ESSAYS ON NEW EQUITY OFFERINGS IN CANADA

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A Thesis

in

The Faculty

of

Commerce and Administration

Presented in Partial Fulfilment of the Requirements
for the Degree of Doctor of Philosophy at
Concordia University
Montreal, Quebec, Canada

December 1999

0-612-47706-1

ABSTRACT

Essays on New Equity Offerings in Canada

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Concordia University, 2000

Through four essays, this thesis investigates different aspects of new issues of common equity in Canada. The first three essays consider initial public offerings (IPOs) and the fourth essay examines seasoned equity offerings (SEOs).

The short-run intraday behaviour of Toronto Stock Exchange (TSE) IPOs are examined first. Initial trading volume and number of trades for underpriced (overpriced) issues is unusually high (low) indicating that informed investors are active (inactive). Liquidity is consistently lower for overpriced issues. The typical investor will probably not earn positive returns from IPO investment since median returns are consistently zero over the short-run. Amortized spreads are large and are driven primarily by unusually large share turnover at the start of secondary market trading. A four-moment market model indicates that the shape of the distribution of returns is important in explaining IPO returns.

The overallotment option (OAO) gives underwriters the right to acquire additional shares from the firm at the offer price (less fees). It has been suggested that one use of the OAO is to stabilize price. Several aspects of stabilization in the new issue market in Canada are examined in order to establish its presence and to determine the role played by the OAO. Although there are indications that prices are being stabilized at the start of secondary market trading, the OAO does not seem to have a clear impact in terms of supporting prices. On the other hand, the OAO does have a positive effect on underwriter fees which implies that the

reluctance of Canadian issuing firms to grant OAOs may be justified.

Next a sample of underwriter fees for TSE listed common equity IPOs is examined. Mean fees for Canadian IPOs are less than one percent below fees charged by U.S. underwriters over a similar period of time. There is some apparent clustering of fees at 6% for medium sized IPOs, but different from U.S. IPOs, this fee concentration is cyclical rather than increasing over time. An analysis of fees charged by Canadian brokerage firms suggests that while fees are high relative to those charged by brokerages in countries other than the U.S., evidence in favour of collusion is weak.

Efforts in Canada to reduce the country's dependence on natural resources are not directly observable in the capital markets with resource firms remaining prominent in the issuance of seasoned equity. Amortized spreads are much smaller for SEOs than IPOs since lower share turnover effectively distributes transactions costs over longer holding periods. Consistent with the literature, negative and positive announcement period abnormal returns are identified for non-resource public offerings and private placements. Pre-announcement abnormal returns and offering type are important in explaining announcement period abnormal returns.

ACKNOWLEDGEMENTS

It seems that even though the completion of a Ph.D. thesis represents a significant individual achievement, there are invariably many others who must play key roles and deserve some recognition as well. I would therefore like to thank my committee members, Dr. Abraham Brodt, Dr. Richard Chung and Dr. Minh Chau To for providing me with important feedback as I moved inexorably forward toward the ultimate completion of this endeavour.

My years at Concordia really began back in 1976 when I decided to pursue an M.B.A. degree after completing an undergraduate degree in Mathematics at McGill University. In the last year of my graduate program, I had the opportunity to work as a research assistant for two young professors. Little did I know that these two individuals would, nearly fifteen years later, end up being both my mentors and my guides along the academic path that has brought me to this point.

Dr. Martin Kusy was a former Dean of Graduate Studies at Concordia and is currently Dean of the business school at Brock University. Martin was my M.B.A. research paper supervisor and was instrumental in my decision to return to Concordia to pursue a doctorate after working in industry for more than a decade. I have thoroughly enjoyed the many conversations that we have had since my return to academia and I have benefited greatly from his wisdom and keen insight. I am deeply indebted to him for all that he has taught me.

My other mentor is also my thesis supervisor, Dr. Lawrence Kryzanowski. Lawrence has been a tremendous role model for me through my years in this program. In my opinion, Lawrence is the consummate academic. He is equally at ease in the classroom or when he is hard at work producing quality research. He lives by the motto that if you take the time to do something, do it well. Lawrence has taught me to be a Finance researcher and has never allowed me to lose sight of the things that are really important on the way to reaching this milestone. I will always be grateful for having had him behind me.

Outside of the academic world, I would be remiss if I didn't acknowledge the support, guidance and love that I have received from my two sets of parents. It has always been clear to me that my birth parents, Evelyn and Michael Rakita and my parents by marriage, Paula and Jack Kadaner have always wished nothing but the best for me.

I would like to thank my son Shawn and daughter Robyn for their years of patience and sincere belief in me. There have been occasions when I would have liked to spend more time with them. They have lived with my quest for nearly half their lives. Perhaps now they can tell their friends that their father has finally finished school.

My deepest appreciation must be reserved for my wife. Her devotion and self-sacrifice through my years in the doctoral program have helped me stay on course and have enabled me to complete this undertaking. Words are inadequate to express the profound love, respect, and genuine admiration that I feel for her. It seems only fitting that I dedicate this thesis to Reesa.

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Introduction

The ability of a company to succeed in a competitive marketplace depends on many factors, one of which is the ease with which external funds can be obtained to finance new opportunities and investment. Before going public, many firms rely on equity provided by company principals as well as on venture capitalists who typically demand a substantial return on this type of risky investment. Schilit (1996) outlines a series of phases that many entrepreneurs experience prior to selling part of the value of their equity to the investing public. He notes that beyond early-stage financing which is comprised of seed financing, start-up financing and first-stage financing, growing companies eventually enter an expansion financing stage. At this point, there are as many as three additional phases that firms pass through on their way to going public. The final phase, termed *mezzanine financing,* occurs when capital is provided to a company that expects to go public within one year's time.

Given that a private company has progressed to this final pre-public phase, the entrepreneur is now faced with an important decision. Should the company be taken public by issuing an initial public offering (IPO), or should the entrepreneur continue to seek equity financing from private sources or limited debt financing from a bank or other lending institution?

It is costly for firms to go public. If a firm chooses this route, lawyers, accountants, and investment bankers must be hired. The largest direct cost that a company faces when it decides to go public is the underwriting fee (or spread). In an early study, Krinsky and Rotenberg (1985) note that the mean spread was 5.96% for Canadian firms who went public in the period 1971-1983. Other direct costs averaged only 0.98%. One indirect cost of going public is the information that must be supplied as part of the disclosure requirements. This may have important competitive ramifications that are difficult to quantify. Typically, the most significant indirect cost faced by a firm that goes public is the underpricing of the company's shares. Jog and Riding (1987) find that underpricing for Canadian IPOs in the period 1971-1983 range from 9% to 11.5% ten days from issuance. In a follow-up study, Jog and Srivastava (1996) estimate that the underpricing of Canadian IPOs is closer to 5% on the first day of trading in the period 1971-1992.

Apart from several drawbacks associated with a firm going public, Grinblatt and Titman (1998) list several good reasons for companies to publicly list their shares. These include: improved access to capital markets; substantially improved liquidity for shareholders; the ability of owners to diversify their holdings; and enhanced firm credibility in the eyes of suppliers, customers and employees. As always, the final decision faced by a rational entrepreneur who is considering going public should come down to weighing the costs versus the benefits of doing such.

There are a number of key players that converge in the market for new equity. Besides the firm itself, investment bankers earn large fees for their services. A logical question to ask is whether or not these fees are provided in a competitive manner and what cost is reasonable from the point of view of the firm, based on the size of the offering and the services rendered.

Ritter (1991) documents the long-term poor performance of IPOs. From the viewpoint of the investor, a natural question to pose is whether or not the investment in an IPO can at least be justified in the short-run. Another issue of importance to investors and firms alike is whether or not underwriters play an active role in supporting the price of a new equity offering. The literature suggests that underwriters support prices through a mechanism that involves them exercising overallotment options (OAOs) to acquire additional shares from the company at a discount. This leads to the following question in a Canadian context. Does evidence exist to support this assertion in Canada, or is there another possible motivation for an underwriter to request an OAO from the issuing firm in Canada?

One previously mentioned benefit of going public is easier access to capital markets. Public companies can raise additional equity financing through seasoned equity offerings (SEOs). This is a well developed market in Canada but has received limited attention from Canadian researchers. It is well-known that the announcement to issue a public SEO in U.S. markets is coupled with a decline in the price of a company's existing shares. It is less well-known that the reverse is true for SEOs in U.S. markets that are privately placed. Specifically, the announcement to issue a privately placed SEO in U.S. markets is associated with an increase in the price of the issuing company's existing shares. Other issues of importance include the analysis of transactions costs that investors face as well as the determination of the factors that are relevant in explaining announcement period excess returns.

Given the preceding information as a backdrop, this thesis investigates several aspects involved in raising new equity in Canada. Various sets of samples consisting of Toronto Stock Exchange (TSE) listed firms are used herein. The samples used in chapters two and three are for the period 1984-1993. The next two chapters primarily consider samples from the more recent five year period 1993-1997.

Chapter two is concerned with the short-run behaviour of Canadian IPOs. A sample of 221 firms is split according to whether the offer-to-open return for newly issued common stock is positive (underpriced), negative (overpriced) or zero (correctly priced). Market trading statistics including share volumes, number of trades and quoted depths are examined to gauge information flow and liquidity. Returns then are examined to assess whether typical investors can expect to earn a profit from IPO investing in Canada. Transactions costs are investigated through an analysis of the amortized spread. Since unusually heavy trading activity occurs when new equity is first issued, it would not be surprising to find that this transactions cost measure is extremely high at first given that share turnover is particularly large during the first few days of secondary market trading. A four-moment market model is used to determine if the shape of the distribution of returns is important in explaining any abnormal returns associated with the initial secondary market trading of IPOs. The third moment is incorporated in asset pricing models through the work of Kraus and Litzenberger (1976) and others. Investors typically prefer positive skewness as this situation resembles a lottery payoff wherein a high payoff may be earned with low probability. If the market returns distribution is positively skewed, then investors require a lower expected return to induce investment. A rationally functioning market only provides higher return expectations (i.e., an additional risk premium) if market returns are negatively skewed. The fourth moment has received little attention in asset pricing and behaves much like the second moment. A positive risk premium should be offered to investors as a reward for bearing higher kurtosis risk.

The third chapter considers underwriter price stabilization at the start of secondary market trading of IPOs. It is traditionally assumed that prices evolve according to the unobstructed forces of supply and demand. Underwriters have reputation capital at stake. As such, they are not expected to remain idle if an IPO is doing poorly in initial secondary market trading. Thus, Ruud (1993) suggests that the underpricing of IPOs exists as a result of the lower end of the distribution of returns being censored by underwriters who are supporting prices. Since stabilization is difficult to observe directly, Hanley, Kumar and Seguin (1993) investigate stabilization through several proxies and conclude that IPO prices are being supported.

