INSIDER TRADING AND MARKET REACTION TO CANADIAN ACQUISITION ANNOUNCEMENTS: WHEN DO INVESTORS REACT TO NEW INFORMATION?

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ABSTRACT

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The exploitation of private information prior to certain public events can lead to substantial excess returns on securities. Previous empirical studies have documented significant stock price run-ups of target firms prior to acquisition announcements. The evidence reveals that these run-ups can be attributed in part to trading by insiders.

While insider trading has been extensively researched in the US, it has not received much attention in Canada where regulations are less stringent and prosecutions are unusual. With a sample of 128 targets and a comprehensive database of daily insider transactions from 1985 to 1995, we examine pre-bid price run-ups and we investigate the incidence of insider trading before the public announcement of takeovers in Canada.

Consistent with previous research, we show that more than half of the market reaction occurs prior to the announcement date in the form of a price run-up. We find that net-selling firms experience higher cumulative average abnormal returns than net-buying firms, and that insider trading surrounding acquisition announcements is insignificantly different from insider trading at other times. Consistent with the use of private information, we observe cumulative average abnormal returns twice as large on

insider trading days than on days with no insider trading. Finally, our results reveal that insider trading has a significant effect on abnormal returns relatively early over the sixty-day period preceding the acquisition announcement, and that positive abnormal returns are associated with insider net-buying and negative abnormal returns with insider net-selling in eighty percent of the cases.

To my family and girlfriend,
Rodolphe, Magda, Nancy, Marc and Sandrine.

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1. INTRODUCTION

It has been well documented in finance literature that target firms experience stock price run-ups starting twenty to sixty days prior to the announcement of takeovers. For example, Keown and Pinkerton [1981], Masse, Hanrahan and Kushner [1991], and Arshadi and Eyssell [1993] report cumulative abnormal returns ranging from 14.04% to 32.35% at the announcement date, with more than half of the abnormal performance occurring prior to the announcement.

There is a wide divergence as to the causes of run-ups. Some view them as a reflection of the market's anticipation of an impending bid (see Jensen and Ruback [1983], Jarrell and Poulsen [1989] and others), whereas others regard them as a consequence of legal or illegal actions by insiders possessing private information (see Eyssell [1990], Keown et al. [1992], Meulbroek [1992] and others). Accordingly, pre-bid run-ups can be attributed to two major hypotheses: the market anticipation hypothesis which is based on public information, and the insider trading-information leakage hypothesis which is grounded on private/asymmetric information.

Takeovers provide an excellent opportunity to measure the effects of insider trading on stock returns because advance information ensures insiders material gains if it is utilized. While insider trading surrounding acquisition announcements has been extensively investigated in the US, it has not received much attention in Canada where

regulations are more lenient and prosecutions are unusual. Moreover, the few existing Canadian studies have not documented the sources of pre-bid price run-ups, and the sample period has generally been confined to the 1970s and 1980s.

In this study, we examine pre-bid price run-ups and we investigate the incidence of insider trading around takeover announcements by analyzing insiders' daily transactions. We extend the sample period to include the recent economic conditions of the early 1990s using a comprehensive sample of 128 target firms traded on the Toronto Stock Exchange, and an extensive database of insider trading transactions spanning the period from 1985 through 1995. Our results should provide relevant insight to investors and regulators into the degree of insider trading that occurs prior to takeover announcements.

Using standard event study methodology, we observe significant positive cumulative average abnormal returns of 12.28% at the announcement date of the acquisition. Consistent with previous research, more than half of the stock abnormal performance takes place before the announcement day in the form of price run-ups. We find that targets whose insiders were net-buyers experience significantly lower cumulative average abnormal returns than firms whose insiders were net-sellers. In addition, insider trading volume transactions exhibit noticeable but statistically insignificant changes in the trading behavior of registered insiders between the sixty-day pre-announcement period and an estimation period preceding it. Consistent with the use

of private information, we show that cumulative average abnormal returns on insider trading days are twice as large as on days with no insider trading. Similarly, using cross sectional regressions, we show that the effect of insider trading on average abnormal returns materializes relatively early over the sixty-day pre-announcement event window. During this period, positive abnormal returns are associated with net-buying transactions, and negative abnormal returns are associated with net-selling transactions in 80% of the cases.

The remainder of the thesis is organized as follows. Section 2 provides a review of related theoretical and empirical background. Section 3 summarizes Canadian insider trading regulations. Section 4 provides a description of the hypotheses. Section 5 outlines the data collection procedure and provides summary statistics on the sample. Section 6 illustrates the empirical methods used and describes the various tests employed in the study. Section 7 presents the results, and section 8 concludes.

2. RELATED THEORETICAL AND EMPIRICAL BACKGROUND

A mass of empirical evidence associates managerial decisions such as earnings announcements, sell-offs, liquidations, stock repurchases, takeovers, and dividend changes with insider trading (see Penman [1982], Elliot, Morse and Richardson [1984], Eyssell [1991] and Lee, Mikkelson and Partch [1992]). Of these, takeovers have been subject to a greater interest for two reasons. First, their number has risen dramatically in the last decades. Second, the prospects from trading on merger-related securities are substantial because the onset of takeover bids is subject to much less market anticipation, and as a result, has a greater effect on stock prices than do other corporate events. To this end, our study relates to two bodies of literature: insider trading and pre-merger price run-ups, which are discussed in the following sections.

2.1. Insider Trading

Different viewpoints about the desirability of sanctions against, or support for insider trading have been proposed. For instance, Arshadi and Eyssell [1993] argue that "the process of regulation and reregulation often results in significant accumulation of rules that may not be economically efficient for the regulated entities in general. Thus, corporate law that was originated as a means of lowering the transaction costs of producing explicit contracts may grow into a tangled, complex, repetitious and overly burdensome system of financial disclosure requirements and insider trading regulations."

In this section, arguments for and against insider trading regulation will be discussed, along with some evidence concerning the effects of such laws.

Opponents of trading by insiders argue that the use of private information by an insider for personal gain is unfair and raises questions of his/her fiduciary duty to the shareholders of the corporation. This argument is based on the belief that market participants should have equal access to information; otherwise, investors' confidence in the corporation may diminish, thus obstructing the efficient allocation of resources in the capital market. Therefore, one purpose of insider trading rules is to ensure investors' confidence in the corporation and the capital market as a whole. Regardless, McGee [1988] contends that while the most potential "victims" of insider trading are the sellers who sell their stock anonymously to an inside trader, they are in fact unharmed by the transaction because they would have sold anyway. So, whether the inside trader buys from them or not does not affect the proceeds they receive from the sale. In fact, he claims that the sellers may actually be better off because they receive a better price.

Furthermore, arguments against insider trading rest on the notion that informed trading results in wider bid-ask spread (Copeland and Galai [1983] and Golsten and Milgrom [1985]) and reduced liquidity (Golsten [1989] and Leland [1992]). In their comprehensive summary of insider trading literature, Arshadi and Eyssell [1993] illustrate that when an order to buy or sell a block of securities is submitted, market makers can determine whether or not the order is from an informed insider or a liquidity

trader by either the size of the order (Easley and O'Hara [1987] and Hasbrouk [1988]) or time of the day (Harris [1986] and Admati and Pfleiderer [1988]). If the market maker identifies the source of the order as an informed trader, the price charged for a buy (sell) order will be higher (lower) than the one charged for an uninformed trader. This as a result reduces demand for further purchases, and consequently, reduces liquidity (see also Gammil, Sirri and Flemming [1992]). However, in their investigation of insider trading surrounding the acquisition of Campbell Taggart by Anheuser-Busch in 1982, Cornell and Sirri [1992] find that insider trading did not result in bid-ask spread widening, and that insider trading actually increased liquidity.

As a proponent of insider trading, Manne [1966] insists that profits from trading on private information are part of the compensation to those people who contribute substantially to the economic process of the firm. In fact, he argues that compensation packages are less than appropriate methods for compensating entrepreneurial leadership; rather, company officials are motivated to innovate if they are permitted to share the gains through insider trading. Moreover, Carlton and Fischel [1983] contend that allowing insiders to trade on new information about the company's prospects may be a low cost method of renegotiating management's compensation package, and that traditional compensation plans may fail since the firm can renounce on promises to reward managers. However, Netter, Poulsen and Hersch [1988] argue that traditional compensation packages may be more effective because they can align the interests of both management and shareholders without risking the potential problems arising from

insider trading. In Addition, they contend that insiders may be using private information which they had no part in developing; thus, there is no guarantee that trading on private information is directly related to productivity especially if managers benefit when the value of the firm falls. To this end, Easterbrook [1981] suggests that it is difficult to separate "proper" trading from "improper" trading, therefore, the property rights to information should not be assigned to managers.

Moreover, it is claimed that insider trading serves as a means of adjusting stock prices to their true value, thus enhancing market efficiency. For instance, proponents of legalized insider trading argue that insiders are the most efficient producers of trading information since they have the least costly access to that information. When they are barred from trading, information is produced by others in a socially more costly way. Nevertheless, Netter, Poulsen and Hersch [1988] dispute that argument by saying that the efficiency of insider trading in signaling to the market the correct security prices is not as straight forward as others have suggested because insiders have an incentive to disguise their activity to achieve the greatest gain. As a matter of fact, they argue that sufficiently adroit insiders could profit without any price correction whatsoever occurring before official disclosure. Insider trading my also delay market disclosure as insiders attempt to exhaust their profit opportunities, especially if a managerial hierarchy exists, where successive managers delay transmission to higher levels. In the same way, Fishman and Hagerty [1992] hold that with insider trading, the aggregate amount processed by traders in the market is greater; yet, under certain circumstances, insider

trading can lead to less efficient stock prices because it has two adverse effects on stock price efficiency. First, with insider trading the number of better informed traders in the market is lower because the presence of these better informed traders deters non-insiders from acquiring information and trading. Second, with insider trading, the information in the market is not evenly distributed across traders. Both of these effects lead to a less competitive market and less efficient prices.

Likewise, Manne [1985] and Carlton and Fischel [1983] assert that insider trading serves as a means of communicating market information. For instance, observing insiders trade acts as a signal to market participants that the price of the stock will likely move in a certain direction. Therefore, prohibiting trading by insiders has the effect of blocking this flow of information. To this end, Fama and Laffer [1971] contend that forcing an analyst to give his information to the world before being allowed to trade on it (as required by SEC rule 10b-5 known as the "disclose or abstain" rule) would eliminate the incentive to acquire the information in the first place. Fischel [1984] suggests that releasing information through insider trading can benefit a firm wishing to reveal general information that its stock price is undervalued. This will help the firm raise capital to finance an investment without having to disclose it to the public. On the other hand, Netter, Poulsen and Hersch [1988] argue that allowing insiders to trade may present them with an opportunity to steal valuable information which is property of the company. For example, insider trading on a new discovery may signal valuable information to the firm's competitors before the firm wants the information revealed.

Again, Herzel and Katz [1987] maintain that a potential bidder may benefit from insider trading. For instance, when a potential acquirer hires an investment banker who leaks information to arbitrageurs, the latter accumulate shares in the target company with the intent of tendering them to the bidder. This increases the chances of the takeover's success, which as a result, benefits the bidding firm. However, Schwert [1996] shows that the pre-bid run-up and the post announcement increase in the target's stock price (the mark-up) are generally uncorrelated, so that control premiums (premium = run-up + mark-up) paid to the target are higher, all else equal, when there has been a large run-up in the target's stock price before the first bid is announced. To the extent that insider trading causes the pre-bid run-up without the target and the bidder being able to determine its causes, the bidder will pay more to the target.

Finally, McGee [1988] holds that outlawing insider trading may have long-term adverse effects on the economy since markets will operate less efficiently, and that insider trading laws will result in compliance and escape costs that would not exist in the absence of regulation. Such costs include legal and accounting fees involved in complying or circumventing the law as well as delays in disclosure, some of which are born by taxpayers. As a result, it is often argued that insider trading can be a matter determined via private contracts between the employers (the shareholders) and the employees. In cases where insider trading is an inefficient form of compensation for employees, firms will ban it, and in cases where it can align the interests of the employees

and the shareholders, it can be permitted. According to Coase [1960], the property rights to information should be assigned to the highest value user. If the highest value users are the managers, then negotiations between the two parties would lead to the assignment of information rights to managers. However, Coase's argument about the assignment of property rights assume no transaction costs. For this purpose, Easterbrook [1981] states that contracting through the law is more efficient in terms of both contracting costs and enforcement efficacy; but this is difficult to prove, and it remains to be seen whether markets and firms can efficiently monitor insider trading if it becomes legalized. This is why it is often claimed that government regulation is the best means of prohibiting theft of corporate information.

