the parameter value is zero, except for β_m where the hypothesis test value is 1.0.

For the portfolio containing all firms, the alpha is insignificant and both the vmg and sml factors have positive loadings. This is not unexpected since the cross-section of TSE stocks is tilted in favor of smaller, higher book-to-market stocks relative to the large-cap, low book-to-market stocks which tend to dominate the TSE index. For portfolios formed on the basis of book-to-market, loadings on β_{vmg} increase as one moves from low to high book-to-market. Alphas for all three portfolios are insignificant. For portfolios formed on the basis of market-cap, the combined small- and mid-cap group has an insignificant alpha and a high loading on β_{sml} as expected. For large-cap stocks, the loading on β_{sml} is lower, however the alpha is negative and significant at traditional confidence levels.

		α	β_m	β_{vmg}	β_{sml}	R^2
All firms		-0.036 (-0.37)	1.05 (1.50)	0.20 (4.06)	0.70 (16.49)	.95
	Low	0.241 (1.81)	1.04 (0.90)	-0.29 (-4.32)	0.56 (9.62)	.92
Book-to-	Middle	-0.142 (-1.25)	0.98 (3.84)	0.22 (3.84)	0.58 (11.68)	.92
market	High	-0.250 (-1.26)	1.14 (2.14)	0.73 (7.39)	1.00 (11.54)	.84
Market-	Low/Middle	0.092 (0.81)	1.06 (1.62)	0.22 (3.92)	0.94 (18.80)	.94
cap	High	-0.246 (-2.18)	1.03 (0.78)	0.15 (2.59)	0.28 (5.69)	.92