In chapter three, the distribution of returns of a sample of TSE IPOs is examined to ascertain if stabilization appears to be present. Additional issues considered in this chapter are the role played by the overallotment option in market stabilization, and whether or not underwriters employ the OAO more likely as a revenue-enhancing tool rather than a market-stabilization tool.

Chapter four is devoted to a study of IPO fees for TSE listed firms. A current class action lawsuit in the U.S. suggests that investment bankers in that country may be colluding to set unusually high fees for IPO distribution. These fees are fixed at exactly 7% for a large percentage of medium-sized issues ($20-80 million) and have been increasing in concentration over time. Evidence from Canadian IPOs is examined in chapter four to determine if the U.S. practice has migrated to Canada. In addition, a multinomial logit model is developed to explain the probability of different fee levels charged by Canadian underwriters, and to identify the factors that may be driving the probability of earning these different fee levels in Canada.

Chapter five analyzes Canadian seasoned equity offerings. Initially, the evidence of dependence of Canadian industries on natural resources is examined. This focuses attention on differences between natural resource companies and companies that are involved in other areas of industry. Thereafter, various differences in share volume and number of trades are highlighted for resource firms (then for non-resource firms) that issue SEOs publicly versus those that issue SEOs through private placements. Since significant negative (positive) abnormal returns are documented in studies of public (private placement) SEOs primarily in the U.S., whether or not this situation also prevails in Canada is examined. In addition, how amortized spreads for SEOs compare to those for IPOs, and to amortized spreads for stocks on other exchanges, are examined in this chapter. The research reported in this chapter also examines if the purpose given for raising new equity or the size of the offering or type of firm are relevant in explaining common equity abnormal returns associated with SEO announcements.

Finally, chapter six reviews the work that was undertaken in this thesis, and highlights the important contributions that this thesis makes to the existing literature. Avenues for future research work also are outlined.

Chapter 2

The Short-Run Intraday Behaviour of Canadian IPOs and a Four-Moment Market Model of IPO Returns

2.1 Introduction

The underpricing of Initial Public Offerings (IPOs) is a well-documented phenomenon that dates back to Ibbotson's (1975) seminal work. In a Canadian context, Jog and Riding (1987) find that nearly all underpricing occurs in the first three days of trading. Cheung and Krinsky (1994) confirm the short-run nature of underpricing but use a small group of investment bankers that went public as their sample and do not specify the time frame over which underpricing persists. In addition, previous research on IPOs considered only daily data until recently. The first few days in the life of a new security is a particularly critical period, and important findings are apt to be buried when data are aggregated and the measurement interval is not particularly short.

We use an expanded sample (relative to several other Canadian studies) and transaction and quote data from the Toronto Stock Exchange (TSE) for IPOs issued over the 1984-1993 period to discern patterns in trading activity in the initial twenty days (approximately one calendar month) of IPO trading. This study focuses not only on underpriced issues but also on the relationship to and characteristics of both correctly priced and overpriced issues. During the course of this investigation, volume, number of trades, market depth, and returns are examined to determine the persistence and magnitude of underpricing during the first days of IPO trading.

In addition, we consider whether risk associated with the third and fourth moments of the distribution of IPO returns is priced. That is, beyond the risk associated with the covariance of specific issues returns with that of the market, is it the case that investors require compensation for bearing risk related to adverse return skewness or kurtosis?

This research will be of particular interest to institutional investors who are important participants in the market for new issues, private investors who continue to play a prominent role in IPO subscription, market regulators who are charged with the responsibility of supervising the new issue process and finally to underwriters who must ultimately be held accountable by the company for the success or failure of an IPO.

The remainder of this paper is organized as follows. In the next section a literature review is presented. The third section describes the data set. In section 4 we report on the results of our investigation of short-run IPO volume, number of trades and bid-ask depth. In section 5 returns are considered. Section 6 is devoted to a discussion of the amortized spread. The ability of a four-moment asset-pricing model to explain returns is examined in section 7. Concluding remarks are offered in section 8.

2.2 Literature Review

Over the past few decades, an extensive body of literature has been developed to examine and attempt to explain the short-run performance of IPOs.[1] Ibbotson (1975) considers a sample of 112 unseasoned common stocks in the period from 1960-1969. He concludes that the mean initial performance[2] is positive (11.4%) and that excess returns disappear in the short-term aftermarket when transaction costs are accounted for. No substantial justification is offered to explain the apparent initial underpricing. Ibbotson, Sindelar and Ritter (1988) report an average return of 16.4% for 4,534 IPOs issued between 1977-1987 when returns are computed from the offer price to the closing price on the first day of trading. Barry and Jennings (1993) consider intraday data and conclude that the benefits of underpricing are enjoyed, for the most part, by initial subscribers. They find that the median first day return is zero. Hanley and Wilhelm (1995) find evidence that institutional investors capture the bulk of short-run IPO profits. There appears to be a *quid*

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1 The long-run performance of IPOs has also received a considerable amount of attention. Ritter (1991) investigates the time- and industry-dependence of IPOs. He reports that an investment made at the end of the first day of public trading and held for 3 years leaves the investor with 83 cents relative to a similar investment in an appropriate matching firm. Many firms appear to issue stock for the first time at the height of industry-specific fads. Investor overoptimism about firm prospects explains subsequent sub-par performance. Loughran and Ritter (1995) examine the performance of IPOs compared to SEOs (seasoned equity offerings) between 1970 and 1990. They determine that geometric average annual returns over five years for IPOs is 5% compared to 7% for SEOs. Matched non-issuing firms of similar size returned 12% and 15% respectively. They hypothesize that firms take advantage of windows of opportunity by issuing equity when it is overvalued. Jain and Kini (1994) use several different measures and infer that firms that go public show a significant decline in operating performance over a six year period that extends from one year prior to the IPO to five years after share issuance. Furthermore, no evidence exists that firms with more underpricing exhibit better post-IPO performance. This seems to indicate that underpricing is not necessarily a signal of quality.

2 Initial performance was intended to include the performance for shares held from the offering date to the date of the first trade, but since only monthly data was available, the results may have been affected by up to one month of aftermarket performance.

pro quo expectation that these investors will also participate in less attractive issues. The data indicate that U.S. underwriters employ a deliberate strategy to discriminate in the allocation of IPOs.

Three well-defined strands of the literature focus on potential reasons for apparent IPO underpricing. Asymmetric information between the issuer and the investment banker is offered by Baron (1982) as one possible explanation. In a similar vein, Rock (1986) contends that every issue has a group of investors who possess superior information. If the price for a new offering is set equal to its expected value, then the knowledgeable group of investors will act aggressively to acquire better issues and retreat when inferior issues are made available (uninformed investors face the winner's curse). The offering firm is forced to underprice the IPO to ensure that uninformed investors earn normal returns and do not withdraw from the new-issue market. This hypothesis is supported by Keloharju (1993) in a study of Finnish IPOs where rationing data are available.

A second strand of literature considers ex ante uncertainty of IPO value. Beatty and Ritter (1986) argue in favor of a positive relationship between ex ante uncertainty of IPO value and its expected initial return. They maintain that the underpricing equilibrium is supported by investment bankers and outline several reasons why it is in the best interests of bankers to promote underpricing. Affleck-Graves et al. (1993) examine the effect of different trading systems on IPO underpricing and generally support Beatty and Ritter. They find average IPO underpricing of 4.82% for NYSE stocks, 2.16% for AMEX stocks, 5.56% for NASDAQ/NMS (National Market System) stocks and 10.41% for NASDAQ/non-NMS stocks. IPOs in the last category have more relaxed listing standards relative to those in the first three trading systems.

The third area of research into IPO underpricing considers value signalling. Welch (1989) suggests that high quality firms underprice and emit a signal to the market about their caliber. Low quality firms mimic the underpricing trend and incur some expense in order to appear to be high quality firms. With some positive probability their true quality is revealed before a subsequent seasoned offering. The high quality firms are then rewarded by obtaining a higher price for their own seasoned offerings. Later studies by Garfinkel (1993), and Jegadeesh, Weinstein and Welch (1993) do not lend support to this theory.

Other theories explain underpricing as insurance against legal liability and the potential damage to the reputations of investment bankers and issuers [Tinic (1988)], and via the "impresario" effect [Shiller (1988)].[3]

Price stabilization has been a fruitful area for IPO research. Ruud (1993) examines the distribution of initial IPO returns and finds that a partially unobserved left tail may be driving positive mean initial returns. She posits that underwriters effectively lend price support until an issue is fully subscribed. Hanley et al. (1993) analyze 1,523 NASDAQ IPOs and find evidence that price stabilization significantly affects quoted spreads. Quoted spreads are narrower during the first ten to fifteen trading days during which stabilization is expected to be critical. Moreover, market prices decline by 2.5% over an interval of five days when stabilization is suspended. Schultz and Zaman (1994) study the aftermarket for

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3 Shiller compares the underwriter to an impresario who employs a deliberate strategy of underpricing concert tickets to enhance the reputation of a performer (by increasing demand) thereby allowing increased prices to be charged for subsequent concerts.

IPOs. They uncover evidence favoring the hypothesis of underwriter support achieved by permanently reducing the supply of shares.

Hanley (1993) finds that underpricing is positively related to revisions in the offer price between the time of filing the preliminary prospectus and the offer date. This suggests that underwriters and issuing firms trade underpricing for increased allocation.

Schultz (1993) investigates the sale of IPO units (bundles). Companies selling these units tend to be smaller, younger and have fewer assets, sales and earnings than companies that issue share IPOs. They are more inclined to be high-tech and service oriented, and are more likely to fail compared to their share IPO counterparts.

From a Canadian perspective, Shaw (1971) determines that initial performance is negative. For Canadian IPOs between 1971 and 1983, Jog and Riding (1987) find that underpricing ranges from 9% to 11.5% ten days from issuance, depending on volume, business sector and intended use of funds. Nearly all the underpricing occurs in the first three days. At the time of the study, these results appear to be comparable to U.S. estimates of underpricing. Jog and Riding also find that about 40% of new issues in the sample are overpriced and that measures of risk (variance and beta) are not useful in explaining underpricing. Krinsky and Rotenberg (1989) investigate the relationship between entrepreneurial ownership retention and initial IPO value. They cannot find any indication that the proportion of shareholdings retained by the entrepreneur reveals private information and therefore increases IPO value. Finally, Cheung and Krinsky (1994) confirm the short-run nature of IPO underpricing but cannot support Baron's hypothesis that information asymmetry between investment bankers and issuers drives underpricing.