2.2. Pre-bid Price Run-ups

The evidence reveals significant price run-ups during the weeks preceding formal announcements of takeovers. For instance, Holland and Hodgkinson [1994] detect price run-ups ranging from 6.62% to 33.47% for UK targets, depending on whether the firm is identified by the market as a potential target or not. In the US, Keown and Pinkerton [1981] report cumulative abnormal returns of 25.27% from day -60 to day 0 (the announcement date), half of which occur prior to the announcement date. Likewise, Arshadi and Eyssell [1993] observe price run-ups ranging from 17.2% to 32.35% at the announcement, depending on the period of study, with more than half of the abnormal returns taking place before day 0. Later, Schwert [1996] shows that price run-ups start

around day -42, reaching 25% at day zero, with the largest pre-bid rise occurring from days -21 to -1. Surprisingly however, Jennings [1994] finds that the mean 21.2% announcement day return for 153 targets consists primarily of a 19.5% return at the announcement, implying a run-up of less than 2%.

In Canada, Amoako-Adu and Yagil [1986] raise the issue of merger anticipation by distinguishing between the announcement month (month 0) and the base month defined as the first month in which both the abnormal returns are significantly positive and the proportion of firms having positive abnormal returns is relatively high. Their results indicate that abnormal returns become significantly positive 2 months before the announcement. Calvet and Lefoll [1987] document monthly abnormal returns ranging from 19% to 31% depending on the method of payment used, with half of abnormal performance occurring before the takeover announcement date. Later, using daily data, Masse et al. [1988] find that the gains to shareholders are concentrated in the month prior to the announcement, reaching 28.53% one day before the announcement date. Appendix 1 outlines 7 studies on wealth effects of Canadian acquisitions in greater detail.

While most of past research agree on the existence of pre-bid run-ups, there is disagreement regarding their magnitude. To this end, Aitken and Czernkowski [1992] contend that the pre-bid abnormal return may be nothing more than a research artifact caused by researchers failing to control for identifiable sources of publicly available information. In fact, they show that when takeover announcement dates are adjusted for

media reports about targets (*i.e.* information conveyed by shareholder notices and the transactions costs of trading), price and volume run-up indicators can be reduced by one third.

2.3. Causes of Pre-Bid Run-ups

There is a wide divergence as to the causes of pre-bid price run-ups. Some view them as a reflection of the market's anticipation of an impending bid, and that stock prices at any time fully reflect all public information, whereas others regard them as a direct consequence of legal or illegal actions by investors with private information. Accordingly, pre-bid run-ups can be attributed to two major hypotheses: the market anticipation hypothesis which is based on public information, and the insider trading-information leakage hypothesis which is grounded on private/asymmetric information.

2.3.1. Market Anticipation Hypothesis

The market anticipation hypothesis states that public information can spread from mandated disclosures such as the Schedule 13D requirement of the *Williams Act* (US), which mandates acquirers of more than 5 percent of a firm's equity to report the acquisition within 10 days, and whether or not the purchasers intends to seek control (Part XX of the *Ontario Securities Act* 'Takeover Bids and Issuer Bids' regulates takeovers in Canada). Furthermore, market anticipation can originate from arbitrageurs and "shark watchers" who use the knowledge that takeovers often come in "waves" with

targets clustered in certain industries as deregulation, or firm-specific knowledge, as the impending demise of tight family control or internal disputes among managerial factions (Jarrell and Poulsen [1989]). Finally, market anticipation can emerge from publicly available information disclosing large stock acquisitions and newspaper stories speculating on future takeovers. In short, the market anticipation hypothesis claims that pre-bid stock abnormal performance is simply due to the market's assessment of an increasing likelihood that the firm will receive a takeover bid (Jensen and Ruback [1983]).

A study done by the Securities and Exchange Commission's *Office of the Chief Economist* [1987] on 172 tender offers shows that the legal market for information explains much of the 38.8% of pre-bid stock price run-up, and that the run-up is found to be dependent upon media speculation, bidder foothold acquisition in the target, and whether the bid is friendly or hostile. Indeed, larger foothold acquisitions and greater media speculation (rumors) are associated with larger run-ups. Also, friendly deals have more pre-bid run-up than hostile takeovers because they are harder to conceal. Similarly, Jarrell and Poulsen [1989] detect a pre-bid run-up of about 40% and find that the presence of rumors in the news media concerning an impending bid is the strongest variable in explaining that run-up. They observe a higher price run-up when the bidder's foothold position in the target is larger. However, whether the acquisition is friendly or hostile is not significant in explaining the run-ups. The authors also find no evidence that targets that were subject to insider trading allegations by the government experience low

unanticipated premiums (higher run-ups), suggesting that run-ups are the result of a legitimate market for information rather than illegal insider trading.

Using a sample of rumors published in the *Wall Street Journal*'s "Heard on the Street" column, Pound and Zeckhauser [1990] detect no significant excess returns on the rumor publication day. Instead, they find a significant 7% price run-up (or about 20% of the magnitude of the average takeover premium) for rumored targets in the month before publication of the takeover rumor, attributing its causes to investors close to the market such as arbitrageurs who may make short-term profits trading on rumors as they unfold. The authors contend that if rumors result from leakage of insider information, then they should be followed by an acquisition offer in a relatively short span of time. Yet, their study documents that only 18 out of 42 firms received takeover bids within one year, and only two firms received bids within 50 calendar days after the publication of the rumor. These findings suggest that if takeover bid rumors originate from private information, they are more likely to be caused by speculation by outside analysts and expert observers than by leakage of insider information.

Similarly, Gupta and Misra [1989] examine the effect on stock prices of takeover related news appearing in the financial press in the period prior to the announcement. They observe that the price run-up for firms "in the news" as potential targets are significantly larger (16.4%) than for firms not in the news as potential targets (2.9%) and that, for the latter, all the abnormal returns accrue upon announcement. However, a

portion of the price run-up (7.2%) in the NEWS sample occurs prior to the first news report. Thus, while the former results provide some evidence supporting the use of public information, the latter finding suggests that the insider trading hypothesis cannot be ruled out. Regardless, the authors argue that the portion of run-up that accrues prior to the first news report can be caused by news sources other than the *Dow Jones News Wire* or the *Wall Street Journal* such as analysts reports, newsletters and street talk.

Sanders and Zdanowicz [1992] examine the abnormal returns and trading volume of target firms during a period of possibly informed trading. This period begins on the unpublicized initiation date (as reported in a post announcement date proxy statement or 14-D1) and ends on the publication date of the first *Wall Street Journal* story signaling an impending bid. They show that the pre-announcement excess returns begin after the unpublicized initiation date of the transaction. However, these returns are not accompanied by a significant abnormal volume; instead, average abnormal volume begins with the first public information regarding the takeover. In addition, there is no evidence of a change in either the frequency or the magnitude of reported trading by insiders during the period between the private initiation date and the public announcement date relative to the pre-initiation period.

Finally, Givoly and Palmon [1985] argue that the mere occurrence of insider trading, regardless of whether it is based on insider information, may generate abnormal returns. Since insider trading is closely watched by many investors, it may trigger a

wave of transactions in the same direction by outsiders, thereby generating abnormal returns to insiders in the period following their trades. As a matter of fact, they show that a significant portion of abnormal returns is produced in the wake of the trades themselves, meaning that outsiders follow the footsteps of insiders. In brief, the above findings suggest that both takeovers and inside trades are closely observed by market professionals and widely diffused by the media.

2.1.2. Insider Trading-Information Leakage Hypothesis

The insider trading-information leakage hypothesis refers to the use of non-public information by registered insiders and/or outsiders to whom inside information was leaked. Attributed to Keown and Pinkerton [1981], this hypothesis faces three main obstacles. First, the definition of the expression "insider trading" is ambiguous. In fact, the authorities and courts do not agree as to what is prohibited. There are numerous cases in which the US courts overrode SEC or state regulations in the last two decades (see Netter, Poulsen and Hersch [1988]). Second, according to Sanders and Zdanowicz [1992], the information leakage aspect of the insider trading hypothesis is even less defined because the distinction between private and public information is not as clear as it seems. To illustrate this point, if we assume that information exists on a continuum from private to public, the distinction between private and public becomes increasingly blurred as the number of market participants privy to the leaked information increases. This distinction, however, should be maintained if the insider trading-information leakage hypothesis is to be distinguished from the market anticipation hypothesis. Third, it is

very difficult to detect and measure unreported trading by registered insiders as well as trading by outside-insiders such as lawyers, consultants and relatives of insiders.

One of the earliest attempts to link insider trading and acquisition related activities is found in Keown and Pinkerton [1981]. Focusing on the daily stock price movement of 194 successful targets (1975-78), the authors report that stock prices increase up to 12 days before the first public announcement (day 0) paralleled by a dramatic increase in trading volume, and find that approximately half of the market reaction occurs prior to announcement. However, they observe that the increase in trading volume is not caused by registered insiders, and as a result, conclude that the trading was executed by outside-insiders to whom private information was leaked. Similar results are found by Keown et al. [1992], and in Canada by Masse et al. [1988] who attribute the abnormal trading volume before the announcement to the use of insider information (see table 1 for a summary of past research on insider trading).

The above studies imply insider trading simply following an abnormal price and volume activity and do not account for insider trading volume. Such conclusions are based on Copeland [1976] who identifies the characteristics of the use of asymmetric information to be increased trading volume and monotonically increasing prices, and Easley and O'Hara [1987] who develop a model in which large trades are associated with informed investors (see also Morse [1980 and 1982], and Verrecchia [1981]). Nevertheless, trading on private information cannot be inferred from an abnormal price

TABLE 1

Summary of Results from Previous Research on Insider Trading

Panel A: US Studies

Study	Sample Date & Size	Event Window	%AR & CAR	Major Findings	Conclusion
Keown and Pinkerton (1981)	1975-78 (194)	Day 0 [-60,0]	12.02 *** 25.27	Increase in firm's trading volume up to 3 weeks prior to the announcement. No evidence of open market purchases by insiders.	Inconclusive
Elliot, Morse and Richardson (1984)	1975-79 (125)			Insiders' sales are less than normal before the announcement. Insider trading before the announcement is often insignificantly different from insider trading at other times.	Ambiguous
Haw, Pastena and Lilien (1986)	1967-80 (121)	Weeks [-3,-1] Weeks [-20,+3]	15.38 ** 24.83 **	Could not reject the Insider Trading-Information Leakage Hypothesis. Price run-ups occur more among owner (shareholder) controlled firms than manager controlled firms.	Inconclusive
Gupta and Misra (1988)	1985-86 (87)	Day 0 Days [-12,0]	5.52 ** 23.20	Insignificant difference in means of price and volume run-ups between the pre and post-May 86 periods (the beginning of insider trading scandals).	Negative
Gupta and Misra (1989)	1985-86 (87)	Day 0 Days [-10,0]	3.93 ** 7.20	Price run-ups are significantly greater for firms which are in the news relative to those that are not. However, there is also evidence of pre-news run-ups.	Ambiguous

Study	Sample Date & Size	Event Window	%AR & CAR	Major Findings	Conclusion
Jarrell and Poulsen (1989)	1981-85 (172)	Days [-20,0]	24.49 ***	The presence of rumors in the media is the strongest variable in explaining pre-bid run-ups, followed by foothold position of the bidder. Significantly positive relation between insider trading allegations and unanticipated premiums.	Negative
Pound and Zeckhauser (1990)	1983-85 (42)			7% price run-up before the publication of takeover rumors. No reaction to the rumor on the day of its publication. Rumors seldom predict imminent takeover bids.	Ambiguous
Seyhun (1990)	1975-86 (393)			Small increases in stock purchases and decreases in sales for managers of the bidding firm prior to takeovers. Bidder managers purchase more shares when the stock price reaction to the takeover is large and positive than when it is large and negative.	Positive
Eyssell (1990)	1975-81 (57)	Day 0 Days [-30,0]	1.76 ** 4.79	Buying activity by nearly all insider groups accelerate in the 6-month period prior to the 13D filing date. Most dramatic is that of board chairmen. High information insiders began purchasing shares before their lower information counterparts.	Positive
Arshadi and Eyssell (1991)	1975-87 (330)			Significant shift from a pattern of net purchases in the pre-ITSA (Insider Trading Sanctions Act) of 1984, to a more normal pattern in the post ITSA period.	Positive

Study	Sample Date & Size	Event Window	%AR & CAR	Major Findings	Conclusion
Meulbrock (1992)	1980-89 (143)			CAR on insider trading days is half as large as the price reaction to the public announcement of the trades. 43% of the target's price run-up occurs on insider trading days. Run-up that occurs on insider trading days is greater than run-up that occurs on either days with public news announcements or on days without news or insider trading.	Positive
Sanders and Zdanowicz (1992)	1978-86 (30)			Price run-up begins after the unpublicized initiation of the transaction, but before its public announcement. No abnormal trading volume before the publication date of an article suggesting a possible change in control. No evidence of change in frequency or magnitude of insider trading during the period between the initiation and public announcement dates relative to the preinitiation date.	Ambiguous
Eyssell and Arshadi (1993)	1982-85 (133)	Day 0 Days [-50,0]	14.05 * 26.73 *	Total trading volume in target shares rises dramatically as the announcement date nears. Insider trading volume suggests existence of insider trading.	Positive
Eyssell and Arshadi (book 1993)	1976-90 (553)			Increase in the magnitude of price and volume run-ups despite the existence of broader and more severe regulation. The increase in total trading volume is partially attributable to increased trading by registered insiders.	Positive
Jennings (1994)	1989 (153)	Day 0 Days [-1,0]	19.5 ** 21.2 **	The Wealth effect associated with acquisition announcements appears to be mostly a reaction to public information. Volume statistics indicate little evidence of informed trading and little change in spread before the announcement.	Negative

Panel B: Canadian and U.K. Studies

Study	Sample Date & Size	Event Window	%AR & CAR	Major Findings	Conclusion
Masse, Hanrahan and Kushner (1988)	1984-86 (59) Can.	Day 0 Days [-45,0]	9.05 ** 37.58 **	The price run-up is paralleled by a significant increase in trading volume.	Positive
Masse, Hanrahan and Kushner (1991)	1984-87 (101) Can.			Targets traded on the Vancouver Stock Exchange (VSE) experience CARs of 23.91% [-45,0] compared to 14.04% for targets traded on the Montreal and Toronto Stock Exchanges (which have stiffer insider trading regulation). CARs decline more rapidly on the VSE.	Positive
Holland and Hodkinson (1994)	1988-89 (86) U.K.			The prior disclosure of bid related information does give rise to pre-bid announcement CARs. For identified targets the ARs could arise from either stakebuilding or public information. For unidentified targets, the ARs could result from either stakebuilding or insider trading.	Ambiguous

*,**,***, show significance levels of 5%,1%, and 0.1% respectively.
AR and CAR stand for Abnormal Returns and Cumulative Abnormal Returns respectively.

or volume activity when insider trading volume is not accounted for. After all, increasing pre-announcement total volume may involve registered insiders and outside-insiders who are acting on insider information, as well as uninformed outsiders who are responding to initial price and volume run-ups or to media speculation. Clearly, price and volume pre-bid run-ups are consistent with the use of private information, but they do not necessarily confirm it.

