

An Examination of the Impact of Disclosure Regulations on the Market Reaction to TSX Open Market
Repurchase Program Announcements

by

James Matthew Moore

A thesis

presented to the University of Waterloo

in fulfillment of the

thesis requirement for the degree of

Doctor of Philosophy

in

Accounting

Waterloo, Ontario, Canada, 2009

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Author's Declaration Page

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

This thesis investigates open market repurchase announcements by Toronto Stock Exchange (TSX) listed firms. First, I develop a comprehensive database of normal course issuer bids (NCIB) and report descriptive data on repurchasing activity between 1994 and 2005. I find that repurchase programs peak in 2000 and then decline. I also find evidence that repurchase programs are concentrated in certain industries. Next, using Compustat data, I investigate the characteristics of firms announcing repurchase programs. I find evidence that firms who announce repurchase programs are large in size and have high operating cash flows, low leverage, low share turnover and low dividend yields. I extend the repurchases literature by demonstrating that firms with low trading volume are more likely to initiate repurchase programs, consistent with an attempt to improve sell side liquidity. Finally, I investigate the market reaction to NCIB announcements. The results indicate that TSX firms experienced a significant market reaction to repurchase announcements between 1994 and 2005 as measured by both return and volume tests. I extend the repurchases literature by showing that announcement returns are higher for firms who followed through on their previous repurchase announcements. Little evidence exists of investor response to the disclosed reasons for repurchase programs.

Acknowledgements

I would like to acknowledge the contributions of my dissertation committee, colleagues, family and friends. Without their help this thesis would not have been possible.

I would like to thank Alan Douglas for being my supervisor, counsellor and friend throughout this dissertation. In addition to his continuous guidance and support on the contents of this thesis, he kept me going forward when the winds appeared to be blowing against me. I will always be grateful.

I would like to thank the members of my dissertation committee: Patricia O'Brien, Ranjini Ja, Mikal Skuterud and Sean Cleary (External). I thank them for their patience, constructive criticism and for improving this dissertation.

I would like to thank many colleagues who have supported me throughout this process. I would like to thank Jim Brown, Karen Salij, Brian Leader and Maria Loschiavo at the Institute of Chartered Accountants of Ontario for their support and encouragement. I am grateful to my colleagues at Brock University for their comments and support: Samir Trabelsi, Fayez Elayan, Pascale Lapointe-Antunes, Jennifer Li and Tom Barnes. I am very grateful to Arnie Cowan for technical assistance in using the Eventus software package. I would also like to thank Ken Klassen, Sati Bandyopadhyay, Gord Richardson and Steve Salteiro for constructive comments during the initial stages of this thesis.

I would like to thank the Institute of Chartered Accountants of Ontario for financial support.

Finally, I would like to thank my family. I thank my father and late mother for their continuous support and encouragement throughout this process. Most of all, I thank my wife for her love without which I could not have possibly done this.

Dedication

This thesis is dedicated to my mother Jeannie Mills Moore who passed away from cancer during the course of my studies at the University of Waterloo. Throughout my life my mother encouraged me towards higher education. It was in her garden that I developed the roots that have seen me through life. I take comfort in knowing how proud she would be.

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CHAPTER 1

Introduction and Outline of Dissertation

1.1 Introduction

Prior studies consistently document positive abnormal returns in the days surrounding stock repurchase announcements. These abnormal returns are consistent with open market stock repurchase programs conveying favourable information to investors. Most prior studies focus on US markets. This thesis examines the market reaction to open market repurchase programs in the Canadian markets by examining TSX firms during the years 1994 to 2005. I find that TSX firms experience a significant market reaction to repurchase announcements as measured by both volume and returns tests. In addition to examining the overall market reaction, I investigate whether investors use two disclosures that are required in Canada but not the United States: the requirement to promptly report repurchases and the requirement to disclose the reason(s) for the repurchase program.

I find that while TSX repurchase announcements increased during the period 1994 to 2000, repurchase announcements have declined in recent years. I find that TSX firms frequently only purchase a small percentage of the maximum shares that are indicated in repurchase announcements and many firms repurchase no shares at all. This raises the possibility that some of the announcements may not be credible. I investigate whether investors use past repurchases in assessing current repurchase announcements. I find evidence that announcement returns are higher for firms who repurchased a higher percentage of shares under their previous repurchase program. This evidence suggests that investors consider past actions in assessing current announcements, consistent with investors using past information to assess a current corporate announcement. I find little evidence that investors react to the reasons cited for repurchase programs. Taken together, these findings provide support for

the TSX requirement to disclose repurchases, but provide no support for the requirement to state the reason(s) for the repurchase program.

My analysis controls for the market's prior expectation of a repurchase announcement. First, the likelihood of firms announcing a repurchase program is modelled using a probit model. Then the market reaction is modelled in light of the market's prior expectation that a repurchase announcement will occur. This approach is necessary to avoid the potentially correlated omitted variable that corresponds to investors' prior expectations of an announcement occurring. As part of this analysis, I investigate several factors not previously investigated in the literature that may impact investors' expectations of a firm announcing a repurchase program. Specifically, I consider past repurchasing history and liquidity as potential variables that may be useful in predicting repurchase announcements. I find evidence consistent with low volume firms being more likely to announce a repurchase program. I also find that repurchasing firms are concentrated in certain industries, are large in size and have low leverage.

In addition to my investigation of additional factors that may impact the likelihood of repurchase announcements and the market reaction to them, I also utilize several methodological improvements. First, I utilize clustered standard errors as recommended by Petersen (2008). Clustered standard errors ensure that the calculation of standard errors considers that there may be multiple observations for some sample firms. Second, I consider competing information events and present results for the subsample of announcements that are not potentially confounded by competing information events such as earnings and dividend announcements. To my knowledge, no prior study on repurchases has utilized clustered standard errors or excluded announcements with competing information events. These methodological improvements serve to increase confidence in the results of this thesis.

My work is concurrent with the work of Schmidt (2007). Schmidt (2007) investigates whether the market reaction to TSX repurchase announcements is conditional on fulfilling past repurchase

announcements. This topic is similar to my investigation of hypothesis three in section 8.4. The results of this thesis as they relate to hypothesis three are similar to the results of Schmidt (2007). Both studies find that announcement returns are positively related to the extent to which the most recent repurchase program was completed.

1.2 Outline of Dissertation

This dissertation proceeds as follows. Chapter 2 discusses existing literature on payout policy and share repurchases. Chapter 3 outlines and discusses TSX repurchase disclosure requirements. Chapter 4 describes TSX repurchase activity from 1994 to 2005 and presents descriptive statistics of repurchasing and non-repurchasing firms. Chapter 5 reviews literature on the characteristics of firms that are likely to announce an open market repurchase program and presents predictions on announcement likelihood. Chapter 6 discusses the research design to be used to evaluate the likelihood of a firm announcing an open market repurchase program. Chapter 7 presents the announcement likelihood results. Chapter 8 reviews the literature on the reaction to repurchase announcements and presents predictions on the market reaction to TSX open market repurchase announcements. Chapter 9 discusses the research design to be used in the event study and the market reaction models developed in chapter 8. Chapter 10 presents the results of the event study and the market reaction models. Chapter 11 provides conclusions. References, tables, figures and appendices follow chapter 11. In all cases, expected relationships are stated as predictions where the matter has previously been investigated in the literature and as hypotheses for new areas investigated as part of this thesis. An overall model of the market reaction to open market repurchase program announcements is provided in Appendix 1.

Chapter 2

Payout Policy: Theoretical Frameworks for Payout Policy Decisions

2.1 Introduction

This chapter reviews literature related to payout policy decisions. The purpose of this chapter is to discuss theories that explain payout policy in general and, where applicable, the choice between dividends and repurchases. Section 2.2 reviews the Miller and Modigliani (1961) Dividend Irrelevancy Theory. Section 2.3 reviews signalling and cheap talk models as they relate to payout policy announcements. Section 2.4 reviews Jensen's (1986) Free Cash Flow Theory and its implications for payout announcements. Section 2.5 discusses undervaluation, shareholder wealth expropriation and managerial opportunism. Section 2.6 discusses Bagwell's (1991) proposition that share repurchases may be used as a takeover deterrent. Section 2.7 discusses leverage, taxes and financial flexibility. Section 2.8 discusses managerial incentives to repurchase shares caused by stock options.

2.2 Miller and Modigliani Dividend Irrelevancy Theory

Miller and Modigliani (1961) show that, assuming frictionless capital markets, a firm's payout policies should have no effect on its value. The intuition behind the Miller and Modigliani (1961) theory is that in a frictionless market, investors can obtain the same return as the firm on capital not needed for positive net present value investments. Hence, investors are indifferent to the firm retaining or distributing this excess capital since they will earn the same amount. If a firm does not pay dividends, a shareholder can simply sell a portion of the firm instead. Since capital markets are assumed to be frictionless, the firm is assumed to be liquid and there are no transaction costs. Miller and Modigliani (1961) do note the potential impact of frictions such as tax and transaction costs, but do not explicitly consider tax and transaction costs in their analysis since they vary from case to case. While not specifically addressing repurchases, the Miller and Modigliani theory implies that repurchases using excess capital should also be

irrelevant to firm value, since repurchases can be viewed as simply another way of returning capital to shareholders.

DeAngelo and DeAngelo (2006) re-examine payout irrelevance. Their analysis points out a major flaw in the Miller and Modigliani (1961) Dividend Irrelevance Theory. DeAngelo and DeAngelo (2006) show that Miller and Modigliani (1961)'s dividend irrelevancy proof requires that firms payout one hundred percent of their available cash flow. They demonstrate that once this requirement is relaxed, and the firm is able to retain free cash flow, payout policy does matter.

2.3 Signalling, Cheap Talk and Reputation

Bhattacharya (1979) incorporates information asymmetry and signalling into the analysis of payout policy. Bhattacharya (1979) extends Spence's (1973) seminal work on signalling to payout policy. Spence (1973) demonstrates that for a signal to be credible, the cost of the signal must be decreasing in firm quality. Therefore, only high quality firms will send the signal to the market since it will be less costly for them than low quality firms. The signal then allows the market to differentiate between low and high quality firms. Bhattacharya (1979) proposes that payout policy may be used as a method of signalling management's private information about firm value. A positive market reaction to a payout announcement will occur since the payout announcement indicates that the firm is of high quality and is able to make the announced payout. Firms with poor future potential are unlikely to announce payout increases because they will find it more costly to follow through on their announcements. Hence, payout policy is relevant because it serves to signal information to the market about firm value.

Bernheim and Wantz (1995) list numerous studies that support the role of dividend announcements as a signalling mechanism. These studies generally find that dividend announcements are effective in communicating information to investors. However, it is difficult to determine empirically if firms are using dividend announcements with the intention of signalling information or whether information is simply obtained from the announcement with no intention of the firm to signal. Numerous

studies also examine the role of signalling in repurchase announcements. Comment and Jarrell (1991), Stephens and Weisbach (1998) and McNally (1999) find support for stock repurchase announcements as signalling devices in the U.S. McNally (1999) takes the position that repurchase announcements are costly signals because insiders are exposed to more firm specific risks after the repurchase, since they will own a higher percentage of a more leveraged firm. Hence, announcement returns should be increasing in insider holdings. This assumes that the change in relative ownership percentage and firm leverage is substantial as a result of the repurchases. McNally (1999) finds evidence consistent with his predictions. As subsequently discussed in chapter 3, this may not be the case for TSX securities since the number of shares that can be repurchased is limited compared to the United States. Hence, insiders may not see a large increase in firm-specific risk as a result of the repurchase program.

A major problem with the use of signalling theory to explain the market reaction to repurchase announcements is that repurchase announcements are not binding commitments. For any signalling mechanism to reach equilibrium, the cost of the signal must be decreasing in firm quality. TSX firms only pay a small fee to the TSX to initiate a repurchase program, so there is little cost to making an announcement and then buying no or few shares. Repurchase announcements may constitute cheap talk that is unlikely to be believed by the market. As subsequently discussed in section 4.1, TSX firms typically repurchase a small percentage (median 15.7% per Table 4) of the maximum shares announced. This may reduce the credibility of the repurchase announcement signal compared to dividend increase announcements since dividend increases tend to be more permanent than repurchases. Firms may avoid making dividend increase announcements unless they are sustainable since they may be penalized if the dividends are later cut. Guay and Harford (2000) find that dividend increases are more associated with future cash flow increases than repurchases, suggesting that a dividend increase announcement may be better news than a repurchase announcement. Consistent with dividend increases being better news than repurchase announcements, Guay and Harford (2000) find that the stock price reaction is more positive for a dividend increase announcements than repurchase announcements.

Sobel (1985) finds that cheap talk can be useful in a repeated game. Sobel (1985) demonstrates that it pays for information providers to build a reputation for providing accurate and valuable information. Kim (1996) demonstrates the importance of reputation in repeated interactions involving cheap talk. Kim (1996, p. 787) provides the following conclusion in a pre-trial negotiation setting: “Repeated interaction between a defendant and a plaintiff can enhance the credibility of cheap talk and improve efficiency in outcomes that would be infeasible without cheap talk. The basic driving force is the reputation effect. If the players are concerned about their reputation, cheap talk cannot be taken as meaningless even in a game where the interests of the players are sufficiently conflicting, because possible current gains from opportunistic behaviour can be wiped out by future losses in payoff from damaged reputation.” Stocken (2000) provides further analysis and demonstrates that the use of review strategies, whereby players review past truthfulness, allows players to factor in past actions when evaluating a current disclosure.

Existing empirical studies in the finance literature support the existence of a reputation effect. Williams (1996) finds that the size of analyst forecast revisions in response to a current management forecast is positively related to past management forecast accuracy, after controlling for other aspects of believability. Hirst, Koonce and Miller (1999) provide similar experimental findings. Brucato and Smith (1997) find that the market reaction to dividend increase announcements is positively related to the directional consistency of past dividend and earnings changes, which they use as a proxy for the firm truthfully revealing private information. Hutton and Stocken (2006) find that investors respond more to management forecasts when the firm has developed a forecasting reputation, which they measure based on past forecasting accuracy and frequency. Outside of the finance literature, support exists for a reputation effect. Boulding and Kirmani (1993) find that firms who fail to fulfill their warranty obligations sacrifice their reputations, thereby eliminating future repeat business and losing other potential customers due to word-of-mouth effects. Davis and Weinberg (2005) find that online auction reputation information is accessed by consumers in making online purchasing decisions. These studies provide support for a reputational effect where there is a repeated game with feedback.

2.4 Free Cash Flow Theory

Jensen's (1986) seminal paper on free cash flow provides insight into the effects of payout policy in the presence of agency costs. Free cash flow is defined as cash flow remaining after funding all positive net present value investments. Agency theory suggests that managers may choose to fund negative net present value investments or invest in perks when free cash flow exists. Payouts reduce the ability of managers to invest in unprofitable investments or to invest in perks. Further, payouts force managers to return to capital markets to fund future projects, thereby subjecting the firm to the monitoring of capital markets. Therefore payouts will be viewed favourably by investors since they help to constrain agency costs. Jensen (1986, p. 325) concludes "Free cash flow theory predicts that, except for firms with profitable unfunded investment projects, prices will rise with unexpected increases in payouts to shareholders or promises to do so". Jensen's conclusion implies that share repurchase announcements should be viewed favourably by the market since they may serve to reduce agency costs and may indicate that corporate governance mechanisms designed to constrain over-investment are working. Isagawa's (2000) analytical paper shows that insiders with shareholdings are more likely to make payouts than waste funds on perks or low net present value investments since they bear some of the cost of the waste.

Recent studies find little evidence that corporate governance structures increase payouts or constrain management's tendency to over-invest free cash flow. Oswald and Young (2004), in a U.K. study, test a large number of governance variables and find that only management entrenchment (measured using degree of external board composition and insider holdings) reduces the tendency to payout excess cash. Richardson (2006) finds that the presence of activist shareholders and the existence of anti-takeover defences results in less over-investment of cash flow, but other variables are found to be insignificant suggesting that most corporate governance structures are ineffective in constraining over-investment of cash flow. These studies suggest that it is difficult to find a one size fits all model of corporate governance that serves to reduce the agency costs associated with free cash flow.

2.5 Undervaluation, Shareholder Wealth Expropriation and Managerial Opportunism

Ikenberry and Vermaelen (1996) propose that share repurchase programs give management the option to purchase shares when, in management's opinion, the shares are undervalued. They partially attribute the positive market reaction to repurchase announcements to the market's recognition that firm value is increased as a result of acquiring a costless, yet valuable, option to repurchase stock. However, as Oded (2005, p.273) points out, this analysis fails to recognize that if the firm is long in the option to repurchase shares when they are undervalued, the market is therefore short in the option to repurchase shares. Further, since the sellers are not aware who the buyer is in an open market repurchase transaction, sellers are not aware that they are selling to a more informed trader. As a result, there is really only a benefit to long-term shareholders, who will not see their wealth expropriated by a competing trader with insider information. Short-term shareholders can be exploited, since they may sell to management who has more information about the firm's future prospects than the short-term shareholder.

Stephens and Weisbach (1998, p.316) propose that managers time share repurchases for when they believe that their firm's stock is undervalued. They refer to this as the "asymmetric information" or "undervalued equity" hypothesis. In support of this hypothesis, Stephens and Weisbach (1998) cite studies showing that the initiation of repurchase programs is preceded by poor stock price performance and followed by good earnings and stock price performance. Stephens and Weisbach (1998, p.316) conclude that "the asymmetric information hypothesis predicts that repurchases will increase following poor stock market performance and decrease following good stock price performance".

Douglas (2007) proposes that managers may engage in share repurchases to enhance their personal wealth and to protect the personal benefits associated with control. Douglas's (2007) analysis concludes that managers are more likely to implement repurchase programs when they have a greater ability to impact pre-repurchase prices and the post-repurchase price. The ability to impact pre-repurchase price is increasing in information asymmetry and in the ability to time information releases.

Douglas's (2007) analysis also suggests that payout policies may be influenced by corporate governance, since corporate governance mechanisms may constrain managerial opportunism.

2.6 Takeover Deterrence

Bagnoli and Lipman (1989) develop a model whereby repurchases serve to increase the cost of a takeover by revealing management's private information about the firm. As a result, repurchases serve to deter takeover bids. McNally, Smith and Barnes (2006) provide results consistent with Bagnoli and Lipman's (1989) predictions. McNally, Smith and Barnes (2006), in a study of 60,000 TSX repurchase transactions, find that repurchases provide price support and the market learns that the shares are undervalued. Similarly, Bagwell (1992) demonstrates that firms can deter hostile takeovers through share repurchases. Bagwell (1992) demonstrates that repurchases increase the cost of a takeover by altering the distribution of shareholder reservation values since repurchases serve to prune investors who are willing to sell at lower prices. The likelihood of repurchasing to deter takeovers is increasing in shareholder heterogeneity with respect to the price the shareholder is willing to sell at. Bagwell (1992) shows that shareholder heterogeneity can result from differences in capital gains taxation as a result of investors having purchased at different prices.

2.7 Leverage, Taxes and Financial Flexibility

Vermaelen (1981) proposes that firms may borrow funds and engage in repurchases to increase their leverage and obtain the tax benefits associated with greater interest deductions. Also, if a firm is below its optimal level of leverage, repurchases will move the firm closer to its optimal level of leverage. However, Li and McNally (2007) find no evidence that firms that are below the average level of debt in their industry are more likely to repurchase shares.

Lie and Lie (1999) find evidence that firms adopt their payout policies to reflect the tax needs of their investors, which they refer to as "tax catering". Lie and Lie (1999) find that the likelihood of

repurchasing is negatively associated with recent stock price increases. They attribute this finding to firms being reluctant to repurchase when their shareholders will suffer high capital gains taxes.

Jagannathan, Stephens and Weisbach (2000) and Guay and Harford (2000) propose that firms use repurchases to distribute transient cash flow shocks and dividends to distribute permanent cash flows. Both studies propose that firms will choose dividends for permanent cash flows since dividends are implicitly permanent commitments, whereas repurchases are not. Both studies find that dividends are used to distribute permanent cash flow changes and repurchases are used to distribute temporary cash flow changes.

2.8 Managerial Incentives

Kahle (2001) investigates how stock options affect the decision to repurchase shares. Kahle (2001) finds evidence consistent with the option funding hypothesis. The option funding hypothesis predicts that firms will repurchase shares in order to prevent dilution due to stock options. Further, since stock options are not normally dividend protected, managers have an incentive to repurchase shares instead of paying dividends since repurchase announcements normally result in an increase in stock price, whereas dividend payments result in a drop in stock price (the “ex-dividend” effect).

2.9 Liquidity

Existing literature on repurchases does not address whether firms might choose to use repurchases in order to improve liquidity. Firms have an incentive to provide liquidity to their shareholders since if the stock is not liquid, many investors will avoid the stock. As a result, the full value of the stock is not achieved due to suppressed demand. Amihud and Mendelson (1986) show that expected stock returns are an increasing function of stock liquidity, as measured by the stock’s bid-ask spread. This model shows that firms with low liquidity should have lower security values. Longstaff’s (1995) model shows that the penalty for illiquidity can be large even when the illiquidity period is short. Archival literature supports the existence of an illiquidity penalty. Amihud and Mendelson (1991) on bonds, Silber (1991)

on restricted stocks and Brennen, Eldor and Hawser (2001) on options all confirm that securities with restricted marketability pay a price penalty. Mittoo (2003), using Canadian data, finds that stocks which have higher liquidity gains from cross-listing also experience greater abnormal returns surrounding US listing.

Due to the small size of many TSX firms, and the lower number of investors investing in TSX stocks than NYSE and Nasdaq stocks, investors of TSX firms who wish to sell often have a hard time finding a buyer. Elfakhani and Lung (2003, p. 198) note that “there are proportionately more small firms listed on Canadian exchanges; consequently more firms are thinly traded”. Elfakhani and Lung (2003) find that Canadian firms who undertake stock splits enjoy better liquidity after the split. Mittoo (2003) finds that Canadian firms who cross-list on U.S. exchanges enjoy greater liquidity after cross-listing. However, the costs of stock splits and cross-listing may outweigh the benefits of increased liquidity for many small firms. Repurchase programs provide a low cost alternative that may help to increase liquidity since repurchases will increase demand for the stock. Further, by reducing the public float, repurchases may improve sell-side liquidity by removing potential sellers from the market.

Chapter 3

TSX Open Market Share Repurchase Requirements

3.1 Introduction

Share repurchase regulations vary between Canada and the United States. As outlined in this chapter, Toronto Stock Exchange (TSX) share repurchase requirements result in TSX investors having more information about past repurchases and the reasons for the repurchase program at the time of a contemporaneous repurchase announcement than would investors of U.S. traded firms. This thesis analyses whether there is any evidence that investors use this additional information. I begin by analysing repurchase requirements in the United States. I then analyse repurchase requirements for TSX traded firms. I conclude by summarizing the regulatory differences between U.S. and TSX traded firms and discuss the implications of these differences.

3.2 Share Repurchase Regulations in the U.S.

There are no specific repurchase disclosure requirements for U.S. traded firms. Firms engaging in repurchases on U.S. traded exchanges are subject to the provisions of SEC Regulation 10-b-18, a safe harbour provision for share repurchases. There are no limits to the size of the program or the duration of the program. Firms are not required to provide a press release announcing the program or any reasons for the program. Most firms choose to voluntarily announce their programs. There are no requirements to disclose actual repurchases except in the normal course of preparing financial statements.

3.3 Share Repurchase Regulations on the TSX

TSX share repurchase programs can take two forms, fixed tender offers and normal course issuer bids. Fixed tender offers are rare and consist of large offers made directly to shareholders. During fixed

tender offers, section 94(8) of the Ontario Securities Act prevents the offering firm from issuing shares at the same time as the fixed tender offer. The most common type of repurchase is a normal course issuer bid (NCIB). NCIBs allow firms to repurchase shares on the open market. Section 94(8) does not apply to normal course issuer bids since they are not considered formal bids according to section 89(1), since paragraph 93(3)(f) exempts NCIBs from being formal bids. The definition of an ‘offeror’ in section 94 requires that the offer to purchase shares be a formal offer, otherwise section 94 would not apply. Since NCIBs are not formal offers, a firm making an NCIB is not an offeror under section 94 and section 94 does not apply. I also find evidence of many firms issuing shares while they have a NCIB in place¹.

Normal course issuer bids are restricted to repurchasing no more than the greater of 5% of outstanding shares or 10% of the public float in a year. No more than 1% of shares outstanding can be repurchased in any calendar month. Firms must apply for permission from the TSX to commence a NCIB. Programs are limited to one year at which time the firm must re-apply to the TSX. As a consequence, firms who wish to repurchase shares over a number of years must continuously re-apply to the TSX and make recurring announcements. In this thesis, firms who make recurring repurchase announcements are referred to as “serial repurchasers”. Serial repurchasers are common, resulting in the ability to examine the impact of past repurchase programs on the market reaction to current repurchases, which is a central theme of this thesis.

Additionally, the TSX requires Canadian firms to disclose the reason(s) for their repurchase program. This requirement exists in Australia, but not in the US or UK (Otchere and Ross, 2002, p. 516). Typical reasons include preventing dilution due to stock options, utilizing excess funds, indicating that the firm feels its shares are undervalued and increasing the proportionate interest of remaining shareholders. Table 3 shows the percentage of firms citing various reasons for their repurchase programs during the period 1994 to 2005.

¹For example, Bank of Nova Scotia had an NCIB in place from January 6, 2004 onward yet issued shares during the year ended December 31, 2004. Compton Petroleum Corporation announced an NCIB in March 2004 and in March 2005, yet issued shares for cash in February 2005. Other examples are available from the author on request.

3.4 Comparison of U.S. and TSX Share Repurchase Regulations

An overall comparison of the requirements of Canadian and U.S. regulations for stock repurchases is provided in Appendix 2. I focus on the effects of two unique TSX requirements, the requirement to disclose actual repurchases and the requirement to disclose the reason for the repurchase. The specific announcement disclosure requirements for TSX firms are contained in Appendix 3. A sample of one firm's repurchase announcement is contained in Appendix 4.

Most research focuses on U.S. firms. However, U.S. firms are not required to report their repurchases on a timely basis. The SEC is only now considering a quarterly reporting requirement. At this time, U.S. firms are only required to provide detailed information on their repurchases in their annual financial statements. Quarterly reports typically only disclose total shares outstanding. Decreases in a firm's total shares outstanding are an imperfect proxy for repurchases since the firm may also have issued shares during the period². Even if a firm voluntarily discloses repurchases in its quarterly report, it could take up to four months for investors to learn about the repurchases. As a result, investors of NYSE or Nasdaq firms are often unable to see on a timely basis if the firm has followed through on its repurchase announcements. These reporting differences result in investors of U.S. traded and TSX traded firms having different information sets at the time of a repurchase announcement. I focus on TSX firms to investigate whether the market uses the historical information provided by TSX firms to assess the credibility of subsequent repurchase announcements.

Additionally, the TSX requires Canadian firms to disclose the reason(s) for their repurchase program. This requirement exists in Australia, but not in the US or UK (Ochere and Ross, 2002, p. 516). This further differentiates the information set available to investors of U.S. and Canadian firms. This thesis investigates whether these reasons are associated with the market reaction to the repurchase announcement.

² For a more detailed discussion of this problem, see Stephens and Weisbach (1998) and Lie (2005), p.423, especially footnote 11.

3.5 Use of TSX Data

I utilize TSX data in this thesis for several reasons. First, as discussed above, TSX regulations result in investors having more current information on the results of past repurchase programs and information on the reasons for the repurchase program. This thesis tests whether this additional information is associated with the market reaction to the repurchase announcement. Second, as Ikenberry, Lakonishok and Vermaelen (2000, p. 2374) point out, Canada is the only other country that has a reasonable sample of repurchases. I am able to identify 2,870 equity repurchase programs during the period 1994 to 2005. Use of Canadian data allows me to confirm findings that have been previously established only using U.S. data. As noted in chapter 4, my sample is recent and includes a sub-period where repurchasing activity begins to decline. Hence, I will be able to confirm past empirical results in a substantially different regulatory setting. In addition, the ready availability of Canadian repurchase data has practical research advantages. Research on the repurchases of U.S. firms has been hampered by the lack of actual repurchase data since researchers need to use a variety of estimation techniques to approximate actual repurchases. For example, Lie (2005) is forced to throw out 37% of share repurchase programs since actual repurchases cannot be determined. Use of TSX data alleviates such problems since it is possible to determine the exact number of shares repurchased each month by consulting the TSX Daily Record³. Finally, my education has been largely subsidized in the past by Canadian taxpayers and I believe that it is important for Canadian researchers to investigate Canadian capital markets.

³ Oswald and Young (2004) note that disclosure of actual repurchases are made by U.K. firms, indicating the possibility of conducting this study using U.K. data. However, Oswald and Young (2004, p.32) are only able to identify 429 announcements over a six year period indicating that use of U.K. data would substantially restrict sample sizes in comparison to the use of Canadian data.

Chapter 4

Share Repurchase Activity on the T.S.X. from 1994 to 2005, Data Sources and Thesis Sample

4.1 Share Repurchase Programs and Announcements

I obtained a complete list of all open market repurchase programs between 1994 and 2005 from the TSX Daily Record. These repurchase programs, known as normal course issuer bids (NCIB), are summarized in Table 1. Table 1 indicates that overall repurchase activity peaked in 2000 and has generally declined since 2000. Table 1 documents that 16.3% of TSX listed securities during the period 1994 to 2005 chose to commence a repurchase program.