Research in the area of asset-pricing models is extensive but there is surprisingly little work related to the importance of higher moments in explaining expected returns. Beyond the analysis of expected returns in terms of systematic risk, several authors have also considered the impact of skewness. Investigators considered skewness as a means to possibly explain prior results wherein a one factor model appeared to underprice low-beta stocks and overprice high-beta stocks. McEnally (1974) found that the usual one-factor capital asset pricing model (CAPM) systematically underpriced low-beta stocks and overpriced high-beta stocks, but also found that high beta stocks had high positive skewness. These results could be explained by investors who prefer stocks with high risk and high positive skewness that provide an opportunity for unusually large positive returns (albeit with low probability) much like the distribution of payoffs that one would expect to see for a typical lottery.

Kraus and Litzenberger (1976) examined this relationship more formally by testing a CAPM with a skewness term and found results that confirmed their hypothesis that investors are willing to pay for positive skewness. They concluded that their three-moment CAPM corrects for the apparent mispricing of high- and low-risk stocks encountered with the standard CAPM. Subsequent testing of the model by Friend and Westerfield (1980) derived mixed results, but the importance of skewness was supported in studies by Sears and Wei (1988) and by Lim (1989).

More recently Fang and Lai (1997) have developed a four-moment capital asset pricing model in which expected excess returns are related to systematic skewness and systematic kurtosis in addition to systematic variance. A cubic market model that is consistent with a four-moment CAPM is of the form:

$$R_{it} = \alpha_i + \beta_i R_{mt} - \gamma_i R_{mt}^2 + \delta_i R_{mt}^3 + \varepsilon_{it} \qquad (2.1)$$

$$i = 1,\ldots,n; \quad t = 1,\ldots,T,$$

where β_i, γ_i, and δ_i are in turn the systematic variance, skewness and kurtosis of asset *i*. Later, we adjust this cubic market model to reflect abnormal returns earned on various event days after the start of secondary market trading.

2.3 Data Description

Initial public offerings are identified using the TSE Annual New Listings Report.[4] Between 1984-1993, 463 IPOs are identified. In order to maintain sample homogeneity, only common share issues are considered. When unit offerings, warrants, preferreds and other hybrids are filtered out, 262 issues remain. In order to minimize classification problems, issues with offer prices below $2 are deleted. After this screen is applied, 240 issues remain. Next, issues that did not trade at least once per day on average over the first twenty days of trading are excluded. This last screen leaves a total of 233 issues. Finally, since only 12 of the remaining issues were for companies in the mining or oil and gas industry these were also dropped from the sample. Thus, the final sample contains 221 issues (24 junior) from

[4] All new TSE listings include IPOs as a subset. However, a new listing need not be an IPO since a company may have gone public earlier but did not list its shares on the exchange.

industrial companies. The majority of the IPOs (124) list exclusively on the TSE.[5] Table 2-1 gives a year by year account of the number of IPOs included in the sample.[6]

[Please place Table 2-1 about here]

The *Equity History* database compiled by the TSE is then used to obtain the required data. This database contains the time stamp, bid, ask and transaction prices, broker clearing numbers, and share trading volumes for every trade and quote on the TSE.

Initially, for each issue, returns are calculated from the offer price to the opening price and this measure is then used to split the sample. Thus the 221 IPOs (full sample) is split into three subsamples according to whether these offer-to-open returns are positive (underpriced - 109 issues, 49.3% of sample), zero (correctly priced - 46 issues, 20.8% of sample), or negative (overpriced - 66 issues, 29.9% of sample[7]). Table 2-2 gives some descriptive statistics on the full sample and the three subsamples.

[Please place Table 2-2 about here]

It is interesting to note that the overpriced issues are associated with the firms that have, on average, the smallest capitalized values and that firms with the largest capitalized

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5 Sixty-four issues listed simultaneously on the Montreal Exchange.

6 The study of the four-moment asset-pricing model contains 203 companies based on the availability of returns data in the TSE/Western database for a period of sixty days post IPO.

7 By contrast, Jog and Riding (1987) find that 39% of a smaller sample of issues are overpriced.

values appear to be responsible for issues that are correctly priced. Undervalued issues tend to come from firms whose capitalized value is close to but less than that of the large cap firms. Thus it seems that the well-documented small firm effect[8] cannot be associated with the underpricing of Canadian IPOs.

2.4 Volume, Number of Trades and Bid-Ask Depth

In the microstructure literature, both volume and number of trades can be seen as proxies for information flow. We look at these two variables for the full sample and three subsamples of issues to try to discern whether investors are in general, aware of the quality of an issue.

[Please place Figure 2-1 about here]

In Panel A of Figure 2-1 we can immediately observe the relatively large share volumes in the first half-hour of the opening day of trading. Although heavy initial trading distorts the scale of the graph, it is still possible to make out the "smile effect" with volume hitting a low point in the early afternoon before increasing near the end of the day. The most striking feature of Panel A is the relatively low volume in the first half-hour for overpriced issues and the high volume for underpriced issues. It appears that informed investors trade heavily when they know that issues are underpriced and remain idle when they believe that an issue is overvalued.

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8 See Banz (1981).

Figure 2-1, Panel B shows the volume pattern on the twentieth day of trading. The volume has dropped substantially from that of the first day and the smile effect is readily apparent for "All" and "Under" issues. Due to their smaller sample sizes, correctly priced and overpriced issues are more sensitive to outliers with several large trades affecting the smile pattern.

Figure 2-2 shows the mean number of trades per 30-minute interval for all issues and the three subsamples. This graph corroborates the findings of the volume plot with underpriced issues consistently showing the most activity and overpriced issues the least. Differences are most pronounced during the first seven days of trading.

[Please place Figure 2-2 about here]

Depth at the bid, at the ask and the difference between the two indicate several things. The level of the depth (at bid or ask) is a measure of liquidity provided by the market-maker. If the imbalance between ask depth and bid depth is negative, this is a sign that the market-maker is supporting the price. In Figure 2-3, the bid (ask) depth on day 1 is greater (less) than 100 board lots and declines steadily for the total sample and the underpriced issues. This suggests that these issues on average require less liquidity over time. On the other hand, for correctly priced and overpriced issues, the decay is not nearly as smooth. There are noticeable ups and downs in the depth patterns. Also the level of depth is quite high initially for correctly priced issues[9], and relatively low for overpriced issues. Depth imbalance for underpriced issues is negligible after day 14 but persists to some degree for overpriced issues until at least day 20.

[Please place Figure 2-3 about here]

2.5 Returns

Based on Table 2-2 the mean offer-to-open return for all companies is large (4.183%) and significantly different from zero (p - value << 0.001). However since the median offer-to-open return is zero[10], the typical investor will probably not be able to profit, at least initially, from an IPO investment. At the same time the mean (median) offer-to-open return for underpriced issues is 12.138% (6.897%), and the mean (median) offer-to-open return for overpriced issues is -6.040% (-3.661%).

[Please place Figure 2-4 about here]

The mean returns for all companies calculated from the offer price to the closing price are nearly constant from days 1 to 20, as shown in Figure 2-4, Panel A. Since this level is insignificantly different from the offer-to-open return, an investor without superior

9 As mentioned earlier, the smaller sample size (46) for the correctly priced issues is sensitive to outliers. In this case, the Air Canada IPO was mainly responsible for the high initial depths at the bid and ask.

10 My finding that the median first day return is zero agrees with Barry and Jennings (1993).

information will on average, earn his full return precisely at the time of the opening trade. On the other hand, median returns for all companies in Panel B indicate that the typical investor is unlikely to earn positive returns over the first 20 days of trading.

From an investor's point of view, winners (underpriced issues) keep on winning over the first 20 days as the mean (median) return rises from 11.360% (6.250%) to 15.603% (13.333%). At the same time, losers (overpriced issues) keep on losing as the mean (median) return declines from -7.600% (-5.871%) to -12.824% (-13.195%) respectively. Correctly priced issues remain correctly priced or move slightly to the negative (overpriced) side over the 20 day period.

2.6 The Amortized Spread

We next investigate the amortized spread. Most empirical studies that consider the importance of the bid-ask spread in asset pricing ignore the impact of amortizing the cost of the spread over investors' holding periods. Chalmers and Kadlec (1998), find that the amortized spread is quite small in a study of AMEX and NYSE stocks over the period 1983-1992. To my knowledge there are no studies to date that have looked at the importance of the amortized spread for IPOs. The amortized spread at the end of day T is summed over all daily trades and is defined as:

$$AS_T = \frac{\sum_{t=1}^{T} |P_t - M_t| * V_t}{P_T * SO} \qquad (2.2)$$

Where $| P_t - M_t |$ is the absolute value of the effective spread (i.e. the absolute value of the transaction price less the prevailing mid-spread), V_t is the volume of shares associated with each trade and $P_T * SO$ represents the firm's market value of equity at the end of day T. We compute an approximate average annualized amortized spread by annualizing the amortized spread of each IPO at the end of each half-hour trading period over the first twenty days of trading. The results for day 1, the average of days 2-5 and the average of days 6-10 for underpriced and overpriced IPOs are shown in the two plots in Figure 2-5.

[Please place Figure 2-5 about here]

All amortized spread plots for both underpriced and overpriced IPOs follow the familiar, although somewhat distorted smile pattern for the most part with larger values occuring at the beginning of the trading day and declining to mid-day before rebounding near the close of daily trading.

Referring to underpriced IPOs, amortized spreads are consistently larger at the end of each half-hour period on day 1 compared to the average for days 2-5 which are in turn larger at the end of each half-hour period compared to the average for each half-hour period for days 6-10. On the other hand, annualized amortized spreads for overpriced IPOs tend to overlap at several points in the day when comparing day 1 to the average for days 2-5. The same overlapping occurs when comparing the average for days 2-5 to the average for days 6-10. The most notable feature of the two plots is that the annualized spread for underpriced IPOs is huge at the end of the first half-hour period on day 1 (about 43%)

compared to a much smaller value for overpriced IPOs at the same point in event time (under 9%). The large value for the annualized amortized spread shown in the underpriced IPO plot is driven primarily by the unusually large trading volume and the associated high share turnover that takes place in the first half-hour of day 1 trading . Both day 1 amortized spreads are relatively large. While the validity of a direct comparison is questionable, Chalmers and Kadlec (1998) find average monthly amortized spreads for a ten-year period of 2.81% for the largest decile stocks for ordinary equity trading on AMEX and the NYSE.

2.7 A Four-Moment Market Model of IPO Returns

Consistent with other studies of IPO returns we have found that returns are significantly positive at the start of secondary market trading and that it is unlikely that the typical investor can expect to profit unless he can consistently buy at the offer price.[11] We now turn to an investigation of whether positive IPO returns are really abnormal or if they simply reflect the compensation that investors should expect to receive based on the riskiness of their investments.