To this end, Eyssell and Arshadi [1993] examine pre-takeover volume run-ups preceding 133 tender offer announcements from 1982 to 1985 by considering three potential players: registered insiders, informed outsiders, and trend chasers. They hypothesize that if the run-up is caused by registered insiders, the stock price rise will be accompanied by increasing insider volume but negligible increases in total volume. If on the other hand the run-up is due to trading by informed outsiders, the rise in the share price will be accompanied by increasing total volume, a negligible increase in insider volume, and no relation between the amount available of public information about the firm and the magnitude of the run-up. Finally, if the run-up is caused by trend chasers (outsiders who buy when prices rise and sell when prices fall), the run-up will be accompanied by abnormal purchase volume by registered insiders, increasing total volume, and a positive relation between available public information and the magnitude of the run-up. The authors find that pre-announcement run-ups are largely due to trading by registered insiders, and explain this phenomenon in the context of the relatively lax regulatory environment during the period studied. In accordance with

these findings, Barclay and Warner [1993] show that medium-size insider trades (1,000-1,900 shares) are responsible for 92.8% of the cumulative price change on the tender offer pre-announcement period.

The direct effect of illegal insider trading on stock prices is investigated by Meulbroek [1992], who employs 229 illegal insider trading cases (79% of which involve takeover related insider trading) detected by the SEC and subsequently cited in a civil case from 1980-89. She shows that stock prices move significantly and become more accurate on insider trading days (on average the abnormal return is 3% on the day of the insider trade). The cumulative abnormal return on insider trading days is almost half the abnormal return on the day the inside information becomes public, suggesting that the stock market detects informed trading and incorporates a large proportion of the information into the stock price before it becomes public. Moreover, the author finds that the run-up that occurs on insider trading days exceeds the run-up that occurs either on news announcement days or on days without news announcements or insider trading. In fact, 43% of the pre-announcement run-up in the 20 days preceding the takeover occurs on the 2.5 days with insider trading. Meulbroek's results also reveal a high total trading volume on insider trading days, but that the volume traded by insiders is small compared to total volume. She argues that the volume traded by insiders could supply the marginal volume necessary to generate excess returns. Finally, abnormal volume is significantly higher on insider trading days than on days without news or insider trading. There is also evidence that the amount traded as well as trade-specific characteristics

such as trade size, direction, and frequency lead to the market's recognition of trading on private information, lending further support to the idea that trading leads to the incorporation of the private information into the share price. These results are in direct conflict with those of Keown et al. [1985] who detect no significant difference in the magnitude of the price run-up between targets in which insiders were ultimately prosecuted and targets in which there were no prosecutions.

Less direct evidence comes from Haw, Pastena, and Lilien [1990]. Focusing on the first known public disclosure of the earliest possible takeover disclosure date (such as preliminary negotiation announcements, required disclosures and rumors), they find that substantial market activity occurs prior to that date, implying either the use of nonpublic information, or public information appearing in sources other than the *Wall Street Journal* and the *Funk and Scott Index*. Moreover, they find that the price run-up occurred earlier for owner-controlled firms than for manager-controlled firms, explaining that this is due to the fact that managers of manager-controlled firms have greater ability to suppress information about informal offers that might increase shareholder (owner) value, and that owners of owner-controlled firms have access to acquisition related information and influence on the firm's decision.

Likewise, Holland and Hodgkinson [1994] try to determine whether the abnormal returns occurring prior to a bid are due to (1) prior disclosure of information concerning the identity or the timing of the bid, (2) stakebuilding, or (3) insider trading.

With a sample of 86 UK companies during the 1988-89 period, they show that for unidentified targets (targets for which no bid related news item has been published before the announcement or that could not be identified using a takeover classification model), the abnormal returns arising prior to the bid announcement could result either from stakebuilding or insider trading. However, for companies identified as potential targets (companies for which one or both of the above characteristics hold), the excess returns could arise from either stakebuilding or additional bid related information reaching the market after the first news item.

Eyssell [1990] provides direct evidence of trading on the basis of insider information prior to toehold acquisitions. His results indicate that high-level corporate insiders such as chairmen of the board display much greater evidence of stock purchasing prior to the Schedule 13D filing than do corporate directors. High-information insiders also began purchasing shares before their low information counterparts. Similarly, Seyhun [1990] finds that insiders in bidder firms tend to trade heavily before the announcement of a takeover bid. Overall, the results are consistent with the use of private information, where bidder managers purchase more shares when the bidder's stock price reaction to the takeover announcement is large and positive than when it is large and negative. Also, managers in firm where cash was used as a method of payment purchased more stock than the control firm as well as firms where equity was used.

Finally, Masse et al. [1991] examine excess returns to targets trading in different

Canadian jurisdictions. They contend that the incidence of insider trading differs across provinces, since in Canada, insider trading is in major part a provincial matter. They detect greater price run-ups on the Vancouver Stock Exchange (VSE) than on the Toronto and Montreal stock exchanges where regulations are stiffer. They also find that the cumulative abnormal returns decline more rapidly after the announcement date on the VSE, suggesting that insiders can benefit from the sale of shares after the event.

All in all, the bulk of evidence on stock price run-ups is mixed and inconclusive, suggesting that both, private and public information affect pre-bid run-ups. While insider trading surrounding merger announcements has been extensively investigated in the US, it has not received much attention in Canada. Except for Masse et al. [1988] and [1991], Canadian studies on insider trading are scarce and unrelated to acquisition events (see Baesel and Stein [1979], Heinkel and Kraus [1987], and Lee and Bishara [1989]). Although Canadian insider trading laws follow closely those of the US, there are two major dissimilarities which may have different implications on the incidence of insider trading in both countries. First, the American penalties are more stringent than they are in Canada (the maximum jail term in the United States is 10 years versus 2 years in Canada). Second, unlike Canada, the US has been subject to a substantial number of insider trading scandals in the past, in which the Securities and Exchange Commission (SEC) and the American courts have played an active role. Whether they are due to the larger size of the US financial markets or to a greater willingness from the part of the

American authorities to prosecute insider trading violations, these differences suggest that Canadian insiders may have a greater incentive to trade on private information.

This thesis complements previous research by extending the sample period to the mid 1990s, and by providing a basis for comparison of insider trading between the United States and Canada. Our results should provide relevant insight into the degree of insider trading that occurs before takeover announcements.

3. INSIDER TRADING IN CANADA

While securities regulation in the US falls mainly under federal jurisdiction, the regulation of securities transactions in Canada is both a federal and a provincial matter. Part XXI of the *Ontario Securities Act* regulates insider trading and self dealing and is enforced by the *Ontario Securities Commission* (OSC) which governs the Toronto Stock Exchange (TSE). The offense of insider trading is defined as purchasing or selling securities with the knowledge of material fact or a material change in a company that has not been disclosed to the investing public. Material information is anything that can be expected to alter share price (Lee and Bishara [1989]). An insider is required to file a report on his insider trades to the OSC within a specified time, which is subsequently published in the OSC Bulletin. The Ontario government legislated new rules in December 1986 which increased the fines to a maximum of $1 million or two years' imprisonment or both, and broadened the definition of insiders to include investment bankers, lawyers, accountants, financial printers and consultants, as well as directors, officers, and employees of the company. The new legislation also made both the tippser (an insider who gives a tip) and the tippee (the person who receives the tip) subject to prosecution, whereas under the old law, someone who got a tip from an insider and traded on this information was not liable. All other provinces' securities laws follow closely the OSA. However, Ontario and Quebec have stiffer penalties than the rest of the provinces. Today, the OSC classifies the following persons or firms as insiders:

(1) Reporting issuer which has acquired securities issued by itself (or, under the Canada Business Corporations Act, by any of its affiliates).

(2) Subsidiary of the reporting issuer.

(3) Security holder who beneficially owns or who exercises control or direction over more than 10% of the securities of the reporting issuer (or under the Bank Act and in Quebec, 10% of a class of shares) to which are attached voting rights or an unlimited right to a share of the profits and in it's assets in case of winding up.

(4) Director of a reporting issuer.

(5) Senior officer of a reporting issuer.

(6) Director or senior officer of a security holder referred to in (3) above.

(7) Director or senior officer of an affiliate (or under the Bank Act and in Quebec, a subsidiary) of the reporting issuer, other than in (4) (5) and (6) above.

(8) Deemed an insider under the Canada Business Corporations Act or the Bank Act.

Federally incorporated companies are governed by the Canada Business Corporations Act which was passed in 1975. Prior to 1975, illegal insider tradings were prosecuted under common law. Basically, the Act requires the insiders to turn over their gain to the company and to compensate the injured party for losses. The insiders are liable to a fine or imprisonment or to both if they fail to file an insider trading report [within ten days after the end of the month in which he has traded], sell short their firm's stock or trade in the firm's call and put options (Lee and Bishara [1985]). The Act classifies the following persons or firms as insiders:

(a) A director or an officer of the corporation

(b) The corporation itself when it purchases its own shares except under a redemption plan or when it purchases or sells shares issued by its affiliates.

(c) A person owning or controlling more than 10% of the shares of the corporation.

Is deemed an insider

(1) A director or an officer of the corporation's subsidiary or of a second firm which is an insider of the corporation.

(2) A person who owns shares beneficially owned or controlled by a second firm.

(3) A second firm which has a subsidiary which beneficially owns the shares of the corporation.

(4) A director or an officer of a second firm, who has traded in the stock of the corporation within six months of the merger of the second firm with the corporation.

(5) A shareholder who beneficially owns more than 10% of a second firm and who has traded in the stock of the corporation within six months of the merger of the second firm with the corporation.

The new categories of insiders are

(d) An affiliate of the corporation.

(e) Any person employed or retained by the corporation.

(f) Any person who, knowing that his source of information is from a insider as defined in the Act, obtains specific confidential information about the corporation.

4. HYPOTHESES DEVELOPMENT

We analyze average abnormal returns and cumulative average abnormal returns from day -60 through day +25 relative to the announcement date (day 0). The existence of pre-announcement price run-ups of target firms' shares is assumed to be a necessary (but not sufficient) condition for the existence of insider trading. In the absence of unusual price patterns prior to the announcement date, one would expect the average and cumulative average abnormal returns to fluctuate around zero under the null hypothesis of no abnormal stock performance.

Nunn, Madden and Gombola [1983] and Seyhun [1990] contend that insiders are capable of predicting the direction of stock prices, and as a result, are able of making abnormal profits from these trades. Accordingly, we expect to see larger cumulative average abnormal returns for the sample of net-buying firms than for the sample of net-selling firms. Indeed, when insiders buy more shares than they sell, they anticipate a greater price run-up hoping to achieve greater returns when they tender their shares after the announcement date. When their selling exceeds their buying, they expect negative returns around the announcement date. In short, we hypothesize that insiders can anticipate the announcement period abnormal stock performance and take this information into account for their personal transactions.

In addition, if insider trading occurs, we would expect trading patterns to differ across time periods. An increase in net-buying (or a decrease in net-selling) over the period immediately preceding the announcement of a merger is consistent with the use of private information. On the other hand, an increase in net-selling over time (or a decrease in net-buying) contradicts the exploitation of private information. Accordingly, we expect to see a significant increase in net purchasing volume (or a significant decrease in net-selling volume) over the event period compared to an estimation period.

Furthermore, significantly larger cumulative average abnormal returns on insider trading days than on days with no insider trading would be consistent with the insider trading-information leakage hypothesis. Larger returns on insider trading days suggest that insider trading could be a potential contributor to price run-ups. According to Meulbroek [1992], this association of insider trading with pre-announcement price run-ups provides a foundation for the argument that insider trading is widespread.