I exclude preferred share, debenture, warrant, instalment receipts and trust repurchases since the incentives to repurchase these securities may be different from the incentives to repurchase common equities. After excluding these other types of securities, there are 2,870 equity repurchase programs during the years 1994 to 2005. In order to be consistent with and comparable to other repurchase studies, such as Stephens and Weisbach (1998), Guay and Harford (2000), Ikenberry, Lakonishok and Vermaelen (2000), Kahle (2001) and Li and McNally (2007), I do not exclude financial firms from my analysis. As documented in Table 2, I am able to locate the press releases for 2,617 equity repurchase programs (91% of all equity repurchase programs) from the Lexis-Nexis database and the SEDAR database. I obtained few press releases for 1994 to 1996 since SEDAR does not cover those years, so the search was limited to the Lexis-Nexis database. The reasons given by firms for their repurchase announcements are summarized in Table 3.

Table 4 provides completion rates for NCIBs from 1994 to 2004. The completion rate for an individual firm is equal to the percentage of the announced maximum targeted shares that were actually repurchased. For the entire period, the mean completion rate was 31.9% and the median completion rate was 15.7%. These rates are consistent with most firms repurchasing considerably less than the

announced maximum target. Completion rates peak in 1999 and steadily decline after 1999. Median completion rates from 2001 to 2004 are less than 10%.

Name changes by firms are a potential concern to this study for two reasons. First, one important contribution of this thesis is the examination of whether firms' past repurchase history impacts the market reaction to their current announcements. If firms change names, it is possible that their history could be misclassified. Second, potential serial correlation in the residuals (see section 9.4) cannot be properly controlled for if firm name changes are not properly identified. To reduce the likelihood of name changes impacting the results, the following procedure was employed. First, I identified all NCIB announcing firms during the sample period whose names remain unchanged on the Compustat database as of January 2008. For the remaining firms, who are no longer on the Compustat database under their original name, I identified these firms as potential name changers. For the potential name changers, I then examined all new releases on the Lexis-Nexis and SEDAR databases in the three years following their last NCIB announcement. If the firm changed name during the three year period after its last repurchase announcement, I recorded the name change in my repurchases database.

4.2 Market Data

Market data were obtained from the Centre for Financial Markets Research Centre database. As summarized in Table 5, market data necessary to conduct an event study was available for 1,756 securities for returns analysis and 2,178 securities for volume analysis. The difference in the number of securities is attributable to the tendency of the CFMRC to leave return fields as no data available when there are no transactions on a given trading day. In contrast, the equivalent volume field contains a value of zero. Table 7 compares the accounting characteristics of the firms with volume data but no return data available against firms with available return data. Table 7 shows that the firms with missing returns data are smaller, have lower capital expenditures, lower market to book ratios, lower share turnover, higher leverage and higher dividend payout ratios than firms with available returns data.

Under my supervision, a Brock University Faculty of Business research assistant and myself compiled a volume index from the TSX Daily Record for each trading day from 1994 to 2005. This volume index is not available from commercial data sources and was compiled from the TSX Daily Record for use in this thesis in order to conduct volume testing. Daily volume, daily total transactions and daily total dollar transactions were manually entered into an excel spreadsheet and then converted to a SAS dataset for use in volume tests.

4.3 Accounting Data

Accounting data were obtained from the Compustat North American and Canadian files⁴. The primary purpose of this thesis is to examine the market reaction to TSX repurchase announcements. Care has to be taken to ensure that only ex-ante information is considered. Table 6 describes the availability of accounting data on the Compustat database. Table 6 shows that total asset data was available for 1,873 firms, constituting 65.3% of the 2,817 announcements. Compustat coverage is low in the early sample years and peaks at 81.1% in 2001. Firms are classified as repurchasers if they announced a repurchase program after the audit report date of the fiscal years presented in Table 6. The reported sample includes all TSX firms in the Compustat North American and Canadian files with fiscal years ending during the years 1993 to 2004 for which total asset and SIC code data were available (9,861 firm years). Data were obtained from the Wharton Research Data Services system during 2008. Using the list of repurchasing firms and their announcement dates (discussed in section 4.1), I then determined the audit report date of the immediately preceding fiscal year from the financial statements contained on the SEDAR database. I then assigned the appropriate Compustat accounting period to each repurchase announcement. In order to ensure that the information considered in the announcement prediction and market reaction models is ex-ante information available to investors at the time of the repurchase announcement, I allow a lag from year end to the audit report date for the preparation and auditing of the annual financial statements.

⁴ I found it necessary to merge these two databases, as there were examples of TSX firms who were contained in one file but not the other. Careful analysis of the data allowed me to eliminate duplicate listings. When using the North American dataset, I restricted the download to firms who were listed in the North American dataset as being traded on the TSX.

Typically the lag was approximately two months. For example, if a firm had a December fiscal year end and made a repurchase announcement on March 2, 2004, I would use the fiscal results for December 31, 2003 if the audit report date for 2003 was dated before March 2, 2004. Otherwise, I would use the fiscal results for December 31, 2002 since the results for 2003 are not publicly available and hence investors would only be able to develop expectations based on 2002 results. I am able to locate accounting data for 1,873 common equity repurchase announcements covering 2,030 securities (157 of the announcements were for two share classes). I report the data from the most recently reported fiscal year immediately preceding the repurchase program announcement date since the primary purpose of this analysis is to consider the publicly known characteristics of firms who subsequently announce repurchase programs. Therefore Table 6 presents the data of repurchasing and non-repurchasing firms that would be known to the market at the time of the announcement (or non-announcement). The actual announcements occurred in the year following the fiscal years shown in Table 6

Table 7 Panel A presents mean accounting values of repurchasing and non-repurchasing firms during the years 1994 to 2005. I document characteristics that prior research has indicated differ between repurchasing and non-repurchasing firms. Dittmar (2000) reports that repurchasing firms are larger than non-repurchasing firms and have lower leverage and market-to-book ratios. Consistent with her findings, I report differences in size, leverage and market-to-book ratios. Barth and Kasnick (1999) find that repurchasing firms have greater intangible assets than non-repurchasing firms. I investigate whether firms' cash and capital expenditures differ, since free cash flow theory (section 2.4) indicates that firms with excess cash and low capital expenditure needs should be more likely to repurchase shares. I also investigate whether firms are using repurchases in lieu of dividends by comparing the dividend payout ratios of announcing and non-announcing firms. The results documented in Table 7 Panel A indicate that announcing firms are characterized by greater size ($t=5.829$, $p<0.01$) and a greater proportion of intangible assets ($t=6.471$, $p<0.01$) than non-announcing firms. Announcing firms have a lower proportion of cash ($t=9.208$, $p<0.01$), capital expenditures ($t=4.602$, $p<0.01$), leverage ($t=1.893$, $p<0.10$)

and share turnover ($t=5.270$, $p<0.01$) than non-announcing firms. Market-to-book ratios and dividend payout ratios are not significantly different.

4.4 Industry Composition

Table 8 presents analysis of repurchasing and non-repurchasing firms by four digit SIC codes. Table 8 reports all four digit SIC codes with at least 90 Compustat observations during the period 1993 to 2004. Table 8 shows that there is substantial variation in repurchase program rates by industry. Industries where share repurchase programs are common include the investment industry (SIC Codes 6020, 6211, 6282 and 6799) and commercial real estate (SIC Code 6512). Industries where repurchase programs are rare include natural resource industries (SIC Codes 1000, 1040, 1311 and 1400), pharmaceutical and biological products (SIC Codes 2834 and 2826), broadcasting (SIC code 3663) and computer programming and system design (SIC Codes 7370 and 7373). These results are surprising since the industries with low repurchase rates are industries where information asymmetry is usually considered to be high. If firms are using repurchases to communicate their prospects, we would normally expect firms with high information asymmetry to be more likely to announce a repurchase program. However, the industries with low repurchase program rates are industries where cash is likely to be scarce. For example, mining firms require capital to continue explorations and pharmaceutical and biological firms require capital for research and development. Given the difficulty of justifying these products to capital providers, these firms may opt to retain cash for future projects rather than distributing cash through repurchases.

4.5 Corporate Governance, Ownership and Compensation Data

Corporate governance, ownership and compensation data were collected for announcing firms. These data were obtained from the firm's proxy circulars, which are available on SEDAR. Table 9 Panel A presents a mean board composition, insider holdings and option values for announcing firms.

Chapter 5

Repurchase Announcement Likelihood: Review of Literature and Hypothesis Development

5.1 Introduction

Where the market is able to anticipate a repurchase announcement, there is likely to be little market reaction to the repurchase announcement since in efficient markets investors will have already incorporated the probability of a repurchase announcement into price. Hence, consistent with Kim and Verrecchia (1991), the market reaction can be expected to be greater where the announcement is not anticipated by the market. Consistent with Li and Prabhala (2005) and Li and McNally (2007), I employ a conditional event study where first the likelihood of a repurchase announcement is modeled and then the market reaction to a repurchase announcement is considered in light of the market's prior assessment of the likelihood of a repurchase announcement being made. Use of a conditional event study first requires an analysis of announcement likelihood.

Past research, such as Dittmar (2000) and Li and McNally (2007), provides evidence on which firms are likely to engage in repurchase programs. In this section I discuss the likely antecedents of repurchase announcements⁵. Where this discussion overlaps with chapter 2, I refer the reader to the appropriate section in chapter 2. I include factors shown in previous research to be relevant to the announcement decision but also model some unique Canadian factors that are likely to impact repurchases in Canada. To clearly separate my intended contribution to the literature, I label factors examined in prior research as predictions and label new factors that I am exploring as part of this thesis as hypotheses.

⁵ My data also allows for the study of the antecedents of actual repurchases as opposed to repurchase announcements. I leave this topic for future study.

5.2 Repurchase History

Canadian firms' repurchase programs are limited to one year, after which a new application to the TSX must be made, along with a new announcement. In order to have multi-year repurchase programs, many Canadian firms routinely obtain TSX approval year after year. Investors may be able to anticipate these announcements given their recurring nature. Jagannathan and Stephens (2003) find that for U.S. firms, announcement returns are decreasing in the number of prior repurchase announcements, indicating that the market may anticipate repeat announcements. Consistent with Jagannathan and Stephens (2003) findings, I **predict (P1)** that the likelihood of announcing a repurchase program is positively associated with past repurchase program announcements.

5.3 Dividend Level

Fama and French (2001) document that public firms now pay less dividends, even when firm characteristics are considered. They interpret this as being consistent with stock exchanges including more growth-oriented firms. Grullon and Michaely (2002) find that while the overall payout rate has remained constant over time, dividends have decreased and repurchases have increased. They interpret this finding as evidence that firms are substituting repurchases for dividends. If firms are substituting repurchases for dividends, firms with a low dividend payout ratio should have a higher likelihood of engaging in repurchases resulting in a negative relationship between dividend payout ratio and the likelihood of announcing a repurchase program. However, Dittmar (2000) finds no relationship between shares repurchased and dividend payout ratio (dividends/income) and Li and McNally (2007) find no relationship between the likelihood of a repurchase announcement and dividend yield (dividends per share/market price per share), suggesting that firms are not substituting repurchases for dividends. However, given the findings of Grullon and Michaely (2002) and the difference in sample period between this study and Li and McNally (2007), I control for both dividend payout ratio and dividend yield.

5.4 Liquidity

As discussed in section 2.9, another possible motivation for repurchase programs is that repurchase programs may allow small, thinly traded firms to increase their stock's trading liquidity. TSX firms frequently (5.8% per Table 3) cite providing liquidity as a reason for their NCIB programs. The discussion in section 2.9 suggests that firms with trading liquidity problems have an incentive to provide trading liquidity through repurchases, resulting in the following hypothesis:

H1 The likelihood of a firm announcing a repurchase program is decreasing in firm trading liquidity.

5.5 Cash Flow and Corporate Governance

Many studies on repurchases use agency theory to explain the market reaction to repurchase announcements. Section 2.4 discusses the free cash flow theory first proposed by Jensen (1986) and suggests that firms with excess cash should distribute that cash to avoid the agency costs associated with the tendency of management to invest in self-serving investments or to utilize funds for perks, empire building, and excessive salaries. Consistent with agency theory, prior studies, such as Dittmar (2000) and Li and McNally (2007) find that high cash flow firms are more likely to repurchase shares since these firms bear greater agency costs if they do not make payouts. Further, Guay and Harford (2000) and Jagannathan, Stephens and Weisbach (2000) find that firms use temporary cash flow surpluses to fund repurchases. I therefore **predict (P2)** that the likelihood of a firm announcing a repurchase program is increasing in cash balances (P2A), operating cash flow (P2B) and change in cash flow (P2C).

5.6 Information Asymmetry

As discussed in section 2.5, where information asymmetry is high, management may wish to utilize its information advantage to purchase stock when management feels that the firm's stock price is undervalued. Under Ikenberry and Vermaelen's (1996) costless option theory, if management feels that

shares are or are likely to be undervalued, they will put a repurchase program in place so that the firm can repurchase its shares at depressed prices and potentially re-issue them when the market realizes its mistake and raises the stock price. Also, by announcing repurchase programs, firms may be able to signal to the market that they are undervalued, provided the announcements are credible.

Ho, Liu and Ramanan (1997) find that the market reaction to a repurchase announcement is negatively related to firm size and the number of analysts following the firm. These results are consistent with repurchase announcements conveying more news where greater information asymmetry exists at the time of the repurchase announcement. Ho, Liu and Ramanan (1997) also find that the re-evaluation of prior accounting information is more significant for firms with greater information asymmetry. Barth and Kasznik (1999) find that firms with more intangible assets, a proxy for information asymmetry, are more likely to repurchase shares. As discussed in section 2.5, Douglas's (2007) model suggests that management's ability to benefit from repurchase programs is positively related to information asymmetry. Consistent with their findings, I **predict (P3)** that the likelihood of announcing a repurchase program is positively related to pre-announcement information asymmetry.

5.7 Undervaluation

Many TSX firms cite undervaluation as a reason for repurchasing shares. Prior studies such as Dittmar (2000) and Li and McNally (2007) find that firms are more likely to repurchase shares where abnormal returns have been negative leading up to the repurchase announcement. Section 2.5 discusses Stephens and Weisbach's (1998) asymmetric information hypothesis. Consistent with the asymmetric information hypothesis, I **predict (P4)** that firms are more likely to announce a repurchase program where abnormal returns have been negative in the period prior to the announcement.

Chapter 6

Repurchase Likelihood: Research Design

6.1 Announcement Likelihood Model

The decision to implement a repurchase program is binary since firms choose to either commence a repurchase program or not. Therefore, the repurchase announcement decision is modeled using a probit model. Assume that firms' repurchase decision takes the following form:

$$y^* = \beta'x + e$$

where β is a vector of parameters, x is a vector of explanatory variables corresponding to the variables defined in section 6.2 and $e \sim N(0,1)$ is a random shock. We observe $y=1$, representing the firm announcing a repurchase program if $y^*>0$, and $y=0$, representing the firm not announcing a repurchase program, otherwise. The variables defined in section 6.2 are proxies for the factors discussed in chapter 5 that are expected to be used by the market to predict the likelihood of a repurchase announcement.

It can therefore be demonstrated that:

$$(1) \Pr(y=1) = \Phi(\beta'x)$$

where Φ is the normal cumulative distribution function.

Assuming that the observations are identically and independently distributed, we can construct the sample log likelihood function which can be maximized using standard nonlinear maximization algorithms.

Equation (1) is estimated using a probit model. Probit model 1 is estimated using accounting data and all available Compustat firms. I test the predictions and hypotheses in chapter 5 by comparing the results from model (1) to the predicted signs in Appendix 5.

As subsequently discussed in section 9.4, the predicted value $\Phi\beta'x$ is used in the subsequent market reaction models discussed in chapters 9 and 10 as a proxy for the markets' surprise level for the announcement. To control for the market's level of surprise that the announcement is occurring, I use model (1) to estimate the market's prior expectation that a repurchase announcement will occur. I then include the predicted value in my analysis of announcement returns and volumes to control for the market's level of surprise that the announcement occurred. The predicted value is bounded by 0 (low probability of repurchase announcement) and 1 (high probability of repurchase announcement).

6.2 Proxy Selection

Appendix 5 contains definitions of variables used to analyse the probability of a firm announcing a repurchase program and to develop a repurchase announcement expectations model. This section discusses the proxies selected, their measurement and the rationale for their selection.

6.2a Repurchase History

Repurchase history is measured using two variables, NCIB1 and NCIB3. NCIB1 is a binary variable, taking on a value of one if the firm announced a repurchase program in the fiscal year prior to the fiscal year in which the current repurchase announcement occurred. NCIB1 therefore measures whether a firm has had a recent repurchase program. NCIB3 measures the number of repurchase programs announced in the three fiscal years prior to the fiscal year in which the current repurchase announcement occurred. NCIB3 measures the intensity of repurchase program over a three year period and can take a value of 0 to 3. P1 predicts that the likelihood of announcing a repurchase program is positively associated with past repurchase programs. Therefore, a significantly positive coefficient on NCIB1 or NCIB3 will be taken as evidence in support of P1.

6.2b Dividends

Dividend level is measured using two variables, DYIELD and DVPT. DYIELD is measured as dividends per share during the most recently completed fiscal year prior to the announcement divided by share price at the end of the most recent fiscal year prior to the repurchase announcement. DVPT is measured as dividends per share divided by income per share during the most recently completed fiscal year prior to the repurchase announcement. If firms determine their total payout level and then decide between dividends and repurchases, there should be a negative relationship between DYIELD and DVPT and repurchase announcements.

6.2c Liquidity

Liquidity is measured using the variable VOL, which represents total share volume traded during the most recently completed fiscal year divided by total outstanding shares at the end of the most recently completed fiscal year preceding the repurchase announcement. Alternative measures include bid-ask spread and market depth. It is not possible to calculate market depth for TSX firms since the CFMRC database does not contain the number of bids and asks on the order book and the TSX is an electronic exchange. Bid-ask spread was rejected as a measure of liquidity since it is more a measure of price uncertainty rather than liquidity. The use of share turnover has some disadvantages. For instance, it is possible that a stock could be liquid while not trading frequently. If there are few reasons to trade because the stock's value is stable over time, trading may not occur frequently. However, it may still be possible to find a buyer or seller when necessary. Nevertheless, high trading volume does indicate that it is possible to find a buyer or seller on a regular basis. Therefore, it is used as the best available alternative to measure liquidity.

6.2d Cash Balances, Cash Flow and Investment Opportunities

As discussed in section 5.5 firms with high cash flow or large cash balances may repurchase shares in order to reduce the agency costs associated with using cash for perks or negative net present value

investments. Also, prior studies such as Guay and Harford (2000) find that firms use temporary cash flow surpluses to fund repurchases. **P2** predicts that the likelihood of a firm announcing a repurchase program is increasing in cash balances (P2A), operating cash flow (P2B) and change in cash flow (P2C). I measure cash balances (variable CASH) as cash over total assets at the end of the most recently reported fiscal year prior to the announcement. Operating cash flow (variable OCF) is measured using cash flow from operations during the most recently reported fiscal year over total assets at the end of the most recently reported fiscal year prior to the announcement. Finally, change in cash (variable CASHCHG) is measured as the percentage change in year-end cash during the most recently reported fiscal year prior to the announcement. Capital expenditures (variable CAPX) are measured as capital expenditures during the most recently reported fiscal year end over total assets at the end of the most recently reported fiscal year prior to the announcement. Capital expenditures (variable CAPX) reduce available cash. Therefore, there should be a negative relationship between CAPX and repurchase announcements.

6.2e Information Asymmetry

P3 predicts that the likelihood of announcing a repurchase program is positively related to pre-announcement information asymmetry. Appendix 5 contains definitions of the variables I use to measure information asymmetry. I use three measures of information asymmetry. First, consistent with Barth and Kasnick (1999)'s repurchase study, I measure information asymmetry based on intangible assets over total assets (variable INTAN) at the end of the most recently completed fiscal year prior to the announcement. My second measure is research and development expenditures over total sales (variable XRD) during the most recently completed fiscal year prior to the announcement. Huddart and Ke (2007) find that research and development expense is a good measure of information asymmetry based on models of informed trading. Finally, my third measure is size (variable SIZE) which I measure as the natural log of total assets at the end of the most recently completed fiscal year prior to the announcement. Smaller firms are expected to have greater information asymmetry since they typically have smaller annual reports

and less analyst coverage. Ho, Liu and Ramanan (1997) use size as a proxy for information asymmetry and find it to be negatively related to repurchase announcement returns.

6.2e Undervaluation

Firms' true values are unobservable. Therefore it is difficult to develop a proxy for which firms are undervalued. Section 2.5 discusses Stephens and Weisbach (1998)'s asymmetric information hypothesis. Consistent with the asymmetric information hypothesis and the results of prior studies, such as Stephens and Weisbach (1998) and Dittmar (2000), I measure the propensity for undervaluation with reference to price movements in the period leading up to the repurchase announcements. P4 predicts that firms are more likely to announce a repurchase program where abnormal returns have been negative in the period prior to the announcement. If managers believe that their firms' shares are undervalued, they may wish to exploit this perceived undervaluation by repurchasing shares, thereby reducing the firm's cost of capital. Managers are more likely to feel the firm is undervalued if there has been a sudden drop in price. I proxy for likelihood that the firm's management feels the firm is undervalued by measuring cumulative abnormal returns in the twenty eight trading days leading up to the repurchase announcement (variable CARJB). Kahle (2002), in a widely cited study, uses a period of forty days prior to the announcement, which represents approximately twenty eight trading days. I use a twenty eight trading day period to be consistent with Kahle (2002).

6.2f Industry Composition

As discussed in section 4.5, Table 8 shows that there is substantial variation in repurchase program rates by industry. Industries where share repurchase programs are common include the investment industry (SIC Codes 6020 and 6211) and commercial real estate (SIC Code 6512). Variable HIGHIND takes on a value of one for these SIC codes and 0 otherwise. Industries where repurchase programs are rare include natural resource industries (SIC Codes 1000, 1040, 1311 and 1400), pharmaceutical and biological products (SIC Codes 2834 and 2826), broadcasting (SIC code 3663) and computer

programming and system design (SIC Codes 7370 and 7373). Variable LOWIND takes on a value of one for these SIC codes and 0 otherwise. Given these varying repurchase program rates by industry, and assuming reasonable market efficiency, investors should expect more (less) repurchase announcements in industries where repurchase programs are prevalent (rare). Inclusion of the variable LOWIND and HIGHIND in Probit Model 1 controls for investor expectations by industry and assumes that industry repurchasing rates are relatively constant over time, otherwise treatment as an ex-ante variable is not reasonable. These variables are not included in Probit Model 1A to determine if inclusion of this potentially ex-post variable impacts the results. Probit Model 1A indicates that inferences are unchanged when this variable is excluded.

Chapter 7

Repurchase Likelihood: Empirical Results

7.1 Introduction

This chapter presents the empirical results of three probit models used to model the antecedents of repurchase announcements. The results are reported in Table 11. Probit Model 1 uses all TSX firms included in the Compustat database from 1993 to 2004 to model the likelihood of a firm announcing a repurchase program during the period 1994 to 2005. The results of Probit Model 1 indicate that past repurchase history, leverage, trading volume, research and development expenses, dividend yield, size and industry are associated with the probability of TSX firms announcing a repurchase program. Pearson correlations for the independent variables used in Probit Model 1 are reported in Table 10.

7.2 Probit Model 1/1A Results

Table 11 presents the results of Probit Models 1 and 1A. Probit Model 1A is a parsimonious version of Probit Model 1 that drops several potentially redundant or ex-post variables. The results of Probit Model 1A are qualitatively indifferent from the results of Probit Model 1, so the discussion of results below focuses on Probit Model 1. In this section, I discuss the results of Probit Model 1 as they relate to the predictions in chapter 5.

7.2a Firm History

Both NCIB1 and NCIB3 are positively associated with the probability of announcing a repurchase program in Model 1 providing support for P1. NCIB3 is also positively associated with the probability of announcing a repurchase program in Model 1A. In all cases, the variables are significant at the 0.01 level of confidence. This result is consistent with many TSX firms having repurchase programs year

after year, which I refer to as “serial repurchasers”. Serial repurchasers are common on the TSX, allowing investors to evaluate past repurchase activity when evaluating a current repurchase announcement and to form expectations about the probability of a firm announcing a repurchase program.

7.2b Dividends

Dividend yield (variable DYIELD) is negatively associated with the probability of a repurchase announcement. Firms who pay a large portion of their earnings to shareholders as dividends are less likely to announce a repurchase program. This result is consistent with firms choosing an amount of income to pay to shareholders. As dividends increase, repurchases decrease since the amount of the total payout is limited.

7.2c Liquidity

Trading volume (variable VOL) is negatively associated with the probability of a repurchase announcement, providing support for H1. This result is consistent with thinly traded firms finding it advantageous to provide trading liquidity through repurchase programs.

7.2d Cash Flow and Cash Balances

Cash flow from operations (variable OCF) is positively associated with the probability of a repurchase announcement, consistent with P3B. Cash balance as a percentage of assets (variable CASH) and change in cash from the previous year (variable CASHCHG) are not significantly associated with the probability of a repurchase announcement. Therefore, there is no support for P3A and P3C. These results are consistent with firms with strong operating cash flows announcing repurchase programs knowing that their strong operating cash flows will allow them to fund the repurchase program in the future. Actual cash on hand (CASH) is less important than the ability to generate cash (OCF) when firms are deciding whether to commence a repurchase program. Probit Model 1A uses the variable FCF in place of CASH, CASHCHG, OCF and CAPX. FCF represents free cash flow and is calculated as cash

from operations less capital expenditures during the most recently reported fiscal year over total assets at the end of the most recently completed fiscal year. FCF is positively associated ($p=0.001$) with the probability of repurchase in Probit Model 1A suggesting that firms seek to mitigate agency costs by distributing free cash flow, consistent with Jensen's (1986) free cash flow theory.

7.2e Information Asymmetry

P6 predicts that the likelihood of announcing a repurchase program is positively related to pre-announcement information asymmetry. Three variables are used to proxy for information asymmetry: INTAN, XRD and SIZE. Contrary to expectations, XRD is negatively associated with the likelihood of announcing a repurchase program. The variable XRD was selected since firms with high research and development expenses are expected to have greater information asymmetry, since investors may lack information on the success of the research and development efforts. However, XRD may also be a valid proxy for a firm's investment opportunities. Firms with high research and development expenses may simply be firms with larger investment opportunities. Firms with large investment opportunities may not wish to expend their available cash on repurchases. The result is, therefore, likely more due to the choice of an inappropriate proxy than evidence against P6. SIZE is positively associated with the likelihood of announcing a repurchase program, consistent with P6. However, SIZE can represent a number of factors beyond information asymmetry and care should be taken in interpreting SIZE as a variable. INTAN is not significantly associated with the probability of announcing a repurchase program. One problem with the use of this variable is that many TSX firms are young in comparison to more established firms on exchanges such as the NYSE, which have frequently been the subject of previous repurchases research. Intangible assets are generally only recorded from acquisitions, since both Canadian and U.S. accounting regulations prohibit the recording of self-created goodwill. As a result, many young TSX firms have not yet accumulated significant intangible assets that are recognized under generally accepted accounting principles. Therefore, the variable INTAN in a TSX research setting may be a weak measurement of information asymmetry. Taken together, the results provide

such weak support for P6 that it is premature to conclude that TSX firms' repurchase decisions are influenced by information asymmetry.

7.2f Industry Composition

As expected, firms in industries with high concentrations of repurchases (HIGHIND) are positively associated with the probability of announcing a repurchase program. Firms in industries with low concentrations of repurchases (LOWIND) are negatively associated with the probability of announcing a repurchase program. This result is not unexpected given the approach to measuring these variables. Probit Model 1A excludes industry composition. The results of Probit Model 1A are qualitatively unchanged from Probit Model 1 indicating that the inclusion of this variable has no impact on the overall conclusions of the results reported in Table 11.

7.2g Leverage

Leverage (variable LEV) is negatively associated with the probability of a repurchase announcement, consistent with firms with little financial slack being unlikely to engage in repurchase programs. Highly leveraged firms may have debt covenants that restrict their ability to reduce their capital levels. Also, highly leveraged firms may be cautious about using up cash for repurchases given their future debt obligations.

7.3 Conclusions on Announcement Likelihood

The results of Probit Model 1 indicate that the probability of announcing a repurchase program is positively associated with the number of past repurchase programs, operating cash flow and size. The probability of announcing a repurchase program is negatively associated with research and development expenses, trading liquidity, dividend yield and leverage. Membership in certain industries that have low or high levels of repurchase programs is also a strong predictor of repurchase announcements.

Chapter 8

The Market Reaction to TSX Repurchase Announcements

Literature Review and Hypothesis Development

8.1 Announcement Reaction

Prior studies consistently demonstrate positive cumulative abnormal returns around the time of repurchase announcements, providing empirical evidence that the market considers repurchase program announcements to be favourable news. U.S. examples include Vermaelen (1981), Comment and Jarell (1991), Jaganathan and Stephens (2003) and Grullon and Michaely (2004). Canadian examples include Ikenberry, Lakonishok and Vermaelen (2000) and Li and McNally (2007). Li and McNally (2007) document abnormal announcement returns of 0.73% during 1987 to 2000. As discussed in chapter 2, several non-mutually exclusive theories have been advanced to explain these abnormal returns. The most often cited theories explaining the positive market reaction to repurchase announcements are signalling theory and free cash flow theory. Under signalling theory, if a firm is able to credibly communicate an intention to repurchase shares, a positive market reaction to the announcement is predicted. Most past applications of signalling theory to repurchase studies presume that repurchase announcements convey credible positive information, since a rational firm would not normally repurchase shares unless management had non-public information that they were undervalued. The cost of false signalling is repurchasing overvalued shares, which raises the cost of equity capital. While there may be instances where management “burns money” by repurchasing overvalued shares, *ceterus paribus*, this behaviour is not expected to be widespread, so in general, repurchase announcements are considered to be good news. Free cash flow theory based on Jensen (1986) also predicts a positive market reaction to repurchase announcements. Under free cash flow theory, a repurchase announcement is considered good news since

it represents a commitment to reduce agency costs. Distributions of cash reduce agency costs because they limit the potential for management to spend cash on perks or to invest in low yielding investments.