In this section we are interested in determining whether excess returns are significantly different from zero when adjusted for systematic variance, systematic skewness and systematic kurtosis over different periods of time post IPO. We proceed to modify equation (2.1) above as follows:

11 One syndicate manager estimated that issues in the neighbourhood of $100M have at least 70% of their shares subscribed to by institutional investors. The split declines to approximately 50/50 as the issues size drops below $10M.

$$R_{it} = \alpha_{i0} + \beta_i R_{mt} + \gamma_i R_{mt}^2 + \delta_i R_{mt}^3 + \alpha_{i1} D_{i1} + \alpha_{i2} D_{i2} + \alpha_{i3} D_{i3} + \varepsilon_{it} \tag{2.3}$$

where all returns are expressed in excess of the risk-free rate,[12] and

R_{it} is the return for issue i on day t,

R_{mt} is the value-weighted return for the TSE 300 index on day t,

α_{ik} is the Jensen performance index and corresponds to the intercept term for issue i on days 1, 2-10, 11-20 and 21-60 for $k = 0, 1, 2, 3$

β_i is the systematic risk of asset i and equals $Cov(R_i, R_m)/Var(R_m)$,

γ_i is the systematic skewness of asset i and equals $Cov(R_i, R_m^2)/E[(R_m - E(R_m))^3]$,

δ_i is the systematic kurtosis of asset i and equals $Cov(R_i, R_m^3)/E[(R_m - E(R_m))^4]$,

D_{i1} is a dummy variable for issue i with ones on days 2-10 and zeros otherwise,

D_{i2} is a dummy variable for issue i with ones on days 11-20 and zeros otherwise,

D_{i3} is a dummy variable for issue i with ones on days 21-60 and zeros otherwise,

ε_{it} is the error term of the relationship on day t for issue i, which is assumed to be distributed normally with mean equal to zero, constant variance, and zero correlation between error terms both across and over time.

Equation (2.3) is the full model and appears as model 5 in Table 2-3. Each model is estimated cross-sectionally using an OLS procedure over sixty days of post IPO trading for

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12 The risk-free rate is proxied by the call loan rate which is the rate that brokers charge their clients.

the 203 TSE IPOs and the coefficients are tested using a parametric *t*-test and nonparametric sign and Wilcoxon tests.[13] Models 1, 2, 3 and 4 have the following respective specifications:

Model 1 $$R_{it} = \alpha_{i0} + \alpha_{i1}D_{i1} + \alpha_{i2}D_{i2} + \alpha_{i3}D_{i3} + \varepsilon_{it} \quad (2.4)$$

Model 2 $$R_{it} = \alpha_{i0} + \beta_i R_{mt} + \alpha_{i1}D_{i1} + \alpha_{i2}D_{i2} + \alpha_{i3}D_{i3} + \varepsilon_{it} \quad (2.5)$$

Model 3 $$R_{it} = \alpha_{i0} + \beta_i R_{mt} + \gamma_i R_{mt}^2 + \alpha_{i1}D_{i1} + \alpha_{i2}D_{i2} + \alpha_{i3}D_{i3} + \varepsilon_{it} \quad (2.6)$$

Model 4 $$R_{it} = \alpha_{i0} + \beta_i R_{mt} + \delta_i R_{mt}^3 + \alpha_{i1}D_{i1} + \alpha_{i2}D_{i2} + \alpha_{i3}D_{i3} + \varepsilon_{it} \quad (2.7)$$

Model 1 simply regresses excess returns on the intercept and dummy variables and allows for a comparison of unadjusted excess mean returns to excess mean returns that are adjusted for the risk associated with systematic variance, systematic skewness and systematic kurtosis. The null hypothesis ($\alpha_{i0} = 0$) implies the absence of significant excess mean returns on the first day of secondary market trading while $\alpha_{i0} > 0$ is indicative of positive abnormal returns. Similarly the null hypotheses ($\alpha_{i1} = 0$), ($\alpha_{i2} = 0$) and ($\alpha_{i3} = 0$) imply the absence of significant excess mean returns on days 2-10, days 11-20 and days 21-60 respectively. The signs of β_i and δ_i are expected to be positive as investors who face higher variance and kurtosis risk need to be compensated in the form of higher expected returns. Previous studies[14] have suggested that investors prefer positive skewness. If this is the case then the sign of γ_i should be opposite to that of the skewness of the market return since if investors experience positive market return skewness they need not be induced to invest through the promise of higher expected returns (and vice-versa).

13 Regressions are run for each firm over the sixty days of event time. The resulting vectors of coefficient estimates are tested cross-sectionally. These coefficients estimated in event time are essentially independent cross-sectionally since few SEO issue dates are clustered on particular calendar days over the ten year period.

14 Kraus and Litzenberger (1976) for example.

[Please place Table 2-3 about here]

Model 1 indicates that there is a mean positive excess return on day 1 of 2.98%. This is significantly different from zero according to the parametric test but is insignificant according to the two nonparametric tests. Excess returns over days 2-10, days 11-20 and days 21-60 are -3.06%, -2.96% and -2.84% and are significant according to the parametric test. Model 2 demonstrates that the excess return on the market has explanatory power as β_i is consistently significant at $p < .01$. The day 1 adjusted excess mean return is marginally smaller (2.96%) and is still significant according to the t-test at $p < .01$. Model 3 shows that skewness risk is priced (with mean coefficient = -37.2858 and $p < .01$) and the day 1 adjusted excess mean return (3.099%) is strongly significant according to the parametric test ($p = .0033$) and weakly significant according to the Wilcoxon rank sum test ($p = .0563$). Both Models 4 and 5 suggest that kurtosis risk in not priced in the presence of variance (i.e. systematic) risk and in the presence of both variance and skewness risk. Variance and skewness remain important and only the parametric test rejects the first day null of no significant adjusted excess mean returns.

The negative coefficient on the skewness component in Model 3 raises the question of whether or not investors exhibit rational behaviour when they invest in IPOs. In this case, rational investing would mean that the skewness of the market should on average be positive during the sixty day period (post IPO) of this study. Under the assumption of independent observations, the usual test of skewness admits that given a daily return per issue (r_i), mean issue return ($\bar{r}$) and sample size (n), the statistic $g \sim N\,(0, 6/n)$ where:

$$g = \frac{\sqrt{n}\sum_{i=1}^{n}(r_i - \bar{r})^3}{\left[\sum_{i=1}^{n}(r_i - \bar{r})^2\right]^{\frac{3}{2}}} \tag{2.8}$$

If observations are not independent, Lomnicki (1961) suggests an alternative asymptotic test where the variance of g is modified to account for autocorrelation. Table 2-4 gives data on market skewness over various time intervals and test statistic distributions under the alternative assumptions of the independence and autocorrelation of market return observations.

[Please place Table 2-4 about here]

As Table 2-4, Panel A shows, both the mean and median market skewness appear to be negative over the sixty day test period as well as over each of the three sub-intervals. Under the assumption of independent observations shown in Panel B, the distribution of test statistics over the full sample period indicate that the market is significantly negatively skewed in 106 (52.22%) of the 203 cases being considered. This would suggest that investors are acting inconsistently if we accept the premise that investors prefer positive skewness. On the other hand, under the assumption of autocorrelated observations shown in Panel C, the distribution of test statistics over the full sample period imply that the market is significantly negatively skewed in only 53 (26.11%) of the 203 cases. Over shorter periods of time there are very few cases of significant negative skewness (4.43% for both days 1-10 and days 11-20). While this is partially due to the smaller number of sample days which tends to depress the test statistic, it makes it difficult nevertheless to conclude that investors are acting inconsistently.

2.8 Concluding Remarks

Splitting a sample of 221 TSE IPOs into underpriced, correctly priced and overpriced issues allows us to highlight several important findings. First, we cannot associate a small firm effect to the underpricing of Canadian IPOs. Second, the initial volume of shares traded for underpriced (overpriced) issues is disproportionately high (low) indicating that informed investors play active (inactive) roles in early IPO trading. This conclusion is also supported by the behaviour in the number of trades. Third, liquidity is lower for overpriced compared to underpriced issues, and that the decay in liquidity over time is not smooth for overpriced issues. Fourth, the typical investor will probably not profit from an IPO investment since the median return for all issues is zero at the open and remains very close to zero for the full 20 day trading period. Fifth, investors who do not have superior information will see their returns maximized by trading at the opening trade on average. Sixth, underpriced issues do increasingly well in the short-run, while overpriced issues deteriorate steadily in the short-run. Seventh, IPO amortized spreads are very large at the beginning of secondary market trading with spread size being driven by unusually large share turnover. Finally, it appears that the shape of the distribution of returns is important in explaining IPO returns as skewness risk but not kurtosis risk is priced when variance risk is present and further it seems that IPO investors may be acting inconsistently when it comes to their preferences versus their actions in the market with the evidence here being somewhat inconclusive.

Chapter 3

Stabilization and the Role of the Overallotment Option in Canadian IPOs

3.1 Introduction

A standard clause that appears in the prospectus of many new equity offerings in Canada reads:

> "In connection with this offering, the Underwriters may over-allot or effect transactions which stabilize or maintain the market price of the Common Shares at levels above those which might otherwise prevail in the open market. Such transactions, if commenced, may be discontinued at any time."

The overallotment option (OAO) gives an underwriter the right but not the obligation to buy an additional predetermined percentage (≤ 15%) of the shares available in an offering of common stock for a specific period of time ranging from a few days up to sixty days from the start of secondary market trading. The price the underwriter pays for these additional shares is the same as the price paid for the other shares in the issue. Namely, the offer price less a discount that represents the underwriter's negotiated fee (spread).

A natural question is whether or not the OAO is employed primarily as a tool to stabilize the price of a new issue or if it enables underwriters, at no additional cost, to better manage risk and to possibly earn compensation in excess of their regular fee. With respect to risk management, Carter and Dark (1990) note two potential benefits of the OAO. First, new issues are typically oversold in expectation of some degree of reneging by investors who initially expressed interest. If reneging is below expectations, underwriters may be forced to cover their short position through secondary market purchases. This can be expensive especially if there has been significant underpricing of the issue. The OAO allows underwriters to oversell and cover their short position by exercising the option.

A second benefit for underwriters lies in the development of better client relations. For especially attractive issues, investor interest will be high and the underwriter may only be able to allocate a reduced number of shares to each client. The OAO eases this shortage problem and serves to enhance underwriter reputation.

As is the case with ordinary options, the OAO cannot have negative value. Since there are potential benefits, is the cost of the OAO reflected in the form of reduced fees charged to the issuing firm? Both Carter and Dark (1990) for initial public offerings (IPOs) and Hansen, Fuller and Janjigian (1987) for secondary offerings find that the OAO is not significantly related to underwriter spreads. Discussions with underwriters have highlighted the fact that issuing firms in Canada are often reluctant to grant OAOs compared to their U.S. counterparts.[1] Two reasons are offered to account for their hesitance. One concern of issuing firms rests on the prospect of greater dilution of share value that will result from additional shares being issued. The second concern centres on the suspicion that the OAO is merely another vehicle to help inflate underwriters' bank accounts at the firm's expense. One goal of this research is to examine this second belief.