Finally, we hypothesize that the effect of insider trading on average and cumulative average abnormal returns appears at an early stage of the event period, whereas the impact of the publication of insider trades materializes closer to the takeover announcement date. In addition to that, we expect a positive stock price reaction on net-buying days, and a negative reaction on net-selling days. Positive returns associated with insider net-buying and negative returns associated with net-selling are consistent with the use of private information.

5. DATA COLLECTION AND SAMPLE DESIGN

Stock price run-ups and insider trading around acquisition announcements have been extensively investigated in the past. The sample period however has been generally confined to the 1970s and 1980s. With our recent sample of Canadian acquisitions, we have extended the period studied to the mid-1990s, compiling a comprehensive database of insider trading transactions from 1985 to 1995.

5.1. Data Sources

The sample of acquisitions used in this study was obtained from the *Securities Data Company*, comprising acquisitions across Canada with announcement dates from January 1985 to December 1995. This included the name of the target and acquiring firms, the announcement and effective dates of the merger, the acquisition technique, the value of the transaction (disclosed and undisclosed), the percentage of shares acquired, and the percentage of shares held 6 months prior to the transaction.

The original sample consisted of 405 acquisitions in which at least 10% of the target's shares were acquired. From the database of all takeovers, 243 targets traded on the Toronto Stock Exchange, out of which 115 targets were dropped because of too many missing returns. This resulted in a final sample of 128 acquisitions selected on the basis of the following criteria:

1. The target is listed on the TSE and daily return data are available on the Canadian Financial Markets Research Center (CFMRC) of the University of Western Ontario.

2. The transaction value is no less than $0.5 million.

Stock returns were obtained from the *CFMRC* database and consist of the fully adjusted daily return calculated as if the security was purchased at the close on day *t-1* and sold at the close on day *t*. We used the *CFMRC Equal Weighted Index* and the *Value Weighted Index* as proxies for the market return. These indices contain daily returns for all domestic common equities in the *CFMRC* database.

Insider trades for the 128 firms that composed the final sample were gathered from the *Ontario Securities Commission Bulletin* (OSCB) for the 121 trading days preceding the acquisition announcement dates. Chapter 7 of the *OSCB* outlines all trades by registered insiders including the relationship of the insider to the company, the date and nature of the transaction, the number and price of the securities bought or sold, and the insiders' month-end holdings. To be eligible in the study, the inside trades had to meet the following criteria:

1. Only common shares were considered.

2. At least 100 shares traded in a single transaction .

3. Open market purchases only (that is, shares acquired or disposed of via gifts, or warrant or option exercise were excluded).

4. The exact date of insider trades was available in the *OSCB*.

As a result, 18 targets were discarded because the exact insider trading transaction date could not be identified (prior to 1987, only the trading month was being reported in the *OSCB*). This left us with a sample of 110 targets, out of which 52 experienced trading by registered insiders (thereafter 'insider trading firms') and were used in the analysis.

Qualifying buying and selling transactions were compiled for every one of the 52 insider trading firms over two distinct periods: the event period, starting on day -60 and ending on day 0 (the announcement date of the merger), and the estimation period covering the period from day -121 through day -61.

5.2. Sample Characteristics

Table 2 reports the distribution of mergers and acquisitions by year for the original sample (405 events) and final sample (128 events) used in the analysis. The large discrepancy between the number of firms in the original sample and the final sample for the years 1990 and 1991 is due in major part to a considerable number of targets being deleted due to many missing returns. Also, unlike other time periods, the 1990-1991 period contained a substantial number of targets that were either private, traded

TABLE 2

Distribution of Mergers and Acquisitions by Year, for the Period 1985-95.

Year	Number of Firms In Final Sample	Number of Firms In Original Sample
1995	21	59
1994	18	42
1993	15	51
1992	11	37
1991	5	43
1990	8	48
1989	18	59
1988	16	34
1987	10	14
1986	1	8
1985	5	10
Total Sample	128	405

Note: See Appendix 2 for company names and announcement dates.

Data source: Securities Data Company.

TABLE 3

Summary Statistics of the Percentage of Targets' Shares Held Six Months Prior to the Acquisition, and the Percentage of Targets' Shares Purchased at the Acquisition for the Period 1985-95.

A. Percentage of Targets' Shares Held Six Months Prior to Acquisition

Range (%)	Number of Firms	Descriptive Statistics (%)	
< 10	8	Median	28.2
10 < 20	4	Mean	32.2
20 < 40	6	Std. Dev.	26.5
40 < 60	9	Minimum	1.9
60 < 80	6	Maximum	89.3
80 < 100	1		
Total Known	34		
Not Known	94		
Total Sample	128		

B. Percentage of Targets' Shares Purchased at the Acquisition

Range (%)	Number of Firms	Descriptive Statistics (%)	
< 10	0	Median	52.2
10 < 20	23	Mean	61.4
20 < 40	22	Std. Dev.	34.8
40 < 60	21	Minimum	10.0
60 < 80	7	Maximum	100.0
80 < 100	55		
Total Sample	128		

Data source: Securities Data Company.

TABLE 4

Summary Statistics of the Transaction Value of Acquisitions, for the Period 1985-95.

Range ($ millions)	Number of Firms
< 1	2
1 < 5	10
5 < 10	9
10 < 20	7
20 < 50	25
50 < 75	5
75 < 100	8
100 < 250	16
250 < 500	9
> 500	15
Total Known	106
Not Known	22
Total Sample	128

Descriptive Statistics ($ millions)	
Median	50.9
Mean	349.1
Std. Dev.	867.6
Minimum	0.5
Maximum	5,807.0

Data source: Securities Data Company.

over the counter, or traded on other exchanges than the Toronto Stock Exchange, which led to their exclusion from the final sample.

The original sample data indicate that the highest percentage of takeovers (approximately 30%) occurred in 1989 and 1995 alone, while the lowest proportions (8%) took place in the 1985-1987 period. This distinguishes our sample from those in earlier studies in that it contains a large number of recent acquisitions, which allows us to determine if the level of price run-ups has changed over time.

Summary statistics about the percentage of shares held six months prior to the acquisition announcement and the percentage purchased at the acquisition are in tables 3a and 3b. In more than 50% of the acquisitions, the bidding firms controlled a minority interest in the target firms, with a mean of 32.2% of the total shares outstanding. This implies that the acquiring firms have been accumulating target shares at least 6 months before the official bid, paving the way for an eventual controlling interest. Table 3b shows that the mean and median percentage of shares purchased at the acquisition are 61.4% and 52.2% respectively. The data reveal that more than 50% of the bidding firms held a majority stake at the end of the transaction, with 43% securing 80% or more of the targets' stocks. In addition, table 4 reports the dollar value of the acquisition for 106 targets. The mean dollar value of the acquisition is $349.1 million, while the median is $50.9 million, ranging from a low of $0.5 million to a high of $5,807 billion. Furthermore, transactions of over $100 million account for 37.7% of the acquisitions

(40 firms), while transactions of less than $1 million account for just over 1% of the takeovers (2 firms).

Summary statistics for transactions carried out by registered insiders over the event period are reported in table 5. The first column displays the number of firms that experienced trading by registered insiders on a daily basis. It indicates that 2.28 targets on average experienced insider trading in their stock per day, over the event period. The range is from a low of 0 to a high of 6 firms per day. The second column examines insider trading per firm over the same period. It shows for every firm, the number of days on which registered insider trading occurred. The data reveal that target firms experienced 2.8 insider trading days on average over the event period, with a minimum of 1 and a maximum of 15 insider trading days per firm.

The third column measures the lag between the actual insider trading transaction date, and the date on which that transaction is made public in the *Ontario Securities Commission Bulletin*. The mean delay between the actual insider trading transaction day and the day on which this transaction is reported in the *OSCB* is 33.37 days (approx. 5 *OSCB* weekly issues), ranging from a low of 7 days (1 *OSCB* issue) to a high of 100 days (14 *OSCB* issues). These numbers suggest that the transactions of registered insiders remained unknown to the public for a period of four to five weeks on average, with a minimum of one week and a maximum of fourteen weeks. In the United States, Seyhun [1986] finds that the delay between the insider trading day and the availability of

TABLE 5

Incidence of Insider Trading Per Day and Per Firm Over the Event Period [-60, 0], and Timing of Insider Trading for a Sample of 52 Insider Trading Firms (1987-95)

Insider trading firms are firms that experienced insider trading by registered insiders over the event period.
Insider trading days are days of the event period on which registered insiders traded.
[1] the publication date of the inside trade is the date of on which the inside trade is made public in the Ontario Securities Commission Bulletin.

	Number of Firms	Number of Days	
	Insider Trading Firms Per Day (Total of 52 Firms)	Insider Trading Days Per Firm (Total of 61 Days)	Lag Between Actual Date of Inside Trade and Publication Date of Inside Trade[1]
Mean	2.28	3	33.37
Median	2	2	31
Standard Error	0.18	0	1.31
Minimum	0	1	7
Maximum	6	15	100

TABLE 6

Insider Trading Days, Volume of Shares Traded, and Number of Insider Transactions Over the Event and Estimation Periods for Sample of 52 Insider Trading Firms (1987-95)

[1] Two extreme cases of heavy selling are omitted. They involve the selling of the shares of one target during the event period and another during the estimation period by two financial institutions.
Insider trading days are days on which registered insiders traded.
Number of shares bought and sold is the number of shares bought and sold daily, and cumulated over the event and estimation periods. Net Stock purchases is the difference between the number of shares bought and the number of shares sold.
Number of buying and selling transactions is the amount of daily buying or selling transactions carried out by a registered insider cumulated over the event and estimation periods. Net purchase transactions is the difference between the number of buying transactions and the number of selling transactions.

	Event Period (Days -60 through 0)		Estimation Period (Days -121 through -61)	
	Overall	Without Institutional Trading[1]	Overall	Without Institutional Trading[1]
Total Insider Trading Days	138	126	113	108
Number of Shares Bought	1,235,357	1,235,357	1,221,971	1,221,971
Number of Shares Sold	2,645,344	1,767,344	4,274,348	1,430,348
Net Stock Purchases	-1,409,987	-531,987	-3,052,377	-208,377
Number of Buying Transactions	66	66	54	54
Number of Selling Transactions	86	74	59	54
Net Purchase Transactions	-20	-8	-5	0
Average Buying Per Transaction	18,718	18,718	22,629	22,629
Average Selling Per Transaction	30,760	23,883	72,447	26,488

the *Official Summary* exceeds 90 days for 31% of the transactions and 60 days for 84% of the transactions, implying that insiders can enjoy a certain leeway when trading on private information before their transactions are made public.

Finally, table 6 aggregates insider trading data over the event (columns 1 and 2) and estimation periods (columns 3 and 4). There are 126 insider trading days over the event period compared to 108 during the pre-event period. In addition, similar to previous research, the data show that insiders were net sellers (insider purchasing is less than insider selling). For instance, net stock purchases (the volume of shares bought minus the volume of shares sold) amounted to -531,987 shares in the event period, and to -208,377 shares in the estimation period. Finally, the average buying and selling transactions in the event period consisted of 18,718 and 23,883 shares respectively, whereas in the estimation period, an average of 22,629 shares were bought and 26,488 shares were sold in a single insider trading transaction.

6. EMPIRICAL METHODS

6.1. Price Run-ups

We employ event-type methodology similar to that of Mikkelson and Partch [1986] to measure the stock price effects associated with acquisition announcements. The Ordinary Least Squares (OLS) coefficients of the market model are estimated over the period *t*=-255 to *t*=-80 relative to the announcement date, t=0 as follows:

$$R_{it} = \alpha_i + \beta_i Rm_t + \varepsilon_{it} \qquad (1)$$

where

R_{it} = Return on security *i* at *t*.

Rm_t = Return on the *CFMRC* Equal and Value Weighted indices at day *t*.

α_i, β_i = Estimated market model intercept and slope for security *i*.

The stock return on security *i* at day *t* is given by:

$$R_t = \frac{[P_t + D_t].S_t - P_{t-1}}{P_{t-1}} \qquad (2)$$

where P is the closing price, D is the cash or cash equivalent dividend and S is the stock split factor. Daily Abnormal Returns (AR) are calculated for each firm *i* over the interval

t=-60 to t=+25 as follows:

$$AR_{it} = (R_{it} - \alpha_i + \beta_i Rm_t) \quad (3)$$

The average abnormal returns (AAR_t) represents a summation of all company abnormal returns on day t, divided by the number of companies N_t in the sample.

$$AAR_t = \sum_{i=1}^{N_t} AR_{it} \Big/ N_t \quad (4)$$

Similarly, the cumulative average abnormal return ($CAAR_T$) is the summation of all company cumulative abnormal returns (CAR_{iT}) over an event window [t_0, T], divided by the number of companies N_T over the same event window. The CAR and CAAR are calculated as follows:

$$CAR_{iT} = \sum_{t=t0}^{T} AR_{it} \quad (5)$$

$$CAAR_T = \sum_{t=t0}^{T} CAR_{iT} \Big/ N_T \quad (6)$$

The t-statistics calculated for the AARs and the CAARs are given by:

$$t_{AARt} = \frac{AAR_t}{\sigma_{AARt}\sqrt{N_t}} \tag{7a}$$

$$t_{CAARt} = \frac{CAAR_T}{\sigma_{CAART}\sqrt{N_T}} \tag{7b}$$

where σ_{AARt} and σ_{CAART} are the standard deviations of the ARs and CAARs on day t. A non parametric generalized sign test is employed to determine whether the ratio of positive to negative abnormal returns in the event window differs from that in the estimation period (see Cowan, Nayar, and Singh [1990]).