On the other hand, there are reasons why repurchase announcements by TSX firms may not result in a significant market reaction. First, as shown in Table 1, TSX repurchase announcements are not uncommon corporate events. Many firms have repurchase programs every year. Investors may be able to anticipate these announcements. If investors are able to anticipate TSX repurchase announcements, there may be little market reaction since in an efficient market, investors should include the probability of repurchase into price. Further, as noted in chapter 3, TSX repurchase regulations limit the number of shares to be repurchased under the program to no more than 5% of outstanding shares or 10% of the public float. Jaganathan and Stephens (2003) report that the mean fraction of shares targeted for repurchase by U.S. firms is 7.68%, 7.13% and 6.67% for infrequent, occasional and frequent repurchases respectively. Jaganathan and Stephens (2003) report that the percentage of the targeted shares actually repurchased is 64.6%, 80.7% and 103.1% respectively for infrequent, occasional and frequent repurchasers. In contrast, Table 4 indicates that TSX firms on average only acquired 31.9% of the targeted shares (median is 15.7%). Given that TSX repurchase regulations limit the actual number of shares to be repurchased to a smaller amount than typically occur in the U.S., and TSX firms typically repurchase a lower percentage of the announced shares, investors may see the announcements as a non-material event, and may not react at all. Finally, investors may be concerned that the repurchase program will allow management to exploit its information advantage over shareholders in order to repurchase shares when management has inside information that they are undervalued. This may cause investors to avoid the stock and could result in a negative market reaction.

Therefore, it is an open empirical question as to whether TSX firms enjoy a significant positive market reaction to their repurchase announcements during the sample period in this study, which ranges from 1994 to 2005. Given the results of prior studies and the predictions of signalling and free cash

flow theory, I **predict (P5)** that announcing firms will have a significantly positive market reaction as measured by both returns and volume tests.

8.2 Size of Repurchase Announcement

Comment and Jarrell (1991) and Ikenberry and Vermaelen (1996) find that, for U.S. firms, announcement returns are increasing in the announced number of shares to be repurchased implying that the size of the repurchase program is important information. However, as noted by Li and McNally (2007), most Canadian firms choose to announce the maximum number of shares that may be repurchased in their open market repurchase programs. U.S. firms do not face similar restrictions, since Rule 10b only restricts the number of shares that can be repurchased on a daily basis. As a result, given that very few Canadian firms (approximately 15% of my sample) announce less than the maximum, the number of shares to be repurchased in Canada is unlikely to be a significant variable affecting the market reaction to a repurchase announcement.

8.3 Reasons for Repurchase Program

Unlike U.S. firms, TSX firms are required to cite the reason(s) for their repurchase programs. Some firms (<5%) ignore the TSX requirement to state the reason for their repurchase programs. Many firms provide multiple reasons. Table 3 presents the distribution of reasons given for the sample of firms for which press releases were available (see Table 2). Prior studies only focus on the undervaluation explanation and do not differentiate between firms who claim that their repurchase programs are being put in place due to current undervaluation or potential future undervaluation. I extend the repurchases literature by developing predictions for other explanations and including them in my empirical models.

Many firms (40.9%) cite current undervaluation as a reason for their repurchase program. If the claim of current undervaluation is credible, there should be a positive market reaction. Otchere and Ross (2002) and Li and McNally (2007) studying Australian and TSX firms respectively find that firms citing

undervaluation enjoy greater announcement returns. Consistent with Otchere and Ross (2002) and Li and McNally (2007), I **predict (P6A)** that announcement returns (and volume changes) are positively associated with firms citing current undervaluation as a reason for their repurchase programs.

Announcements that cite potential future undervaluation as a reason for the repurchase program (32.4%) should be viewed positively. This explanation indicates that management will create demand for the firm's shares when, in management's opinion, the shares are undervalued. This may reduce information asymmetry since the market will be able to infer from management's actions information about the value of the firm's shares. I **predict (P6B)** that announcement returns and volume changes are positively associated with firms who cite putting the program in place in case of future undervaluation as a reason for their repurchase programs.

Announcements that cite improving the liquidity of the firm's stock as a reason for the repurchase program (5.8%) should also be viewed positively. As indicated in section 2.8, analytical and empirical studies support the notion that firms with low market liquidity pay a 'liquidity penalty'. If management is able to credibly communicate an intention to improve market liquidity, the market should respond positively to the announcement since improving market liquidity should increase the value of the firm. I **predict (P6C)** that that announcement returns (and volume changes) are positively associated with firms who cite improving market liquidity as a reason for their repurchase program.

In the three cases above, I predict a positive reaction, but only if the announcement is credible. I will inter-act these variables with my credibility variable (past follow-through). I predict a positive reaction only when the disclosed reason is credible. For the explanations that follow, I do not have clear predictions since there are competing arguments as to what the market reaction should be and the explanations may not be informative. Nevertheless, it is an interesting empirical question as to whether these explanations impact the market reaction.

Some firms (7.3%) cite avoiding dilution due to stock options as a reason for their repurchase programs. This rationale might evoke a positive reaction if investors are concerned about dilution of their interests due to stock options. On the other hand, the market might see the announcement of the intention to purchase shares as proof that the stock option programs are expensive and may react negatively to the announcement. Kahle (2002) finds that announcement returns are smaller for firms with high levels of non-managerial options. Kahle (2002) attributes the finding of decreased returns to the market interpreting a repurchase to fund options as not being indicative of undervaluation. Consequently where a firm cites option funding as the reason for its repurchase program, I expect no abnormal returns during the announcement window.

Announcements that cite excess cash (5.1%) or good use of cash (57.7%) as an explanation could also evoke either a negative or positive response. If the market perceives that the firm has few investment opportunities, a negative reaction could occur. On the other hand, if the market had already viewed the firm as having few good investment opportunities before the repurchase announcement, the lack of investment opportunities should already be incorporated in price. Consistent with Jensen's (1986) free cash flow theory, announcing the return of excess cash should be viewed as a positive development since management is indicating that they do not intend to waste cash. Hence, a positive reaction to the announcement could also occur. One problem is that citing good use of cash is a common reason (57.7%) and not particularly informative. One would expect firms to put their cash to good use. It is possible that many firms provide "good use of cash" as a reason simply to meet the TSX requirement that the reason for the NCIB be stated. It is possible that a negative reaction may occur if the market views "good use of cash" as ambiguous and indicative of a lack of transparency.

Announcements that cite helping or increasing the proportionate interest of remaining shareholders as a reason for the repurchase program (37.3% of firms) could also be viewed positively or negatively. Shareholders who do not have an intention to sell may view this statement positively since management will be using its information advantage when purchasing stock from selling shareholders.

Selling shareholders will be facing an informed buyer. Depending on the unobservable ratio of long-term to short-term shareholders, the market reaction could be positive or negative. Again the reason is not particularly informative and may just be provided to meet the TSX requirement to provide a reason for the program.

8.4 Credibility

I employ a framework similar to Mercer (2004) to examine whether the market assesses the credibility of TSX stock repurchase announcements. Mercer (2004) synthesizes the existing literature on disclosure credibility to identify four factors that investors consider when assessing the credibility of a management disclosure: (1) situational incentives at the time of the disclosure, (2) management's credibility, (3) the levels of external and internal assurance and (4) characteristics of the disclosure itself, which includes precision, venue, time horizon, amount of supporting information and inherent plausibility.

8.4.1 Situational Incentives

Summarizing the literature, Mercer (2004, p. 187) concludes that "investors should be less likely to believe management disclosures when management has high incentives to be misleading or untruthful". Similarly, Lippert, Nixon and Pilotte (2000) apply an agency theory approach and predict an inverse relationship between the stock price response to dividend increase announcements and the pay-stock performance sensitivity of management compensation for two reasons: (1) Increased pay-performance sensitivity exacerbates managers optimistic bias regarding future performance, reducing the credibility of the dividend signal and (2) Increased pay-performance reduces the need for dividends as a means of reducing agency costs since the interests of management and shareholders are aligned. Their empirical results confirm their prediction. Rogers and Stocken (2005) find that bias in management forecasts is associated with the incentives to incorporate bias and that the market varies its response to management forecasts with the amount of predictable bias. Applying Lippert, Nixon and Pilotte's (2000) approach to repurchase announcements, investors should be less likely to believe that the repurchase announcement is

credible and actually conveys good news the more management stands to gain from an increase in stock price. Where management has stock price dependant incentives, the interests of management and the shareholders are likely to be more aligned, so there should be less of a tendency to invest in perks or low net present value investments. As a result, the announcement that the firm intends to distribute cash will be less positively viewed by investors since there is less need to distribute cash to reduce agency costs. Consistent with these studies, I predict that announcement returns will be negatively related to managerial wealth incentives leading to the following hypothesis:

H2 Announcement returns (and volume changes) are negatively related to stock-price-dependant managerial wealth incentives.

Kahle (2002) does not consider managerial incentives beyond the number of stock options held. I extend Kahle (2002) by considering managerial wealth incentives beyond the number of stock options held since Mercer's (2004) disclosure credibility framework includes all managerial wealth incentives. In addition to the number of options held, I measure and include in my empirical tests the extent that stock options have intrinsic value and insider holdings, since insider holdings also create a managerial wealth incentive. Jensen and Murphy (1990) show that the value of options to managers is increasing in the options' intrinsic value. Core and Guay (2001) note that the sensitivity of managers' wealth to market value, known as delta, depends on intrinsic value, among other factors. If the stock options are deep out of the money or if management holds no shares, a gain in stock price will not provide an immediate benefit to management. However, existing shareholdings and stock options that are already in the money will further increase in value with a rise in share price. Therefore the benefit to management is increasing in the extent that stock options have intrinsic value and in the extent of management shareholdings.

8.4.2 Management Credibility

Section 2.3 discusses studies that support the existence of a reputation effect for corporate disclosures. Bandyopadhyay and Kao (1996) provide the first empirical analysis of the role of history in stock

repurchase programs. They find that while announcing firms enjoy abnormal returns during the announcement period, firms that have made repurchases under past repurchase programs enjoy greater returns over the repurchase period than firms that did not make repurchases. I extend their work by using a continuous variable for repurchase history and incorporating past behaviour into Mercer's (2004) credibility framework. Use of Mercer's (2004) framework results in a more complete modelling of investor reaction that includes other aspects of credibility, such as equity-based managerial incentives (section 8.3.1). My work is similar in nature to Schmitt (2007) who finds that the repurchase announcement returns are positively related to completion rates on recently completed repurchase programs. Further, I control for the market's prior expectation of the likelihood of a repurchase announcement and the disclosed reasons for the repurchase. By controlling for other factors that may influence the market reaction to a repurchase announcement, I am able to reduce the likelihood of correlated omitted variables and to rule out competing explanations.

Lie (2005) finds that improvements in performance are limited to firms who actually repurchase shares during the same fiscal quarter. Lie's (2005) results suggest that actual repurchases, not announcements, are more important in forecasting future performance. In his conclusion, Lie (2005) points out the benefits of a study that addresses the actual follow through rate of firms. My study partially addresses Lie's call for research into follow through rates by considering the extent to which the market considers past follow through rates in interpreting a current announcement.

As discussed in chapter 3, TSX reporting standards allow investors to see the extent to which the announcing firm followed through on its prior repurchase announcement. Given the framework of the TSX repurchase system, I contend that firms and their management may develop reputations for either following through or not following through on their share repurchase announcements. Consistent with the empirical and analytical studies discussed above, if a firm has had a recent repurchase program and had followed through on the repurchase announcement for that program, subsequent repurchase announcements will be more likely to be believed by the market and considered good news. Therefore, more

positive return and a greater volume reaction is expected if the firm had a recent repurchase program and repurchased stock during the year in which its previous plan was in place leading to the following hypothesis.

H3 Announcement returns (and volume changes) are positively related to the follow-through rate on the immediately preceding repurchase program.

Management's response to stock price changes during its past repurchase programs may impact the importance of past repurchases on the credibility of the current announcement. Prior repurchases are expected to be evaluated in light of market conditions at the time the prior repurchase program was in place. Prior repurchases may be endogenous since they reflect prior market conditions. There may be no loss of credibility or reputation if management did not repurchase shares but the stock price rose nonetheless. In this case, there was no need for management to purchase stock since the market increased the price of the share. Also, the rise in share price can be seen as confirmation of the good news implicit in the previous announcement. Stephens and Weisbach (1998, p.327, note 11) note the following: "If, for example, there is a strongly positive reaction to the announcement, underpricing will be reduced, lowering the firm's demand for reacquiring securities". However, where management announced a repurchase program, the price of the stock dropped and management did not buy any shares back, management's credibility with respect to the current announcement is expected to be low since the firm did not stand behind its previous statement that the firm intended to repurchase shares and subsequent information did not confirm that the previous announcement was good news. If the price of the stock rose during the year the previous repurchase program was in place and the firm bought back stock, credibility would be very high since the firm carried through with its repurchase announcement and the market accepted the good news conveyed in the previous announcement. If the price of the stock dropped during the year of the previous repurchase program and the firm bought back stock, credibility would be high since the firm supported its stock through actual repurchases when it was dropping in price. In summary, the effects of

past stock price behaviour and past repurchases during the most recent repurchase program on the credibility of a current repurchase announcement are predicted to be as follows:

	High Repurchases (exceed average)	Low Repurchases
Stock Price Increased	Very high credibility.	No loss of credibility.
Stock Price Decreased	High credibility.	Low credibility.

The above discussion indicates that credibility should be higher where the firm's stock price rose during its preceding repurchase program. Since credibility is higher, cumulative abnormal returns over the announcement period should be higher. In contrast, prior studies such as Ho, Liu and Ramanan (1997) and Stevens and Weisbach (1998) find that a drop in stock price just prior to a repurchase announcement is associated with greater returns during the announcement period. This finding is attributed to the market being more likely to believe that the stock is currently undervalued if it experienced a decline in price just prior to the announcement. Where there has been a drop in price, the repurchase announcement is seen as conveying previously private management information to the market that the market's recent negative assessment of the firm's future prospects was incorrect. Therefore, I will control for price changes over the one year period corresponding to the prior repurchase program (variable PPRET), a long-term measure, and cumulative abnormal returns in the twenty eight trading days immediately preceding the current program announcement (variable CARJB), a short-term measure. Kahle (2002), in a widely cited study, uses a period of forty days prior to the announcement, which represents approximately twenty eight trading days. I use a twenty eight trading day period to be consistent with Kahle (2002). I predict **(P7 and P8 respectively)** that the long-term measure will be

positively related to announcement returns and volume changes, while the short-term measure, as in prior studies, will be negatively related to announcement returns and volume changes.

8.4.3 Levels of External and Internal Assurance

Mercer (2004) summarizes the results of experimental and archival research on the effects of external auditing on disclosure credibility and finds that, *ceteris paribus*, audited disclosures are more credible than un-audited disclosures. However, given that repurchase announcements involve a statement of future intent that cannot be verified by an external auditor, it is not possible to have repurchase announcements with external audit assurance. All firms and regulatory jurisdictions are equal in this respect.

Assurance from within the firm may improve disclosure credibility. Wild (1996) finds that investors rely more on earnings after formation of an audit committee. Other studies cited in Mercer (2004) find a link between corporate governance and credibility, implying that better corporate governance structures may make disclosures more credible. Since the firm is well governed, its disclosures are more likely to be truthful and informative resulting in a greater market reaction. This approach can be applied to stock repurchase announcements and results in the prediction that better corporate governance indicators should be associated with greater announcement returns and volume. The presence of external directors may indicate to investors that the firm is well governed since management is subject to scrutiny through the presence of external directors. The announcement of a repurchase plan may also indicate to the market that the external directors have been successful in constraining management's use of free cash flow. Consequently, I predict **(P9)** a positive relationship between announcement returns (and volume changes) and the presence of external directors.

8.4.4 Disclosure Characteristics

Mercer (2004) lists additional factors that affect disclosure credibility. These factors relate to the characteristics of the disclosure itself.

a. Precision. Given that few (approximately 15% of sample firms) TSX firms announce less than the maximum, the precision of the announced number of shares to be repurchased in Canada is unlikely to be a significant variable affecting the market reaction to a repurchase announcement.

b. Venue. Mercer (2004) summarizes evidence that suggests that the venue management chooses to make a disclosure in may impact the credibility of the disclosure. However TSX firms are required to announce their repurchase programs through a press release carried on the major corporate news services. As a result, there is little or no variation in venue and hence it is not expected to be a significant factor affecting the market reaction to a repurchase announcement by a TSX firm.

c. Time Horizon. Mercer (2004) notes managers are likely to have better information about short time horizons. As a result, short horizon disclosures may be more credible than long horizon disclosures. Again, however, all Canadian repurchase programs are limited to one year and no firms in my sample announced that their program would be restricted to less than one year, so there is no variation among firms with respect to time horizon. In contrast, U.S. firms may have multi-year programs.

d. Amount of Supporting Information. Where additional information is provided to support the disclosure, disclosure credibility may be higher for two reasons. First, the firm may be disclosing proprietary information. Investors, realizing that disclosure of proprietary information is costly, may perceive the disclosure to be more credible. Second, additional disclosures increase the ex post verifiability of the disclosure. Since management's reputation may suffer, the ex post verifiability of the disclosure places limits on management's ability to make opportunistic disclosures. Canadian firms are required to provide reasons for their repurchase programs. However, some firms (<10%) in my sample either provided no reason at all in violation of the requirement or provided very vague reasons for their repurchase programs. Other firms provided more detailed reasons for their repurchase programs. In many cases, multiple reasons were cited for the repurchase program.

e. Inherent Plausibility. Mercer's (2004) final factor influencing the credibility of a management disclosure is the inherent plausibility of the disclosure. The more plausible the disclosure, the more credible it is. Disclosures that are inconsistent with prior beliefs will be received with skepticism. Numerous management forecasting studies are cited by Mercer (2004) as support but, for the sake of brevity, will not be repeated here. Ho, Liu and Ramanan (1997) find that repurchase announcements are associated with greater abnormal returns where firms have enjoyed an increase in quarterly profits and sales, consistent with the market viewing the repurchase announcement as plausible good news since the repurchase news is consistent with past earnings news. This effect is larger for firms with higher information asymmetry. I include in my regressions as control variables (Appendix 8) the same factors considered by Ho, Liu and Ramanan (1997). I also include cash on hand. In order for a repurchase announcement to be plausible good news, investors should feel that the firm has the capability to repurchase shares. Consequently, I predict **(P10)** that announcement returns are increasing in firm cash.

Section 2.5 discusses the asymmetric information hypothesis. Prior studies such as Ho, Liu and Ramanan (1997), Stevens and Weisbach (1998) and Li and McNally (2007) find that a drop in stock price just prior to a repurchase announcement is associated with greater returns during the announcement period. This finding is attributed to the market being more likely to believe that the stock is currently undervalued if it experienced a decline in price just prior to the announcement. The announcement that the firm is repurchasing its shares is seen as conveying information to the market that the market's recent negative assessment of the firm's future prospects was incorrect. The greater the more recent drop in stock price, the more information a repurchase announcement conveys since it reverses other recent information. Consistent with these prior studies, I **predict (P8 repeated)** a negative relationship between announcement returns and volume changes surrounding the repurchase announcement and cumulative abnormal returns prior to the announcement.

Chapter 9

The Market Reaction to TSX Repurchase Announcements

Research Design

9.1 Market Reaction Tests

P7 predicts a significant market reaction to TSX repurchase announcements. I begin by calculating abnormal returns and abnormal volume using multiple models of abnormal returns and abnormal volumes. Abnormal return and abnormal volume models measure returns and volume in excess of what would be expected to occur if the announcement did not occur. I use multiple models of abnormal returns and volume in order to ensure that the results are not contingent on the choice of model. Event window abnormal returns are calculated using cumulative abnormal returns (CAR) from the market model and buy and hold returns (BHR) from the buy and hold model. Kothari and Warner (2004, p.12) discuss the differences between these two models. The market model calculates daily abnormal returns and then calculates cumulative abnormal returns (CAR) by compounding the daily returns over the event window. The buy and hold return model calculates cumulative returns over the entire event window and essentially ignores daily returns. Essentially, the difference between the two models is that the market model allows for daily adjustment of the amount invested (ie. daily portfolio re-balancing), whereas the buy and hold model does not. These models are defined in Appendix 6. Examples in the repurchases literature of the use of market return models include Barth and Kasznik (1999), Ikenberry, Lakonishok and Vermaelen (2000) and Grullon and Michaely (2004). Examples in the repurchases literature of the use of buy and hold returns include Ikenberry, Lakonishok and Vermaelen (1995) and Li and McNally (2007). Alternative approaches include raw returns and control sample returns, such as Jagannathan and Stephens (2003). Following Cready and Hurtt (2002), I also test the market reaction to repurchase announcements using volume metrics since Cready and Hurtt (2002) show that volume metrics are capable of detecting

investor reaction to an information event when returns tests are not. Cready and Hurtt (2002) find that volume tests are particularly useful where the expected investor reaction is small and where sample sizes are small. Investor response to a Canadian normal course issuer bid is expected to be small since firms are limited to a maximum of 10% of the public float of the firms' stock. In contrast, US repurchase announcements are not limited in size by regulation. Also, repurchase announcement sample sizes are limited in comparison to earnings announcement studies since not all firms repurchase shares. Cumulative abnormal volume (CAV) is calculated for each security in the sample using log-transformed relative volumes as described by Campbell and Wasley (1996) and non-transformed relative volumes.

In order to ensure that the event study results are not contingent on the choice of event window or estimation period, a number of event windows and estimation periods are used. I use the statistical package Eventus by Cowan Research Inc. which allows for easy calculation of abnormal returns and volume using various models, event windows and estimation periods. A complete list of market reaction variables including their calculation approach (market model or buy and hold model), event windows and parameter estimation periods is contained in Table 11. Table 11 also contains the results, which are discussed in chapter 10. My primary measures of CAR and CAV, for which I report complete empirical results, utilizes the market model calculated over the three day event window commencing one day before the announcement. I estimate the market model using a minimum of sixty days data and a maximum of 200 days data. My primary measures of CAR and CAV use an estimation model that includes equal days before and after the announcement date. I utilize this approach for two reasons. First, if firm risk shifts over time, use of equal days before and after the announcement may better reflect firm risk at the time of the announcement. Changing firm risk may be a risk in this study since repurchases reduce equity, resulting in increased financial leverage. Mandelker (1974) utilizes a post-event period to account for the possible change in risk due to mergers. Masulis (1980) splits the estimation period equally into a pre-event and post-event period in his study of the price impacts of exchange offers and recapitalization announcements. Masulis (1980) splits the event period since,

similar to share repurchases, exchange offers and recapitalizations can impact capital structure and hence risk. Second, use of an estimation period before and after the event allows inclusion in the sample of firms who do not have a long history of returns before the repurchase announcement. Table 15 indicates that the correlation between the primary measure of returns (CAR) and an alternative that uses an estimation period before the announcement (CARNP) is 0.9798, indicating that the choice of estimation period (pre-event or mixed) is unlikely to have any impact on the results of this study. I do not use log transformed returns in my primary measure of cumulative abnormal returns since the primary event window (-1 to +1) is short, so continuous compounding should not impact the results. Table 15 indicates that the correlation between the primary measure of returns (CAR) and an alternative that uses log transformed returns (CARCC) is 0.9945, suggesting that the use of non-log transformed abnormal returns is unlikely to impact the results of this study.

After calculating abnormal returns and volume using various models, event windows and estimation periods, the Patell (1976) test and the generalized sign test are conducted to evaluate the market reaction. These tests are defined in Appendix 6. The Patell (1976) test considers whether the returns (or volume) around the repurchase announcement are normal given the pattern of returns during the return estimation period. A significant Patell (1976) test indicates that the returns (or volume) around the event period were significantly higher or lower than what normally occurred during the estimation period and is used as a test of whether the sample repurchase announcements had information content (P7). The generalized sign test tests the null hypothesis that the fraction of positive returns (or abnormal volume) in the event window is the same as in the estimation period. It is also used to evaluate the information content of the sample repurchase announcements (P7). In a very recent paper, Campbell, Cowan and Salotti (2009) use seeded simulated abnormal returns of varying levels (-5% to +5%) to evaluate the appropriateness of commonly used event study tests and conclude that the generalized sign test is the best test. Campbell, Cowan and Salotti (2009) also find support for market

model based tests, such as the Patell (1976) test, provided the market model based tests use a local stock exchange index, as is done in this thesis.

9.2 Market Reaction Explanatory Model

The market's reaction to the repurchase announcement for firm j at announcement date t is modeled using the following two regression equations:

$$(2) \text{CAR}_{jt} = \gamma + \delta Y_{jt} + \epsilon$$

$$(3) \text{CAV}_{jt} = \nu + \psi Y_{jt} + \zeta$$

Where CAR_{jt} and CAV_{jt} refer to cumulative abnormal returns and volume respectively calculated according to the definitions in Tables 12 and 13 for firm j at announcement date t , γ and ν represent intercept terms, δ and ψ are vectors of k parameters, Y is an $n \times k$ vector of k variables corresponding to the ex-ante variables for firm j at time t in Appendices 7 (primary variables) and 8 (control variables) and ϵ and ζ represent residual error terms.

Equations (2) and (3) are estimated using only firms who announced a NCIB. Four sets of results are presented in Tables 18 to 30. Model 1 utilizes all announcing firms with available market and announcement content data. Model 2 utilizes all announcing firms with available market, announcement and accounting data. Model 3 controls for proxy circular data items. Model 4 contains the same announcing firms as model 3, but excludes announcements with competing information events. I test the predictions and hypotheses in chapters 5 and 8 by comparing the results from the OLS models to the predicted signs in Appendix 7.

9.3 Proxy Selection

In this section, I discuss the proxies used to represent the factors likely to impact the market reaction to a repurchase announcement. Justification for these factors is provided in chapter 8. Primary variables are defined in Appendix 7. Control variables are defined in Appendix 8.

9.3a Shares Targeted

I measure shares targeted (variable TARGET) as shares to be repurchased per the announcement over total outstanding shares at the end of the fiscal year immediately preceding the announcement.

9.3b Reasons for the Announcement

I personally read the 2,617 found press releases (see Table 2) and coded all variables according to the explanations summarized in Table 3. I developed this list of explanations by first reading approximately 500 press releases and determining the most common explanations. Table 3 summarizes the proportion of firms citing each reason. I ignore explanations used by less than five percent of firms since it is statistically impractical to determine the importance of infrequently provided reasons due to small sample sizes. As described in Appendix 7, the variables CUV, FUV, GOOD, EXCASH, STOCKP, LIQ and REMSH are binary variables taking on a value of 1 if the firm cites the corresponding reason in their repurchase announcement.

9.3c Managerial Incentives

H2 predicts that the market reaction to repurchase announcements is negatively related to managerial wealth incentives. I measure managerial wealth incentives using three variables. OPTPER is measured as total options outstanding divided by total shares outstanding as reported in the most recently completed fiscal year preceding the announcement. Data on total options outstanding were hand collected from firms' financial statement notes in the year immediately prior to their repurchase announcements.

INMONEY is the intrinsic value of options as of the most recently reported proxy circular preceding the

repurchase announcement date, scaled by total assets at the end of the most recently reported fiscal year preceding the repurchase announcement date. INMONEY measures the extent to which stock options are in the money. If stock options have intrinsic value, management will experience an immediate gain from any increase in stock price as a result of the repurchase announcement. If options do not have intrinsic value, there is unlikely to be an immediate gain unless the shares are barely out of the money and the increase in stock price from the announcement puts the options 'in the money'. Jensen and Murphy (1990) show that the value of options to managers is increasing in the options' intrinsic value. Core and Guay (2001) note that the sensitivity of managers' wealth to market value, known as delta, depends on intrinsic value, among other factors. As a result, intrinsic value may serve as a proxy for delta. I include both OPTPER and INMONEY since OPTPER measures the future incentive to raise share prices and INMONEY measures the current incentive to raise share prices. Finally, INSIDER is total insider shares as of the most recently reported proxy circular preceding the repurchase announcement date divided by total shares outstanding as reported in the most recently completed fiscal year preceding the repurchase announcement date.

9.3d Management credibility

H3 predicts that the market reaction to repurchase announcement is positively related to the follow-through rate on the firm's most recent repurchase program. I measure the repurchase rate (variable REP) as the number of shares actually repurchased during the last repurchase program, but no more than three years preceding the current announcement, divided by the maximum number of shares the preceding announcement stated could be repurchased under the plan. P10 predicts that the market reaction to a repurchase announcement is increasing in cash on hand, since cash on hand indicates an ability to actually repurchase shares. Variable CASH is measured as cash over total assets as of the most recently reported fiscal year preceding the announcement and is predicted to be positively associated with announcement returns.

9.3e Information Asymmetry

I use the same three information asymmetry proxies (INTAN, XRD, SIZE) for market reaction analysis that I use for repurchase announcement likelihood. These variables are discussed in section 6.4f.

9.3f Corporate Governance

P9 predicts a positive relationship between the market reaction to a repurchase announcement and board independence. Variable EXBRD is measured as the number of non-executive directors over total directors as of the most recently reported proxy circular preceding the announcement.