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1 For example, the Carter and Dark (1990) sample contained 439 issues of which 403 (92%) contained OAOs. This is in sharp contrast to the sample in this study which examines 180 issues of which only 56 (31%) contain OAOs.

A number of studies have suggested that the primary anomaly associated with the market for new equity issues, namely short-term underpricing,[2] can be explained by the aftermarket activities of underwriters. While it has been traditionally assumed that prices evolve according to the unobstructed forces of supply and demand, underwriters with reputation capital at stake cannot be expected to remain idle when a new issue is performing poorly at the start of secondary market trading. Thus, recent research argues that IPOs are not deliberately underpriced,[3] but rather the stabilization of prices for what would otherwise be poorly performing new issues makes it appear that initial cross-sectional mean returns are significantly positive.

Ruud (1993) suggests that if underwriters stand ready to buy back shares of non-underpriced issues at the offer price, the distribution of initial returns should be positively skewed and excessively peaked around zero. Hanley, Kumar and Seguin (1993) contend that since the cost of supplying immediacy may be affected by stabilization, market makers will systematically adjust the width of the bid-ask spread depending on whether or not prices are

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2 Depending on the study, underpricing is either computed as the cross-sectional mean return from the offer price to the closing price on the first day of secondary market trading or from the offer price to the price of the first secondary market trade. A number of previous studies have documented the short-term underpricing of IPOs. An incomplete list includes Ibbotson (1975), Miller and Reilly (1987), Ibbotson, Sindelar and Ritter (1988) and Barry and Jennings (1993). Several Canadian studies including Jog and Riding (1987), Cheung and Krinsky (1994), Jog and Srivastava (1996) and Kryzanowski and Rakita (1996) also confirm the short-term nature of underpricing for Canadian IPOs.

3 A number of alternative ideas have been advanced in an effort to explain IPO underpricing. Baron (1982) hypothesizes that asymmetric information between issuing firms and underwriters drives underpricing. Beatty and Ritter (1986) suggest that ex ante uncertainty about true IPO value leads to underpricing. Rock (1986) attributes underpricing to the *winner's curse* (a consequence of the existence of informed and uninformed investors in the new issue market). Tinic (1988) maintains that underpricing is a result of underwriters' attempts to avoid legal liability. Finally, Welch (1989) contends that underpricing is due to the actions of high quality firms (mimicked by low quality firms) who expect to recapture losses with subsequent seasoned offerings.

being stabilized. By accounting for factors that are known to affect the spread, a methodology for detecting stabilization is outlined and subsequently tested. Schultz and Zaman (1994) uncover evidence favouring the hypothesis of underwriter support achieved by permanently reducing the supply of shares. This is accomplished by overselling the issue and then covering the short position by either exercising an overallotment option or by buying back shares in the secondary market. Chowdhry and Nanda (1996) develop a model in which underpricing is generated via both the deliberate relative reduction of the offer price and by stabilization through aftermarket purchasing by underwriters at the offer price. Finally, Benveniste, Busaba and Wilhelm (1996) provide a rationale for stabilization and the use of penalty bid provisions in which members of the distribution team discourage flipping of poorly-received issues. Primary market efficiency is promoted via the complementary activities of price stabilization and penalty bids.

Another focus of this study is to investigate a sample of Canadian IPOs that listed on the Toronto Stock Exchange (TSE) over the period 1984-1993 to determine the extent of and mechanism(s) by which prices are supported by underwriters near the start of secondary market trading. This study focuses not only on the full sample of new equity issues, but also on characteristics of return distributions for underpriced and non-underpriced issues as well as the impact of both stabilization on the bid-ask spread and of the overallotment option on returns.

This research is of particular interest to institutional investors who are important participants in the market for new issues, private investors who continue to play a prominent role in IPO subscriptions, market regulators who are charged with the responsibility of supervising the new issue process and finally to underwriters who must ultimately be held accountable by the issuing firm for the success or failure of an IPO.

The remainder of this paper is organized as follows. In the next section the data set is described. In section 3 we report on evidence of price support reflected in the distribution of initial IPO returns. Section 4 is concerned with an analysis of IPO bid-ask spreads and evidence of stabilization contained therein. Section 5 considers evidence of stabilization contained in the overallotment option and its impact on underwriter fees. Concluding remarks are offered in section 6.

3.2 Data Description

Initial public offerings are identified using the TSE Annual New Listings Report. Between 1984-1993, 463 IPOs are identified. In order to maintain sample homogeneity, only common share issues are considered. When unit offerings, warrants, preferreds and other hybrids are filtered out, 262 issues remain. In order to minimize classification problems, 22 issues with offer prices below $2 are deleted. Next, issues that did not trade at least once per day on average over the first twenty days of trading are excluded. This screen leaves a total of 233 issues. Finally, 12 of the remaining issues were for companies in the mining or oil and gas industry and 5 issues had information missing. These were also dropped from the sample. Thus, the final sample contains 216 issues from industrial companies. Table 3-1 gives a year by year account of the number of IPOs included in the sample.

[Please place Table 3-1 about here]

The *Equity History* database compiled by the TSE is then used to obtain the required data. This database contains the time stamp, bid, ask and transaction prices, broker clearing numbers, and share trading volumes for every trade and quote on the TSE.

Initially, for each issue, returns are calculated from the offer price to the opening price and this measure is then used to classify issues in the sample as underpriced or non-underpriced (composed of correctly priced and overpriced issues). Thus, the 216 IPOs (full sample) are composed of 106 underpriced issues (49.1% of sample), and 110 non-underpriced issues (50.9% of sample).

3.3 The Distribution of Short-Term IPO Returns

3.3.1 The Shape of the Distribution

If the price of an IPO is being supported, the distribution of returns should be positively skewed (since the negative tail of the distribution is being suppressed), and the severity of this skewness should decrease over time as the effects of stabilization diminish. In addition, there should be excess peaking of the distribution around zero (as otherwise negative returns are pushed up and become positive). The degree of leptokurtosis of the distribution should also decay over time.

Kendall and Stuart (1969) define the measure $\beta_1 = \mu_3^2/\mu_2^3$ which is the ratio of the square of the third moment about the mean to the cube of the second moment about the mean. They proceed to develop the measure of skewness as $\gamma_1 = \sqrt{\beta_1}$. When γ_1 is equal to zero, the distribution is symmetric and when γ_1 is greater (less) than zero the distribution is positively (negatively) skewed. Kendall and Stuart also develop the measure of kurtosis which is given by $\beta_2 = \mu_4/\mu_2^2$. This is simply the fourth moment about the mean divided by the square of the second moment about the mean. For purposes of hypothesis testing, the kurtosis of a distribution is generally compared to that of the normal distribution for which $\beta_2 = 3$.

Table 3-2 clearly shows that the measure of skewness (γ_1) at each point in time is positive, consistently different from zero, reaches a peak sometime during the first day of secondary market trading and tends to decrease steadily thereafter. Moreover, the measure of kurtosis (β_2) indicates that the distribution is considerably more peaked than the normal distribution at each point in time and also tends to decrease over time.

[Please place Table 3-2 about here]

Another interesting feature of the time series of return distributions is the migration of the minimum return.[4] The 0.5 percentile of the distribution declines from a maximum of -0.232 at the end of the first day to -0.433 at the end of week four. On the other hand the 0.995 percentile of the distribution cycles up and down over the same period of time. These data suggest that the minimum return is free to drop when stabilization is removed while the lack of price intervention on the upside allows the maximum return to bounce around in a random fashion.

A visual testimony to the presence of positive skewness and excess kurtosis is given

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[4] We compute 0.5 and 0.995 percentiles of the return distributions as alternatives to the minimum and maximum values in an attempt to mitigate the possible influence of outliers. Since the sample contains 216 observations at each point in time, only the smallest and largest values are effectively omitted.

in Figure 3-1. There is clear evidence of distribution asymmetry and extreme peakedness at day one along with the tendency for these measures to decrease with time. In particular, the ratio of the frequency of returns in the 0-5% range at week four compared to that of day one is exactly one-half (29 occurrences at the end of week four compared to 58 occurrences at the end of day one).

[Please place Figure 3-1 about here]

3.3.2 Tobit Analysis

Ruud (1993) tests the underwriter price support hypothesis and concludes that a partially unobserved negative tail drives underpricing. Since stabilization effectively left censors the distribution of returns (prices) at zero (the offer price), a tobit regression should yield an estimate of the true mean return (adjusted for stabilization).[5] The model is defined as:

$r_t^* = \mu + \varepsilon_t$ where $\varepsilon_t \sim N(0, \sigma^2)$, r_t^* is the true return vector at time *t*, and μ is the true mean return.

$r_t = \begin{cases} r_t^* \; if \, r_t^* > 0 \\ 0 \;\; if \, r_t^* \leq 0 \end{cases}$ where r_t is the vector of observed returns at time *t*.

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5 There is a subtle difference between censoring and truncation. When a distribution is truncated from the left (right), sample points below (above) some threshold are ignored. On the other hand, when a distribution is censored from the left (right), sample points below (above) some threshold are assumed to occur at the threshold. In this sample, returns that might otherwise be negative are assumed to be zero (i.e. left censored at zero).

Maximum likelihood estimation is used to estimate the true mean return μ at each point in time and a likelihood ratio test is employed for the purposes of hypothesis testing.

From Table 3-2, the sample mean return for TSE IPOs is significantly different from zero at the 1% level at each point in time. However, the estimate of the true mean return determined by tobit regressions is found to vary from a low of -2.2% at the end of day one and week one to a high of 0.006% at the end of week four. In each case, the tobit mean is not significantly different from zero at the 1% level. Qualitatively similar remarks can be offered with respect to the sample median. In order to compare the ordinary mean and the tobit mean, 90% confidence intervals around the two means are computed at each point in time. The confidence intervals do not overlap until week 2. This suggests that the two means are initially different from each other.[6] Moreover, the tobit mean and the median tend to approach each other over time. This is another indication that the distribution of returns is becoming symmetrical as stabilization forces are withdrawn. As further evidence, a 90% confidence interval for the tobit mean overlaps a 91% confidence interval for the median at each point in time. Thus we cannot reject the hypothesis that the tobit mean and the median are equal - an indication that were it not for stabilization the distribution of returns would be symmetrical (since the mean and median may coincide).

3.4 IPO Stabilization and the Bid-Ask Spread

Hanley, Kumar and Seguin (1993) suggest that market makers react to stabilization by adjusting their bid-ask spreads. If underwriters stand ready to support the price by buying

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[6] 95% confidence intervals for the two means also do not overlap until week 2 post IPO.

shares at the offer, the maximum loss that a market maker will incur on his inventory of shares held should decline. The market maker can then afford to narrow the spread as the price declines since the cost of supplying immediacy is reduced. Consequently, the ratio of the bid price to the offer price can be taken as a proxy for stabilization. By including other factors that are known to affect the size of the spread (share volume, price and volatility), a regression of the relative spread on these factors and the stabilization proxy should yield a significant and positive coefficient for the proxy if market makers are indeed adjusting their quoted spreads to account for stabilization.