6.2. Insider Trading

We use three methods to explore the incidence of insider trading before acquisition announcements. The first aims at measuring cumulative average abnormal returns of different sub-samples of target firms on the basis of sample specific characteristics. The returns are then compared using both parametric and non-parametric tests.

First we examine the difference in CAARs between a sample of 25 net-buying firms (target firms whose registered insiders bought more stocks than they sold) and a sample of 27 net-selling firms (targets whose insiders sold more stocks than they bought). We expect the CAARs for the sample of net-buying firms to be significantly

greater than those of the net-selling sample. Next, we compare the CAARs on insider trading days with the CAARs on days with no insider trading, where insider trading days are days of the event period on which insider trading took place. Statistically significant larger CAARs on insider trading days than on days with no insider trading would be consistent with the use of private information.

The second method consists of analyzing the difference in net volume of insider transactions between the event and estimation periods. The objective is to discern changes in the trading behavior of registered insiders between the two periods, where a significant increase in net-buying or a significant decrease in net-selling would support the notion of trading on the basis of inside information. This approach is based on daily insider trading transactions for every registered insider. The amount of shares purchased and sold on day t for firm i is denoted by p_{it} and s_{it} respectively. Summing over n firms in the sample portfolio provides the total number of shares bought and total number of shares sold on day t relative to the announcement date, which we denote P_t and S_t respectively. That is

$$P_t = \sum_{i=1}^{n} p_{it} \tag{8a}$$

$$S_t = \sum_{i=1}^{n} s_{it} \tag{8b}$$

Summing the P_t and S_t values over t days provides a cumulative measure of all insider stock purchases and sales from the beginning of the period to day T, denoted CP_T and CS_T respectively:

$$CP_T = \sum_{t=t0}^{T} P_t \qquad (9a)$$

$$CS_T = \sum_{t=t0}^{T} S_t \qquad (9b)$$

Net stock purchases at t denoted by NP_t is the difference between stock purchases and stock sales across all firms at t, and cumulative net stock purchases, CNP_T is the difference between the cumulative stock purchases and sales from the beginning of the period to day T.

$$NP_t = P_t - S_t \qquad (10a)$$

$$CNP_T = CP_T - CS_T \qquad (10b)$$

Finally, the third operation involves a series of cross sectional regressions over the event period (days -60 to 0) for the sample of 52 insider trading firms. The objective is to identify days and window periods on which insider trades have a significant impact on average abnormal returns and cumulative average abnormal returns. The basic specification of the models is as follows:

$$AAR_{it} = \alpha_i + \beta_1 \text{ ANNOUNCE}_i + \beta_2 \text{ INSIDE}_i + \varepsilon_i \qquad (11a)$$

$$CAAR_{iT} = \alpha_i + \beta_1 \sum_{t=t0}^{T} \text{ANNOUNCE}_t + \beta_2 \sum_{t=t0}^{T} \text{INSIDE}_t + \varepsilon_i \qquad (11b)$$

where:

AAR_{it}	=	The average abnormal return for firm *i* at day *t*.
$CAAR_{iT}$	=	The cumulative average abnormal return for firm *i* over a specific window period from t_0 to *T*.
ANNOUNCE	=	Dummy variable which equals 1 for firm *i* if the inside trade is made public on day *t*, and zero otherwise.
INSIDE	=	Dummy variable which equals 1 for firm *i* on days of insider trading, and zero otherwise.

We expect the effect of insider trading on abnormal returns to take place earlier than the impact of the publication of inside trades. We also expect a positive association between net-buying transactions and abnormal returns and a negative association between net-selling transactions and abnormal returns.

7. RESULTS

7.1. Pre-Bid Stock Price Run-ups

Figure 1 shows the cumulative average raw returns from days -200 to +25. A price run-up is evident as early as day -55, increasing sharply around day -5 and reaching 18% at the announcement date (day 0). This run-up can be perceived as a reflection of the market's anticipation of an impending bid, or it can be viewed as a consequence of illegal insider trading.

Abnormal returns were estimated using both the CFMRC Equal Weighted Index and Value Weighted Index as proxies for the market return. Both measures yield similar results. Table 7 reports the mean, median, standard deviation, minimum and maximum values, as well as the distribution pattern of cumulative average abnormal returns over the [-60, +25] window. The mean and median CAARs are 14.05% and 14.83% respectively, and the distribution reveals a concentration of observations at large positive and large negative CAAR values (*i.e.* > 25% and < -25%). In fact, CAARs with large absolute values constitute over 50% of the sample. This shows that while target firms gain from takeovers on average, some do experience considerable losses, implying that not all merger announcements are value increasing events for the acquired firms.

The average and cumulative average abnormal returns over the [-60, +25] event window are displayed in table 8 and figure 2. With the exception of day -4, the data in the table reveal positive AARs starting at day -16, reaching 5.85% at day zero, and continuing through until day +1. Approximately 65% of the targets achieve positive returns on day zero. The AAR at the announcement day is statistically significant at the 0.1% level according to the *t*-statistic and the Wilcoxon sign rank test. Moreover, there is a large concentration of significantly positive AARs between days -5 and +1; during this period, the CAARs increase sharply from 5.51% to 13.41%.

Table 8 also reveals a series of significantly positive CAARs starting at day -5, reaching 12.28% at day zero at the 0.1% significance level, and continuing through to the end of the event period. The Wilcoxon sign rank test for this period also shows a sequence of highly significant returns, with an increase in the proportion of firms with positive CAARs from 55.5% to 69.5%. Our findings imply a sixty-day price run-up of 6.43%, considering that the CAARs of 12.28% from day -60 to day 0 incorporate an average abnormal return of 5.85% at the announcement day. This is consistent with the 14.04% CAARs found by Masse et al. [1991] with a sample of 81 targets traded on the Toronto and Montreal Stock Exchanges, comprised of an average abnormal return of 5.57% at the announcement day.

Our results are in line with previous research suggesting that more than half of the market reaction occurs prior to the public announcement date in the form of price

FIGURE 1

Cumulative Average Raw Returns for 128 Targets from 1985 to 1995 for Days -200 to +25 Relative to the Announcement Date (Day 0)

The cumulative average raw returns are the actual returns of target firms cumulated and averaged over the period t=-200 to t=+25 relative to the takeover announcement date, t=0.

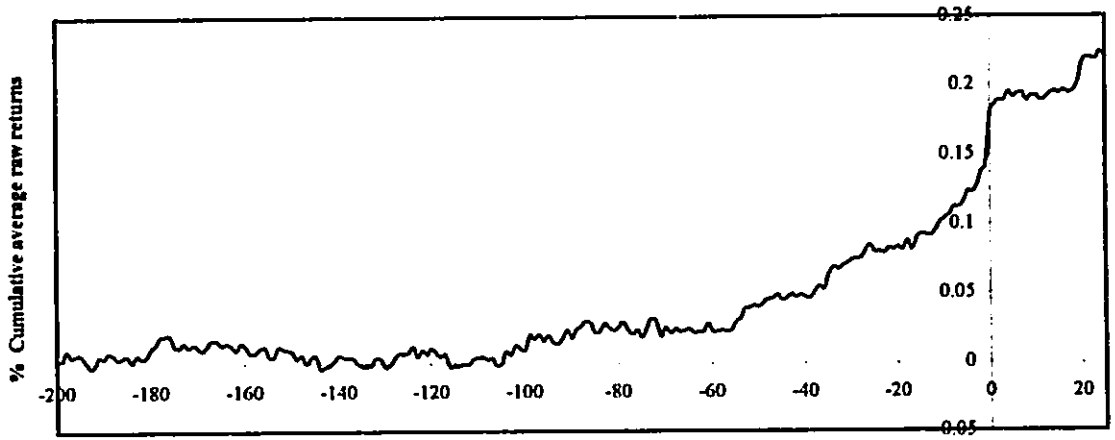


TABLE 7

Summary Statistics of Cumulative Average Abnormal Returns (CAAR) for 128 targets from 1985 to 1995.

Distribution of Observations for the [-60, +25] Event Window

CAAR Range (%)	Number of Firms
> 25	45
20 < 25	11
15 < 20	7
10 < 15	7
5 < 10	10
0 < 5	5
-5 < 0	7
-10 < -5	5
-15 < -10	4
-20 < -15	5
-25 < -20	2
< -25	20
Total Sample	128

Descriptive Statistics (%)	
Median	14.83
Mean	14.05
Std. Dev.	43.85
Minimum	-127.57
Maximum	201.83

The market model parameters are estimated over the period t=-255 to t=-80 relative to the announcement date (t=0).

TABLE 8

Daily Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) for 128 Target Firms Listed on the TSE, with Acquisition Announcements for the Period of 1985 to 1995.

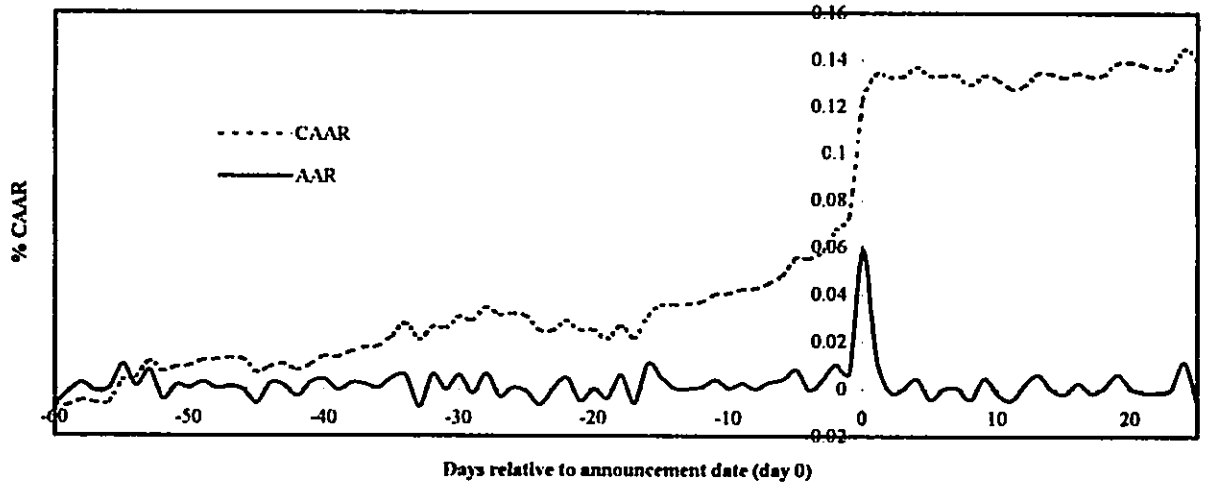
Day	AAR (%)	Sign Rank Test (% Positive)	CAAR (%)	Sign Rank Test (% Positive)	Day	AAR (%)	Sign Rank Test (% Positive)	CAAR (%)	Sign Rank Test (% Positive)
-60	-0.66	47.0	-0.66	47.0	-17	-0.61	44.5	2.14	46.9
-59	-0.13	39.5	-0.71 S	48.4	-16	1.09	50.4	3.10	51.6
-58	0.26	47.8	-0.49	45.3 S	-15	0.49	46.6	3.55	50.0
-57	-0.11	47.2	-0.58	43.8	-14	0.03	44.8	3.57	50.0
-56	0.03	49.1	-0.56	43.8	-13	0.01	45.3	3.58	51.6
-55	1.03 *	54.9	0.36	46.1	-12	0.09	46.0	3.66	52.3
-54	0.13	44.7	0.47	42.2	-11	0.40	50.0	4.01	51.6
-53	0.79 S	48.1	1.14	46.9	-10	0.02	54.0	4.02	50.8
-52	-0.44	44.8	0.78	46.9	-9	0.24	51.4	4.23	52.3
-51	0.16	48.7	0.93	49.2	-8	0.00	45.9	4.22	52.3
-50	0.05	46.4	0.97	48.4	-7	0.28	52.3	4.46	54.7
-49	0.28	54.7	1.21	51.6	-6	0.40	56.8 S	4.81	56.3
-48	0.02	43.1	1.23	53.9	-5	0.82 S	53.9	5.55 S	55.5 S
-47	0.09	48.2	1.31	53.9	-4	-0.05	45.7	5.51 S	57.0 S
-46	-0.06	49.1	1.25	54.7	-3	0.40	52.3	5.86 S	57.8 *
-45	-0.61 *	40.9 S	0.73	53.1	-2	1.06 *	59.6 *	6.76 *	59.4 **
-44	0.22	46.8	0.92	53.1	-1	0.67	48.2	7.34 *	60.9 **
-43	0.16	49.5	1.05	54.7	0	5.85 ***	64.8 ***	12.28 ***	69.5 ***
-42	-0.30	44.9	0.80	54.7	1	1.27 *	61.9 S	13.41 ***	71.1 ***
-41	0.27	47.7	1.03	56.3	2	-0.13	46.1	13.29 ***	69.5 ***
-40	0.42	49.1	1.39	53.9	3	0.01	47.8	13.30 ***	70.3 ***
-39	-0.06	49.5	1.34	53.1	4	0.45	47.3	13.70 ***	68.0 ***
-38	0.25	50.9	1.56	53.1	5	-0.43	41.8	13.33 ***	68.8 ***
-37	0.22	50.5	1.75	53.1	6	-0.01	44.6	13.32 ***	68.0 ***
-36	0.04	51.3	1.79	54.7	7	0.04	45.7	13.36 ***	68.8 ***
-35	0.49	49.6	2.24	54.7	8	-0.45	41.9	12.95 ***	68.8 ***
-34	0.57	49.5	2.74	54.7 S	9	0.46	49.6	13.36 ***	67.2 ***
-33	-0.77	40.9 *	2.08	53.9	10	-0.19	41.6	13.19 ***	67.2 ***
-32	0.61	52.3	2.61	56.3	11	-0.50	45.5	12.76 ***	66.4 ***
-31	-0.02	40.7	2.59	52.3	12	0.18	51.8	12.91 ***	66.4 ***
-30	0.58	51.9	3.06	53.9	13	0.61	47.7	13.43 ***	66.4 ***
-29	-0.19	56.7	2.90	52.3	14	0.00	49.5	13.43 ***	66.4 ***
-28	0.63	45.0	3.44	55.5	15	-0.21	50.0	13.26 ***	66.4 ***
-27	-0.34	50.0	3.13	54.7	16	0.25	50.0	13.40 ***	67.2 ***
-26	0.05	43.1	3.17	50.0	17	-0.17	50.0	13.32 ***	66.4 ***
-25	-0.12	46.0	3.07	50.8	18	0.07	50.0	13.37 ***	66.4 ***
-24	-0.65 *	44.6 *	2.49	47.7	19	0.63 S	52.9	13.88 ***	67.2 ***
-23	-0.01	47.3	2.49	47.7	20	0.04	47.7	13.91 ***	68.0 ***
-22	0.50	57.9	2.91	49.2	21	-0.15	55.8	13.79 ***	67.2 ***
-21	-0.51	41.1	2.48	47.7	22	-0.16	46.2	13.66 ***	65.6 ***
-20	0.01	42.0	2.49	46.9	23	0.01	50.5	13.67 ***	65.6 ***
-19	-0.40	42.9	2.12	49.2	24	1.14 **	53.3	14.49 ***	66.4 ***
-18	0.59	50.0	2.67	45.3	25	-0.57	52.6	14.06 ***	66.4 ***