9.4 Announcement Surprise and Sample Selection

I control for the market's prior expectation of a repurchase announcement using several methods. Controlling for the market's prior expectation of a repurchase announcement is appropriate since the market will already have expectations as to whether firms will announce repurchase programs. Also, it is only possible to observe announcement returns and the disclosed reasons for repurchase programs for firms who actually announce repurchase programs. As a result, the sample of TSX firms who announce repurchase programs is a truncated sample of the entire population of TSX firms. Selection is not the focus of this thesis. However, any attempt to model the market's reaction to an announcement without first considering the market's assessment of the likelihood of that announcement occurring in the first place could result in a correlated omitted variable problem since the surprise level of the announcement could be an important variable. As Li and Prabhala (2005, p. 10) point out "the process of correction for self-selection can be viewed as including an omitted variable".

I use three approaches to control for the market's prior expectation of a repurchase announcement. In the first series of regressions (Tables 18,19,25,26), I include the variable NCIB3, which represents the number of repurchase programs announced in the three fiscal years prior to the most recently completed fiscal year prior to the announcement. NCIB3 is used to proxy for the market's expectation that the firm will announce a repurchase program. I utilize this simple approach to control for the market's prior expectation of the probability of a repurchase announcement since Francis and

Lennox (2008) show that more formal selection models can be sensitive to the choice of variables in each stage of the two step procedure employed. Using UK data on auditor selection, Francis and Lennox (2008) show that by changing the variables included in the first and second stage of the Heckman selection model they employ, their results are extremely sensitive to minor specification changes. Using their UK auditor selection data, they find that simple one stage OLS models are much less sensitive to specification changes.

My second approach to controlling for the market's level of surprise that a repurchase announcement has occurred is similar to Li and McNally (2007). Li and McNally (2007) are the only previous example in the repurchases literature of controlling for selection bias. Li and McNally (2007) first estimate the probability of an announcement using a probit model. They estimate this probability using a sample of announcing firms and a comparative sample (size, industry) of firms who did not announce repurchase programs. They estimate one probit model for all firms in the cross-sectional sample over the period 1988 to 2000. They document that the probit model residuals of the announcing firms are correlated with the announcement returns and interpret this finding as evidence that firms convey private information in their repurchase announcements.

Li and McNally (2007)'s approach assumes that information is available to investors immediately after the end of the fiscal year. Their approach allows no lag for the preparation or auditing of the financial statements or for preparation and issuance of the proxy circular.

In my second set of market reaction regressions, I employ the Li and McNally (2007) approach with several modifications. First, I assume that the annual financial statements become available to investors on the same day that the auditor signs the audit report, since it is common practice for companies to issue a press release announcing their earnings and other important results immediately after the auditor has completed their field work and issued an audit report. This generally involves a lag of approximately two months after the end of the fiscal period. I also check the date of the proxy circular

and only use proxy circulars that were publicly issued at the time of the repurchase announcement. This modification is made to ensure that only ex-ante information is considered. My second modification is that I also include repurchase history, options and liquidity as potentially significant announcement predictors, since as discussed in chapter 5 there is support for these variables impacting the announcement decision. Finally, I include the predicted value from probit model 1 in the OLS market reaction model, rather than testing for a correlation between the residuals of the two models. Inclusion of the predicted value from the probit model in the OLS models controls for the market's level of surprise that a repurchase announcement has occurred.

I use the entire Compustat database from 1993 to 2004 to develop an announcement expectations model (Probit Model 1 in Table 11). This approach has the advantage of allowing size and industry to be variables considered by investors in determining their expectation of a repurchase announcement. I explicitly include size and industry in the model. This approach also allows for a considerable increase in sample size when developing an expectations model. It also results in a sample of firms that is more representative of the population of repurchasing and non-repurchasing firms. The disadvantage of this approach is that it is too costly to gather corporate governance, ownership and compensation data for all firms on the Compustat database. There are no commercial databases that contain this information. As a result, it is not possible to control for the influence of corporate governance, ownership and compensation structure on the repurchase decision.

In my second series of market reaction regressions (Tables 20,21,27,28), I use the predicted value from Probit Model 1 (results in Table 11), P1, to proxy for the market's level of surprise that the firm announced a repurchase program. The predicted value is transformed using the normal cumulative distribution function to a value that is bounded by 0 (low probability of announcement) and 1 (high probability of announcement). P1 has a mean of 0.2076 and a standard deviation of 0.247.

Finally, I use a full information maximum likelihood Heckman model to formally control for selection (Tables 22,23,29,30). The Heckman model has the advantage of being frequently employed as a method of controlling for sample selection. Francis and Lennox (2008) provide a complete description and extensive discussion of the Heckman model and cite over thirty recent accounting studies that utilize this approach. In summary, the Heckman model allows for the possibility that factors that impact the repurchase announcement decision may also impact the market reaction to the repurchase announcement. As a result, potentially endogenous explanatory variables exist that could bias the coefficients of ordinary least squares regressions if the truncated errors are correlated with the explanatory variables. The Heckman procedure accounts for potentially truncated errors that could bias the coefficient estimates. I use the full-information maximum-likelihood Heckman model rather than the original two stage Heckman model. Francis and Lennox (2008) emphasize the importance of imposing and justifying exclusion restrictions when using selection models. I impose exclusion restrictions by including the following variables in the first stage, but excluding them from the second stage. First, I control for industry (variables LOWIND and HIGHIND) in the first stage because some industries have either high (variable HIGHIND) or low (variable LOWIND) repurchase rates. However, there is no theory that suggests that the market reaction to repurchase announcements should vary by industry. Second, I control for dividends (variables DVPT and DYIELD) in the first stage since empirical evidence, such as Grullon and Michaely (2002) show that firms may be substituting repurchases for dividends. Modigliani and Miller (1961) in a seminal paper provide an analysis that suggests that dividend policy has no affect on market value. Finally, leverage (variable LEVERAGE) is included in the first stage since heavily levered firms may not have the financial capacity to repurchase shares and may be prohibited from reducing equity as a result of debt covenants. However, leverage is unlikely to impact the market reaction to TSX repurchase announcements since TSX regulations severely limit the number of shares that can be repurchased. Hence, the repurchases are unlikely to have a large impact on leverage that might necessitate a market reaction due to a change in risk profile for the stock. As noted in section 11.4, limitations of analysis, these exclusion restrictions can be challenged on the grounds that if management seeks to maximize firm

value through repurchases, it is possible that any factor that impacts management's propensity to repurchase shares could also impact firm value. It would be convenient if there were exogenously imposed events during the sample period that led firms to repurchase shares without those same events impacting market value. Unfortunately, there are no such exogenously imposed events. Firms voluntarily choose to repurchase shares.

9.5 Use of Panel Data, Serial Correlation and Outliers

As my sample contains multiple observations from many firms, there is the potential for serial correlation in the residuals. Petersen (2008) simulates the results of several models typically used to estimate standard errors in panel data. Petersen (2008) provides evidence that only clustered standard errors are unbiased, since they account for the residual dependence created by the firm effect. Consistent with the findings of Petersen (2008), I use clustered standard errors, which provide more conservative estimates of standard errors than regular ordinary least squares regression, since the standard error estimates account for the potential serial correlation in the residuals of observations from the same firms. Clustered standard errors allow for the possibility that disturbances within each cluster are correlated with each other, but require that the disturbances from different clusters be uncorrelated⁶. I use the statistical package STATA to conduct my regression analyses. STATA contains a feature that allows the determination of clustered standard errors. I define a cluster as an individual firm.

9.6 Competing Information Events

In order to provide results that are less likely⁷ to be confounded by competing information events, I also present results for the sub-sample of firms who do not make other announcements, such as earnings or dividends at the same time as their repurchase program announcement or announce multiple security

⁶ Baum, Christopher, 2006, *An Introduction to Modern Econometrics Using Stata*, p.138.

⁷ TSX firms are required to post earnings and dividend announcements on SEDAR. TSX firms are not required to include press releases on SEDAR, although they are encouraged to do so. As a result of the lack of requirement to include all press releases on SEDAR, it is not possible to guarantee that firms in my sample did not have other press releases on the same day as their repurchase announcement.

repurchase programs. All announcements were scrutinized for competing information events by reviewing all documents on the SEDAR database within 10 days of the announcement date. Any firm with an announcement during the standard event window (-1,1) were noted. This procedure identified 526 security announcements that had confounding information events, representing 18.36% of sample announcements. The high rate of competing information events indicates that competing information events may be a significant problem when studying TSX repurchase announcements. Results excluding firms with competing information events are reported under the heading “model 4” in Tables 19 to 32.

Chapter 10

Market Reaction Empirical Results

10.1 Introduction

Stock repurchase announcement studies consistently document positive abnormal returns around the announcement. These findings are consistent with repurchase announcements conveying favourable information to the market. In this chapter, I begin by examining the market reaction to TSX repurchase announcements. I find evidence that repurchase announcements convey information to the market, as evidenced by statistically significant price and volume reaction tests. Next, I examine factors that may be associated with the market reaction to TSX repurchase announcements. I find evidence that firms who cite current undervaluation as the reason for their repurchase program enjoy higher announcement returns, but this reason fails to remain statistically significant when other potential explanatory variables are controlled for. Other reasons are not found to be significant. I also find evidence that firms who have fulfilled more of their previous repurchase announcements enjoy higher returns on subsequent announcements. This evidence provides limited support for TSX disclosure requirements.

10.2 Market Reaction to NCIB Announcements

Tables 12 and 13 present mean cumulative abnormal returns and volumes respectively according to a number of definitions of returns, event windows, index type and event parameter estimation periods. Abnormal returns range from 1.04% to 1.78% depending on the definition used. Abnormal volumes range from 1.28% to 3.75%. Volume results are strongly influenced by whether log transformations of volume are conducted. While mean abnormal volume is positive, it is interesting to note that there are more reductions in volume around the announcement date than increases in volume. This result is consistent with some investors not wanting to trade against an informed trader (management) and avoiding trading. Douglas (2007) notes that repurchases can result in wealth expropriation by

management if management utilizes non-public information to purchase shares when they are undervalued. The reduction in trading in many stocks may reflect investors' desire to protect against wealth expropriation by management who has an information advantage over investors. In all cases, both cumulative abnormal returns and cumulative abnormal volume are statistically significant at the 0.001 level using both a standard Patell test and a generalized sign test. Table 14 presents correlation coefficients of market and volume variables. These correlation coefficients indicate that the choice of return and volume estimation methods yield similar results, providing some comfort that the primary measures of CAR and CAV are robust to the choice of abnormal return calculation method, estimation period method and event window. The correlation is lowest between the primary measure, CAR, and CARLW, which measures returns over a five day window instead of a three day window.

Tables 15 and 16 present abnormal returns and volume by day relative to the announcement date (day 0). Figure 1 presents mean daily abnormal returns for announcing firms in graphical form. Figure 2 presents mean daily abnormal volume for announcing firms in graphical form. Table 15 indicates that most stocks have negative returns leading up to the repurchase announcement date. On the announcement date and for several days after the announcement, returns are positive. After the announcement period, abnormal returns do not occur and returns appear to follow a random walk pattern. It is interesting to note that abnormal returns persist for up to five days after the repurchase announcements. The generalized sign test reported in Table 16 indicates that abnormal volumes persist for up to nine days after the repurchase announcement. The Patel-Z test indicates that abnormal volume exists in the pre-event period, the event period and the post-event period. The results of the Patel-Z test are unexpected and difficult to explain. Campbell, Cown and Salotti (2009) examine the effectiveness of standard event study tests as they apply to returns reactions, but they provide no evidence on these tests as they apply to volume reactions. In their study of return measures, Campbell, Cowan and Salotti (2009) conclude that overall, the generalized sign test is the best test since it more accurately captures the seeded abnormal returns included in their sample. One possible explanation for the long period of statistically

abnormal Patel-Z volumes reported is that the Patel-Z test may not be appropriate for volume results. Other possible explanations include insider trading and model misspecification. The generalized sign test indicates that investors may take some time to digest the news contained in TSX repurchase announcements. However, it is premature to conclude that the TSX is lacking in market efficiency from this result as transaction costs and other factors may prohibit a faster price and volume reaction.

In summary, the results are consistent with TSX share repurchase announcements conveying information to the market since there is clear evidence of a market reaction around the time of the announcement. Therefore, I conclude that TSX repurchase announcements are a significant information event.

10.3 Market Returns Reaction Explanatory Model Results

Table 17 reports Pearson correlations for explanatory model variables. Tables 18 and 19 present the results of four OLS regressions without controls for sample selection, other than the inclusion of the NCIB3 variable, as discussed in section 6.3. Table 18 provides results for all announcers and Table 19 presents results for repeat announcers. In all cases, the dependent variable is cumulative abnormal returns calculated using the primary measure of CAR (see Table 12). Model 1 provides the results using only market data. Model 2 presents the results using both market and accounting data. Model 3 provides results using the sample with available market data, accounting data and proxy statement data. Model 4 repeats Model 3, but excludes all firms with competing information events (see section 9.5). In all cases, as discussed in section 9.4, all standard errors are calculated using robust clustered standard errors.

Tables 20 and 21 present the same results as Tables 18 and 19, except that the regressions include the predicted value probit model 1 in order to control for the market's level of surprise that the repurchase announcement has occurred. Tables 22 and 23 present the results of explanatory models using the

Heckman full information maximum likelihood procedure. Table 24 presents an overall summary of the results of the market return explanatory models reported in Tables 18 to 23.

10.3a Shares Targeted

Variable TARGET is insignificant in any of the results documented in Tables 18 to 23. This result is expected since the majority of firms typically announce the maximum allowable limit of five percent of outstanding shares. Therefore, there is little information gained from the number of shares targeted.

10.3b Reasons for the Announcement

Little support is found for a relationship between the reasons cited for the repurchase program and abnormal returns. Variable CUV, representing a claim by the firm that it is commencing a repurchase program due to current undervaluation, is statistically significant in model 1 in Tables 18 and 19 for all and repeat announcers respectively. However, when controls for accounting and proxy circular data are included, CUV does not remain statistically significant. Tables 19 to 23 indicate that including controls for selection results in a non-significance result for most repurchase explanations. An exception is FUV, representing a claim by the firm that it is commencing a repurchase program in case of future undervaluation. As reported in Tables 18 and 20 this variable is negatively related to announcement returns when controls for proxy circular data are included. However, the result is not very robust across models. Overall I conclude that there is little market reaction to the reasons provided by TSX firms for their repurchase programs. This finding contradicts the earlier findings of Otchere and Ross (2002) and Li and McNally (2007). There may be several reasons for the results of this study contradicting the findings of earlier studies. First, I consider a wider range of explanations than previous studies. For example, I consider the reasons CUV, FUV and GOOD as separate reasons. Li and McNally (2007) consider all these explanations to be the same reason. Otchere and Ross (2002) only consider undervaluation as a reason for the repurchase program. Second, while reading these announcements and recording their reasons, it was observed that these announcements tend to follow a boiler-plate pattern,

with many announcements from different firms using the exact same language. Firms may be copying each other's releases, resulting in a loss of distinct information content. Also many firms cite multiple reasons, resulting in some confusion as to the true motivation of the firm for repurchasing shares. Finally, the use of clustered standard errors is more conservative than regular OLS regression and reduces the reported significance of all variables, including variables relating to the reasons for the announcement.

10.3c Managerial Incentives

H2 predicts a negative relationship between managerial wealth incentives and announcement returns. Variable OPT, representing the extent of stock options, is not statistically significant in any of the models. This finding fails to confirm the findings of Kahle (2000) who found a negative relationship between options outstanding and announcement returns. INMONEY is negative and weakly significant (0.10 level) in Tables 18 and 22 which report the results for all announcers. The variable is not significant when the sample is restricted to repeat announcers, suggesting that investors may react more to the intrinsic value of stock options when the firm does not make frequent announcements. This finding provides weak support for H2. INSIDER is positive and significantly associated with announcement returns in table 19. The result for INSIDER indicates that announcement returns are higher the greater the percentage of the firm that is held by insiders. This result does not support H2 which predicts that where management owns a large portion of the firm, repurchase announcement returns will be negative since management will gain from any price appreciation. An explanation for the finding of a positive relationship between insider holdings and announcement returns is that the market infers from the announcement that insiders are not prepared to waste funds on perks or low net present value investments. Hence a positive market reaction is observed as shareholders reduce their concerns of potential agency costs. However, the result is not economically significant since the coefficient is very near zero, suggesting little economic impact.

10.3d Managerial Credibility

Variable REP is positive and significant in most models in Tables 19, 21 and 23 which apply to repeat announcers. REP is not significant in model 4 in Tables 19, 21 or 23. Model 4 has significantly reduced sample sizes as a result of the exclusion criteria imposed and this may explain the non-significance of REP in this subsample. Coefficient estimates range from 0.0105 to 0.0165, suggesting that firms who repurchased one hundred percent of their previous repurchase announcement maximum target enjoy a repurchase announcement return of 1.05% to 1.65% higher than firms who repurchased no shares under their previous repurchase plan. Given that mean abnormal announcement returns are 1.19% (see Table 12), the results indicate that following through on previous repurchase announcements has an economically significant impact on subsequent announcement returns. I find little evidence of an interactive effect between REP and other variables (CUV, FUV, LIQ and PPRET), suggesting that the positive association between announcement returns and the follow-through rate on the previous program is not limited to certain explanations. Variable PPRET, representing abnormal returns over the prior program, is not significantly related to announcement returns, suggesting that investors do not condition their response to a current announcement on returns over the previous program. Overall the results support H3. Announcement returns are higher where the firm followed through on its previous announcement.

P8 predicts a negative relationship between announcement returns and pre-announcement returns. Contrary to this prediction, variable CARJB, representing pre-announcement returns is positive and statistically significant in many of the models reported in Tables 18 to 23. This finding contradicts the previous findings of Kahle (2002) and Li and McNally (2007) and suggests that firms that have enjoyed strong recent stock performance will obtain greater repurchase announcement returns than firms who have had poor recent stock performance⁸. P10 predicts a positive relationship between cash and announcement

⁸ In un-tabulated results, I re-perform models 3 and 4 in Tables 19 and 20 and include inter-active variables of recent stock performance and claims of under-valuation. I find no evidence of an inter-active effect between recent stock performance (variable CARJB) and claims of under-valuation (variables CUV and FUV) for all announcers (Table 19). For repeat announcers (Table 20), the coefficient on the inter-action of CARJB and FUV is positive and significant ($p < 0.05$) in both models 3 and 4. The coefficient estimate is 0.1203 for model 3 and 0.0826 for model 4.

returns. CASH is positive and weakly associated (0.10 level of significance) with announcement returns in some versions of model 2. However, cash is not significant when additional proxy statement controls are included. This result may be due to decreased sample size or due to consideration of proxy statement items. Overall, the results for a positive relationship between cash and announcement returns do not support P10.

10.3e Information Asymmetry

Ho, Liu and Ramanan (1997) find a negative association between size and announcement returns, which they attribute to the market learning less from announcements of firms with low information asymmetry. Tables 18 to 23 indicate that there is no consistent relationship between announcement returns and SIZE, INTAN and XRD, the three measures of information asymmetry used in this study. The lack of result may be due to these factors being weak proxies for information asymmetry (see section 7.2e).

10.3f Corporate Governance

P9 predicts a positive relationship between the market reaction to a repurchase announcement and board independence. Variable EXBRD is measured as the number of non-executive directors over total directors. Variable EXBRD is insignificant in any of the models in Tables 18 to 23. Therefore, there is no evidence in support of P9. A failure to find a significant impact of a corporate governance factor is not unusual. As discussed in section 2.4, recent studies such as Oswald and Young (2004) and Richardson (2006) find little evidence that corporate governance structures increase payouts or constrain management's tendency to over-invest free cash flow. Investors may perceive that governance structures are unlikely to ensure that management follows through on its announcement.

10.3g Announcement Surprise and Sample Selection

These results suggest that firms who cite potential future undervaluation as a reason for their repurchase program enjoy higher announcement returns the greater their pre-announcement returns.

Tables 18 and 19 do not utilize the predicted value from a probit analysis to proxy for the market's level of surprise that an announcement has occurred. Instead, the regressions documented in Tables 18 and 19 use the variable NCIB3 to control for the market's prior expectation that a repurchase announcement is occurring. NCIB3 is negative and statistically significant in Table 18, indicating that less market reaction can be expected when firms have previous repurchase programs. This result is consistent with the findings of Jaganathan and Stephens (2003) who found that announcement returns are decreasing in prior repurchase programs, which they attribute to the market being less surprised and informed by repeat repurchase announcements. NCIB3 is not statistically significant in the regressions reported in Table 19. However, all firms included in the regressions in Table 19 were repeat announcers. Tables 20 and 21 utilize the predicted value (P1) from Probit Model 1 to proxy for the market's level of surprise that the announcement occurred. P1 is only significant for the firms reported in Model 2 of Table 20, representing all announcers, but without controls for proxy circular data. When proxy circular data is considered in Models 3 and 4, P1 is not significant. Finally, I employ a Heckman full information maximum likelihood model to formally control for sample selection. The results are presented in Tables 22 and 23 and document similar results as Tables 18 to 21. To test for the impact of selection, I use STATA to calculate ATHRHO, the hyperbolic arctangent of the probability from the probit model. A significant ATHRHO indicates that OLS results will not generate consistent estimates⁹. The only significant ATHRHO coefficient occurs for model 2 applied to all announcers (Table 22) and is highly significant for Model 2, suggesting that controlling for the accounting characteristics of announcing firms using the heckman procedure provides better estimates of coefficients than the simple OLS estimates of Model 2 contained in Tables 18. With the exception of Model 2 for all announcers, the insignificant coefficients for ANTRHO for the models reported in Tables 22 and 23 indicate that selection has little impact on the results reported in this thesis.

10.3h Market Returns Reaction Explanatory Models: Overall Evaluation of Results

⁹ For a detailed discussion of the full information maximum likelihood Heckman model and the ATHRHO test, see Baum, C., *An Introduction to Modern Econometrics Using Stata*, p.p. 266-271.

Tables 18 to 23 present the results of market returns reaction explanatory models using various explanatory variables. Samples correspond to the availability of data for the explanatory variables used in each model. The results are summarized in Table 24. Tables 18 and 19 present results that control for the surprise level of the repurchase announcements by controlling for the past history of announcements. Tables 20 to 21 present results that control for the surprise level of the repurchase announcements by including the predicted value from probit models 1. Tables 22 and 23 utilize the more formal Heckman full information maximum likelihood model to control for sample selection. Given the wide acceptance of the Heckman model, and the advantages of the Heckman model that are discussed in Francis and Lennox (2008), the results in Tables 22 and 23 are considered to be the most reliable results presented in this thesis since they contain formal controls for sample selection. However, given the findings of Francis and Lennox (2007) on the potential pitfalls of selection models, discussed in section 9.4, all results should be considered.

The major result of this thesis is that announcement returns are positively related to the follow through rate on the most recent repurchase program (REP). Table 24 Panel B indicates that this result is confirmed in all analyses of repeat announcers except in model 4 and in Table 19 Model 2. These results are based on a small sample with full proxy circular controls and no competing announcements. These requirements significantly reduce the sample size and may account for the lack of significance of REP in these models. Most importantly, Table 23 Model 2, which includes formal controls for sample selection through use of the Heckman procedure and has a large sample size, confirms that announcement returns are positively related to the follow through rate on the most recent program.

Other variables are often not significant as reported in Table 24. The lack of significance of many variables that were found to be significant in prior studies may be due to several factors. First, the sample sizes used in some models in this study are small, making it difficult to obtain statistical significance. Second, this study utilizes clustered standard errors to account for the lack of independence of multiple observations from the same firm. Previous studies do not mention the use of clustered

standard errors. Clustered standard errors are more conservative since they consider the lack of independence. As a result, it is possible that if clustered standard errors were used in previous studies, some variables may not have been found to be significant. Finally, this study introduces several new variables that were omitted from prior studies. Examples include the prior program's follow through rate (REP), intrinsic value of stock options (INTRINSIC) and share turnover (VOL). Inclusion of these variables may have impacted the significance of variables found to be significant in prior studies.

10.4 Market Volume Reaction Explanatory Models Results

Tables 25 to 30 present volume reaction model results similar to the return reaction models contained in Tables 18 to 23. All models are the same except that the dependent variable is cumulative abnormal volume (CAV). Few variables are significant in Tables 25 to 30. Interpreting volume reactions is difficult. Kim and Verrecchia (1991) find that trading volume is proportional to both the absolute price change and a measure of differential precision of private information across traders. Unfortunately, in an empirical setting, the level of differential precision of private information across traders is unobservable leaving the researcher unable to control for a potentially important omitted variable. The results of Tables 28 to 35 should be considered in light of this limitation.

Similar to the results of the returns reaction models, NCIB3 is negative and statistically significant for all announcers (Table 25), but not for the subsample of repeat announcers (Table 26). This result is consistent with the market reacting less to repeat announcers since the announcement is predictable and hence has less information content. Also similar to the results of the returns reaction model, P1 is negative and generally statistically significant for all announcers (Table 27), but not for the subsample of repeat announcers (Table 28). This result is also consistent with the market reacting less to announcements where the probability of the announcement was high.

Models 1 and 2 in Tables 25 and 26 indicate that trading volume reduces when firms claim undervaluation as a reason for their repurchase programs. One possible explanation is that investors

reduce trading while they attempt to determine if the claim of undervaluation is warranted. Some investors may be unwilling to sell if they feel that management's claim may be true. However, the result is not robust to use in smaller samples that include proxy circular data variables. Hence, caution should be taken in interpreting this result.

Accounting variables are only inconsistently significant in the results reported in Tables 25 to 30. Proxy circular data variables (EXBRD, OPT, INSIDER, INMONEY) are either insignificant or not consistently significant, with the exception of INSIDER, the percentage of shares held by insiders. INSIDER is positive and statistically significant (Tables 28 and 31) for the subsample of firms without competing information events. However, this is a small sample result and should be interpreted with caution.

In summary, the volume reaction models provide less insight into the market reaction to repurchase announcements than returns models. The results indicate that trading volume reaction is negatively associated with past repurchase history and claiming current undervaluation as a reason for the repurchase program.

Chapter 11

Conclusions, Limitations and Further Study

11.1 Introduction

This thesis examines the market reaction to open market repurchase announcements by TSX firms during the period 1994 to 2005. I begin by discussing the differences between TSX and US repurchase regulations. Two major differences are noted and subject to empirical testing. First, TSX firms must disclose the reason(s) for their repurchase programs. Second, firms must promptly report to the TSX the number of shares repurchased each month. The TSX publishes this information each month. As a result, investors of TSX firms enjoy more information about a firms repurchase program and history than do investors of US exchange traded firms. This thesis investigates whether this information is associated with the market reaction to repurchase announcements.

11.2 Results

Open market share repurchases have increased steadily in the United States over the years. In contrast, I find that while TSX repurchase announcements increased during the period 1994 to 2000, repurchase announcements have declined in recent years. I find that TSX firms frequently only purchase a small percentage of the maximum shares that are indicated in repurchase announcements and many firms repurchase no shares at all. This raises the possibility that some of the announcements may not be credible. I investigate whether investors use past repurchases in assessing current repurchase announcements.

I find evidence of a significant market reaction to TSX repurchase announcements as measured by both return and volume tests. This significant market reaction continues for up to five days according to returns tests and up to nine days according to volume tests. This reaction period is longer

than what is typically observed in other repurchases studies. Announcement returns are positively associated with the extent to which firms fulfilled their previous repurchase announcements. This evidence suggests that investors consider past actions in assessing current announcements, consistent with investors using past information to assess a current corporate announcement. I also find limited evidence that investors react to repurchase announcements that cite current undervaluation as the reason for the repurchase program. Taken together, these findings provide limited support for TSX disclosure requirements. I also find limited evidence that announcement returns are negatively associated with the extent to which the firm's stock options have intrinsic value.

11.3 Contribution

My thesis contributes to academic research as follows. First, it extends the literature on disclosure credibility by applying Mercer's (2004) credibility framework to stock repurchases announcements. This enables a comparison of repurchase announcements to other disclosures, and helps to ensure a thorough modeling of investor reaction, since Mercer's framework synthesizes existing research on disclosure credibility. Second, my thesis extends the literature on the characteristics of firms that engage in repurchases by showing that the probability of a TSX firm announcing a repurchase program is increasing in firm size, past repurchase program frequency and operating cash flow and decreasing in leverage, share turnover, research and development expenses and dividend yield. Finally, my thesis contributes to the literature on reputation by showing that a firm's follow-through rate on previous repurchase announcements positively affects the market price reaction to current announcements.

11.4 Limitations of Analysis

The results of this thesis are subject to several limitations. This section discusses some of the important limitations of this thesis.

First, section 4.1 discusses the disclosed reason(s) for repurchase programs. This evidence needs to be evaluated in light of the possibility that firms may not be truthful about the real reasons for their repurchase announcements.

Second, as discussed in section 9.6, I identify all repurchase announcements where the firm has a concurrent earnings or dividend announcement. This is possible since firms are required to post earnings and dividend announcements on SEDAR. However, firms are not required to post all press releases on SEDAR, so it is not possible to ensure that there are no competing non-dividend or non-earnings announcements.

Third, as discussed in section 9.4, exclusion restrictions for sample selection models are difficult to justify with certainty since firms may seek to maximize their market values which may impact their repurchase decisions. There are no natural experiments that result in variables that impact the repurchase decision, but do not impact market value. I have made a reasonable attempt to provide a theoretical basis for the variables included in each stage of the sample selection models employed in this thesis.

Fourth, many of the variables used in this study may be endogenous. I have attempted to deal with the endogeneity of past repurchase follow through by controlling for market conditions during the prior program (variable PPRET). However, other sources of endogeneity may exist which could impact the results presented in this thesis.

Finally, as noted in section 10.4, it is difficult to analyze volume reactions since it is not possible to observe the precision of privately held information, which Kim and Verrecchia (1991) demonstrate is important to volume analysis.