Alternatively, stabilization can be compared to a protective put option with exercise price equal to the floor value (offer price) of the stock. In this case, the Black-Scholes value of a European put option can be written as:

$$p = (\text{Offer Price})\, e^{-r_f(T-t)} N(-d_2) - (\text{Closing Bid Price})\, N(-d_1)$$

where: $$d_1 = \frac{\ln(\text{Bid/Offer}) + (r_f + \frac{1}{2}\sigma^2)(T-t)}{\sigma\sqrt{T-t}} \quad \text{and} \quad d_2 = d_1 - \sigma\sqrt{T-t}$$

Following Hanley et al, $r_f = 0$ and $T-t = 1$. In an effort to minimize the impact of heteroskedasticity, volatility is calculated in the following way:

$$\text{Volatility}_{jt} = \begin{cases} \sigma_{1:11} & \text{if } t \leq 6 \\ \sigma_{t-5:t-5} & \text{if } t > 6 \end{cases}$$

In other words, the volatility for security *j* on day *t* is constant for the first six days and is just the standard deviation of returns over the first eleven days of secondary market trading.

Thereafter, the volatility is calculated on a rolling basis. For example, the volatility for day seven is the standard deviation of returns calculated over days two to twelve inclusive.

As the price of the stock declines, the value of the put option increases. Therefore a regression of the relative spread on the factors that affect the spread and the put option proxy should produce a significant and negative coefficient for this proxy if market makers systematically adjust their spreads.

Table 3-3 gives summary statistics for the two proxies aggregated across all stocks over the forty day period. The *Bid/Offer* proxy is on average equal to 1.036, an indication of the positive mean return that is earned initially. The typical value is 1.000 which reflects the high frequency with which the bid price is equal to the IPO offer price. The put option proxy is quite volatile, exhibits considerable skewness and kurtosis and is typically close to zero in value. It is clear that the two stabilization proxies are not independent. In fact the *Bid/Offer* proxy is contained in the values d_1 and d_2 which are used to compute the value of the put option proxy. A simple linear regression of the *Bid/Offer* proxy on the put option proxy produces an adjusted R^2 of 0.70.

[Please place Table 3-3 about here]

Two series of daily cross-sectional regressions of the natural logarithm of the relative spread on the three spread factors and the two stabilization proxies were run from day one through day forty post IPO. Table 3-4 contains a summary of the output when the bid to offer proxy was used and Table 3-5 contains a similar summary of the output when the put option proxy was used.[7] The model employed here differs somewhat from that of Hanley, Kumar and Seguin (1993) in that their sample considered NASDAQ stocks with multiple dealers and therefore included a regressor for the number of dealers. Since TSE stocks have only one market maker, it is not necessary to control for this variable. In addition, the series of regressions that include the put option proxy is modified to be: 1+ put option value. This step was necessary since approximately 44% of the put option values were zero and this would produce an undefined logarithm.[8]

[Please place Tables 3-4 and 3-5 about here]

Both sets of regressions explain the relative spread very well (adjusted R^2 as high as 0.519 for regression set one and 0.530 for regression set two). However, while the coefficients for volume, price and volatility are significant at conventional levels on nearly every day, the coefficients for the two stabilization proxies are rarely significant. The coefficient for the *Bid/Offer* proxy is not significant until day six and is only significant on two of the forty days. Although the coefficient of the put option proxy is significant on the

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7 We have also run the same model with the two alternative proxies over the first twenty days of trading against other measures of trading costs. In turn, we take as dependent variables, the relative liquidity premium (RLP) defined as, RLP =[| Transaction Price -½ (Bid + Ask) |] / [½ (Bid + Ask)]; the ln(1 + RLP), the depth weighted spread (DWS) defined as, DWS = [(Ask*Ask Depth) - (Bid*Bid Depth)] / [(Ask*Ask Depth) + (Bid*Bid Depth)]; and ln(1 + DWS). For the RLP and ln(1 + RLP), either of the two stabilization proxies are significant at $p<.10$ on as many as five days but there is no apparent pattern to the days on which they are significant (days 2, 7, 8, 13 and 15). Moreover, the model typically explains only about 3-5% of the variation in the associated dependent variable. Regressions employing the depth weighted spread and ln(1 + DWS) do more poorly. The two stabilization proxies are never significant at $p<.05$ and the adjusted R^2 is often close to zero and is occasionally negative.

8 See Appendix 1 for a theoretical explanation of the relatively high incidence of zero put option values.

first two days, it is only significant on four of the forty days.[9] Thus it appears that in contrast to the findings of Hanley, Kumar and Seguin (1993), market makers on the TSE do not adjust the size of the spread to reflect stabilizing trades by underwriters for Canadian IPOs.

3.5 The Overallotment Option

3.5.1 The OAO and Stabilization

From the original sample of 216 IPOs, a subsample of 180 issues were taken based on the availability of a final prospectus. The majority of issues do not contain an OAO (124 versus 56). When an OAO is present, the mean (median) ratio of overallotment shares as a percentage of the number of shares issued is 10.5% (10.0%). The distribution of OAO percentages is bimodal with the most frequently occuring values being 10% (20 instances or 36% of OAO issues) and 15% (14 instances or 25% of OAO issues). Table 3-6 gives a frequency distribution of ranges of OAO percentages.

[Please place Table 3-6 about here]

The sample of issues that contain an OAO is not that dissimilar from the sample for

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9 There is a possibility that this test of stabilization activity is not powerful enough to detect stabilization if it is present. Hence we have run two additional sets of paired regressions as a robustness check. In the first case, we only include non-underpriced issues in the sample. In the second case, we consider the possibility that since stabilization is a capital intensive exercise, it may be that smaller underwriters do not have the financial resources to support the price. Therefore we only consider non-underpriced issues whose lead or co-lead underwriter is one of the four largest underwriters in Canada over the sample period. In both cases the number of significant coefficients was virtually identical to those reported for the full sample. Tables with this additional evidence have been suppressed to save space.

which an OAO has not been granted. Based on one-sided t-tests shown in Table 3-7, there is no significant difference between mean offer price, opening price, shares issued, offer size, underpricing at the open and day one share volume. However the mean underwriter spread for the OAO sample is significantly larger than that of the sample that does not contain an OAO. Since the OAO has value, one would expect to find lower fees when one is granted. This is somewhat unusual but could be explained by other factors that may affect fees such as issue size, underwriter reputation and issue riskiness. We will examine the impact of the OAO on fees while controlling for these other variables in the next section.

[Please place Table 3-7 about here]

If an OAO is indeed a mechanism used by underwriters to stabilize prices, one would expect that the difference between ordinary and adjusted (Tobit) mean returns should be larger for the OAO sample than for the sample that does not contain an OAO during the period when the OAO is alive. Table 3-8 contains ordinary and adjusted mean returns at different points in time for the OAO and No-OAO sample. For both samples, the ordinary mean returns are generally significantly different from zero at each point in time while the adjusted mean returns are never significantly different from zero. And although the difference between the ordinary and adjusted means is larger for the OAO sample at days five, ten, fifteen and twenty, the difference in the differences is not significant at any point in time. Thus it does not seem that the presence of the OAO has had a measurable impact on mean returns over the life of the option.

[Please place Table 3-8 about here]

3.5.2 The OAO and Underwriter Fees

At the very least the OAO will expire worthless. Hansen, Fuller and Janjigian (1987) estimate that the OAO is worth about one percent of the gross proceeds of the full issue while Hansen (1986) suggests that the value of the OAO may represent in excess of 9% of the proceeds collected when the option is exercised.[10] Since the expected value of the OAO is certainly positive, the granting of the OAO should logically reduce underwriter fees. We next formally test the hypothesis that the OAO is negatively related to the fees charged by underwriters.

We include several explanatory variables to control for effects not directly related to the presence of the OAO. The full model can be written as:

$$\textit{Underwriter Fee (Spread)} = \beta_0 + \beta_1\, lnoffer + \beta_2\, demand + \beta_3\, oaoprcnt + \beta_4\, rank + \beta_5\, synd + \beta_6\, retstdev + \varepsilon \quad (3.1)$$

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10 In fact there are several erroneous assumptions that call into question the reliability of the estimates, achieved through Black-Scholes option pricing, given in these studies. First, an assumption is made that the strike price of the OAO is the offer price. In reality, the underwriter pays the offer price less the fee discount. Second, the OAO is likened to an American call option. It is well-known [Merton (1973)] that American calls on assets with no intermediate payouts are equivalent in value to European calls. This would suggest that OAOs should never be rationally exercised before maturity (In fairness, Merton's argument is predicated on there being a market in which options could be traded, which is not the case for OAOs). Third, and most important is the implicit assumption that issues are undersold prior to the start of secondary market trading. The majority of new issues are in fact oversold. One syndicate manager estimates the probability of being oversold at 80%. The same syndicate manager estimated that conditional on a new issue being oversold, the range of overselling is 10-400%! If an issue is oversold by at least the size of the OAO, the value of an OAO at the start of secondary market trading is certain since the additional shares are sold at the offer price. The underwriter exercises the option, covers his short position and effectively earns his spread on the OAO shares. It is therefore likely that Black-Scholes option pricing is inappropriate as a means of estimating OAO value in the majority of cases.

The first control variable is *lnoffer* and represents the natural log of gross issue value. The larger the issue size the smaller the fee and therefore the sign of β_1 should be negative. The second control variable is *demand* and includes the number of issues in a given month.[11] Carter and Dark (1990) posit that this variable should be negative if underwriters reduce their spread in an effort to induce firms to issue during a window of opportunity. On the other hand, our feeling is that hot markets are likely to influence a firm's decision to go public and that management would be willing to pay the underwriter their fee and then some in order to take advantage of an opportunity to issue shares when they may be overvalued. The coefficient β_2 should therefore be positive.

The variable *oaoprcnt* is the number of OAO shares as a percentage of the number of shares in the issue.[12] As suggested earlier, since the OAO has a value greater than or equal to zero, it should have a negative effect on fees. The coefficient β_3 should therefore be negative.

The certification role of the underwriter in IPO issuance has been documented in a number of studies. Beatty and Ritter (1986) find that increased underwriter reputation is associated with fairly priced issues. Carter and Manaster (1990) conclude that prestigious underwriters prefer lower risk offerings. Similarly, Wolfe, Cooperman and Ferris (1994) determine that prominent underwriters avoid smaller, riskier issues. We include the variable *rank* to reflect underwriter reputation. Starting in 1984 and using a method similar to

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11 Using the dollar value of the issues in a given month makes no qualitative difference.

12 We considered two other variations for this regressor. The first was to use a binary variable which took the value of one if an OAO was granted and was zero otherwise. The second assigned ordinal values to different OAO levels as in Table 6. Neither alternative made any material difference.