S,*,**,***, show significance levels of 10%, 5%, 1% and 0.1% respectively.
The market model parameters are estimated over 175 trading days, starting from -255 to -80 before the acquisition announcement date (day 0).

FIGURE 2

Average and Cumulative Average Abnormal Returns for 128 Targets from 1985 to 1995 Over the [-60, +25] Event Window

The average abnormal returns (AAR) of target firms' reaction to takeover announcements for a sample of 128 firms, during the period of 1985 to 1995, are presented by the solid line. The cumulative average abnormal returns (CAAR) for the same period and sample are presented by the dotted line. The market model parameters are estimated over the period t=-255 to t=-80 relative to the acquisition announcement date, t=0.



run-ups. However, the run-ups found in this study are smaller in magnitude than the ones found by Masse et al. [1988] in Canada, and Keown and Pinkerton [1981], Jarrell and Poulsen [1989], and Eyssell and Arshadi [1993] in the US, who report CAARs ranging from 20% to 37.5%. Yet, they are greater than the ones found by Eyssell [1990] who observes CAARs of 4.79% on the day of 13D filing (see table 1). This may be attributed to differences in sample size and period.

7.2. Insider Trading

The CAARs for the samples of 25 net-buying firms and 27 net-selling firms are shown in table 9 and figure 3. Net-buying firms were defined as target firms whose insiders bought more shares than they sold, and net-selling firms as targets whose insiders sold more shares than they bought over the sixty-one-day event period. We find a statistically significant difference in CAARs between the two samples. The cumulative abnormal returns for net-selling targets are 20.76% over the [-60, +25] event period, compared to 13.83% for net-buyers over the same period, with a mean CAAR of 10.69% and 5.78% respectively (the means are significantly different from zero). The data also reveal a higher stock price range for net-selling targets than for net-buying target firms. The CAARs of net-selling firms range from a low of -13.18% to a high of 23.66%, whereas those of net-buying firms range from a low of -2.57% to a high of 16.79%. These results are in conflict with Seyhun [1990] who finds that insiders of bidding firms are more optimistic in the large positive abnormal returns sample than in

the large negative returns sample. However, our findings could suggest that insiders of net-buying firms buy stocks and hold them until after the announcement of the acquisition to profit from their trades. At the same time, insiders of net-selling firms take advantage of the price run-ups by selling their stocks prior to the announcement of a takeover in order to make immediate profits. Nevertheless, to make our results comparable with previous research, it would be important to analyze the post-announcement returns of net-selling targets over a longer time period in order to see if their stock performance deteriorates in the long run. For instance, Heinkel and Kraus [1987] observe more positive (or less negative) CAARs over periods of up to six months following insider purchases than those following insider sales in Canada (the inside trades being the event dates).

Table 10 reports descriptive statistics of net insider trading volume per day (number of shares bought minus shares sold everyday), and net insider trading volume per firm (cumulative number of shares bought minus cumulative number of shares sold by every firm) over the event and estimation periods. While insiders were net sellers in both periods, they sold less shares on a daily basis during the event period than they did during the pre-event period. For instance, on average, 23,114 shares were sold every day over the event period, compared to an average of 50,039 over the estimation period. These results are consistent with Elliot, Morse and Richardson [1984] who find that sales by insiders are less than normal before merger announcements. By not selling, insiders are effectively using private information. However, as in Elliot Morse and

Richardson [1984], the means are not significantly different across the two periods. Similarly, the data in the third and fourth columns indicate that insiders sold less shares over the event period than they did over the estimation period, on a firm by firm basis. For instance, 29,374 shares per firm were sold over the event period, versus 63,591 over the preceding period. Again, the means are not significantly different, disputing the contention that insider trading increases significantly before takeover announcements. Our results are in line with Sanders and Zdanowicz [1992], but they deviate from Arshadi and Eyssell [1993], who report statistically significant differences in the means between the event and estimation periods over 6 out of 10 different regulatory periods, and Eyssell [1990] who detects abnormal buying activities by insiders in the six months prior to the 13D filing date. One reason behind the divergence between the studies could be the length of the event and estimation periods.

Table 11 shows the difference in CAARs between insider trading days and days with no insider trading over the event period. The mean CAAR on insider trading days is 18.36%, compared to 3.71% on days with no insider trading. Both averages are significantly different from zero, and the difference in means is statistically significant at the 0.1% level. Moreover, the CAARs on insider trading days reach a maximum of 39.76%, compared to a maximum of 17.04% on days with no insider trading. These findings match those of Meulbroek [1992] who reports a greater run-up on insider trading days than on any other day, implying trading on the basis of private information.

FIGURE 3

Cumulative Average Abnormal Returns (CAAR) of 25 Net Buying Firms and 27 Net-Selling Firms, for the Period of 1987 to 1995, Over the [-60, +25] Event Window

The cumulative average abnormal returns (CAAR) of target firms' reaction to takeover announcements, for a sample of 25 net-buying targets, during the period of 1987 to 1995, are presented by the dotted line. CAARs for a sample of 27 net-selling targets are presented by the solid line. The market model parameters are estimated over the period t=-255 to t=-80 relative to the acquisition announcement date, t=0.
Net buying firms are firms for which stock purchases by insiders are greater than stock sales during the event window of [-60 to 0].
Net selling firms are firms for which stock purchases by insiders are less than stock sales during the event period of [-60, 0].

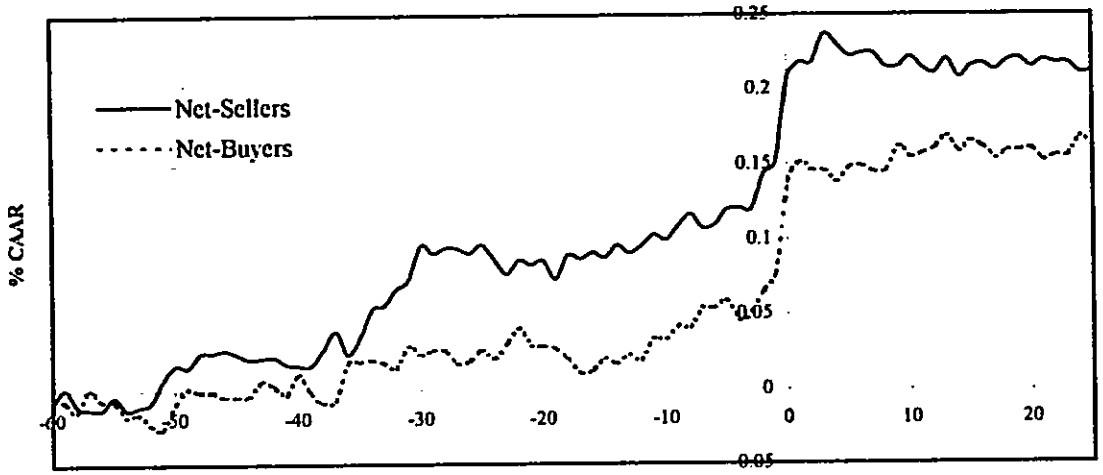


TABLE 9

Cumulative Average Abnormal Returns (CAAR): 25 Net-Buying Firms Versus 27 Net-Selling Firms (1987-95)

*** shows significance at a level of 0.1%.

* shows significance at a level of 0.1% for the Wilcoxon signed rank statistic.

Net-Buying Firms are firms whose insiders purchased more shares than they sold. Net- selling firms are firms whose insiders sold more shares than they purchased over the event period.

	CAAR (%), [-60,+25]	
	Net-Buying Firms	**Net-Selling Firms**
Announcement Day (Day 0)	13.83	20.76
Mean	5.78	10.69
Standard Error	0.72	0.89
Minimum	-2.57	-13.18
Maximum	16.79	23.66
T Statistic (Mean=0)	8.05 ***	11.99 ***
Difference in Means (T Statistic)	-4.151 *** *	

TABLE 10

Net Purchase Volume Per Day and Net Purchase Volume Per Firm: Estimation Period Versus Event Period for a Sample of 52 Insider Trading Targets (1987-95)

$ shows a level of significance of 10%.
Net purchase volume of shares is the number of shares purchased minus the number of shares sold by insiders.

	Net Purchase Volume of Shares Per Day (61 Days)		Net Purchase Volume of Shares Per Firm (52 Firms)	
	Event [-60,0]	Estimation [-121,-61]	Event [-60,0]	Estimation [-121,-61]
Mean	-23,114	-50,039	-29,374	-63,591
Standard Error	14,725	29,685	24,877	67,423
Maximum Sold	-612,520	-100,000	-868,000	-2,994,000
Maximum Purchased	40,000	809,400	550,000	900,000
T Statistic (Mean=0)	-1.569	-1.685 $	-1.181	-0.943
Difference in Means (T Statistic)	-0.81		-0.48	

TABLE 11

Cumulative Average Abnormal Returns: Insider Trading Days Versus Days with No insider Trading for a Sample of 52 Insider Trading Firms (1987-95)

* shows significance levels of 0.1%.

[a] shows significance at a level of 0.1% for the Wilcoxon signed rank statistic.

Insider Trading Days are days on which registered insiders bought or sold shares.

	Cumulative Average Abnormal Returns (%), [-60,0]	
	Insider Trading Days	Days With No Insider Trading
Announcement Day (Day 0)	31.61	17.04
Mean	18.36	3.71
Standard Error	1.34	0.48
Minimum	-1.75	-2.29
Maximum	39.76	17.04
T Statistic (Mean=0)	13.66 ***	7.72 ***
Difference in Means (T Statistic)	-10.256 ***[a]	

TABLE 12

OLS Regressions Results Showing the Effects of Insider Trading and the Publication of Inside Trades on Average Abnormal Returns for a Sample of 52 Insider Trading Firms (1987-95)

$$AAR_{it} = \alpha_i + \beta_1 ANNOUNCE_t + \beta_2 INSIDE_t + \varepsilon_i$$

Note: For convenience and legibility, only statistically significant insider trading days are reported in the table. Except for the intercept, the parameter values of insignificant variables are not reported.
a and b indicate if day t is a net buying day and net selling day respectively.
$, *, **, ***, show significance at the 10%, 5%, 1% and 0.1% level respectively.
AAR represents the dependent variable in the cross sectional regression. It is the average abnormal returns for company i at day t. ANNOUNCE is a dummy variable which equals 1 for firm i if the inside trade is made public on day t, and zero otherwise. INSIDE is dummy variable which equals 1 for firm i on days of insider trading, and zero otherwise.
The t statistics are in parentheses.