11.5 Further Study

Future research will include the following. I would like to expand my sample to include the years 2006 and 2008. Expansion of my sample may allow items that were marginally insignificant to become significant in a larger sample size. Next, I would like to expand my research to consider tax motivations for repurchasing in Canada. My database includes data that allows me to identify where the major shareholder is a connected corporation under Canadian tax law. Connected corporations receive dividends on a tax free basis, so it is possible that firms modify their payout methods to cater to their major shareholders' tax needs. I will also further explore corporate governance factors. My database contains data on whether management receives performance based compensation and on whether management had any loans outstanding to the firm. My database also includes monthly share repurchases by firm. I would like to examine whether current repurchases foreshadow future performance increases. Finally, I would like to attempt to implement a Cox Proportional Hazard model to examine the likelihood of repurchasing in further depth.

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Table 1
Toronto Stock Exchange Normal Course Issuer Bid Programs
Number of Programs by Year and Type of Security

This table presents the number of normal course issuer bids (NCIB) by type of security announced during the period 1994 to 2005 and reported in the TSX Daily Record. The percentage of TSX listed securities announcing a NCIB is determined by dividing the total number of programs by the total number of listed securities per the TSX Monthly Review.

Year	Bonds	Preferred Shares	Trust Units	Warrants and Instalment Receipts	Equities	Total Securities	Total TSX Listed Securities ¹⁰	Percentage of TSX Listed Securities Announcing a NCIB
1994	0	3	0	1	133	137	1538	8.9%
1995	1	1	2	0	193	197	1572	12.5%
1996	1	1	2	1	195	190	1626	11.7%
1997	1	2	4	3	218	228	1720	13.3%
1998	6	1	13	4	310	335	1721	19.5%
1999	8	2	19	2	326	357	1761	20.3%
2000	10	6	20	1	346	383	1708	22.4%
2001	13	2	22	2	285	324	1645	19.7%
2002	8	6	36	2	233	285	1654	17.2%
2003	5	3	42	1	226	277	1710	16.2%
2004	6	5	69	1	193	274	1804	15.2%
2005	4	12	99	1	222	338	1962	17.2%
Total	63	44	328	20	2870	3325	20421	16.3%

¹⁰ The Toronto Stock Exchange, 1999 and 2002. TSX Review, Dec. 1997, 2002 and 2006.

Table 2
Found Press Releases

This table documents the number of press releases that were obtained. Press releases were obtained from the Lexis-Nexis database, the SEDAR database or from corporate websites.

<u>Year</u>	<u>Total</u>	<u>Missing Press Releases</u>	<u>Found Press Releases</u>	<u>Percentage of Press Releases Found</u>
1994	133	65	68	51.1
1995	193	65	128	66.3
1996	185	52	133	71.9
1997	218	23	195	89.5
1998	310	10	300	96.8
1999	326	6	320	98.2
2000	346	12	334	96.5
2001	285	9	276	96.8
2002	233	6	227	97.4
2003	226	3	223	98.7
2004	193	1	192	99.5
2005	222	1	221	99.5
<u>Total</u>	<u>2870</u>	<u>253</u>	<u>2617</u>	<u>91.2</u>

Table 3
Equity Securities, Reasons Cited for Repurchase Programs 1994 to 2005

This table documents the percentage of TSX announcements citing various reasons for repurchase programs during the period 1994-2005. Firms can cite more than one reason for their repurchase program. The results reflect the 2,617 repurchase announcements that were obtained (see Table 2).

1. Current Undervaluation.	40.9%
2. Firm is putting in place repurchase program in case of future undervaluation.	32.4%
3. Repurchase program is a good use of funds/investment.	57.7%
4. Firm has excess cash.	5.1%
5. Repurchasing stock for stock plans or to prevent dilution due to stock options.	7.3%
6. To improve liquidity.	5.8%
7. To benefit/increase interest of remaining shareholders.	37.3%
8. All other reasons.	3.4%

Table 4
Program Completion Rates

This table documents mean and median completion rates for all equity normal course issuer bids during the years 1994 to 2004. The completion rate is equal to the actual number of shares repurchased divided by the maximum number of shares that the repurchase announcement stated could be repurchased under the program.

Year	Total	Mean	Median
		Percentage Completion	Percentage Completion
		Rate	Rate
1994	133	36.3	25.3
1995	193	30.9	12.9
1996	185	31.6	17.9
1997	218	37.7	17.3
1998	310	38.3	25.4
1999	326	42.5	29.3
2000	346	35.8	20.7
2001	285	23.7	8.0
2002	233	23.5	6.7
2003	226	18.3	4.7
2004	193	26.1	7.8
Total	2870	31.9	15.7

Table 5
Event Study Sample

This table documents the number of firms that were included in the event study, the results of which are reported in Tables 10 and 11.

	Returns	Volume
	<u>Testing</u>	<u>Testing</u>
Total announcements, 1994 to 2005	2,870	2,870
Missing press releases	(253)	(253)
Missing market data	<u>(861)</u>	<u>(439)</u>
Announcements with press releases and market data	<u>1,756</u>	<u>2,178</u>

Table 6
Accounting Data Availability of
Announcing and Non-Announcing Firms

Panel A: Available Total Asset and Industry

This table presents information on the number of firms for which total asset and industry information was available on the Compustat database. NCIB refers to normal course issuer bids.

Fiscal Year Prior to NCIB	Announcing Firms Covered by Compustat	Total NCIBs	Percentage of Announcements Covered by Compustat	Non-Announcing Firms Covered by Compustat	Total Firms Covered by Compustat	Total TSX Companies Listed ¹¹	Percentage of TSX Firms Covered by Compustat
1993	42	133	31.6	477	519	1218	42.6
1994	99	193	51.3	566	665	1244	53.5
1995	102	195	52.3	634	736	1258	58.5
1996	126	218	57.8	627	753	1323	56.9
1997	147	310	47.4	596	743	1420	52.3
1998	227	326	69.6	622	849	1433	59.3
1999	245	346	70.8	685	930	1456	63.9
2000	205	285	71.9	731	936	1398	67.0
2001	189	233	81.1	718	907	1316	68.9
2002	172	226	76.1	719	891	1304	68.3
2003	153	193	79.3	779	932	1340	69.6
2004	166	222	74.8	834	1000	1421	70.4
Total	1873	2870	65.3	7988	9861	16131	61.1

Panel B: Sample Size for Probit Models

	All NCIB	All Non-NCIB
Observations with total asset and industry data available per Panel A	1873	7988
Missing accounting data for Probit Model 1	<u>(637)</u>	<u>(3287)</u>
Available data for Probit Model 1	<u>1236</u>	<u>4701</u>

¹¹ The Toronto Stock Exchange, 1999 and 2002. TSX Review, Dec. 1997, 2002 and 2005.

Table 7
Mean Accounting Values of Announcing and Non-Announcing Firms

This table presents mean accounting values obtained from the Compustat database. The number of observations used to generate the means is shown in brackets. T-tests compare the means of the respective samples. SIZE= Total assets in thousands of dollars at the end of the most recently reported fiscal year prior to the announcement. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. CAPX= capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. LEV= Total debt divided by total assets at the end of the most recently reported fiscal year prior to the announcement. DVPT=Dividends as a percentage of total income during the most recently reported fiscal year end preceding the announcement.

Panel A: Announcing and Non-Announcing Firms

Item	Mean All Announcing Firms with available Compustat data	Mean All Non-Announcing Firms with available Compustat data	t-test all Announcing versus all Non-Announcing Firms
SIZE	6862.52 (1873)	2840.06 (7988)	5.829***
CASH	0.1143 (1873)	0.1664 (7977)	-9.208***
CAPX	0.0869 (1776)	0.1100 (7667)	-4.602***
INTAN	0.0851 (1814)	0.0624 (7719)	6.471***
MBOOK	1.89 (1855)	2.13 (7069)	-0.330
VOL	0.3565 (1855)	0.7774 (7094)	-5.270***
LEV	0.4100 (1562)	0.5700 (7392)	-1.893*
DVPT	0.4100 (1848)	0.3000 (7848)	0.740

Panel B: Firms with Necessary Market and Volume Data for Event Study

	Mean All Announcing Firms with Necessary Market Data for Event Study	Mean All Announcing Firms with Necessary Volume Data for Event Study but missing market data	T-test Announcing Firms with Returns Data versus Announcing Firms with Volume Data but missing market data
SIZE	8549.66 (1366)	180.74 (256)	3.3867***
CASH	0.1143 (1366)	0.1141 (256)	0.0186
CAPX	0.0938 (1299)	0.0587 (247)	3.8661***
INTAN	0.0873 (1326)	0.0772 (247)	0.9914
MBOOK	2.03 (1352)	1.19 (256)	3.0788***
VOL	0.4115 (1352)	0.1092 (255)	14.3069***
LEV	0.40 (1156)	0.43 (201)	-2.5722**
DVPT	0.29 (1347)	1.24 (255)	-2.0359**

* Significant at the 0.10 level ** Significant at the 0.05 level *** Significant at the 0.01 level

Table 8
Repurchase Program Rates by Industry

This table presents repurchase program rates for Compustat covered firms with fiscal years ending from 1993 to 2004. Mean repurchase program rate is the number of observations in the SIC Code where the firm subsequently announced a repurchase program divided by the number of observations for the SIC Code. The overall announcement rate for all firms in the Compustat database was 18.99%. T-tests are reported testing whether the mean repurchase program rate for the SIC Code differs from the population rate of 18.99%.

SIC Code	Industry	Number of Compustat Observations for SIC Code from 1993 to 2004	Mean Repurchase Program Rate	T-Test vs Population Mean t-value
1000	Metal mining	429	3.96%	-15.94***
1040	Gold and silver ores	781	4.74%	-18.74***
1311	Crude petroleum and natural gas	1107	16.53%	-2.20**
1400	Mining, quarry, non-metal materials	128	2.34%	-12.40***
2834	Pharmaceutical preparations	203	5.91%	-7.88***
2836	Biological products and diagnostic testing	192	2.08%	-16.36***
3312	Steel works and blast furnaces	108	25.00%	1.44
3663	Radio, television, broadcasting	110	6.36%	-5.40***
3714	Motor vehicle parts and accessories	124	12.90%	-2.01**
4813	Phone communication and radio telephone	102	16.67%	-0.63
6020	Commercial banks	110	30.00%	2.51**
6211	Security brokers and dealers	93	44.08%	4.85***
6282	Investment advice	109	40.36%	4.53***
6512	Operators of non-residential buildings	104	37.5%	3.88***
6799	Investment firms	203	18.23%	-0.28
7370	Computer programming and data processes	113	11.50%	-2.48**
7372	Pre-packaged software	315	21.27%	0.98
7373	Computer integrated system design	126	6.34%	-5.80***
All other	All other SIC codes with less than 90 observations	5404		
Total	All firms in all SIC codes	9861	18.99%	

** Significant at the 0.05 level *** Significant at the 0.01 level

Table 9
Mean Corporate Governance, Ownership and Option Values:
Repurchasing Firms

This table presents mean values of corporate governance, ownership and option variables for repurchasing firms with available data. The number of observations is presented in parentheses. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. OPT= Total stock options outstanding as a percentage of total shares outstanding at the end of the most recently reported fiscal year prior to the announcement. INMONEY= Intrinsic value of total insider stock options outstanding per the most recent proxy circular preceding the announcement date divided by total assets at the end of the most recently reported fiscal year preceding the announcement.

Item	Mean (# of observations)
EXBRD	0.7488 (1035)
INSIDER	0.1991 (984)
OPT	0.0486 (1028)
INMONEY	0.0130 (1025)

Table 10
Correlation Matrices of Announcement Prediction Model Independent Variables

This table presents the Pearson correlation coefficients of variables used in Probit Model 1, the results of which are presented in Table 11. NCIB3= Number of repurchase programs in the three fiscal years preceding the fiscal year of the current announcement. NCIB1=1 if the firm commenced a repurchase program in the fiscal year preceding the fiscal year of the current announcement, 0 otherwise. DVPT=Dividends as a percentage of total income during the most recently reported fiscal year end preceding the announcement. DYIELD= Dividends per share during the most recently reported fiscal year preceding the announcement divided by year end market value per share as of the most recently reported fiscal year preceding the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. CASHCHG= Percentage change in opening and closing cash during the most recently reported fiscal year preceding the announcement. CAPX= capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. FCF= Operating cash flow less capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CARJB= Abnormal returns using the market model in the twenty eight days prior to the announcement window. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. LEV= Total debt divided by total assets at the end of the most recently reported fiscal year prior to the announcement. LOWIND=1 if the firm is in industries with the following SIC codes: 1000,1040,1400,2834,2836,3663 and 7373. HIGHIND=1 if the firm is in industries with the following SIC codes: 6020,6211,6282 and 6512. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement.

Table 10 (continued)
Correlation Matrices of Announcement Prediction Model Independent Variables

	NCIB1	NCIB3	CASH	CAPX	INTAN	CASHCHG	XRD	DYIELD	SIZE
NCIB1	1.00								
NCIB3	0.82	1.00							
CASH	-0.10	-0.12	1.00						
CAPX	-0.04	-0.06	-0.05	1.00					
INTAN	0.05	0.05	-0.11	-0.16	1.00				
CASHCHG	0.00	0.00	0.08	-0.08	-0.00	1.00			
XRD	-0.07	-0.07	-0.02	-0.02	0.03	-0.44	1.00		
DYIELD	0.04	0.02	-0.02	-0.02	0.03	-0.02	-0.01	1.00	
SIZE	0.24	0.27	-0.32	-0.12	0.17	0.08	-0.18	0.12	1.00
MBOOK	-0.00	-0.00	0.01	-0.01	0.01	0.03	-0.07	-0.01	0.02
LEV	0.01	0.01	-0.13	0.15	0.03	-0.19	0.12	0.01	-0.07
DVPT	0.04	0.04	-0.01	-0.02	0.02	-0.01	-0.02	0.09	0.07
LOWIND	-0.22	-0.22	0.27	0.02	-0.14	-0.01	0.08	-0.04	-0.29
HIGHIND	0.06	0.06	0.00	-0.05	0.05	0.01	-0.02	0.0	0.00
VOL	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00	-0.00
OCF	0.01	0.03	-0.06	0.46	0.02	0.20	-0.17	0.01	0.10

	MBOOK	LEV	DVPT	LOWIND	HIGHIND	VOL	OCF
MBOOK	1.00						
LEV	-0.04	1.00					
DVPT	0.00	0.00	1.00				
LOWIND	-0.03	-0.15	-0.04	1.00			
HIGHIND	0.01	0.00	0.02	-0.06	1.00		
VOL	-0.00	0.00	-0.00	0.02	-0.00	1.00	
OCF	0.01	-0.14	0.01	-0.05	0.02	0.00	1.00

Table 11
Probit Analysis of Antecedents of Repurchase Announcements

This table presents probit coefficient estimates. Models 1 and 1A utilize data from the entire Compustat database from 1994 to 2004 (Number of Observations=5937, Number of Firms=1198).

The dependant variable is 1 if the firm announced a repurchase program, 0 otherwise. Independent variables are defined as follows. NCIB3= Number of repurchase programs in the three fiscal years preceding the fiscal year of the current announcement. NCIB1=1 if the firm commenced a repurchase program in the fiscal year preceding the fiscal year of the current announcement, 0 otherwise. DVPT=Dividends as a percentage of total income during the most recently reported fiscal year end preceding the announcement. DYIELD= Dividends per share during the most recently reported fiscal year preceding the announcement divided by year end market value per share as of the most recently reported fiscal year preceding the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. CASHCHG= Percentage change in opening and closing cash during the most recently reported fiscal year preceding the announcement. FCF= Operating cash flow less capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CARJB= Abnormal returns using the market model in the twenty eight trading days prior to the announcement window (-1,+1). XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market to Book Ratio at the end of the most recently reported fiscal year prior to the announcement. LEV= Total debt divided by total assets at the end of the most recently reported fiscal year prior to the announcement. LOWIND=1 if the firm is in industries with the following SIC codes: 1000,1040,1400,2834,2836,3663 and 7373. HIGHIND=1 if the firm is in industries with the following SIC codes: 6020,6211,6282 and 6512.

Table 11 (continued)
Probit Analysis of Antecedents of Repurchase Announcements

Variable	Predicted Sign	Estimated coefficient Model 1	p-value Model 1	Estimated coefficient Model 1A	p-value model 1A
N – NCIB firms		1236		1236	
N – Non-NCIB firms		4701		4701	
N-Total		5937		5937	
Pseudo R ²		0.3210		0.2820	
NCIB1	+	1.018	0.000		
NCIB3	+	0.2927	0.000	0.0783	0.000
LOWIND	-	-0.6324	0.000		
HIGHIND	+	0.3873	0.062		
MBOOK		-0.0070	0.605	-0.0001	-0.17
CASH	+	0.1909	0.231		
CASHCHG	+	0.0249	0.210		
OCF	+	0.0608	0.007		
VOL	-	-0.1765	0.011	-0.2139	0.001
CAPX	-	-0.0880	0.619		
INTAN	+	0.9260	0.577	0.1265	0.408
XRD	+	-1.4980	0.001	-1.341	0.000
DYIELD	-	-0.0305	0.029		
DVPT	-	-0.0144	0.131	-0.0141	0.085
LEV	-	-0.5547	0.000	-0.3224	0.001
SIZE	+	0.1078	0.000	0.1001	0.000
FCF	+			0.0412	0.001

Table 12
Event Study Returns Results: NCIB Sample

This table presents event study cumulative abnormal returns results for TSX firms announcing repurchase programs during the years 1994 to 2005. Cumulative abnormal returns using the market model and the buy and hold model are calculated according to the definitions contained in Appendix 6. Raw returns reflect cumulative returns over the event window. Index refers to the CFMRC equally weighted or value weighted index. Event window refers to the period in days starting before (-) and ending after (+) the NCIB announcement date. N refers to the number of observations. Patell Z test results and generalized sign test results are calculated according to the definitions contained in Appendix 6. All results were generated using the statistical package Eventus. All calculations are calculated without log transformation of returns, except CARCC which converts each security and index return from r_{jt} to $\log(1+r_{jt})$ resulting in a continuously compounded measure of cumulative abnormal returns.

Market Reaction Returns Measure	Model ¹²	Index	Event window	N	# Positive: # Negative Ratio	Mean cumulative return	Patell Z Test Result	Generalized Sign Z
CAR	Market	Equally	(-1,+1)	1756	998:758	1.19%	9.66***	8.63***
CARCC	Market	Equally	(-1,+1)	1756	1012:744	1.15%	9.12***	8.16***
RAW	Raw	n/a	(-1,+1)	1756	1076:622	1.57%	12.31***	17.29***
CARV	Market	Value	(-1,+1)	1756	985:771	1.13%	9.23***	7.84***
CARNP	Market	Equally	(-1,+1)	1728	979:749	1.12%	8.58***	8.28***
CARNPV	Market	Value	(-1,+1)	1728	971:757	1.11%	8.45***	7.81***
CARLW	Market model	Equally	(0,+4)	1789	1028:761	1.78%	11.62***	9.24***
BHR	Buy and hold	Equally	(-1,+1)	1756	966:790	1.06%	n/a	7.10***
BHRV	Buy and hold	Value	(-1,+1)	1756	970:786	1.05%	n/a	7.12***
CARJB	Market	Equally	(-30,-2)	1809	728:1081	-3.68%	10.26***	-5.39***

*** denotes significance at the 0.001 level

¹² Estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day, except CARNP which is estimated using a minimum of 60 and a maximum of 200 days of returns over the period ending 31 days before the event day.

Table 13
Event Study Volume Results: NCIB Sample

This table presents event study cumulative returns results for TSX firms announcing repurchase programs during the years 1994 to 2005. Cumulative abnormal volume using market models are calculated according to the definitions contained in Appendix 6. Event window refers to the period starting before (-) and ending after (+) the NCIB announcement date. N refers to the number of observations. Patell Z test results and generalized sign test results are calculated according to the definitions contained in Appendix 6. All results were generated using the statistical package Eventus. CAV is calculated with log transformed volume. CAVNLT is calculated without log transformation.

Market Reaction Returns Measure	Model ¹³	Index	Event window (starting date, ending date)	N	# Positive: # Negative Ratio	Mean cumulative abnormal volume	Patell Z Test Result	Generalized Sign Z
Volume Measures:								
CAV	Market model	Volume index	(-1,+1)	2178	833:1345	1.28%	18.72***	13.36***
CAVNLT	Market model	Volume index	(-1,+1)	2178	822:1356	3.75%	20.56***	13.50***

*** denotes significance at the 0.001 level

¹³ Estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day.

Table 14
Correlation Matrices of Return and Volume Market Reaction Variables

This table presents the Pearson correlation coefficients of alternative definitions of abnormal returns and abnormal volume. All variables are defined in Tables 12 and 13.

Panel A: Return Measures

	CAR	CARNP	BHR	CARLW
CAR	1.0	0.9798	0.9710	0.6593
CARCC	0.9945	0.9743	0.9730	0.6842
CARNP	0.9798	1.0	0.9427	0.6560
BHR	0.9710	0.9427	1.0	0.6405
CARLW	0.6593	0.6560	0.6405	1.0
RAW	0.9605	0.9546	0.9281	0.6227

Panel B: Volume Measures

	CAV	CAVNLT
CAV	1.0	0.6093
CAVNLT	0.6093	1.0

Table 15
Mean Daily Abnormal Returns Around TSX Repurchase Announcements

This table presents mean daily, non-cumulative, abnormal returns during the period prior to, during and after TSX NCIB repurchase announcements (day 0). Mean daily abnormal returns are calculated using the market model defined in Appendix 6, estimated over a minimum of 60 days and a maximum of 200 days split equally between the period ending 31 days before and commencing 31 days after the event day and using an equally weighted market index. Patell Z test results and generalized sign test results are calculated according to the definitions contained in Appendix 6. All results were generated using the statistical package Eventus.

Day	Mean Abnormal Return	Positive: Negative	Patell Z	Generalized Sign Z
-20	-0.22%	716:870	-2.341**	-1.259
-19	-0.34%	669:934	-4.523***	-4.003***
-18	-0.11%	738:860	-1.901*	-0.432
-17	-0.20%	734:854	-2.165*	-0.400
-16	-0.27%	715:877	-3.121***	-1.448\$
-15	-0.17%	711:874	-2.356**	-1.488\$
-14	-0.11%	715:864	-1.135	-1.147
-13	-0.26%	693:899	-3.592***	-2.553**
-12	0.02%	751:851	-0.309	0.126
-11	-0.30%	685:926	-4.337***	-3.381***
-10	-0.22%	737:866	-2.309*	-0.599
-9	-0.22%	733:877	-3.199***	-0.961
-8	-0.13%	713:895	-2.430**	-1.914*
-7	-0.10%	753:858	-1.276	0.015
-6	-0.26%	691:919	-4.031***	-3.059**
-5	-0.03%	723:883	-0.168	-1.369\$
-4	-0.05%	737:858	-0.021	-0.413
-3	0.04%	740:848	0.366	-0.098
-2	-0.14%	744:850	-1.325\$	-0.038
-1	0.00%	743:860	0.270	-0.298
0	0.61%	904:719	7.579***	7.249***
+1	0.58%	883:749	6.943***	5.978***
+2	0.31%	834:803	3.759***	3.426***
+3	0.12%	797:831	2.305*	1.806*
+4	0.16%	823:802	3.126***	3.170***
+5	-0.08%	800:824	-1.201	2.051*
+6	0.01%	770:862	0.346	0.372
+7	-0.17%	734:886	-1.985*	-1.141
+8	0.29%	749:869	4.441***	-0.347
+9	-0.04%	748:866	0.924	-0.304
+10	-0.03%	732:878	0.220	-1.011
+11	0.02%	763:844	0.147	0.609
+12	0.13%	742:851	2.591**	-0.115
+13	-0.10%	745:846	-0.753	0.083
+14	-0.17%	746:864	-1.786*	-0.311
+15	-0.13%	717:872	-2.472**	-1.278
+16	0.02%	754:831	0.098	0.677
+17	-0.15%	752:831	-0.646	0.624
+18	-0.01%	740:827	2.150*	0.398
+19	-0.01%	733:855	-0.064	-0.450
+20	-0.02%	728:875	-0.579	-1.049

The symbols \$, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using 1-tail Patell Z and generalized sign Z tests as described in Appendix 6.

Table 16
Mean Daily Abnormal Volumes Around TSX Repurchase Announcements

This table presents mean daily, non-cumulative, abnormal volumes during the period prior to, during and after TSX NCIB repurchase announcements (day 0). Mean daily abnormal volumes are calculated using the market model with log transformed daily firm and total exchange volume, estimated over a minimum of 60 days and a maximum of 200 days split equally between the period ending 31 days before and commencing 31 days after the event day. Patell Z test results and generalized sign test results are calculated according to the definitions contained in Appendix 6. All results were generated using the statistical package Eventus.

Day	Mean Abnormal Relative Volume	Positive: Negative	Patell Z	Generalized Sign Z
-20	0.11%	523:1624	7.510***	-1.348\$
-19	-0.13%	513:1634	0.197	-1.842*
-18	-0.09%	500:1647	3.621***	-2.485**
-17	-0.06%	518:1629	4.057***	-1.595\$
-16	0.09%	518:1629	0.300	-1.595\$
-15	-0.04%	488:1659	1.006	-3.078**
-14	0.10%	572:1575	3.727***	1.075
-13	-0.06%	547:1600	3.974***	-0.161
-12	0.03%	584:1563	4.080***	1.668*
-11	0.01%	547:1600	14.239***	-0.161
-10	-0.14%	571:1576	5.215***	1.025
-9	0.08%	587:1560	3.971***	1.816*
-8	0.07%	558:1589	4.107***	0.382
-7	-0.04%	542:1605	2.389**	-0.409
-6	0.05%	579:1568	5.550***	1.421\$
-5	0.03%	560:1587	4.637***	0.481
-4	0.00%	578:1569	9.363***	1.371\$
-3	0.11%	554:1593	5.257***	0.185
-2	0.01%	563:1584	3.303***	0.630
-1	0.10%	571:1576	4.538***	1.025
0	0.48%	747:1400	14.752***	9.725***
+1	0.74%	735:1412	14.344***	9.132***
+2	0.33%	664:1483	10.785***	5.622***
+3	0.27%	677:1470	13.278***	6.265***
+4	0.06%	595:1552	7.099***	2.211*
+5	0.15%	601:1546	9.147***	2.508**
+6	0.04%	633:1514	9.325***	4.090***
+7	-0.01%	593:1554	5.855***	2.113*
+8	0.07%	609:1538	8.150***	2.904**
+9	0.07%	608:1539	7.094***	2.854**
+10	-0.09%	569:1578	5.691***	0.926
+11	-0.15%	593:1554	7.097***	2.113*
+12	-0.06%	580:1567	10.254***	1.470\$
+13	-0.07%	583:1564	10.361***	1.618\$
+14	0.10%	614:1533	12.066***	3.151***
+15	0.10%	608:1539	11.946***	2.854**
+16	-0.07%	563:1584	6.740***	0.630
+17	-0.10%	554:1593	4.855***	0.185
+18	0.02%	578:1569	10.933***	1.371\$
+19	-0.05%	592:1555	5.497***	2.063*
+20	-0.08%	553:1594	5.027***	0.135

The symbols \$, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using 1-tail Patell Z and generalized sign Z tests as described in Appendix 6.

Table 17
Correlation Matrix of Announcement Reaction Models' Independent Variables

This table presents the Pearson correlation coefficients of variables used in the market reaction analysis models, the results of which are presented in Tables 18 to 31.