Megginson and Weiss (1991), we rank underwriters in decreasing order according to the total IPO financing dollars they were involved in as lead or co-lead underwriters over a five year period. We then roll forward one year, re-rank and continue until 1993. Underwriters who were either the lead or co-lead for an issue in 1984 were then assigned a ranking based on the 1984-1988 list of ranks. Lead or co-lead underwriters for issues in 1985 and 1986 were ranked according to the 1985-1989 list of ranks. In turn, underwriters for 1987 and 1988 issues were assigned ranks from the 1986-1990 list, 1989 and 1990 issues were assigned ranks from the 1987-1991 list, 1991 and 1992 issues were assigned ranks from the 1988-1992 list and finally, 1993 issues were assigned ranks from the 1989-1993 list. To some extent, this procedure accounts for the time-varying nature of underwriter reputation.[13] The assignment of ranks according to particular five year windows is somewhat arbitrary but according to Table 3-9, ranks for adjacent five year periods have high rank correlations which tend to mitigate any inherent assignment bias. Due to the value of certification and the fact that underwriter reputation will be negatively associated with issue risk, we expect the coefficient β_4 to be positive.[14]

[Please place Table 3-9 about here]

The fifth control variable, *synd* represents the size of the underwriting syndicate. One important function performed by members of the underwriting syndicate is share

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13 It was impossible to go year by year due to the small number of issues in several years.

14 Note that a rank of one corresponds to the highest reputation level.

distribution. If distribution efforts are facilitated with larger syndicates then higher fees may be justified. The coefficient β_5 should therefore be positive.

Finally, we include the variable ***retstdev*** to proxy for one type of issue risk. This is determined as the standard deviation of daily returns over the first sixty days of trading. Underwriters will need to be compensated for bearing the risk associated with issue success and we therefore expect β_6 to be positive.

A series of regressions were run with the results appearing in Table 3-10. In addition to the control variables listed above, we include two interaction variables that represent in turn the interaction between the overallotment option percentage and standard deviation of returns (*oao*std*), and underwriter reputation and standard deviation of returns (*rank*std*).

Regression one is exactly as equation (3.1). Coefficients for issue size, underwriter reputation and standard deviation of returns have the predicted sign and are all significant at $p < .05$. While the coefficients for new issue activity and syndicate size are of the predicted sign, they are not statistically different from zero at conventional levels. Unlike Carter and Dark (1990) and Hansen, Fuller and Janjigian (1987), we find that the coefficient for the overallotment option percentage is positive and significant at $p < .05$. This suggests that the cost of the OAO is not reflected in lower fees but rather that the option actually contributes to higher underwriter revenue. Due to the reduced incidence of OAOs in this sample, these results provide a cleaner test of OAO impact on fees than is available from U.S. studies where OAOs are almost universal.

[Please place Table 3-10 about here]

An examination of Table 3-10 suggests that *lnoffer* and *oaoprcnt* are always significant whether or not interaction terms are included. The reputation variable *rank* is significant in the absence of the *rank*std* interaction term as is the *retstdev* variable. In terms of explaining the variation in underwriter fees, Regression 2 performs best and also represents a parsimonious relationship between fees and its determinants. The positive coefficient on the interaction term *rank*std* suggests that higher rank (lower underwriter reputation) - one type of issue risk, coupled with higher standard deviation of returns - a second type of issue risk, are together associated with higher underwriter fees. Thus we can write:

$$\textit{Underwriter Fee} = 14.938 - 0.542\ \textit{lnoffer} + 0.032\ \textit{oaoprcnt} + 0.009\ \textit{rank*std} \quad (3.2)$$

3.6 Concluding Remarks

We have demonstrated that stabilizing activities by underwriters appear to have an effect on the distribution of returns for TSE IPOs. Return distributions tend to be positively skewed and leptokurtic and the degree of skewness and leptokurtosis tends to decrease over time as stabilizing forces diminish. Further, while ordinary mean returns are significantly different from zero out to week four post IPO, tobit means which account for the censoring of the distribution are not significantly different from zero. Moreover, 90% confidence intervals for the mean and the tobit mean do not overlap until the end of the second week post IPO indicating that the two means are indeed initially different from each other.

Consistent with the reduced effects of stabilization over time, the 0.5 percentiles of the return distributions decrease out to week four. On the other hand, stabilization does not appear to affect the size of the bid-ask spread. A series of regressions using two stabilization proxies are rarely significant over the first forty days of secondary market trading.

While we have uncovered some evidence of stabilization in the market for new equity issues in Canada, it is by no means clear that the overallotment option is the mechanism by which stabilization is effected. Schultz and Zaman (1994) suggest that underwriters typically oversell IPOs. This short position is then covered by exercising an overallotment (Green Shoe) option if the issue is hot or by buying shares at lower prices in the secondary market if the issue is cold. Smith (1986) remarks that the OAO is only valuable to the underwriter if an IPO is underpriced since the underwriter earns incremental commissions if the option is exercised.[15] While discussions with several Canadian underwriters point to the OAO as the primary mechanism by which prices for IPOs are stabilized in Canada, we find no significant difference between differences in ordinary and adjusted mean returns for the OAO sample compared to the No-OAO sample.

On the other hand, we do find evidence that the OAO has a positive impact on fees charged by underwriters when we control for factors such as issue size, underwriter reputation and issue risk. This suggests that the OAO is a means for underwriters to earn additional compensation and that firms that are reluctant to grant OAOs may well be justified.

Our findings are consistent with recent research conducted on U.S. IPO samples. Aggarwal (2000) challenges the belief that underwriters provide price support by posting a

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15 This argument again ignores the question of whether or not an issue is oversold and fails to consider the additional revenue that underwriters can earn as long as they can buy at a discount and sell the additional shares at some higher price (not necessarily in excess of the offer price).

"stabilizing bid" in the aftermarket. She finds that underwriters stimulate demand in the aftermarket by covering syndicate short positions and by restricting supply by penalizing "flippers." Ellis, Michaely and O'Hara (2000) uncover evidence that the lead underwriter engages in stabilization activity for poorly performing IPOs and uses the overallotment option to reduce inventory risk.

We have not as yet conducted direct tests of stabilization which require an analysis of buying patterns of underwriters at the start of secondary market trading. We leave this topic for future research.

Chapter 4

Is the U.S. Seven Percent Solution Equivalent to the Canadian Six Percent Solution?

4.1 Introduction

In a forthcoming article, Chen and Ritter (2000) suggest that gross spreads (fees) received by U.S. underwriters for common equity initial public offerings (IPOs) are considerably higher than those received by underwriters in other countries. They claim that fees charged to underwrite new issues of common equity in Japan, Hong Kong and Europe are about half the level of U.S. fees. In addition, the authors cite Lee, Lochhead, Ritter and Zhao (1996), who report that U.S. fees for bonds, convertible bonds and seasoned equity offerings do not show significant clustering at one particular fee level, whereas the proportion of medium sized common equity U.S. IPOs ($20-80 million) charged a fee of exactly 7% has approximately tripled over the last ten years.

Hot on the heels of a recent $1 billion (U.S.) settlement for price-fixing by market makers on the NASDAQ,[1] the above revelations have prompted another class action lawsuit undertaken by a retired Florida real estate businessman who names 27 of the top U.S.

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[1] See Christie and Schultz (1994).

brokerages. The suit claims that investment firms have colluded for years on the prices they charge to underwrite IPOs. If the suit is successful, damages awarded may run into the billions of dollars.[2]

This study examines a sample of 330 common equity IPOs that listed on the Toronto Stock Exchange (TSE) in the period 1984-1997. The aim here is to analyze various aspects of fees charged by Canadian underwriters and to compare and contrast the findings with those of the U.S. study.

This research will be of particular interest to Canadian firms who have recently issued or are considering the issuing of common equity for the first time. It will also be of interest to Canadian brokerage firms who can compare their practices to others in the industry, and to regulators who are charged with the responsibility of maintaining fair competition among firms servicing the new issues market. Investors themselves may be interested in facts surrounding one of the significant costs that are embedded in the new shares that they subscribe to. Finally, lawyers on the other side of the aforementioned lawsuit may want to know that fees charged by Canadian underwriters are only slightly less on average than those charged by their U.S. counterparts.

The remainder of this paper is organized as follows: In Section 2, data sources are discussed. In Section 3, we present information on the distribution of common equity TSE IPO fees and consider the dependence of medium sized IPO fees on time using a simple chi square test. In Section 4 we investigate the fee structure of prominent Canadian investment

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2 See Lang (1998).

banks and examine the collusion issue. A multinomial logit model is specified and estimated in Section 5 and additional explanatory variables that proxy for firm-specific risk and bankruptcy likelihood are introduced in Section 6. Section 7 concludes this article.

4.2 The Data

The data used in this study comes from several sources. For the period 1984-93 we used the TSE Annual New Listings Report to identify TSE IPOs. To maintain sample homogeneity, unit offerings, warrants, preferreds and other hybrids were filtered out. Prospectuses for the remaining IPOs were then examined to capture information on syndicate composition and fees charged. For the period 1994-97 we used the Financial Post's Record of New Issues. This annual source lists all new issues in Canada and is split up into sections on equity, debt and preferred shares. Common equity IPOs were picked out and the resulting list was cross-checked against the TSE Review to highlight only those common equity IPOs that listed on the TSE.

The final sample consists of 330 common equity IPOs. Most of these are for Industrial companies but 27 firms out of the total are in either Oil & Gas or Mining.

4.3 The Distribution of IPO Fees

To control for inflation, IPO offer size is adjusted to 1997 prices using the Canadian annual Consumer Price Index. Overallotment options are excluded from this study and would be expected to increase revenue (but not fee percentages charged) for underwriters since they allow additional shares to be purchased from the issuing firm at the same discount as the rest of the issue.[3]

Table 4-1shows the frequency distribution and descriptive statistics for IPO fees in the sample. There is some apparent clustering of fee frequency at the three integer levels shown (5%, 6% and 7%) with particularly strong clustering at exactly 6% (28.18% of the sample).[4] The fee range containing the highest proportion of IPOs is 6%-6.99% (57.57% of the sample). The mean fee charged in the sample is 6.09%. While this fee is high relative to those charged in countries outside the U.S., it is still less than 1% below the mean fee in the U.S. study (6.82%).

[Please place Table 4-1 about here]

It is interesting to note that the distribution of Canadian fees is approximately normally distributed as the mean, median and mode virtually coincide, skewness is positive but close to zero and kurtosis is only slightly larger than 3.