Day	INTERCEPT	ANNOUNCE	INSIDE
-57 [a]	0.002		0.133 **
	(0.383)		(3.301)
-51 [b]	0.003		-0.052 *
	(0.038)		(-1.946)
-43 [a]	0.003		0.074 **
	(0.647)		(3.046)
-38 [b]	0.013		-0.051 *
	(1.612)		(-1.952)
-36 [b]	0.011 $		-0.094 ***
	(1.925)		-5.027
-22 [b]	0.008 $		0.176 ***
	(1.769)		(5.737)
-21 [b]	-0.003		-0.135 **
	(-0.408)		(-2.618)
-20	-0.004	0.052 $	
	(-0.597)	(1.67)	
-18 [b]	-0.001		0.236 ***
	(-0.107)		(6.626)
-12 [a]	-0.001		0.084 *
	(-0.083)		(2.42)
-10 [b]	-0.001		-0.064 $
	(-0.271)		(-1.857)
-9	0.010	0.073 *	
	(1.815) $	(1.98)	
-8	-0.006	0.099 **	
	(-1.197)	(2.93)	
-4	-0.005	-0.141 **	
	-0.836	(-3.19)	
-2	0.022	-0.090 **	
	(3.290) **	(-2.15)	

TABLE 13

OLS Regressions Results Showing the Effects of Insider Trading and the Publication of Inside Trades on Cumulative Average Abnormal Returns for a Sample of 52 Insider Trading Firms (1987-95)

$$CAAR_{iT} = \alpha_i + \beta_1 \sum_{t=t_0}^{T} ANNOUNCE_t + \beta_2 \sum_{t=t_0}^{T} INSIDE_t + \varepsilon_i$$

$, *, ** show significance at a level of 10%, 5% and 1% respectively.
CAAR represents the dependent variable in the cross sectional regression. It is the cumulative average abnormal return for company i over a specific window from t_0 to T. ANNOUNCE is a dummy variable which equals 1 for firm i if the inside trade is made public on day t, and zero otherwise. INSIDE is dummy variable which equals 1 for firm i on days of insider trading, and zero otherwise. The t statistics are in parentheses.

Event Windows	INTERCEPT	ANNOUNCE	INSIDE
10-Day Event Windows			
[-60, -51]	-0.003	0	-0.017
	(-0.155)		(-0.66)
[-50, -41]	0.018	0.011	-0.014
	(0.900)	(0.309)	(-0.68)
[-40, -31]	0.033	-0.067 $	0.044 *
	(1.655)	(-1.855)	(2.538)
[-30, -21]	0.007	-0.273	0.011
	(0.436)	(-1.017)	(0.709)
[-20, -11]	0.012	-0.048	0.028
	(0.667)	(-1.604)	(1.476)
[-10, 0]	0.101	0.035	-0.028
	(3.302) **	(0.812)	(-0.84)
20-Day Event Windows			
[-60, -41]	0.005	0.012	-0.005
	(0.176)	(0.202)	(-0.253)
[-40, -21]	0.031	-0.053	0.038 *
	(0.971)	(-1.598)	(2.428)
[-20, 0]	0.103	0.034	-0.019
	(2.336) *	(0.804)	(-0.669)
Other Event Windows			
[-60, 0]	-0.116	-0.032	0.141 **
	(-0.715)	(-0.461)	(3.013)
[-50, 0]	-0.049	-0.028	0.119 *
	(-0.391)	(-0.470)	(3.232)
[-40, 0]	-0.048	0.131	2.192 *
	(-0.496)	(1.631)	(1.943)
[-30, 0]	0.103 $	0.081 $	-0.066 $
	(2.041)	(1.773)	(-1.862)
[-20, 0]	0.107 **	0.034	-0.027
	(3.471)	(0.851)	(-0.922)
[-10, 0]	0.140	-0.029	0.013
	(1.172)	(-0.268)	(0.341)

Results from the cross sectional regressions are displayed in tables 12 and 13. The objective is twofold: to identify, over the event period (days -60 to 0), the days and window periods on which insider trading has a significant impact on AARs and CAARs, and to determine if the sign of the AARs conforms with the predicted direction of insider trades.

The first set of regressions consists of separate OLS regressions for each day of the event period. For convenience and legibility, table 12 reports only the days on which the variables ANNOUNCE and INSIDE are statistically significant in explaining the average abnormal returns, showing only the parameters of the variables that are significant at the 10% level or better. The results indicate that insider trading takes place over 10 days, between days -57 and -12, implying that registered insider trading had a significant impact on AARs at an early stage of the event period. Furthermore, as predicted, the sign of the parameters is consistent with the direction of insider trading in 8 out of the 10 days on which insider trading has a significant impact on AARs. According to table 12, 3 out of the 5 days on which the insider trades have a positive impact on AARs are characterized by net-buying, and 5 days out of 5 on which insider trades have a negative impact on AARs are net-selling days.

In contrast, as expected, the statistical significance of the variable ANNOUNCE starts at a later stage of the event period. ANNOUNCE is statistically significant during 4 days at the 1% level or better, from days -9 to -2 relative to the announcement day of

the acquisition. The relative timing in the significance of both variables suggests that the impact of insider trading on stock abnormal performance materializes at an early stage, whereas the impact of publication of the inside trades in the *Ontario Securities Commission Bulletin* shows much later, closer to the takeover announcement date. These findings reconcile the opposing results in the related literature. On the one hand, consistent with the insider trading-information leakage hypothesis, our analysis establishes a statistically significant link between insider trading and the abnormal performance of the target's stock at an early stage, much before the announcement of a merger. On the other hand, there is evidence that the run-up that occurs immediately before the announcement is not explained by insider trading but by the existence of a legal market for information such as official reports or press speculations about an impending bid, a finding in accordance with the market anticipation hypothesis.

With regards to the cumulative average abnormal returns, the results from table 13 support the findings that insider trading activity takes place at an early stage of the 61-day period. The variable INSIDE is significant at the 5% level or better for event windows [-40,-31], [-40,-21], [-60,0], [-50,0], and [-40,0]. The variable ANNOUNCE however, is no longer significant over the 10-day period preceding the announcement date of the merger because of the opposite sign effects it has on the AARs (see table 12). For instance, the public announcement has a positive impact on the AARs on days -9 and -8, and a negative impact on days -4 and -2.

8. CONCLUSION

The finance literature documents significant price run-ups to target firms before takeover events. These run-ups can be seen as a reflection of the market's anticipation of an impending bid, or they can be viewed as a result of trading by insiders with private information. This thesis provides some insight into the role that insider trading plays prior to takeover announcements. With a Canadian sample of 128 target firms from 1985 to 1995, we examine pre-bid price run-ups and we investigate the incidence of insider trading over a sixty-one day period ending at the announcement date of the acquisition.

Statistically significant cumulative average abnormal returns of 12.28% are found at the announcement date of the merger, comprised of an average abnormal return of 5.85% on that day. Consistent with related research, our results imply that more than half of the market reaction occurs before the public announcement date in the form of price run-ups. However, the magnitude of the run-ups is lower than that of past research. This may be attributed to the difference in sample size and period.

We find that the cumulative average abnormal returns on net-buying days are significantly lower than those on net-selling days. This suggests that net-buyers buy stocks and hold them after the announcement to profit from their trades. At the same time, net-sellers take advantage of the run-ups by selling their stocks prior to the

announcement to make immediate profits. Data on insider transactions reveal a decrease in insider net-selling over time. The mean net-selling volume is half as large in the sixty-day event period prior to the acquisition as in a sixty-day estimation period. Neither a t-test nor a Wilcoxian sign rank test, however, were able to detect any significant difference between the two periods.

Consistent with the use of private information, we observe significantly larger cumulative average abnormal returns on insider trading days than on days without insider trading. In addition, results from a series of OLS regressions show that insider trading has a statistically significant impact on average abnormal returns at an early stage of the sixty-day event period preceding the takeover announcement. In eighty percent of the cases, positive returns are associated with insider net-buying and negative returns are associated with insider net-selling. In contrast, the publication of insider trades in the *Ontario Securities Commission Bulletin* starts being statistically significant at a later stage, closer to the announcement date. On the one hand, our findings indicate that insider trading starts long before the market learns about the acquisition, supporting the insider trading-information leakage hypothesis. On the other hand, our results show that the increase in average abnormal returns over the ten-day period before the announcement is a reflection of market anticipation due to the disclosure of insider trades and possibly rumors and speculations, endorsing the market anticipation hypothesis.

Our findings imply that although trading by insiders does occur, some pre-bid trading may be independent of insider trading and may as a result, arise from event anticipation. Thus, we have only been able to explain one portion of pre-bid run-ups as a result of the private use of information by informed traders. Although there is some indication that insiders trade on the basis of non-public information to generate profits, some insider trading may occur because of wealth changes, portfolio diversification effects, consumption opportunities, and taxes.

Moreover, our investigation is limited to insider trading by registered insiders and excludes others who may have access to inside information (the so-called outside-insiders) such as investment bankers, accountants, legal counsel to the firms and relatives who may be exposed to sensitive information without being required to disclose it. It is very likely that some portion of insider trading be executed by less conspicuous groups and consequently, be impossible to measure. Another limitation to this study (attributable to Canadian empirical research in general) is the unavailability of daily total trading volume, which would have provided more conclusive results on the incidence of insider trading. As such, establishing a statistical relationship between total trading volume and insider trading volume would appear to warrant further empirical investigation. Another opportunity for future research includes the effect of insider trading on the probability of acquisitions. In fact, it is often argued that insider trading could decrease the probability of an acquisition by increasing the premium offered to shareholders, causing substantial welfare losses.

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APPENDIX 1

Summary of Results from Previous Research on Wealth Effects of Canadian Takeover Targets

Study	Sample Dates	Event Dates	Acquisition-Related Variables	Sample Size	% AR & CAR
Eckbo (1986)	1964-83	Month 0		413	3.58 **
		Months [-12,0]		413	10.02 **
Amoaku-Adu and Yagil (1986)	1976-81	Month 0		< 36	18.44 **
		Months [-12,0]			-1.68
Calvet and Lefoll (1987)	1971-80	Month 0	All	104	12.40 *
			Cash	56	13.10 *
			Non-Cash	34	10.00 *
		Months [-24,0]	All	104	23.00 *
			Cash	56	31.30 *
			Non-Cash	34	19.00 *
Masse, Hanrahan and Kushner (1990)	1984-87	Day 0	Stock Merger	32	2.66 **
			Cash Merger	11	2.10 **
			Stock Tender Offer	13	9.72 **
			Cash Tender Offer	24	7.57 **
		Days [-10,0]	Stock Merger	32	6.09 **
			Cash Merger	11	18.45 **
			Stock Tender Offer	13	8.38 **
			Cash Tender Offer	24	21.00 **

Study	Sample Dates	Event Dates	Acquisition-Related Variables	Sample Size	% AR & CAR
Eckbo (1992)	1964-82	Month 0	Non-Horizontal	36	3.17 **
			Horizontal	48	5.12 ***
Amoaku-Adu and Smith (1993)	1977-89	Days [-20,+10]	Complete tender offers	127	33.25 **
			Partial tender offers	33	22.36 **
Smith and Amoako-Adu (1994)	1976-89	Days [-5,+10]	Superior voting shares	20	38.61 *
			Restricted voting shares	20	31.38 *
			Dual class firms	40	36.73 *
			Single class firms	154	24.31 *

*,**,***, show significance levels of 5%, 1% and 0.1% respectively.

AR and CAR stand for Abnormal Returns and Cumulative Abnormal Returns respectively.