NCIB3= number of repurchase programs in the three fiscal years preceding the fiscal year of the current announcement. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 17 (continued)
Correlation Matrix of Announcement Reaction Models' Independent Variables

	CARJB	NCIB3	REP	PPRET	CUV	FUV	GOOD
CARJB	1.00						
NCIB3	0.07	1.00					
REP	0.01	-0.02	1.00				
PPRET	0.06	-0.04	-0.08	1.00			
CUV	-0.15	-0.27	0.04	0.03	1.00		
FUV	0.05	-0.01	-0.18	-0.02	-0.15	1.00	
GOOD	-0.05	-0.05	-0.01	-0.01	0.18	0.14	1.00
EXCASH	0.12	-0.00	0.03	-0.05	-0.09	-0.04	-0.00
STOCKP	0.01	0.15	-0.08	-0.01	-0.18	0.06	-0.09
LIQ	-0.03	-0.03	-0.09	-0.03	0.08	-0.11	-0.04
REMSH	-0.10	-0.10	-0.06	-0.01	0.11	0.10	-0.15
TARGET	-0.04	-0.08	0.14	-0.02	0.05	-0.00	0.19
REPxCUV	-0.08	-0.14	0.56	-0.05	0.52	-0.04	0.10
REPxFUV	-0.05	-0.05	0.27	-0.08	0.06	0.53	0.08
REPxLIQ	0.03	-0.02	-0.04	-0.04	-0.01	-0.07	-0.08
REPxPPRET	0.10	-0.01	-0.21	0.63	-0.02	-0.02	-0.05
SIZE	0.08	0.17	0.02	0.00	-0.35	-0.00	-0.24
MBOOK	-0.00	0.11	-0.01	0.09	-0.12	0.00	0.04
CASH	0.00	-0.04	0.03	0.00	0.25	-0.16	0.16
OCF	-0.19	-0.06	0.01	0.02	-0.10	0.15	-0.08
VOL	0.06	-0.04	0.08	0.00	-0.07	-0.13	-0.17
CHGINC	-0.06	-0.02	0.01	-0.12	-0.09	0.03	-0.09
CHGCAPX	0.03	-0.04	-0.02	-0.05	0.07	0.01	-0.00
CHGREV	0.01	-0.00	-0.02	-0.13	-0.06	0.03	-0.06
INTAN	0.13	0.04	-0.05	-0.03	-0.13	-0.12	0.02
XRD	0.09	-0.02	-0.02	0.04	0.07	-0.13	0.03
CAPX	-0.05	-0.03	-0.03	-0.03	-0.01	0.21	-0.04
EXBRD	0.00	0.08	0.07	0.00	-0.07	-0.05	-0.14
OPT	0.01	0.07	0.03	0.02	0.26	-0.08	0.13
INMONEY	-0.12	0.11	-0.04	-0.14	0.24	-0.04	0.15
INSIDER	-0.11	0.02	-0.01	0.04	0.18	0.15	0.15

Table 17 (continued)
Correlation Matrix of Announcement Reaction Models' Independent Variables

	EXCASH	STOCKP	LIQ	REMSH	TARGET	REPxCUV	REP x FUV	REPxLIQ	REPx PPRET
EXCASH	1.0								
STOCKP	-0.02	1.00							
LIQ	-0.03	-0.06	1.00						
REMSH	0.01	-0.25	0.12	1.00					
TARGET	-0.02	-0.23	0.04	0.03	1.00				
REPxCUV	-0.02	-0.08	-0.04	0.05	0.02	1.00			
REPxFUV	-0.02	-0.05	-0.06	0.05	0.12	0.19	1.00		
REPxLIQ	-0.04	-0.04	0.62	-0.01	-0.04	-0.02	-0.04	1.00	
REPxPPRET	-0.02	0.01	0.00	0.03	-0.01	-0.33	-0.11	0.00	1.00
SIZE	0.04	0.26	-0.06	-0.10	-0.12	-0.07	-0.12	-0.04	0.03
MBOOK	-0.2	0.07	-0.06	-0.10	-0.01	-0.09	0.00	-0.02	0.05
CASH	0.01	0.09	-0.09	-0.08	0.01	0.10	-0.07	-0.05	0.03
OCF	0.02	-0.05	0.08	0.16	0.03	-0.03	0.00	-0.02	-0.04
VOL	0.30	-0.07	0.02	0.04	0.14	0.06	-0.03	-0.06	-0.01
CHGINC	-0.04	-0.04	0.02	-0.02	0.06	-0.03	-0.02	0.09	-0.03
CHGCAPX	-0.05	-0.00	0.10	-0.03	-0.02	0.03	0.10	0.25	-0.04
CHGREV	0.02	-0.02	0.31	-0.02	0.01	-0.02	0.05	0.62	-0.10
INTAN	-0.10	-0.18	0.03	-0.14	-0.13	0.00	-0.08	0.21	-0.03
XRD	0.20	-0.11	-0.04	0.09	-0.15	-0.01	-0.06	-0.02	0.05
CAPX	0.02	-0.01	0.08	0.21	0.06	-0.04	0.11	-0.01	-0.02
EXBRD	0.03	0.18	-0.05	0.07	0.00	0.03	-0.01	-0.13	0.02
OPT	0.04	-0.17	-0.02	-0.08	0.03	0.06	0.08	-0.01	0.01
INMONEY	-0.01	-0.07	0.05	-0.06	0.11	0.05	-0.06	0.04	-0.06
INSIDER	-0.11	-0.14	0.00	0.06	-0.12	0.05	0.15	0.07	-0.01

Table 17 (continued)
Correlation Matrix of Announcement Reaction Models' Independent Variables

	SIZE	MBOOK	CASH	OCF	VOL	CHGINC	CHGCAPX	CHGREV	INTAN
SIZE	1.00								
MBOOK	0.01	1.00							
CASH	-0.29	0.10	1.00						
OCF	-0.02	0.10	-0.17	1.00					
VOL	0.34	0.02	0.04	0.08	1.00				
CHGINC	-0.05	0.03	-0.01	0.12	0.10	1.00			
CHGCAPX	-0.10	0.01	0.01	-0.08	0.00	0.15	1.00		
CHGREV	0.01	0.00	-0.09	0.15	0.09	0.26	0.37	1.00	
INTAN	0.05	0.05	-0.09	-0.14	-0.10	-0.00	0.14	0.18	1.00
XRD	-0.29	0.01	0.57	-0.21	0.04	0.00	-0.08	-0.07	-0.00
CAPX	-0.08	0.03	-0.29	0.43	0.08	0.12	0.27	0.19	-0.29
EXBRD	0.39	0.02	-0.07	0.07	0.16	-0.07	-0.10	-0.17	-0.07
OPT	-0.31	0.02	0.33	-0.14	0.03	0.03	0.00	-0.02	0.03
INMONEY	-0.25	0.20	0.38	0.19	0.09	0.03	0.13	0.09	-0.07
INSIDER	-0.33	0.00	0.12	-0.12	-0.30	0.04	0.06	-0.01	0.05

	XRD	CAPX	EXBRD	OPT	INMONEY	INSIDER
XRD	1.00					
CAPX	-0.21	1.00				
EXBRD	-0.09	-0.03	1.00			
OPT	0.30	-0.09	-0.10	1.00		
INMONEY	0.01	0.03	-0.00	0.10	1.00	
INSIDER	0.14	-0.05	-0.20	0.11	0.05	1.00

Table 18
Regression Analysis of Market Returns Reaction: All Announcers

This table presents, without the use of selection controls, OLS regression results for all sample firms with the required data. Model 1 presents the results using the contents of the announcement and returns data. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. NCIB3= number of repurchase programs in the three fiscal years preceding the fiscal year of the current announcement. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 18 (continued)
Regression Analysis of Market Returns Reaction: All Announcers

Variable	Model 1 Estimate	Model 1 t-stat	Model 2 Estimate	Model 2 t-stat	Model 3 Estimate	Model 3 t-stat	Model 4 Estimate	Model 4 t- stat
Number of Obs.	1747		1023		516		458	
Number of Firms	622		365		201		187	
R-squared	0.0238		0.0415		0.0771		0.0730	
Intercept	0.0209	3.27***	0.0358	2.60***	0.03867	1.26	0.0248	0.73
History:								
a. NCIB3	-0.0128	-3.11***	-0.0054	-3.02***	-0.0041	-1.58	-0.0046	-1.67*
Announcement Content:								
b. CUV	0.0113	2.80***	0.0024	0.45	0.0018	0.20	0.0029	0.31
c. FUV	-0.0051	-1.43	-0.0077	1.81*	-0.0138	-2.16**	-0.0129	-1.96*
d. GOOD	-0.0042	-1.15	-0.0042	-0.93	-0.0070	-1.04	-0.0058	-0.81
e. EXCASH	-0.0049	-0.68	0.0053	0.72	0.0114	1.17	0.0045	0.46
f. STOCKP	-0.0049	-1.26	-0.0021	-0.43	-0.0070	-0.72	-0.0061	-0.61
g. LIQ	-0.0062	-0.72	0.0031	0.25	-0.0098	-0.61	-0.0072	-0.47
h. REMSH	-0.0044	-1.22	-0.0038	-0.83	-0.0059	-0.88	-0.0031	-0.45
i. TARGET	0.0005	0.69	0.0007	0.65	0.0005	0.34	0.0008	0.53
Market Data								
j. CARJB	0.0179	1.23	0.0228	1.07	0.0428	1.74*	0.0308	1.32
k. VOL			-0.0094	-0.81	-0.0101	-0.51	-0.0031	-0.15
Accounting:								
l. SIZE			-0.0015	-1.14	-0.0028	-1.40	-0.0010	-0.51
m. MBOOK			-0.0006	-0.90	-0.0001	-0.20	-0.0001	-0.12
n. CASH			0.0301	1.94*	0.0272	1.56	0.0252	1.53
o. OCF			-0.0031	-0.19	0.0095	0.53	0.0139	0.81
p. INT			-0.0135	-0.90	-0.0267	-1.38	-0.0310	-1.42
q. XRD			-0.0250	-0.43	-0.0377	-0.51	0.0063	0.09
r. CAPX			-0.0022	-0.12	-0.0224	-1.18	-0.0156	-0.95
s. CHGINC			0.0000	1.05	0.0001	10.20***	0.0001	9.62***
t. CHGCAPX			-0.0007	-1.87*	-0.0008	-0.98	0.0006	0.41
u. CHGREV			0.0001	6.89***	0.0000	3.91***	0.0001	1.27
Proxy Circular								
v. EXBRD					0.0174	0.47	0.0077	0.18
w. OPT					-0.0465	-1.16	-0.0382	-0.89
x. INMONEY					-0.0871	-1.73*	-0.0736	-1.66*
y. INSIDER					0.0000	1.48	0.0001	2.74***

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 19
Regression Analysis of Market Returns Reaction: Repeat Announcers Only

This table presents, without the use of selection controls, OLS regression results for all firms with repeat announcements during the sample period and the required data. Model 1 presents the results using the contents of the announcement and returns data. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. NCIB3= number of repurchase programs in the three fiscal years that preceding the fiscal year of the current announcement. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 19 (continued)
Regression Analysis of Market Returns Reaction: Repeat Announcers Only

Variable	Model 1 Estimate	Model 1 t-stat	Model 2 Estimate	Model 2 t-stat	Model 3 Estimate	Model 3 t-stat	Model 4 Estimate	Model 4 t-stat
Number of Obs.	1064		694		356		316	
Number of Firms	360		246		132		125	
R-squared	0.0409		0.0634		0.0994		0.0981	
Intercept	0.0405	1.10	0.0194	1.35	0.0047	0.19	0.0101	0.39
History:								
a. CARJB	0.0456	2.62***	0.0326	1.29	0.0389	1.54	0.0424	1.72*
b. REP	0.0105	2.03**	0.0088	1.63	0.0148	1.81*	0.0079	1.01
c. PPRET	0.0043	0.09	0.0020	0.35	0.0038	0.49	-0.0038	-0.62
d. NCIB3	-0.0351	-0.97	-0.0020	-0.83	-0.0002	-0.04	-0.0027	-0.74
Announcement Content:								
e. CUV	0.0125	2.18**	0.0030	0.38	0.0153	1.30	0.0113	0.93
f. FUV	0.0011	0.23	-0.0055	-0.99	-0.0096	-1.41	-0.0056	-0.73
g. GOOD	-0.0020	-0.45	0.0112	1.56	0.0067	1.05	0.0057	0.94
h. EXCASH	0.0087	1.14	0.0112	1.56	-0.0012	-0.11	-0.0092	-0.84
i. STOCKP	-0.0033	-0.67	-0.0008	-0.13	-0.0051	-0.48	-0.0040	-0.40
j. LIQ	0.0029	0.23	0.0128	0.76	-0.0146	-0.45	-0.0164	-0.46
k. REMSH	-0.0095	-2.21	-0.0031	-0.62	-0.0055	-0.76	-0.0033	-0.49
l. TARGET	0.0003	0.42	-0.0004	-0.38	-0.0014	-1.12	-0.0009	-0.75
History/Content:								
m. REPxCUV	-0.0117	-1.31	-0.0112	-0.83	-0.0258	-1.66*	-0.0071	-0.46
n. REPxFUV	-0.0028	-0.33	0.0010	0.10	-0.0013	-0.09	-0.0105	-0.67
o. REPxLIQ	-0.0492	-1.88*	-0.0491	1.54	0.0199	0.44	0.0371	0.77
p. REPxPPRET	0.0036	0.39	0.0111	0.97	-0.0056	-0.46	0.0056	0.48
Accounting:								
q. SIZE			-0.0014	-1.22	-0.0014	-0.66	0.0032	0.19
r. MBOOK			-0.0018	-3.64***	-0.0024	-1.46	-0.0012	-0.96
s. CASH			0.0429	1.92*	0.0188	0.78	0.0101	0.48
t. OCF			0.0032	0.18	0.0321	1.27	0.0354	1.27
u. VOL			0.0026	0.41	0.0115	0.98	0.0151	1.36
v. CHGINC			0.0000	1.74*	0.0005	10.65***	0.0001	10.47
w. CHGCAPX			-0.0007	-0.51	-0.0007	-0.45	-0.0008	-0.57
x. CHGREV			-0.0016	-0.44	0.0029	0.59	0.0000	0.01
y. INTAN			0.0023	0.14	-0.0065	-0.34	-0.0077	-0.38
z. XRD			0.0109	0.18	0.0112	0.16	0.0713	1.38
aa. CAPX			0.0081	0.31	-0.0416	-1.10	-0.0148	-0.44
Proxy Circular								
bb. EXBRD					0.0135	0.46	-0.0125	-0.42
cc. OPT					0.0173	0.33	0.0187	0.37
dd. INMONEY					-0.2324	-0.99	-0.0971	-0.52
ee. INSIDER					0.0001	2.31**	0.0001	4.55***

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 20

**Regression Analysis of Market Returns Reaction with
Probit Model 1 Surprise Control: All Announcers**

This table presents OLS regression results for all sample firms with the required data. The market's level of surprise that the announcement is occurring is controlled for by including the predicted value (P1 below) from probit model 1. The results of probit model 1 are summarized in Table 11. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 20 (continued)

**Regression Analysis of Market Returns Reaction with
Probit Model 1 Surprise Control: All Announcers**

Variable	Model 2 Estimate	Model 2 t- stat	Model 3 Estimate	Model 3 t- stat	Model 4 Estimate	Model 4 t- stat
Number of Obs.	897		447		417	
Number of Firms	327		180		170	
R-squared	0.0455		0.0908		0.0906	
Intercept	0.0405	2.67***	0.0453	1.47	0.0378	1.10
Surprise Control:						
a. PI	-0.0245	-2.75***	-0.0162	-1.32	-0.0223	-1.60
Announcement Content:						
b. CUV	0.0011	0.19	-0.0007	-0.08	-0.0028	-0.29
c. FUV	-0.0071	-1.49	-0.0159	-2.31**	-0.0142	-2.05**
d. GOOD	-0.0060	-1.17	-0.0095	-1.41	-0.0099	-1.36
e. EXCASH	0.0048	0.61	0.0114	0.85	0.0046	0.41
f. STOCKP	-0.0055	-0.89	-0.0119	-1.27	-0.0137	-1.19
g. LIQ	0.0038	0.24	-0.0079	-0.33	-0.0094	-0.41
h. REMSH	-0.0061	-1.16	-0.0089	-1.25	-0.0083	-1.08
i. TARGET	0.0009	0.73	0.0006	0.38	0.0011	0.65
Market Data						
j. CARJB	0.0290	1.27	0.0489	1.81*	0.0420	1.61
k. VOL	-0.0000	-1.02	-0.0164	-0.79	-0.0118	-0.52
Accounting:						
l. SIZE	-0.0010	-0.60	-0.0026	-1.07	-0.0002	-0.07
m. MBOOK	-0.0000	-0.12	-0.0000	-0.09	0.0001	0.22
n. CASH	0.0332	2.06**	0.0255	1.40	0.0306	1.68*
o. OCF	-0.0034	-0.17	0.0061	0.34	0.0106	0.63
p. INTAN	-0.0255	-1.32	-0.0395	-1.71*	-0.0462	-1.66*
q. XRD	-0.0512	-0.82	-0.0125	-2.29**	-0.0113	-2.26**
r. CAPX	-0.0063	-0.33	-0.0301	-1.62	-0.0001	-1.38
s. CHGINC	-0.0000	-0.90	0.0011	1.59	0.0014	2.04**
t. CHGCAPX	-0.0007	-2.01**	-0.0009	-1.19	-0.0001	-0.10
u. CHGREV	0.0000	6.52***	0.0000	4.20***	0.0000	2.14**
Proxy Circular						
v. EXBRD			0.0224	0.61	0.0076	0.18
w. OPT			-0.0610	-1.44	-0.0314	-0.76
x. INMONEY			-0.0971	-2.01	-0.0902	-2.05**
y. INSIDER			0.0075	0.38	0.0113	0.54

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 21
Regression Analysis of Market Returns Reaction with
Probit Model 1 Surprise Control: Repeat Announcers Only

This table presents OLS regression results for all firms with repeat announcements during the sample period and the required data. The market's level of surprise that the announcement is occurring is controlled for by including the predicted value (P1 below) from probit model 1. The results of probit model 1 are summarized in Table 11. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 21 (continued)
Regression Analysis of Market Returns Reaction with
Probit Model 1 Surprise Control: Repeat Announcers Only

Variable	Model 2 Estimate	Model 2 t- stat	Model 3 Estimate	Model 3 t- stat	Model 4 Estimate	Model 4 t- stat
Number of Obs.	587		300		264	
Number of Firms	221		115		108	
R-squared	0.1104		0.1087		0.0930	
Intercept	0.0235	1.45	0.0074	0.28	0.0123	0.45
Surprise Control:						
a. P1	-0.0138	-1.09	-0.0011	-0.06	-0.0076	-0.35
History:						
b. CARJB	0.0338	1.25	0.0484	1.68*	0.0521	1.87*
c. REP	0.0135	2.36**	0.0164	1.75*	0.0089	1.10
d. PPRET	0.0043	0.75	0.0079	0.84	-0.0006	-0.08
Announcement Content:						
e. CUV	0.0042	0.50	0.0173	1.27	0.0131	0.92
f. FUV	-0.028	-0.45	-0.0101	-1.32	-0.0058	-0.69
g. GOOD	0.0004	0.07	0.0049	0.75	0.0032	0.5
h. EXCASH	0.0072	0.79	0.0008	0.06	-0.0108	-0.79
i. STOCKP	-0.0058	-0.78	-0.0061	-0.53	-0.0051	-0.44
j. LIQ	0.0165	0.73	-0.0251	-0.57	-0.0338	-0.71
k. REMSH	-0.0048	-0.80	-0.0056	-0.63	-0.0031	-0.36
l. TARGET	-0.0008	-0.79	-0.0019	-1.37	-0.0012	-1.01
History/Content:						
m. REPxCUV	-0.0212	-1.52	-0.0408	-2.42**	-0.0223	-1.45
n. REPxFUV	-0.0008	-0.07	0.0037	0.24	-0.0045	-0.29
o. REPxLIQ	-0.0720	-2.27**	0.0593	0.36	0.1733	1.04
p. REPxPPRET	0.0068	0.58	-0.0164	-1.23	-0.0050	-0.43
Accounting:						
q. SIZE	-0.0003	-0.21	-0.0004	-0.15	0.0014	0.64
r. MBOOK	-0.0021	-0.95	-0.0042	-1.49	-0.0024	-0.96
s. CASH	0.0370	1.48	0.0230	0.83	0.0135	0.54
t. OCF	-0.0073	-0.28	0.0323	1.05	0.0397	1.27
u. VOL	0.0002	-1.60	0.0105	0.83	0.0153	1.27
v. CHGINC	-0.0015	-1.60	0.0010	1.08	0.0007	0.80
w. CHGCAPX	-0.0009	-0.49	-0.0012	-0.73	-0.0011	-0.71
x. CHGREV	0.0018	0.41	0.0012	0.21	-0.0025	-0.43
y. INTAN	-0.0075	-0.37	-0.0038	-0.14	-0.0119	-0.39
z. XRD	0.0598	0.62	-0.0358	-0.62	0.0030	0.07
aa. CAPX	0.0166	-0.49	-0.0437	-1.12	-0.0180	-0.52
Proxy Circular						
bb. EXBRD			0.0100	0.34	-0.0215	-0.73
cc. OPT			0.0274	0.57	0.0324	0.68
dd. INMONEY			-0.1437	-0.65	-0.0266	-0.15
ee. INSIDER			0.0071	0.28	0.0128	0.56

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 22
Market Reaction Returns Analysis Using Full Information
Maximum Likelihood Heckman Model: All Announcers

This table presents Heckman full information maximum likelihood results for all sample firms with the required data. Selection is controlled for by utilizing a Heckman full information maximum likelihood model. Probit results from the full information maximum likelihood model are presented in Table 11. Model 2 utilizes Probit Model 1 from Table 11 in the first stage and controls for the contents of the announcement and accounting data. Model 3 utilizes Probit Model 1 from Table 11 in the first stage and presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. Z-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. ATHRHO is the hyperbolic arctangent of the probability from the probit model and is used to control for sample selection. Rho is the correlation between the residuals of the repurchase decision model and the market reaction model. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 22 (continued)
Market Reaction Returns Analysis Using Full Information
Maximum Likelihood Heckman Model: All Announcers

Variable	Model 2 Estimate	Model 2 z- stat	Model 3 Estimate	Model 3 z- stat	Model 4 Estimate	Model 4 z- stat
Number of Obs.	886		446		393	
Number of Firms	327		178		164	
Intercept	0.0170	1.09	0.0306	0.98	0.0116	0.34
Sample Selection Control:						
a. ATHRHO	0.1427	2.63***	0.0980	1.28	0.1139	1.30
a1. Rho	0.1417		0.0977		0.1134	
Announcement Content:						
b. CUV	0.0015	0.26	-0.0017	-0.18	-0.0009	-0.09
c. FUV	-0.0070	-1.49	-0.0161	-2.35**	-0.0152	-2.18**
d. GOOD	-0.0062	-1.23	-0.0091	-1.28	-0.0065	-0.88
e. EXCASH	0.0045	0.59	0.0123	1.17	0.0067	0.64
f. STOCKP	-0.0060	-0.98	-0.0129	-1.20	-0.0111	-0.98
g. LIQ	-0.0034	0.22	-0.0091	-0.38	-0.0079	-0.36
h. REMSH	-0.0064	-1.23	-0.0088	-1.17	-0.0056	-0.73
i. TARGET	0.0009	0.72	0.0040	0.24	0.0008	0.47
Market Data						
j. CARJB	0.0283	1.25	0.0487	1.87*	0.0360	1.45
k. VOL	-0.0116	-0.94	-0.0154	-0.74	-0.0070	-0.32
Accounting:						
l. SIZE	-0.0008	-0.51	-0.0028	-1.13	-0.0010	-0.39
m. MBOOK	-0.0001	-0.19	0.0000	0.02	0.0001	0.17
n. CASH	0.0332	2.07**	0.0309	1.63	0.0281	1.60
o. OCF	-0.0024	-0.13	0.0074	0.39	0.0085	0.53
p. INTAN	-0.0259	-1.37	-0.0378	-1.59	-0.0469	-1.73*
q. XRD	-0.0445	-0.71	-0.0916	-1.18	-0.0561	-0.76
r. CAPX	-0.0052	-0.29	-0.0295	-1.60	-0.0251	-1.64
s. CHGINC	-0.0000	-0.86	0.0011	1.66*	0.0016	2.34**
t. CHGCAPX	-0.0007	-2.03**	-0.0010	-1.31	0.0002	0.13
u. CHGREV	0.0001	6.63***	0.0000	4.36***	0.0000	2.10**
Proxy Circular						
v. EXBRD			0.0232	0.61	0.0155	0.36
w. OPT			-0.0556	-1.29	-0.0257	-0.64
x. INMONEY			-0.0948	-1.91*	-0.0845	-1.98**
y. INSIDER			0.0059	0.29	0.0031	0.16

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 23
Market Reaction Returns Analysis Using Full Information
Maximum Likelihood Heckman Model: Repeat Announcers Only

This table presents Heckman full information maximum likelihood results for all firms with repeat announcements during the sample period and the required data. Selection is controlled for by utilizing the Heckman full information maximum likelihood method. The results of the probit model are reported in Table 11. Model 2 utilizes Probit Model 1 from Table 11 in the first stage and controls for the contents of the announcement and accounting data. Model 3 utilizes Probit Model 1 from Table 11 in the first stage and presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. Z-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. ATHRHO is the hyperbolic arctangent of the probability from the probit model and is used to control for sample selection. Rho is the correlation between the residuals of the repurchase decision model and the market reaction model. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 23 (continued)
Market Reaction Returns Analysis Using Full Information
Maximum Likelihood Heckman Model: Repeat Announcers Only

Variable	Model 2 Estimate	Model 2 z-stat	Model 3 Estimate	Model 3 z-stat	Model 4 Estimate	Model 4 z-stat
Number of Obs.	586		299		264	
Number of Firms	221		115		108	
Intercept	0.0127	0.74	0.0060	0.23	0.0026	0.10
Sample Selection Control:						
a. ATHRHO	0.0658	0.86	0.0076	0.06	0.0566	0.36
a1. Rho	0.0657		0.0076		0.0565	
History:						
b. CARJB	0.0335	1.26	0.0478	1.76*	0.0521	1.99**
c. REP	0.0134	2.41**	0.0165	1.85*	0.0090	1.19
d. PPRET	0.0045	0.81	0.0079	0.88	-0.0007	-0.11
Announcement Content:						
e. CUV	0.0043	0.52	0.0174	1.32	0.0136	1.00
f. FUV	-0.0028	-0.45	-0.0099	-1.37	-0.0057	-0.73
g. GOOD	0.0003	0.05	0.0051	0.81	0.0032	0.54
h. EXCASH	0.0071	0.78	-0.0009	-0.08	-0.0115	-0.96
i. STOCKP	-0.0061	-0.83	-0.0064	-0.57	-0.0051	-0.47
j. LIQ	0.0164	0.75	-0.0254	-0.61	-0.0343	-0.77
k. REMSH	-0.0051	-0.87	-0.0061	-0.74	-0.0032	-0.41
l. TARGET	-0.0008	-0.83	-0.0018	-1.41	-0.0011	-1.00
History/Content:						
m. REPxCUV	-0.0211	-1.55	-0.0407	-2.53**	-0.0224	-1.55
n. REPxFUV	-0.0007	-0.06	0.0038	0.26	-0.0044	-0.30
o. REPxLIQ	-0.0722	-2.35	0.0639	0.40	0.1788	1.13
p. REPxPPRET	0.0064	0.56	-0.0162	-1.30	-0.0050	-0.46
Accounting:						
q. SIZE	-0.0004	-0.29	-0.0003	-0.11	0.0016	0.79
r. MBOOK	-0.0022	-1.01	-0.0042	-1.56	-0.0025	-1.03
s. CASH	0.0367	1.50	0.0194	0.74	0.0106	0.46
t. OCF	-0.0081	-0.32	0.0335	1.17	0.0408	1.40
u. VOL	0.0032	0.44	0.0103	0.87	0.0155	1.38
v. CHGINC	-0.0015	-1.65*	0.0010	1.12	0.0007	0.81
w. CHGCAPX	-0.0009	-0.53	-0.0011	-0.73	-0.0041	-0.72
x. CHGREV	0.0018	0.45	0.0010	0.19	-0.0025	-0.47
y. INTAN	-0.0083	-0.42	-0.0047	-0.18	-0.0132	-0.46
z. XRD	0.0665	0.70	-0.0276	-0.37	0.0320	0.55
aa. CAPX	0.0164	0.57	-0.0011	-0.73	-0.0176	-0.54
Proxy Circular						
bb. EXBRD			0.0095	0.34	-0.0214	-0.77
cc. OPT			0.0281	0.58	0.0282	0.62
dd. INMONEY			-0.1364	-0.63	-0.0144	-0.08
ee. INSIDER			0.0062	0.25	0.0127	0.59

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 24
Summary of Results from Market Reaction Return Explanatory Models

This table reports significant coefficients from Tables 18 to 23. Panel A summarizes the returns results for all announcers. Panel B summarizes the returns results for repeat announcers. Blank cells represent statistically insignificant coefficients. Variables not included in a model are denoted n/a.

The dependent variable, CAR, is cumulative abnormal returns determined using the market model (equally weighted index) over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day.

ATHRHO is the hyperbolic arctangent of the probability from the probit model and is used to control for sample selection in the Heckman models (Tables 25 and 26). Independent variables are defined as follows. P1 is the predicted value from probit model 1. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 24 (continued)
Summary of Results from Market Reaction Return Explanatory Models

Panel A Market Return Models: All Announcers

	Table 18 Model 1	Table 18 Model 2	Table 18 Model 3	Table 18 Model 4	Table 20 Model 2	Table 20 Model 3	Table 20 Model 4
N	1747	1023	516	458	897	447	417
R ²	0.0238	0.0415	0.0771	0.0730	0.0455	0.0908	0.0906
NCIB3	-0.013***	-0.005***		-0.0046*			
P1	n/a	n/a	n/a	n/a	-0.0245***		
ATHRHO	n/a	n/a	n/a	n/a			
CARJB			.0428*			0.0489*	
CUV	0.0113***						
FUV		-0.0077*	-0.0138**	-0.0129*		-0.0159**	-0.0142**
CASH	n/a	0.0301*					0.0306
CHGINC	n/a		0.0000***	0.0001***	0.0322**	0.0000***	0.0000
CHGREV	n/a		0.0001***	0.0000***	0.0000***		0.0014
CHGCAPX	n/a		-0.00067*		-0.0007**		
XRD	n/a					-0.0125**	-0.0013**
INTAN						-0.0395*	
CAPX	n/a						
INMONEY	n/a	n/a	-0.0871*	-0.0736*			
INSIDER	n/a	n/a		0.0001***			

	Table 22 Model 2	Table 22 Model 3	Table 22 Model 4
N	886	446	393
NCIB3	n/a	n/a	n/a
P1	n/a	n/a	n/a
ATHRHO	0.1427***		
CARJB		0.0487*	
CUV			
FUV		-0.0161**	-0.0152**
CASH	0.0332**		
CHGINC		0.0011**	0.0016**
CHGREV	0.0001***	0.0000***	0.0000**
CHGCAPX	-0.0007**		
XRD			
CAPX			
INTAN			-0.0469*
INMONEY	n/a	-0.0948*	-0.0845**
INSIDER	n/a		

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 24 (continued)
Summary of Results from Market Reaction Return Explanatory Models

Panel B Market Return Models: Repeat Announcers

	Table 19 Model 1	Table 19 Model 2	Table 19 Model 3	Table 19 Model 4	Table 21 Model 2	Table 21 Model 3	Table 21 Model 4
N	1064	694	356	316	587	300	264
R ²	0.0409	0.0634	0.0994	0.0981	0.1104	0.1087	0.0930
P1	n/a	n/a					
ATHRHO	n/a	n/a	n/a	n/a			
CARJB	0.0456***			0.0424*		0.0484*	0.0521*
REP	0.0105**		0.0148*		0.0135**	0.0164*	
CUV	0.0125**						
REPxCUV			-0.0258*			-0.0408**	
REPxLIQ					0.0720**		
MBOOK	n/a	-0.002***					
CASH	n/a	0.0429*					
CHGINC	n/a	0.00003*	0.0005***				
INMONEY	n/a	n/a					
INSIDER	n/a	n/a	0.00007**	0.0001***			

	Table 23 Model 2	Table 23 Model 3	Table 23 Model 4
N	586	299	264
P1	n/a	n/a	n/a
ATHRHO			
CARJB		0.0478*	0.0521**
REP	0.0134**	0.0165*	
CUV			
REPxCUV		-0.0407**	
REPxLIQ			
MBOOK			
CASH			
CHGINC	-0.0015*		
INMONEY			
INSIDER			

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 25
Regression Analysis of Market Volume Reaction: All Announcers

This table presents, without the use of selection controls, OLS regression results for all sample firms with the necessary data. Model 1 presents the results using the contents of the announcement and returns data. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAV, is cumulative abnormal volume determined using the market model over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. NCIB3= number of repurchase programs in the three fiscal years preceding the fiscal year of the current announcement. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 25 (continued)
Regression Analysis of Market Volume Reaction: All Announcers

Variable	Model 1 Estimate	Model 1 t-stat	Model 2 Estimate	Model 2 t- stat	Model 3 Estimate	Model 3 t- stat	Model 4 Estimate	Model 4 t- stat
Number of Obs.	1757		1031		514		454	
Number of Firms	613		359		196		183	
R-squared	0.0140		0.0497		0.0660		0.0911	
Intercept	0.0287	2.84***	0.0088	0.45	0.0337	0.54	0.0243	0.36
History:								
a. NCIB3	-0.0134	-1.95*	-0.0057	-1.89*	-0.0041	-0.69	-0.0071	-2.17**
Announcement Content:								
b. CUV	-0.0236	-3.83***	-0.0137	-1.76*	-0.0047	-0.30	0.0132	0.88
c. FUV	-0.0011	-0.01	0.0035	0.42	0.0180	1.04	0.0007	0.08
d. GOOD	0.0027	0.44	0.0029	0.44	0.0097	0.80	0.0034	0.40
e. EXCASH	0.0055	0.39	-0.0103	-0.56	-0.0240	-0.66	-0.0439	-1.59
f. STOCKP	-0.0212	-2.70***	-0.0120	-1.39	-0.0001	-0.06	0.0052	0.38
g. LIQ	-0.0058	-0.82	-0.0049	-0.45	-0.0115	-0.67	-0.0017	-0.11
h. REMSH	-0.0042	-0.67	0.0053	0.72	0.0127	0.81	0.0099	0.14
i. TARGET	0.0011	1.07	-0.0011	-0.62	-0.0011	-0.41	-0.0011	-0.39
Market Data								
j. CARJB	-0.0230	-1.18	-0.0702	-2.34**	-0.0534	-1.31	-0.0296	-0.91
k. VOL					0.0670	1.55	0.0545	1.20
Accounting:								
l. SIZE			-0.0003	-0.14	-0.0006	-0.11	0.0039	1.65*
m. MBOOK			0.0002	0.24	0.0015	1.70*	0.0009	1.76*
n. CASH			0.0196	0.68	-0.0271	-0.85	-0.0347	-1.31
o. OCF			-0.0043	-0.22	-0.0177	-0.52	0.0056	0.29
p. INTAN			0.0402	1.01	0.0643	0.92	0.0042	0.11
q. XRD			-0.0122	-0.17	-0.0713	-0.48	0.1349	1.35
r. CAPX			-0.0301	-1.49	-0.0458	-1.25	-0.0242	-1.02
s. CHGINC			-0.0000	-0.67	0.0001	0.40	0.0000	2.76***
t. CHGCAPX			-0.0020	-1.98**	-0.0029	-1.44	-0.0011	-0.59
u. CHGREV			0.0001	2.69***	0.0000	1.77*	0.0000	0.90
Proxy Circular								
v. EXBRD					-0.0566	-0.76	-0.0627	-0.72
w. OPT					0.0433	0.42	-0.0563	-1.17
x. INMONEY					0.0584	0.51	0.0537	0.54
y. INSIDER					0.0000	0.39	0.0001	1.88*

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 26
Regression Analysis of Market Volume Reaction: Repeat Announcers Only

This table presents, without the use of selection controls, OLS regression results for all firms with repeat announcements during the sample period and the necessary data. Model 1 presents the results using the contents of the announcement and returns data. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAV, is cumulative abnormal volume determined using the market model over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 26 (continued)
Regression Analysis of Market Volume Reaction: Repeat Announcers Only

Variable	Model 1 Estimate	Model 1 t-stat	Model 2 Estimate	Model 2 t-stat	Model 3 Estimate	Model 3 t-stat	Model 4 Estimate	Model 4 t-stat
Number of Obs.	1071		697		354		313	
Number of Firms	355		243		129		122	
R-squared	0.0172		0.0333		0.0594		0.1066	
Intercept	0.0299	1.12	-0.0253	-1.55	-0.0326	-0.80	-0.0654	-2.25**
Market:								
a. CARJB	-0.0184	-0.75	-0.0606	-2.23**	-0.0999	-1.80*	-0.0397	-1.38
History								
b. NCIB3	-0.0234	-0.93	-0.0008	-0.22	0.0037	0.38	-0.0049	-1.37
c. REP	-0.0053	-0.76	0.0036	0.31	0.0183	0.81	-0.0032	-0.29
d. PPRET	0.0015	0.19	-0.0006	-0.05	0.0039	0.19	-0.0052	-0.93
Announcement Content:								
e. CUV	-0.0279	-3.59 ***	-0.0150	-1.88*	-0.0100	-0.79	-0.0020	-0.19
f. FUV	-0.0005	-0.04	-0.0012	-0.13	0.0236	0.81	-0.0074	-0.84
g. GOOD	0.0094	1.45	0.0132	1.90*	0.0192	1.17	0.0069	0.96
h. EXCASH	-0.0071	-0.53	-0.0106	-0.64	0.0001	0.00	-0.0210	-1.30
i. STOCKP	-0.0136	-1.70*	-0.0089	-0.92	0.0037	0.20	0.0038	0.27
j. LIQ	0.0052	0.31	0.0162	0.86	0.0040	0.21	-0.0020	-0.13
k. REMSH	-0.0016	-0.24	0.0008	0.99	0.0223	0.96	0.0114	1.55
l. TARGET	0.0021	1.71*	0.0012	0.96	0.0019	0.81	0.0019	1.17
History/Content:								
m. REPXCUV	0.0112	1.27	-0.0030	-0.21	-0.0098	-0.31	0.0115	0.68
n. REPxFUV	-0.0054	-0.36	0.0010	0.06	-0.0136	-0.72	-0.0202	-1.29
o. REPxLIQ	-0.0215	-0.93	-0.0241	-0.72	-0.0047	-0.11	0.0492	1.52
p. REPxPPRET	0.0033	0.34	0.0089	0.72	0.0090	0.44	0.0068	0.77
Accounting:								
q. SIZE			0.0035	1.83*	-0.0007	-0.10	0.0036	1.36
r. MBOOK			-0.0011	-1.61	0.0010	0.33	0.0021	1.29
s. CASH			0.0130	0.64	-0.0106	-0.33	-0.0081	-0.42
t. OCF			0.0024	0.07	-0.0583	-0.82	0.0135	0.42
u. VOL			-0.0054	-0.31	0.0097	0.36	-0.0035	-0.21
v. CHGINC			0.0000	0.02	-0.0001	-0.32	0.0000	2.32**
w. CHGCAPX			-0.0047	-1.16	-0.0032	-0.64	0.0021	0.87
x. CHGREV			0.0000	0.00	-0.0034	-0.41	-0.0022	-0.51
y. INTAN			0.0361	0.64	0.0928	0.86	-0.0348	-0.99
z. XRD			0.0844	1.20	0.0457	0.20	0.1921	2.09**
aa. CAPX			-0.0124	-0.33	-0.0535	-0.66	-0.0491	-1.14
Proxy Circular								
bb. EXBRD					0.0082	0.20	0.0571	2.29**
cc. OPT					-0.1564	-1.51	-0.0625	-0.92
dd. INMONEY					0.0698	0.19	-0.2472	-1.71*
ee. INSIDER					-0.0000	-0.20	0.0000	1.06

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 27
Regression Analysis of Market Volume Reaction with
Probit Model 1 Surprise Control: All Announcers

This table presents OLS regression results for all sample firms with the necessary data. The market's level of surprise that the announcement is occurring is controlled for by including the predicted value (P1 below) from Probit Model 1. The results of Probit Model 1 are presented in Table 11. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAV, is cumulative abnormal volume determined using the market model over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 27 (continued)

**Regression Analysis of Market Volume Reaction with
Probit Model 1 Surprise Control: All Announcers**

Variable	Model 2 Estimate	Model 2 t- stat	Model 3 Estimate	Model 3 t- stat	Model 4 Estimate	Model 4 t- stat
Number of Obs.	896		458		403	
Number of Firms	321		177		165	
R-squared	0.0621		0.0815		0.0842	
Intercept	0.0067	0.31	0.0287	0.42	0.0555	0.79
Surprise Control:						
a. P1	-0.0336	-2.11**	-0.0247	-0.80	-0.0156	-0.54
Announcement Content:						
b. CUV	-0.0162	-1.91**	-0.0106	-0.68	-0.0029	-0.19
c. FUV	0.0053	0.59	0.0181	1.01	0.0195	1.04
d. GOOD	0.0016	0.23	0.0097	0.78	0.0065	0.54
e. EXCASH	-0.0124	-0.66	-0.0312	-0.85	-0.0481	-1.60
f. STOCKP	-0.0116	-1.19	0.0042	0.26	0.0101	0.58
g. LIQ	-0.0068	-0.47	-0.0216	-1.03	-0.0204	-1.02
h. REMSH	0.0053	0.63	0.0174	0.92	0.0177	0.96
i. TARGET	-0.0011	-0.58	-0.0012	-0.38	-0.0021	-0.67
Market Data						
j. CARJB	-0.0773	-2.39**	-0.0744	-1.60	-0.0764	-1.64
k. VOL	0.0000	1.83*	0.0702	1.53	0.0607	1.27
Accounting:						
l. SIZE	0.0008	0.29	0.0003	0.06	-0.0019	-0.31
m. MBOOK	0.0010	1.22	0.0014	1.41	0.0004	0.53
n. CASH	0.0251	0.81	-0.0177	-0.52	-0.0025	-0.08
o. OCF	0.0118	0.56	-0.0048	-0.14	-0.0154	-0.52
p. INTAN	0.0535	1.01	0.0953	0.99	0.1245	1.15
q. XRD	-0.0071	-0.09	0.0004	0.07	-0.0014	-0.25
r. CAPX	-0.0326	-1.48	-0.0028	-1.34	-0.0237	-0.89
s. CHGINC	-0.0000	-4.59***	-0.0002	-0.19	-0.0011	-1.29
t. CHGCAPX	-0.0020	-1.95**	-0.0028	-1.34	-0.0047	-1.16
u. CHGREV	0.0000	2.33**	0.0000	1.34	0.0000	1.07
Proxy Circular						
v. EXBRD			-0.0593	-0.74	-0.0679	-0.78
w. OPT			0.0620	0.65	-0.0567	-0.81
x. INMONEY			0.0556	0.47	0.0344	0.37
y. INSIDER			-0.0165	-0.62	-0.0255	-1.01

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 28
Regression Analysis of Market Volume Reaction with
Probit Model 1 Surprise Control: Repeat Announcers Only

This table presents OLS regression results for all firms with repeat announcements during the sample period and the necessary data. The market's level of surprise that the announcement is occurring is controlled for by including the predicted value (P1 below) from probit model 1. The results of probit model 1 are presented in Table 11. Model 2 presents the results using the contents of the announcement, market data and accounting data. Model 3 presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. T-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAV, is cumulative abnormal volume determined using the market model over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 28 (continued)

**Regression Analysis of Market Volume Reaction with
Probit Model 1 Surprise Control: Repeat Announcers Only**

Variable	Model 2 Estimate	Model 2 t-stat	Model 3 Estimate	Model 3 t-stat	Model 4 Estimate	Model 4 t-stat
Number of Obs.	598		309		273	
Number of Firms	216		114		108	
R-squared	0.0390		0.0845		0.1712	
Intercept	-0.0220	-1.14	-0.0509	-1.10	-0.0576	-1.82*
Surprise Control:						
a. P1	0.0008	0.03	0.0273	0.53	-0.0311	-1.56
Market:						
b. CARJB	-0.0681	-2.18**	-0.1314	-2.03**	-0.0605	-2.01**
History						
c. REP	-0.0019	-0.17	0.0186	0.72	-0.0052	-0.53
d. PPRET	0.0003	0.03	0.0011	0.04	-0.0102	-1.65
Announcement Content:						
e. CUV	-0.0159	-1.80*	-0.0118	-0.75	-0.0071	-0.61
f. FUV	0.0013	0.13	0.0266	0.94	-0.0061	-0.71
g. GOOD	0.0094	1.35	0.0163	1.03	0.0054	0.71
h. EXCASH	-0.0174	-1.27	-0.0139	-0.46	-0.0398	-2.62**
i. STOCKP	-0.0082	-0.71	0.0058	0.25	0.0045	0.29
j. LIQ	0.0254	1.20	-0.0127	-0.46	-0.0247	-1.53
k. REMSH	0.0064	0.60	0.0248	0.80	0.0104	1.26
l. TARGET	0.0012	0.83	0.0022	0.68	0.0028	1.72*
History/Content:						
m. REPxCUV	0.0001	0.01	-0.0109	-0.26	0.0191	1.10
n. REPxFUV	0.0059	0.33	-0.0144	-0.69	-0.0203	-1.34
o. REPxLIQ	-0.0370	-0.92	0.2194	0.50	0.6186	3.54***
p. REPxPPRET	0.0059	0.44	0.0123	0.46	0.0136	1.42
Accounting:						
q. SIZE	0.0037	1.14	-0.0006	-0.07	0.0057	2.06**
r. MBOOK	-0.0018	-0.68	-0.0006	-0.12	0.0025	0.74
s. CASH	0.0108	0.47	-0.0271	-0.75	-0.0178	-0.80
t. OCF	0.0118	0.31	-0.0390	-0.42	0.0355	1.09
u. VOL	-0.0000	-0.41	0.0123	0.43	-0.0043	-0.26
v. CHGINC	-0.0006	-1.46	-0.0013	-1.01	-0.0011	-1.69*
w. CHGCAPX	-0.0051	-1.07	-0.0035	-0.52	0.0034	1.13
x. CHGREV	0.0015	0.19	-0.0058	-0.47	-0.0077	-1.35
y. INTAN	0.0485	0.58	0.1367	0.79	-0.0678	-1.36
z. XRD	0.1356	1.92*	0.1324	0.95	0.1855	4.39***
aa. CAPX	-0.03334	-0.79	-0.0745	-1.11	-0.0796	-1.80*
Proxy Circular						
bb. EXBRD			0.0135	0.30	0.0379	1.47
cc. OPT			-0.1525	-1.12	-0.0008	-0.01
dd. INMONEY			0.1031	0.28	-0.2756	-1.78*
ee. INSIDER			0.0099	0.28	0.0006	0.03

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 29
Market Volume Reaction Analysis using Full Information
Maximum Likelihood Heckman Model: All Announcers

This table presents Heckman full information maximum likelihood results for all sample firms with the required data. Selection is controlled for by utilizing the Heckman full information maximum likelihood method. The results of the relevant probit models are reported in Table 11. Model 2 utilizes Probit Model 1 from Table 11 in the first stage and controls for the contents of the announcement and accounting data. Model 3 utilizes Probit Model 2 from Table 11 in the first stage and presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. Z-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAV, is cumulative abnormal volume determined using the market model and log transformed volume over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. ATHRHO is the hyperbolic arctangent of the probability from the probit model and is used to control for sample selection. Rho is the correlation between the residuals of the repurchase decision model and the market reaction model. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 29 (continued)
Market Volume Reaction Analysis using Full Information
Maximum Likelihood Heckman Model: All Announcers

Variable	Model 2 Estimate	Model 2 z-stat	Model 3 Estimate	Model 3 z-stat	Model 4 Estimate	Model 4 z-stat
Number of Obs.	895		446		391	
Number of Firms	321		173		160	
Intercept	-0.0400	-1.43	-0.0074	-0.09	-0.0145	-0.18
Sample Selection Control:						
a. ATHRHO	0.1894	1.88*	0.1241	0.67	0.2328	1.61
b. Rho	0.1872		0.1235		0.2287	
Announcement Content:						
c. CUV	-0.0172	-1.94*	-0.0119	-0.75	0.0079	0.52
d. FUV	0.0050	0.55	0.0181	1.01	0.0004	0.04
e. GOOD	0.0025	0.35	0.0098	0.85	0.0039	0.42
f. EXCASH	-0.0120	-0.65	-0.0292	-0.82	-0.0537	-2.04**
g. STOCKP	-0.0110	-1.14	0.0050	0.31	0.0124	0.87
h. LIQ	-0.0064	-0.43	-0.0226	-1.04	-0.0082	-0.40
i. REMSH	0.0058	0.68	0.0181	1.00	0.0048	0.66
j. TARGET	-0.0011	-0.57	-0.0012	-0.38	-0.0010	-0.32
Market Data						
k. CARJB	-0.0750	-2.32**	-0.0722	-1.59	-0.0493	-1.38
l. VOL	0.0554	1.80*	0.0697	1.55	0.0583	1.24
Accounting:						
m. SIZE	0.0020	0.65	0.0011	0.15	0.0054	1.66*
n. MBOOK	0.0009	1.16	0.0015	1.49	0.0008	1.45
o. CASH	0.0234	0.78	-0.0111	-0.33	-0.0215	-0.77
p. OCF	0.0156	0.73	-0.0043	-0.12	0.0144	0.68
q. INTAN	0.0506	0.97	0.0970	1.03	0.0114	0.23
r. XRD	-0.0004	-0.01	-0.0484	-0.32	0.1846	1.74*
s. CAPX	-0.0338	-1.45	-0.0294	-0.81	-0.0069	-0.30
t. CHGINC	-0.0001	-4.85***	-0.0003	-0.22	-0.0010	-1.37
u. CHGCAPX	-0.0020	-2.06**	-0.0027	-1.25	-0.0000	-0.01
v. CHGREV	0.0000	2.43**	0.0000	1.27	-0.0000	-0.17
Proxy Circular						
w. EXBRD			-0.0608	-0.79	-0.0814	-0.91
x. OPT			0.0675	0.72	-0.0182	-0.33
y. INMONEY			0.0529	0.46	0.0536	0.51
z. INSIDER			-0.0156	-0.61	-0.0291	-1.24

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 30
Market Volume Reaction Analysis using Full Information
Maximum Likelihood Heckman Model: Repeat Announcers Only

This table presents Heckman full information maximum likelihood results for all firms with repeat announcements during the sample period and the required data. Selection is controlled for by utilizing the Heckman full information maximum likelihood method. The results of the relevant probit models are reported in Table 11. Model 2 utilizes Probit Model 1 from Table 11 in the first stage and controls for the contents of the announcement and accounting data. Model 3 utilizes Probit Model 2 from Table 11 in the first stage and presents the results using the contents of the announcement, market data, accounting data and proxy circular data. Model 4 presents the same results as Model 3 but excludes announcements that involved multiple securities or had competing earnings or dividend announcements during the event window. Z-statistics are calculated using robust clustered standard errors as recommended by Petersen (2008).

The dependent variable, CAV, is cumulative abnormal volume determined using the market model and log transformed returns over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day. ATHRHO is the hyperbolic arctangent of the probability from the probit model and is used to control for sample selection. Rho is the correlation between the residuals of the repurchase decision model and the market reaction model. Independent variables are defined as follows. CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 30 (continued)
Market Volume Reaction Analysis using Full Information
Maximum Likelihood Heckman Model: Repeat Announcers Only

Variable	Model 2 Estimate	Model 2 z-stat	Model 3 Estimate	Model 3 z-stat	Model 4 Estimate	Model 4 z-stat
Number of Observations	590		299		263	
Number of Firms	218		112		105	
Intercept	-0.0217	-0.76	-0.0237	-0.38	-0.0948	-3.53***
Sample Selection Control:						
a. ATHRHO	-0.0037	-0.04	-0.0792	-0.74	0.2229	1.39
b. Rho	-0.0036		-0.0790			
Market:						
c. CARJB	-0.0685	-2.26**	-0.1297	-2.09**	-0.0572	-2.04**
History						
d. REP	-0.0018	-0.17	0.0185	0.76	-0.0057	-0.60
e. PPRET	0.0003	0.02	0.0009	0.04	-0.0107	-1.77*
Announcement Content:						
f. CUV	-0.0155	-1.77*	-0.0113	-0.79	-0.0070	-0.62
g. FUV	0.0015	0.15	0.0262	0.97	-0.0070	-0.84
h. GOOD	0.0093	1.36	0.0158	1.04	0.0053	0.75
i. EXCASH	-0.0171	-1.28	-0.0079	-0.28	-0.0344	-2.30**
j. STOCKP	-0.0080	-0.71	0.0067	0.31	0.0051	0.35
k. LIQ	0.0253	1.22	-0.0128	-0.47	-0.0243	-1.51
l. REMSH	0.0064	0.61	0.0267	0.93	0.0121	1.55
m. TARGET	0.0012	0.87	0.0021	0.70	0.0027	1.71
History/Content:						
n. REPxCUV	-0.0000	-0.01	-0.0017	-0.30	0.0184	1.14
o. REPxFUV	0.0057	0.33	-0.0143	-0.73	-0.0192	-1.32
p. REPxLIQ	-0.0370	-0.94	0.2089	0.49	0.6185	3.63***
q. REPxPPRET	0.0060	0.45	0.0119	0.49	0.0132	1.43
Accounting:						
r. SIZE	0.0037	1.16	-0.0009	-0.10	0.0060	2.14**
s. MBOOK	-0.0018	-0.69	-0.0007	-0.14	0.0020	0.64
t. CASH	0.0097	0.43	-0.0155	-0.47	-0.0072	-0.37
u. OCF	0.0122	0.33	-0.0424	-0.49	0.0330	1.08
v. VOL	-0.0075	-0.41	0.0118	0.45	-0.0016	-0.11
w. CHGINC	-0.0005	-1.50	-0.0013	-1.04	-0.0012	-1.87*
x. CHGCAPX	-0.0051	-1.08	-0.0037	-0.58	0.0033	1.15
y. CHGREV	0.0016	0.21	-0.0054	-0.46	-0.0705	-1.49
z. INTAN	0.0491	0.58	0.1419	0.85	-0.0705	-1.49
aa. XRD	0.1352	1.89*	0.1132	0.47	0.2635	2.72***
bb. CAPX	-0.0335	0.79	-0.0705	-1.09	-0.0747	-1.76*
Proxy Circular						
cc. EXBRD			0.0158	0.37	0.0401	1.60
dd. OPT			-0.1564	-1.35	-0.0199	-0.31
ee. INMONEY			0.0899	0.26	-0.2902	-1.91*
ff. INSIDER			0.0141	0.41	0.0033	0.15

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 31
Summary of Results from Market Volume Reaction Explanatory Models

The following table presents the significant coefficients from Tables 28 to 35. Panel A summarizes the volume results for all announcers. Panel B summarizes the volume results for repeat announcers. Blank cells represent statistically insignificant coefficients. Variables not included in a model are denoted n/a.

The dependent variable, CAV, is cumulative abnormal volume determined using the market model and log transformed firm and exchange volume over the window (-1,+1) relative to the announcement date. Market model parameters are estimated using a minimum of 60 and a maximum of 200 days of returns split equally between the period ending 31 days before and commencing 31 days after the event day.

Independent variables are defined as follows. P1 is the predicted value from probit model 1. ATHRHO is the hyperbolic arctangent of the probability from the probit model and is used to control for sample selection in the Heckman models (Tables 29 and 30). CUV=1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise. FUV=1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise. LIQ=1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise. GOOD=1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise. EXCASH=1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise. STOCKP=1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise. REMSH=1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise. OPTPER= Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement. INMONEY= Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INSIDER= Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement. REP= Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement. PPRET= Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement. CARJB= Abnormal returns determined using the market model during the twenty eight days prior to the announcement window. EXBRD= Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date. CASH= Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement. OCF= Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. INTAN= Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement. XRD= Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement. VOL= Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement. MBOOK= Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement. CAPX=capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement. SIZE= Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement. CGCINC= Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement. CHGREV= Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement. CHGCAPX= Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.

Table 31 (continued)
Summary of Results of Announcement Volume Explanatory Models

Panel A: Market Volume Models, All Announcers

	Table 25 Model 1	Table 25 Model 2	Table 25 Model 3	Table 25 Model 4	Table 27 Model 2	Table 27 Model 3	Table 27 Model 4
N	1757	1031	514	454	896	458	403
R ²	0.0140	0.0497	0.0660	0.0911	0.0621	0.0815	0.0842
NCIB3	-0.0134*	-0.0137*		-0.0071**			
P1	n/a	n/a	n/a	n/a	-0.0336**		
ATHRHO	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CARJB							
CUV	-0.0236***	-0.0137*			-0.0336**		
FUV							
STOCKP	-0.0212***						
EXCASH							
CARJB		-0.0702**			-0.0773**		
MBOOK			0.0015*	0.0009*			
VOL					0.0000*		
SIZE							
CASH							
CHGINC					0.0000***	-0.0005***	
CHGREV		-0.0001***	0.0000*			0.0000**	
CHGCAPX		-0.0020**				-0.0020**	
XRD							
CAPX							
INMONEY							
INSIDER				0.0001*			

	Table 29 Model 2	Table 29 Model 3	Table 29 Model 4
N	895	446	391
NCIB3			
ATHRHO	0.1894*		
CARJB	-0.0750**		
CUV	-0.0172*		
FUV			
EXCASH			-0.0537**
REMSH			
SIZE			0.0054*
CASH			
CHGINC	-0.0001**		
CHGREV	0.0000**		
CHGCAPX	-0.0020**		
XRD			0.1846*
CAPX			
INMONEY			
INSIDER			

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Table 31 (continued)
Summary of Results of Announcement Volume Explanatory Models

Panel B: Market Volume Models, Repeat Announcers

	Table 26 Model 1	Table 26 Model 2	Table 26 Model 3	Table 26 Model 4	Table 28 Model 2	Table 28 Model 3	Table 28 Model 4
N	1071	69	354	313	598	309	273
R ²	0.0172	0.0333	0.0594	0.1066	0.0390	0.0845	0.1712
P1	n/a	n/a	n/a	n/a			
ATHRHO	n/a	n/a	n/a	n/a			
CARJB		-0.0606**	-0.0999*		-0.0681**	-0.1314**	-0.0605**
REP							
CUV	-0.0279***	-0.0150*			-0.0159*		
STOCKP	-0.0136*						
EXCASH							-0.0398**
REMSH							
GOOD*		0.0132*					
REPxCUV							
REPxLIQ							0.6186*
TARGET*	0.0021*						0.0028*
SIZE*		0.0035*					0.0057**
MBOOK							
XRD*				0.1921**	0.1356*		0.1855***
CASH							
CAPX							-0.0796*
CHGINC				0.0000**			-0.0011*
EXBRD*				0.0571**			
INMONEY				-0.2740*			
INSIDER							

	Table 30 Model 2	Table 30 Model 3	Table 30 Model 4
N	590	299	263
P1	n/a	n/a	n/a
ATHRHO			
CARJB	-0.0685**	-0.1297*	-0.0572**
REP			
CUV	-0.0155*		
EXCASH			-0.0344**
LIQ*			
REPxCUV			
REPxLIQ			0.6185***
PPRET			-0.0107*
TARGET			
MBOOK			
SIZE			0.0060**
XRD	0.1352*		0.2635***
CASH			
CAPX			-0.0747*
CHGINC			-0.0012*
INMONEY			-0.2902*
INSIDER			

*** denotes significance at the 0.01 level, ** denotes significance at the 0.05 level and * denotes significance at the 0.1 level.

Figure 1
Daily Abnormal Return by Day Relative to Announcement Date:
Announcing Firms

This table presents abnormal returns during the period prior to and after TSX NCIB repurchase announcements (day 0). Abnormal returns are determined using the primary measure of CAR described in Table 10.