APPENDIX 2

List of Target Firms Used in the Sample

TARGET NAME	TARGET BUSINESS	BIDDER NAME	EVENT DATE
QUNO Corp(Tribune Co)	Pulp & Paper	Donohue Inc(Quebecor Inc)	Dec 22, 1995
Inverness Petroleum Ltd	Oil/Gas Expl & Devel	Rigel Energy Corp	Dec 13, 1995
Circuit World Corp	Circuit Board Mfg	Simmonds Capital Ltd	Dec 13, 1995
Conwest Exploration Co Ltd	Oil/Gas Expl & Devel	Alberta Energy Co Ltd	Dec 11, 1995
Redstone Resources Inc	Mineral Expl & Devel	Franco Nevada Mining Corp Ltd	Dec 1, 1995
20/20 Financial Corp	Holding Co.	AGF Management Ltd	Nov 3, 1995
International Pedco Energy	Oil/Gas Expl & Devel	Lateral Vector Resources Inc	Oct 23, 1995
Canadian Pioneer Energy Inc	Oil/Gas Expl & Devel	Cimarron Petroleum Ltd	Sep 28, 1995
Czar Resources	Oil/Gas Expl & Devel	Ranger Oil Ltd	Sep 13, 1995
Baja Gold Inc	Mineral Expl & Devel	Loki Gold	Sep 13, 1995
Home Oil Co Ltd	Oil/Gas Expl & Devel	Anderson Exploration Ltd	Aug 11, 1995
Brunswick Mining & Smelting	Mining & Smelting	Noranda Inc	Jul 24, 1995
Northern Reef Exploration Ltd	Oil/Gas Expl & Devel	Penn West Petroleum Ltd	Jul 7, 1995
Journey's End Corp	Motels	Royal Bank of Canada	Jul 4, 1995
Alberta Natural Gas Co Ltd	Gas Pipelines	TransCanada Pipelines Ltd	Jun 28, 1995
Malette Inc	Forest Products	Tembec Inc	May 31, 1995
Mannville Oil & Gas Ltd	Oil/Gas Expl & Devel	Gulf Canada Resources Ltd	May 18, 1995
Rising Resources Ltd	Oil/Gas Expl & Devel	Gardiner Oil & Gas Ltd	Apr 24, 1995
Diamond Fields Resources Inc	Diamond Expl & Devel	Teck Corp	Apr 17, 1995
Waddy Lake Resources Inc	Gold Expl & Devel	Golden Rule Resources Ltd	Mar 29, 1995
Hycroft Resources and Dvlp	Gld Sil Expl & Devel	Granges Inc	Jan 16, 1995
Breakwater Resources Ltd	Gold Expl & Devel	Dundee Bancorp Inc	Dec 21, 1994
Green Forest Lumber Corp	Forest Products	MacMillan Bloedel Ltd	Dec 14, 1994
Applied Carbon Technology Inc	Graphite Producer	Stratmin Inc	Nov 29, 1994
Dominion Explorers Inc	Mineral Expl	Gobi Oil and Gas Ltd	Oct 17, 1994
Integrated Network Services	Telecomm	Call-Net Enterprises Inc	Oct 12, 1994
Freewest Resources Inc	Mineral Expl & Devel	Hemlo Gold Mines Inc	Oct 7, 1994
North Canadian Oils Ltd	Oil Gas Expl & Devel	Norcen Energy Resources Ltd	Aug 16, 1994
Trans Mountain Pipe Line Ltd	Oil Pipelines	Inland Natural Gas Co Ltd	Jul 27, 1994
Regal Greetings & Gifts Corp	Retail Merch	MDC Communications Corp	Jul 27, 1994
Lac Minerals Ltd	Mineral Expl & Devel	American Barrick Resources	Jul 25, 1994
Canadian Frobisher Resources	Oil/Gas Expl & Devel	Orbit Oil & Gas Ltd	Jun 2, 1994
Luscar Oil and Gas(Val d'Or)	Oil/Gas Expl & Devel	Encal Energy Ltd	May 18, 1994
Bow Valley Energy Inc	Oil/Gas Expl & Devel	Talisman Energy Inc	May 17, 1994
Lakewood Energy Inc	Oil/Gas Expl & Devel	Serenpet Inc	Apr 22, 1994
Maritime Electric Co	Public Utility	Fortis Inc	Mar 25, 1994
Channel Resources Ltd	Oil/Gas Expl & Devel	Viceroy Resource Corp	Feb 25, 1994
Jascan Resources Inc	Mineral Expl & Devel	Conwest Exploration Co Ltd	Feb 4, 1994
Maclean Hunter(Rogers Commun)	Printing & Publish	Rogers Communications Inc	Feb 2, 1994
BF Realty Holdings(BCE Inc)	Real Estate	Carena Developments Ltd	Dec 2, 1993
Falconbridge Gold Corp	Gold Expl & Devel	Kinross Gold Corp	Oct 13, 1993
Goldex Mines Ltd	Mineral Expl & Devel	Agnico-Eagle Mines Ltd	Sep 29, 1993
Dickenson Mines Ltd	Gold Expl & Devel	Goldcorp Inc	Aug 17, 1993

TARGET NAME	TARGET BUSINESS	BIDDER NAME	EVENT DATE
International Mahogany Corp	Res Expl & Devel	Baja Gold Inc	Aug 9, 1993
Falconbridge Gold Corp	Gold Expl & Devel	Kinross Gold Corp	Jul 15, 1993
Jascan Resources Inc	Mineral Expl & Devel	Conwest Exploration Co Ltd	Jul 7, 1993
Trilogy Resource Corp	Oil/Gas Expl & Devel	Manville Oil & Gas Ltd	Jul 2, 1993
American Eagle Petroleums Ltd	Oil/Gas Expl & Devel	CS Resources Ltd	May 21, 1993
Southam Inc	Printing & Publish	Power Corp of Canada	Mar 19, 1993
Encor Inc	Oil/Gas Expl & Devel	Talisman Energy Inc	Mar 10, 1993
Arrowlink Corp	Security Systems	Compu-Home Systems Intl Inc	Mar 4, 1993
Benson Petroleum Ltd	Oil/Gas Expl & Devel	International Pursuit Corp	Mar 3, 1993
Minnova Inc	Copper Expl & Devel	Metall Mining Corp	Feb 16, 1993
Home Products Inc	Window Covering	Quorum Growth Inc	Jan 27, 1993
Majestic Contractors Ltd	Pipelines	Banister Foundation Inc	Dec 16, 1992
GW Utilities Ltd	Holding Co.	Olympia & York Developments	Dec 16, 1992
North Canadian Oils Ltd	Oil/Gas Expl & Devel	Norcen Energy Resources Ltd	Dec 9, 1992
Canamax Resources Inc,Minerex	Mineral Expl & Devel	Canada Tungsten Mining Corp	Nov 24, 1992
Southam Inc	Printing & Publish	Hollinger Inc	Nov 9, 1992
Union Energy Inc	Gas Prod/Distr	Westcoast Energy Inc	Sep 28, 1992
REA Gold Corp	Res Expl & Devel	CMP Resources Ltd	Aug 27, 1992
Altex Resources Ltd	Oil/Gas Expl & Devel	ATCOR Resources Ltd	Aug 6, 1992
Minnova Inc	Copper Expl & Devel	Metall Mining Corp	Jul 27, 1992
Alberta Natural Gas Co Ltd	Gas pipeline	TransCanada Pipelines Ltd	Apr 10, 1992
Northgate Explorations Ltd	Mineral Expl & Devel	Westfield Minerals Ltd	Feb 10, 1992
Eastmaque Gold Mines Ltd	Gold Expl & Devel	Equinox Resources Ltd	Dec 6, 1991
Agnico-Eagle Mines Ltd	Gld/sil Expl & Devel	Mentor Exploration & Dvlp	Nov 22, 1991
Canada Northwest Energy Ltd	Oil/Gas Expl & Devel	Sherritt Gordon Ltd	Jun 21, 1991
Hope Brook Gold Inc(BP Canada)	Gold Expl & Devel	BP Canada(British Petroleum)	May 16, 1991
Voyager Energy(Poco Petroleum)	Oil Gas Expl & Devel	Poco Petroleums Ltd	Jan 30, 1991
Maple Leaf Gardens(Harold E)	Holding Co.	Molson Companies Ltd	Nov 1, 1990
Coseka Resources Ltd	Oil/Gas Expl & Devel	North Canadian Oils Ltd	Oct 12, 1990
Time Air Corp	Air Transportation	PWA Corp	Aug 15, 1990
Cominco Resources Intl	Mineral Expl & Devel	Cominco Ltd	May 29, 1990
Interhome Energy Inc	Oil Pipeline	Gulf Canada Resources Ltd	Apr 20, 1990
Mineral Resources Intl Ltd	Mineral Expl & Devel	Conwest Exploration Co Ltd	Feb 15, 1990
Coseka Resources Ltd	Oil Expl & Devel	North Canadian Oils Ltd	Jan 11, 1990
Bovar Inc	Waste Mgt Services	Trimac Ltd	Jan 2, 1990
Ranger Oil Ltd	Oil/Gas Expl & Devel	Westcoast Energy Inc	Dec 11, 1989
Broulan Resources Inc	Gold Expl & Devel	Cabre Exploration Ltd	Nov 28, 1989
Geddes Resources Ltd	Mineral Expl & Devel	Northgate Explorations Ltd	Oct 19, 1989
Neptune Resources Corp	Mineral Expl & Devel	ABM Gold Corp	Oct 16, 1989
SHL Systemhouse Inc		BCE Inc	Aug 9, 1989
Paramount Funding Corp	Investment Co.	Trical Resources(CanCapital)	Jun 7, 1989
Syngold Exploration Inc	Mineral Expl & Devel	Intl Thunderwood Expl Ltd	Jun 1, 1989
Neptune Resources Corp	Mineral Expl & Devel	Northgate Explorations Ltd	May 8, 1989
Blackdome Mining Corp	Gld/sil Expl & Devel	MinVen Gold Corp	May 5, 1989
Thomson Newspapers Ltd	Newspapers	Intl Thomson Organisation	Mar 15, 1989
Kam-Kotia Mines Ltd	Holding Co.	Goldcorp Investments Ltd	Mar 13, 1989
Dickenson Mines Ltd	Gold Expl & Devel	Goldcorp Investments Ltd	Mar 13, 1989
Montreal Trustco Inc	Trust Co.	BCE Inc	Mar 8, 1989
Pioneer Metals Corp	Mineral Expl & Devel	Pegasus Gold Inc	Feb 10, 1989

TARGET NAME	TARGET BUSINESS	BIDDER NAME	EVENT DATE
Kam-Kotia Mines Ltd	Holding Co.	Corona Corp	Jan 31, 1989
Dickenson Mines Ltd	Gold Expl & Devel	Corona Corp	Jan 31, 1989
Texaco Canada Inc(Texaco Inc)	Integrated Oil	Imperial Oil Ltd(Exxon Corp)	Jan 19, 1989
Steinberg Inc	Retail Food Chain	Socanav Inc	Jan 6, 1989
Oakwood Petroleums Ltd	Oil & Gas	Sceptre Resources Ltd	Nov 30, 1988
Falconbridge Ltd	Mineral Expl & Devel	Noranda Inc	Aug 15, 1988
Breakwater Resources Ltd	Gold Expl & Devel	Corona Corp	Aug 15, 1988
Barons Oil Ltd	Oil Expl & Devel	Mineral Resources Intl Ltd	Jul 18, 1988
Trillium Telephone Systems	Electronic Telecom Sys	Mitel Corp(British Telecomm)	Jul 8, 1988
Monaco Group Inc	Land Sales & Devel	Dylex Ltd	Jul 1, 1988
Noverco Inc	Natural Gas Distr	Canam Manac Group Inc	Jun 28, 1988
Computer Innovations Distn Inc	Computer Mfg & Design	SHL Systemhouse Inc	Jun 9, 1988
Royex Gold Mining & 4 Others	Mining Expl & Devel	Corona Corp	Apr 6, 1988
Ocelot Industries Ltd	Oil Gas Expl & Devel	Bow Valley Industries	Mar 22, 1988
Asamera Inc	Oil & Gas	Gulf Canada Resources Ltd	Feb 29, 1988
Northgate Explorations Ltd	Mineral Expl & Devel	Great Lakes Group Inc	Feb 15, 1988
Campbell Resources Inc	Mineral Expl & Devel	Northgate Explorations Ltd	Feb 12, 1988
Praxis Technologies Corp	-	Cinram Ltd	Jan 29, 1988
Polysar Energy & Chemical Corp	Equity Investor	NOVA Corp of Alberta Ltd	Jan 29, 1988
Oakwood Petroleums Ltd	Oil & Gas	Suncor Inc(Sun Co)	Jan 29, 1988
Dominion Securities Ltd	Invest Holding Co	Royal Bank of Canada	Nov 16, 1987
Meston Lake Resources Inc	Expl & Devel	Campbell Resources Inc	Nov 12, 1987
Vulcan Packaging Inc	Mfg Containers	Royal Bank of Canada	Nov 10, 1987
North Canadian Oils Ltd	Oil Gas Expl & Devel	Hees International Inc	Oct 9, 1987
Nesbitt Thomson Inc	Invest Holding Co	Bank of Montreal	Aug 13, 1987
Sullivan Mines Inc	Gold Producers	Cambior Inc	Jul 24, 1987
Dome Mines Ltd	Gold Producers	Placer Development Ltd	May 6, 1987
Dome Petroleum Ltd	Oil & Gas Expl	Amoco Canada Petroleum(Amoco)	Apr 13, 1987
Mascot Gold Mines Ltd(Royex)	Gold Producers	Lacana Mining Corp	Mar 10, 1987
Lacana Mining Corp	Mining Expl	Royex Gold Mining Corp	Feb 5, 1987
Dumagami Mines Ltd	Mineral Expl & Devel	Agnico-Eagle Mines Ltd	Feb 11, 1986
Mercantile Bank of Canada	-	National Bank of Canada	Oct 15, 1985
Canadian Pacific Enterprises	-	Canadian Pacific Ltd	Sep 6, 1985
Southam Inc	Printing & Publish	Torstar Corp	Aug 26, 1985
Abitibi-Price Inc	Newsprint & paper	Gulf Canada Ltd(Chevron Corp)	Jun 3, 1985
Fraser Inc	Pulp & Paper	Noranda Inc	May 30, 1985