Eventus (R) Software from Cowan Research, L.C.
 Market index distinction=Equal

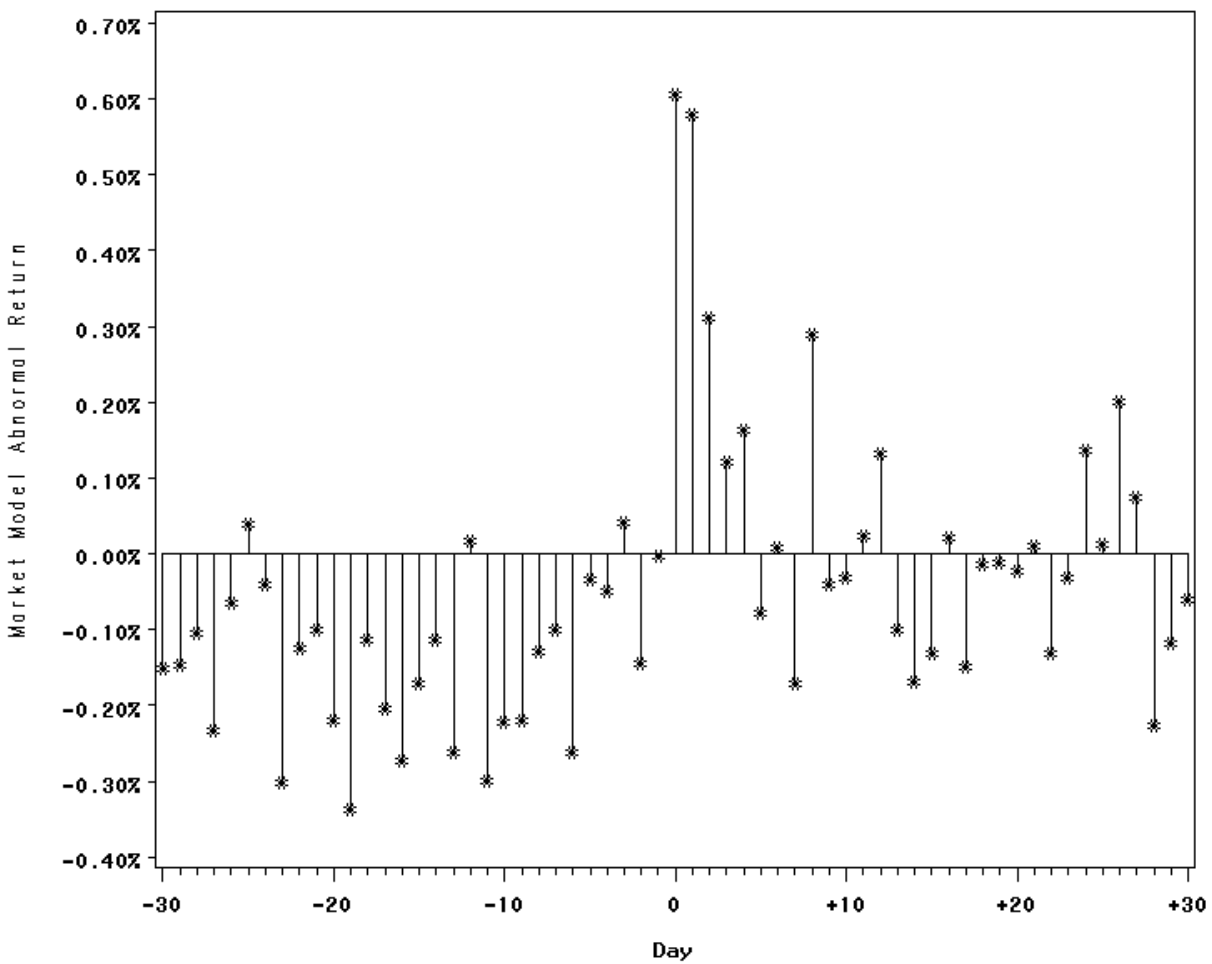
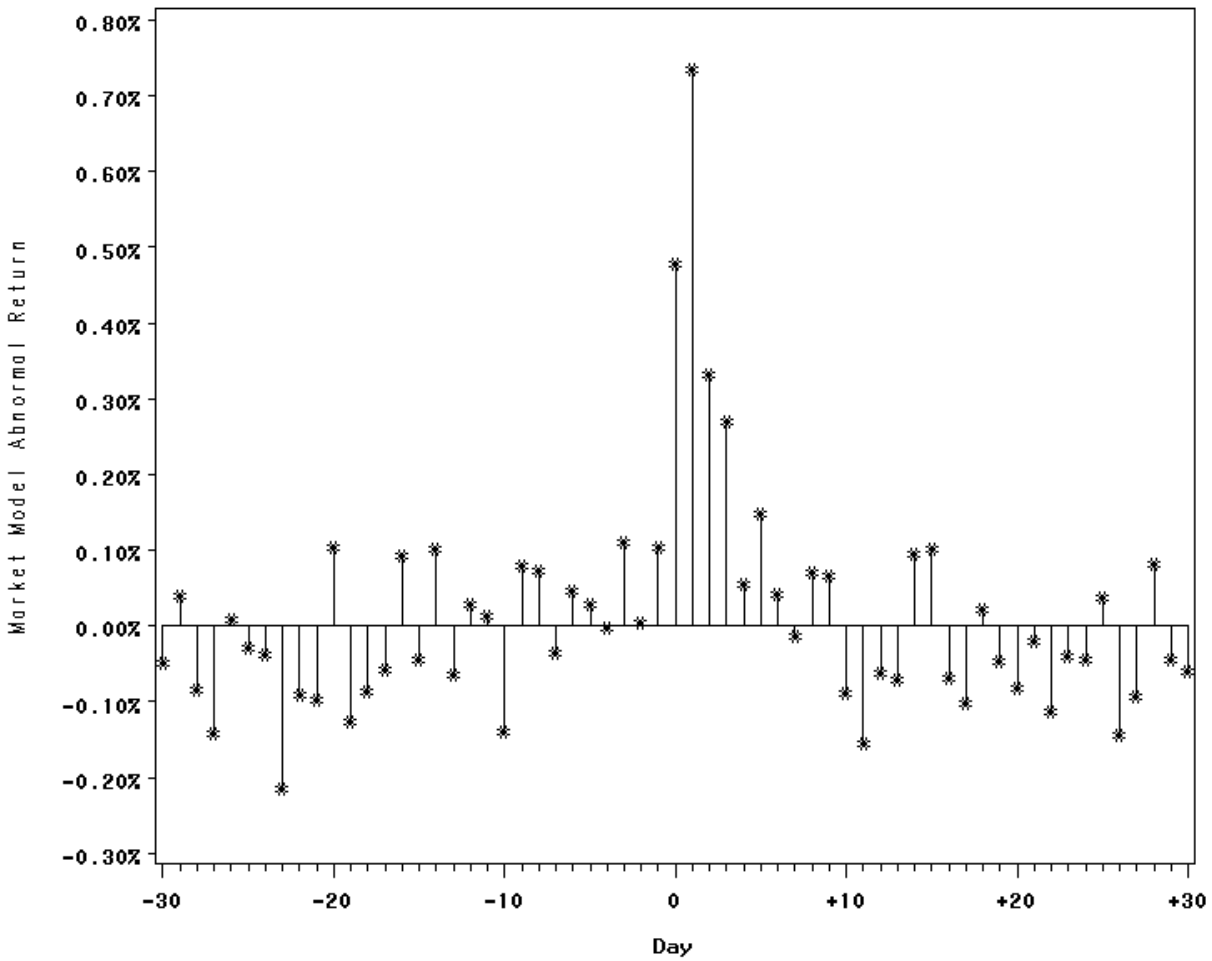


Figure 2
Daily Abnormal Volume by Day Relative to Announcement Date:
Announcing Firms

This table presents abnormal volume during the period prior to and after TSX NCIB repurchase announcements (day 0). Abnormal volume is determined using the primary measure of CAV described in Table 10.

Eventus (R) Software from Cowan Research, L.C.
 Market index distinction=Equal



Please note that the vertical axis should read “abnormal volume percentage” not “abnormal return”.

Appendix 1

Model of the Market Reaction to Repurchase Announcements

The market reaction to a repurchase announcement, measured using cumulative abnormal returns and volume changes over the announcement period, is a function of the amount of new information in the announcement, the contents of the announcement and the credibility of the announcement.

Amount of New Information

1. Surprise level of announcement. Dependant on the market's expected probability of an announcement based on the following ex-ante information:
 - a. First-time or repeat announcer.
 - b. Dividend level.
 - c. Liquidity.
 - d. Cash flow.
 - e. Corporate governance.
 - f. Information asymmetry.

Contents of Announcement

1. Size of repurchase program being announced.
2. Reasons for the repurchase.

Credibility of Information

1. Management incentives (stock options, shares).
2. Management credibility (past repurchase program follow-through rate, returns over last repurchase period).
3. Corporate governance (board composition).
4. Plausibility of announcement information being real good news (cash is available to fund the repurchases, consistency with past earnings).

Appendix 2
Comparison of Canadian and U.S. Regulations on Open Market Share Repurchases

	TSX Requirements¹⁴	SEC Requirements¹⁵
Authority	Policy 6-501 of the TSX Manual governs Normal Course Issuer Bids	No specific statutory rules relating to repurchases Firms fall under SEC Reg. 10b-18, a safe harbour provision for share purchases
Authorization	Firms must obtain authorization from the TSX to commence a normal course issuer bid	No requirement for authorization
Size Limitation	Annual repurchases are limited to the greater of 5% of total shares outstanding or 10% of the public float No more than 2% of total outstanding shares in a month	No specific limitations Reg. 10b-18 provides safe harbour if a firm does not exceed certain limits with respect to price, volume and time of day
Announcement disclosure	Press release announcing program mandatory Specific announcement requirements as per Appendix 2 – includes requirement (item 6) to disclose reason(s) for repurchasing	No requirement to announce start of repurchase program although most firms choose to do so ¹⁶ No specific disclosure requirements for announcement
Actual Shares Repurchased	Requirement to disclose shares repurchased in last twelve months as part of announcement press release Requirement to report shares repurchased each month once program started – published in the TSX Daily Record	No requirements to disclose shares repurchased except in the normal course of preparing interim and annual financial statements SEC Currently considering a quarterly repurchase reporting ¹⁷
Program Duration	Limited to a maximum of twelve months at which time authorization must be re-obtained	No specific program duration. Can range from short (several months) to long (several years or no fixed duration)

¹⁴ Source: Toronto Stock Exchange requirements for normal course issuer bids are contained in Policy 6-501 of the TSE Manual.

¹⁵ Ikenberry, Lakonishok and Vermaelen. 2000. Stock Repurchases in Canada: Performance and Strategic Trading, *The Journal of Finance* (Vol.55, No.6), p.2377.

¹⁶ Oded, J. 2005. Why Do Firms Announce Open-Market Repurchase Programs. *The Review of Financial Studies* (Vol.18, No.1), p.271.

¹⁷ E. Lie. 2005. Operating Performance Following Open Market Share Repurchase Announcements. *Journal of Accounting and Economics* (Vol. 39), p.423.

Appendix 3
TSE Company Manual Disclosure Requirements for Open Market Share Repurchases

Source: TSE Company Manual, Appendix F

CONTENTS OF NOTICE — A notice shall provide the information set out below in the following form:

- Item 1 Name of Issuer

- Item 2 Shares Sought — State the class and maximum number (or percentage) of shares that may be acquired. Also state the percentage of shares outstanding or the public float, as the case may be, that the bid is for. Where the issuer has established a specific number of shares to be acquired, state the number of shares sought. A notice may relate to the acquisition of more than one class of shares of an issuer provided the bid for each class of shares qualifies as a normal course issuer bid. For example, an issuer with common shares and convertible preferred shares outstanding may wish to purchase up to 5% of each class over a 12 month period.

- Item 3 Duration — State the dates on which the normal course issuer bid will commence and terminate. The normal course issuer bid may not extend for a period of more than one year from the date on which purchases may commence.

- Item 4 Method of Acquisition — Indicate clearly that purchases will be effected through the facilities of the Exchange and identify any other exchanges on which purchases will be made. State that purchase and payment for the shares will be made by the issuer in accordance with the requirements of the Exchange and that the price that the issuer will pay for any shares acquired by it will be the market price of the shares at the time of acquisition. In addition, indicate whether purchases (other than by way of exempt offer) will be made other than by means of open market transactions during the period the normal course issuer bid is outstanding.

- Item 5 Consideration Offered — Indicate any restrictions on the price the offeror is prepared to pay and any other restrictions relating to the issuer bid, such as specific funds available, method of purchasing, etc.

- Item 6 Reasons for the Normal Course Issuer Bid — State the purpose or the business reasons for normal course issuer bid.

- Item 7 Valuation — Include a summary of any appraisal or valuation of the issuer known to the directors or officers of the issuer after reasonable enquiry regarding the issuer, its material assets or securities prepared within the two years preceding the date of the

Appendix 3 (continued)
TSE Company Manual Disclosure Requirements for Open Market Share Repurchases

notice, together with a statement of a reasonable time and place at which such appraisal or valuation, or a copy thereof, may be inspected. For the purpose of this Item 7, the phrase “appraisal or valuation” means both an independent appraisal or valuation and a material non-independent appraisal or valuation.

- Item 8 Previous Purchases — Where the issuer has purchased shares which are the subject of the normal course issuer bid within the past 12 months, state the method of acquisition, the number of shares purchased and the average price paid.
- Item 9 Persons Acting Jointly or In Concert with the Issuer — Disclose the identity of any party acting jointly or in concert with the issuer.
- Item 10 Acceptance by Insiders, Affiliates and Associates — State the name of every director or senior officer of the company who intends to sell shares of the issuer during the course of the normal course issuer bid and where their intention is known after reasonable enquiry, the name of every:
- (a) associate of a director or senior officer of the company;
 - (b) person acting jointly or in concert with the company; or
 - (c) person holding 10% or more of any class of equity securities of the company, who intends to sell shares.
- Item 11 Benefits from the Normal Course Issuer Bid — State direct or indirect benefits to any of the persons or companies named in item 10 of selling or not selling shares of the issuer during the course of the normal course issuer bid. An answer to this item is not required where the benefits to such company of selling or not selling shares are the same as the benefits to any other shareholder who sells or does not sell.
- Item 12 Material Changes in the Affairs of the Issuer Company — Disclose any previously undisclosed material changes or plans or proposals for material changes in the affairs of the issuer.
- Item 13 Certificate — The notice shall be certified complete and accurate and in compliance with Part 6 of the Rules and Policies of the Exchange by a director or senior officer of the issuer duly authorized by the issuer’s board of directors. The certificate shall include a statement to the effect that the notice contains no untrue statement of a material fact and does not omit to state a material fact that is required to be stated or that is necessary to make a statement not misleading in the light of the circumstances in which it is made.

Appendix 4
Sample Repurchase Announcement

Copyright 2002 Business Wire, Inc.
Business Wire

December 19, 2002, Thursday

DISTRIBUTION: Business Editors

LENGTH: 377 words

HEADLINE: Polyair Inter Pack Inc.: Press Release

DATELINE: TORONTO, Dec. 19, 2002

BODY:

Polyair Inter Pack Inc. (AMEX:PPK) (TSX:PPK) announced today that the **Toronto Stock Exchange** has accepted a notice filed by the Company of its intention to make **normal course issuer bids**.

The notice provides that the Company may, during the 12-month period commencing December 20, 2002 and ending December 19, 2003, purchase on the **Toronto Stock Exchange** up to 305,165 common shares in total, or 5% of the outstanding common shares. The price that the Company will pay for any such shares will be the market price at the time of acquisition. The actual number of common shares that may be purchased and the timing of any such purchases will be determined by the Company. The Company intends to cancel the common shares purchased pursuant to the **normal course issuer bid**. As of December 10, 2002, there are 6,103,300 common shares of the Company outstanding.

During the twelve months ending December 19, 2002, the Corporation acquired 120,000 common shares of the Corporation at an average price of \$8.25 per share, excluding commissions, pursuant to a normal course issuer bid through the facilities of the Toronto Stock Exchange.

The Company believes that the common shares have been trading in a price range that may not adequately reflect their value in relation to the Company's future business prospects. As a result, depending upon share price movements and other factors, the Company believes that its outstanding

Appendix 4 (continued)
Sample Repurchase Announcement

common shares may represent an attractive investment to the Company and a desirable use of a portion of its available funds.

Polyair Inter Pack Inc. (www.polyair.com and www.cantar.com), through its Polyair Division, manufactures protective packaging; through its Cantar Pool division the Company manufactures swimming pool accessory products are sold through a network of some 2,500 distributors across North America. Polyair operates ten manufacturing facilities, seven of which are based in the United States where the Company generated approximately 85% of its annual sales. The shares are traded on The American Stock Exchange and The Toronto Stock Exchange under the symbol "PPK".

CONTACT: Polyair Inter Pack Inc.
John Foglietta, 416/740-2687
jfoglietta@polyair.com

URL: <http://www.businesswire.com.proxy.lib.uwaterloo.ca>

LOAD-DATE: December 20, 2002

Appendix 5
Announcement Prediction Variables

Variable	Definition	Rationale/Prior Studies	Announcement Prediction Model Expected coefficient
NCIB3	Number of repurchase programs in the three fiscal years preceding the fiscal year of the current announcement.	Jagannathan and Stephens (2003).	+ (P1)
NCIB1	1 if the firm commenced a repurchase program in the fiscal year preceding the fiscal year of the current announcement, 0 otherwise.	Jagannathan and Stephens (2003).	+ (P1)
DVPT	Dividends as a percentage of total income during the most recently reported fiscal year preceding the announcement.	Grullon and Michaely (2002). Repurchases are increasingly being used as a substitute for dividends.	
DYIELD	Dividends per share during the most recently reported fiscal year preceding the announcement divided by year end market value per share as of the most recently reported fiscal year preceding the announcement.	To determine if TSX firms are substituting repurchases for dividends.	
VOL	Total share volume during the most recently reported fiscal year prior to the announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement.	Low liquidity firms have an incentive to provide liquidity through repurchases in order to maximize shareholder value.	- (H1)

Appendix 5 (continued)
Announcement Prediction Variables

Variable	Definition	Rationale/Prior Studies	Announcement Prediction Model Expected Coefficient
CASH	Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement.	Dittmar (2000). High cash firms have an incentive to make payouts to reduce agency costs.	+ (P2A)
OCF	Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement.	Jagannathan, Stephens and Weisbach (2000), Dittmar (2000). High cash flow firms have an incentive to make payouts to reduce agency costs.	+ (P2B)
CASHCHG	Percentage change in opening and closing cash during the most recently reported fiscal year preceding the announcement.	Guay and Harford (2000). Firms with increases in cash are more likely to use repurchases than dividends to payout excess cash.	+ (P2C)
FCF	Operating cash flow less capital expenditures during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement.	Jensen (1986) suggests that firms with high free cash flow should payout cash to reduce agency costs.	+ (P2)
INTAN	Total intangible assets as a percentage of total assets at the end of the most recently reported fiscal year prior to the announcement.	Barth and Kasznik (1999) conclude that intangible assets are a good measure of information asymmetry.	+ (P3)

Appendix 5 (continued)
Announcement Prediction Variables

Variable	Definition	Rationale/Prior Studies	Announcement Prediction Model Expected Coefficient
XRD	Research and development expenses as a percentage of total sales during the most recently reported fiscal year prior to the announcement.	Huddart and Ke (2007) find that research and development expense is a good measure of information asymmetry based on models of informed trading.	+ (P3)
SIZE	Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement.	Dittmar (2000). Larger firms are more likely to announce repurchase program as indicated by the descriptive statistics contained in Table 6.	+ (P3)
CARJB	Abnormal returns in the twenty eight days prior to the announcement window.	Li and McNally (2007), Dittmar (2000). Firms who have had recent stock price drops are more likely to be considered undervalued by management and hence find repurchasing beneficial.	- (P4)
MBOOK	Market value of equity divided by book value of equity at the end of the most recently reported fiscal year prior to the announcement.	Dittmar (2000) and Li and McNally (2007). Indicative of potential for over- or under-valuation.	- (P4)
LEV	Total debt divided by total assets at the end of the most recently reported fiscal year prior to the announcement.	Highly leveraged firms have less available financial resources to commit to repurchases since they require their financial resources to repay debt.	-
LOWIND	1 if the firm is in industries with the following SIC codes: 1000,1040,1400,2834,2836,3663 and 7373. Per Table 8, these industries had announcement rates of ten percent or less.	Liano, Huang and Manakyan (2003) find industry to be associated with announcement returns, which they attribute to some industries being more or less likely to engage in repurchases.	-
HIGHIND	1 if the firm is in industries with the following SIC codes: 6020,6211,6282 and 6512. Per Table 8, these industries had announcement rates of thirty percent or more.	Liano, Huang and Manakyan (2003) find industry to be associated with announcement returns, which they attribute to some industries being more or less likely to engage in repurchases.	+

Appendix 6 Definition of Returns and Market Reaction Test Statistics

Source: Eventus Manual

Market Model Returns¹⁸

Assume that security returns follow a single factor market model,

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt},$$

Where R_{jt} is the rate of return of the j^{th} firm on day t ; R_{mt} is the rate of return of a market index on day t ; ε_{jt} is a random variable that by construction must have an expected value of zero, and is assumed to be uncorrelated with R_{mt} , uncorrelated with R_{jt} for $k \neq j$, not autocorrelated, and homoskedastic. β_j is a parameter that measures the sensitivity of R_{jt} to the market index. Define the abnormal return (or prediction error) for the common stock of the j^{th} firm on day t as:

$$A_{jt} = R_{jt} - (\hat{\alpha}_j - \hat{\beta}_j R_{mt})$$

where the coefficients $\hat{\alpha}_j$ and $\hat{\beta}_j$ are ordinary least squares estimates of α_j and β_j .

The average abnormal return (or average prediction error) AAR_t is the sample mean:

$$AAR_t = \frac{\sum_{j=1}^N A_{jt}}{N}$$

Where t is defined in trading days relative to the event date (e.g. $t=-60$ means 60 trading days before the event).

Over an interval of two or more trading days beginning with day T_1 , and ending with T_2 , the cumulative average abnormal return is

$$CAAR_{T_1, T_2} = \frac{1}{N} \sum_{j=1}^N \sum_{t=T_1}^{T_2} A_{jt}$$

¹⁸ Cowan, A. 2007. Eventus Software for Event Studies, Users Guide, p.p.73-74.

Appendix 6 (continued)
Definition of Returns and Market Reaction Test Statistics

Buy and Hold Returns¹⁹

Over an interval of two or more trading days beginning with day T1, and ending with T2, the buy and hold abnormal return is

$$BHAR_{T_1, T_2} = \left[\prod_{t=T_1}^{T_2} (1+R_{jt}) - 1 \right] - \left[(1 + \hat{\alpha}_j)^{(T_2-T_1+1)} - 1 \right] - \hat{\beta}_j \left[\prod_{t=T_1}^{T_2} (1+R_{mt}) - 1 \right]$$

The average compound abnormal return is

$$ACAR_{T_1, T_2} = \frac{1}{N} \sum BHAR_{j, T_1, T_2}$$

Patell Test²⁰

Under the null hypothesis, each A_{jt} has mean zero and variance $\sigma^2_{A_{jt}}$. The maximum likelihood estimate of the variance is

$$s^2_{A_{jt}} = s^2_{A_j} \left[1 + \frac{1}{M_j} + \frac{((R_{mt} - R_{mEst})^2)}{\sum_{k=E_1}^{E_2} (R_{mk} - R_{mEst})^2} \right]$$

where

$$s^2_{A_j} = \frac{\sum_{k=E_1}^{E_2} A_{jk}^2}{M_j - 2}$$

R_{mt} is the observed return on the market index for day t, R_{mEst} is the mean market return over the estimation period and M_j is the number of non-missing trading day returns in the interval E_1 to E_2 used to estimate the parameters for firm j.

Define the standardized abnormal return (or standardized prediction error) as

$$SAR_{jt} = A_{jt} / s_{A_{jt}}$$

¹⁹ Cowan, A. 2007. Eventus Software for Event Studies, Users Guide, p.74.

²⁰ Cowan, A. 2007. Eventus Software for Event Studies, Users Guide, p.p.80-82.

Appendix 6 (continued)
Definition of Returns and Market Reaction Test Statistics

Under the null hypothesis, each SAR_{jt} follows a Student's t-distribution with $M_j - 2$ degrees of freedom. Summing the SAR_{jt} across the sample, we obtain

$$TSAR_t = \sum_{j=1}^N SAR_{jt}$$

The expected value of $TSAR_t$ is zero. The variance of $TSAR_t$ is

$$Qt = \sum_{j=1}^N \frac{M_j - 2}{M_j - 4}$$

The test statistic for the null hypothesis that $CAR_{T_1, T_2} = 0$ is

$$Z_{T_1, T_2} = \frac{1}{N^{1/2}} \sum Z_{T_1, T_2}^j$$

$$\text{Where } Z_{T_1, T_2}^j = \frac{1}{(Q_{T_1, T_2}^j)^{1/2}} \sum_{t=T_1}^{T_2} SAR_{jt}$$

$$\text{and } Q_{T_1, T_2}^j = (T_2 - T_1 + 1) \frac{M_j - 2}{M_j - 4}$$

Under cross-sectional independence of the Z_{T_1, T_2}^j and other conditions (see Patell, 1976), Z_{T_1, T_2} follows the standard normal distribution under the null hypothesis.

Generalized Sign Test²¹

The null hypothesis of the generalized sign test is that the fraction of positive returns in the event window is the same as in the estimation period. The actual test uses the normal approximation to the binomial distribution.

²¹ Cowan, A. 2007. Eventus Software for Event Studies, Users Guide, p.88.

Appendix 7
Returns and Volume Testing: Primary Explanatory Variables

Variable	Definition	Rationale/Prior Studies	Expected coefficient
CUV	1 if announcement states current undervaluation as a reason for the repurchase program, 0 otherwise.	Otchere and Ross (2002) and Li McNally (2007) find greater announcement returns for firms who offer undervaluation as an explanation for their repurchase announcements.	+ (P6A)
FUV	1 if announcement states that repurchase program is being initiated in case of future undervaluation, 0 otherwise.	Firm is offering shareholders some downside price protection which is valuable.	+ (P6B)
LIQ	1 if announcement states that repurchase program is being put in place to improve liquidity, 0 otherwise.	Improving liquidity will reduce the price penalty that firms with poor liquidity pay.	+ (P6C)
GOOD	1 if announcement states that repurchase program is a good use of cash or a good investment, 0 otherwise.	To determine if the market differentiates between explanations other than undervaluation when reacting to repurchase announcements.	No prediction.
EXCASH	1 if announcement states that repurchase program is being initiated due to excess cash, 0 otherwise.	To determine if the market differentiates between explanations other than undervaluation when reacting to repurchase announcements.	No prediction.
STOCKP	1 if announcement states that repurchase program is being initiated to prevent dilution due to stock options, 0 otherwise.	To determine if the market differentiates between explanations other than undervaluation when reacting to repurchase announcements.	No prediction.
REMSH	1 if announcement states that repurchase program is being initiated to benefit the remaining shareholders or to increase their proportionate interest, 0 otherwise.	To determine if the market differentiates between explanations other than undervaluation when reacting to repurchase announcements.	No prediction.
OPTPER	Number of stock options outstanding divided by total shares outstanding at the end of the most recently completed fiscal year preceding the announcement.	Kahle (2001) finds that the market reaction is negatively related to options outstanding. Market will not see repurchase announcement as credible if management stands to gain from an increase in stock prices.	- (H2)
INMONEY	Total intrinsic value of options held by insiders per the most recent proxy circular prior to the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement.	Incentive to fool the market is higher when options are currently in the money since option holder can reap an immediate profit.	- (H2)

Appendix 7 (continued)
Returns and Volume Testing: Primary Explanatory Variables

Variable	Definition	Rationale/Prior Studies	Expected coefficient
INSIDER	Total shares held by senior officers and directors per the most recent proxy circular preceding the announcement date divided by total outstanding shares at the end of the most recently reported fiscal year preceding the announcement.	The greater management shareholdings are, the more incentive management has to make a repurchase announcement to benefit their own wealth.	- (H2)
REP	Percentage of announced shares actually repurchased during the most recent repurchase program that was completed no more than three years prior to the current announcement.	Firms will develop a reputation for either following through or not following through on their repurchase announcements. Credibility will be increasing in the follow-through rate.	+ (H3)
PPRET	Cumulative abnormal returns determined using the market model during the one year period of the most recent prior repurchase program that was completed no more than three years prior to the current announcement.	If a firm was able to credibly announce good news through the past repurchase program, returns should be positive. Negative returns indicate that the announcement was not followed by increased economic performance.	+ (P7)
CARJB	Abnormal returns determined using the market model during the twenty eight days prior to the announcement window.	Stephens and Weisbach (1998) and Li and McNally (2007) find that the market is more likely to believe that the firm is undervalued where recent returns are negative.	- (P8)
EXBRD	Percentage of board members who are not officers of the firm per the most recent proxy circular preceding the announcement date.	External board members increase credibility of disclosures since management is being monitored. Announcement of repurchase program communicates that monitoring is working to ensure cash not wasted.	+ (P9)
CASH	Total cash as a percentage of total assets at the end of the most recently reported fiscal year preceding the announcement.	The good news contained in a repurchase announcement is more plausible if the firm has cash available to purchase its own shares. Distributing cash reduces agency costs.	+ (P10)
OCF	Operating cash flow during the most recently reported fiscal year preceding the announcement divided by total assets at the end of the most recently reported fiscal year preceding the announcement.	High cash flow firms incur agency costs if management spends funds on perks or negative NPV projects. Announcement is seen as an intention to reduce agency costs.	+

Appendix 8
Announcement Reaction Control Variables

Variable	Definition	Rationale/Prior Studies	Expected coefficient in returns and volume regressions
MBOOK	Market to Book Ratio at the end of the most recently reported fiscal year prior to the announcement.	Ikenberry, Lakonishok and Vermaelen (1995, 2000)	-
TARGET	Size of Repurchase Announcement as a % of Total Shares Outstanding at end of Most Recent Fiscal Year	Comment and Jarrell (1991)	+
SIZE	Natural log of total assets at the end of the most recently reported fiscal year prior to the announcement.	To control for size.	n/a
CHGINC	Percentage change in annual earnings during the two most recently reported fiscal years preceding the announcement.	Ho, Liu and Ramanan (1997)	+
CHGREV	Percentage change in annual sales during the two most recently reported fiscal years preceding the announcement.	Ho, Liu and Ramanan (1997)	+
CHGCAPX	Percentage change in annual capital expenditures during the two most recently reported fiscal years preceding the announcement.	Ho, Liu and Ramanan (1997)	-
VOL	Total share volume during the most recently reported fiscal year prior to announcement divided by total shares outstanding at the end of the most recently reported fiscal year preceding the announcement.	To control for differences in liquidity.	n/a