Chen and Ritter (hereafter CR) show evidence that fee clustering at exactly 7% is particularly high and increasing over time for medium sized IPOs ($20-79.99 million - 57% of the sample). To facilitate a comparison with CR, we split our sample into small (under $10 million - 15% of the sample), medium ($10-50 million - 61% of the sample) and large (over $50 million - 25% of the sample) IPOs. Table 4-2 gives a frequency breakdown by fee

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3 See Chung, Kryzanowski and Rakita (1997) for a discussion of the role of the overallotment option in Canadian IPOs.

4 The second highest level of fee frequency clustering was at 6.5% (14.55% of the sample).

range, offer size and year.[5] As can be seen, the recent five year period (apart from 1995), has been relatively good in terms of number of IPOs issued. Medium sized IPOs do exhibit higher fee clustering at 6% (36% of all medium IPOs), but the proportion is considerably less than the 73% at 7% in CR. CR also note that clustering at 7% in the most recent three years (1995-1997) is a staggering 90%. Our data indicates that clustering at 6% in the three years 1995-1997 for medium sized IPOs is actually lower at 33 ⅓%. Figure 4-1 reinforces our finding that the percentage of medium sized IPOs with fees at exactiy 6% is not increasing over time and in fact shows that these fees tend to follow a cyclical pattern (charts 1 and 3 of Figure 4-1).

[Please place Figure 4-1 and Table 4-2 about here]

The first chart in Figure 4-2 shows that there are economies of scale associated with new issues with fee size declining somewhat as issue size increases for the full sample. The second chart in Figure 4-2 clearly indicates how little fees actually vary for medium sized IPOs in Canada, and may suggest an opportunity for an entrepreneurial investment banker to increase market share by competing on price while still earning a decent return for services rendered.

[Please place Figure 4-2 about here]

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5 We were forced to aggregate some of the frequency data across several year ranges due to the small number of IPOs issued in particular years. The five year interval following the 1987 market crash was a period of extremely low IPO activity in Canada.

The underpricing of IPOs is a well-documented phenomenon. If underwriters underprice to compensate uninformed investors as Rock (1986) suggests, or because they benefit from asymmetric information in terms of knowledge of true value compared to issuing firms as in Baron (1982), then underwriters may be predisposed to reduce fees for underpriced (relative to overpriced) issues since selling efforts are reduced. Tables 4-2a and 4-2b split the sample additionally into underpriced and overpriced issues. It does not appear that fees are generally lower for underpriced offerings. Indeed, the opposite may be true as 23.7% (32.5%) of underpriced (non-underpriced) IPOs have fees below 6%, while 46.8% (40.8%) of underpriced (overpriced) IPOs have fees above 6%.

[Please place Tables 4-2a and 4-2b about here]

Next we look at equally and value-weighted averages (weighted by issue size) over time. These results appear in Table 4-3. On average, fees have not changed dramatically over the fourteen years of this study, although there was a bit of a decline in the lean years following the 1987 crash, it was followed by a complete recovery for medium and large sized IPOs in particular.

[Please place Table 4-3 about here]

A chi square test of independence between fees and time for medium sized IPOs is conducted next. Observed cell frequencies and results are reported in Table 4-4. This test indicates that we cannot reject the null of independence between fees and time at the 5% level and further supports the notion that fees for medium sized IPOs are not increasing over time in contrast with the CR study.

[Please place Table 4-4 about here]

4.4 The IPO Fee Structure of Canadian Underwriters

In the United States there are literally hundreds of firms that are in the business of underwriting new security issues. The lawsuit currently underway points a finger at 27 of the largest firms and is undoubtedly motivated by the fact that these firms are sufficiently solvent to make the necessary payment(s) should the verdict go against them. In Canada, there are far fewer investment bankers and only about a dozen or so prominent ones. The majority of these prominent underwriters are affiliated with the country's largest banks as legislation was enacted more than a decade ago to permit it.[6] For the years 1993-1997, syndicate participation by eleven prominent Canadian underwriters appears in Table 4-5 for all IPOs in the sample as well as for only medium sized IPOs. Concentrating our analysis on the most recent period of time was done to limit the complications arising from prior changes in the identity of several key players in the industry, as well as to try to conform to

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6 The Royal Bank of Canada owns RBC Dominion Securities while The Bank of Montreal owns Nesbitt Burns. The Canadian Imperial Bank of Commerce purchased Wood Gundy as far back as 1988 but only effected a name change to CIBC Wood Gundy in 1995. The National Bank owns Levesque, Beaubien and Geoffrion, The Bank of Nova Scotia owns ScotiaMcleod and The Toronto Dominion Bank owns TD Securities.

the time period that CR focus on (1995-1997).[7] RBC Dominion Securities leads in terms of syndicate participation frequency for the full subsample, while Midland Walwyn was involved in the largest number of medium sized IPOs.[8]

[Please place Table 4-5 about here]

Table 4-6 contains mean fees charged by the eleven brokerages for the syndicates that they were involved in. The only mean fees that are significantly different at conventional levels are those of Toronto Dominion Securities with Nesbitt Burns and Toronto Dominion Securities with ScotiaMcleod. All other paired differences have *p*-values that are greater than 10%.

[Please place Table 4-6 about here]

The study by CR suggests that there may be collusion among leading U.S. investment

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7 We haven't conformed exactly to the CR time period since we thought that 1993-1994 data should be included as they were particularly strong IPO years in Canada and we wanted to maintain a more meaningful sample size.

8 There have been a number of consolidations in the industry. Throughout this section we attribute IPO involvement of firms that no longer exist to the surviving firm. For example, The Bank of Montreal purchased Burns Fry and merged it with Nesbitt Thomson to create Nesbitt Burns on September 1, 1994. IPO involvement by Burns Fry is therefore included in the information for Nesbitt Burns. Similarly for RBC Dominion Securities which completed its acquisition of Richardson Greenshields on November 1, 1996. On the other hand, Merrill Lynch Canada finalized the purchase of Midland Walwyn on August 26, 1998. Prior to this date, Merrill Lynch Canada was not a major force in the new issue market and is therefore grouped into the "Other" category. At the start of 1998, the board of directors of Marleau Lemire decided to shut down operations in the wake of several years of large losses, the exodus of employees, and mounting lawsuits.

bankers since the proportion of fees that are exactly 7% is extremely high and has been steadily increasing. An examination of fees charged by 12 brokerages is also shown in the CR study and the concentration at 7% is also unusually high. These facts, do not by themselves, prove that collusion took place. In reality it is always easier to disprove an assertion than to prove it true. To disprove, all that is usually required is to provide counterexamples or other plausible explanations. To prove that an assertion is true, an exhaustive analysis of all possible, reasonable, alternatives must be proven false.

In the Canadian context, one cannot as easily assert that investment bankers collude to set prices charged for either all or medium sized IPOs. Figure 4-3 shows a series of charts depicting fee frequency distributions for leading Canadian IPO underwriters of common equity in the period 1993-1997 for all issues. The concentration at exactly 6% is never more than 37.7% (First Marathon). Figure 4-4 focuses attention on medium sized IPOs. Here the fee concentration at exactly 6% runs as high as 57.8% (Nesbitt Burns) with ScotiaMcleod coming in second (48.7%). Is there sufficient evidence to assert that widespread collusion exists among firms servicing the Canadian new issues market?

[Please place Figures 4-3 and 4-4 about here]

A stronger case for collusion could be made if the difference in the proportion of fees at exactly 6% were statistically insignificant between an overwhelming majority of pairs of investment bankers. We consider this possibility by performing a series of paired *t*-tests for the difference between proportions at exactly 6%. Specifically, for each of the 55 pairs of combinations of the eleven leading Canadian brokerage firms, we test the hypotheses:

$$H_0: p_1 - p_2 = 0$$

$$H_1: p_1 - p_2 \neq 0$$

Results for the statistical tests appear in Table 4-7. Eighteen differences (33% of the tests) are significant at the 10% level while seven differences (13%) are significant at the 5% level and two differences (4%) are significant at the 1% level. These results do not indicate an unusually high similar concentration of fees at 6%.

[Please place Table 4-7 about here]

4.5 A Multinomial Logit Model to Explain IPO Fees

Up to now we have highlighted differences in fees charged by underwriters for IPO distribution services. We now turn to factors that attempt to explain the observed fee structure. For this purpose, we concentrate on the five-year period 1993-1997 for two key reasons. First, this is the most recent period of time and is therefore apt to allow for more reasonable extrapolation of findings into the future. Second, although the IPO sample dates back to 1984, more than sixty percent of the issues under consideration were released in the five years starting in 1993. This allows for an adequate sub-sample from which conclusions may be drawn with some reliability.

The dependent variable being examined is *FEESIZE* and was originally expressed in percentages. We code this variable for each IPO as 0 (less than 6%), 1 (equal to 6%) and

2 (greater than 6%). We proceed to estimate the following multinomial logit model by maximum likelihood:

$$\text{Prob.}[FEESIZE_i = \tau] = \frac{\omega_\tau}{1 + \sum_{k=1}^{2} \omega_k}, \quad \tau = 1,2$$

$$\text{Prob.}[FEESIZE_i = 0] = \frac{1}{1 + \sum_{k=1}^{2} \omega_k} \qquad (4.1)$$

where:

$$\omega_\tau = \exp(\beta_{0,\tau} + \beta_{1,\tau} DEMAND_i + \beta_{2,\tau} REPUTE_i + \beta_{3,\tau} OFFER_i + \beta_{4,\tau} SYNDICAT_i)$$

and where:

$DEMAND_i$	=	number of IPOs issued in the same calendar month as IPO *i*
$REPUTE_i$	=	a measure of the reputation of the lead or co-lead underwriter(s) for IPO *i* [9]
$OFFER_i$	=	the offer size of IPO *i* measured in 1997 dollars
$SYNDICAT_i$	=	the number of syndicate members that participated in the distribution of IPO *i*

As might be expected, syndicate size and offer size are strongly correlated ($r = 0.75$) as the lead underwriter brings in additional syndicate members in an effort to limit the risk of an incomplete distribution. We estimate equation (4-1) as listed above, as well as without the *SYNDICAT* variable (labelled equation 4-1a). High demand (a hot new issues market) should increase the probability of getting higher fees and the coefficient for this variable should be positive. Since underwriter reputation should be valuable to the issuing firm, it

9 This measure is attributed to Megginson and Weiss (1991) and is based on the total IPO dollar volume for IPOs that the underwriter participated in as either lead or co-lead. It is highly correlated with another measure of reputation based on tombstone announcement hierarchies developed by Carter and Manaster (1990).

is expected that the sign on this variable should be negative (higher reputation is indicated by a lower rank) for higher fees. It is expected that larger offer size should have a negative influence on higher fees and therefore yield a negative coefficient. Finally, if syndicate size is really just a proxy for issue size the corresponding coefficient should be negative. Table 4-8 shows the results of the estimation.

[Please place Table 4-8 about here]

Normalization requires setting the coefficients for the dependent variable P[Y=0] (the probability of a fee less than 6%) to zero. Estimation of equations (4.1) and (4.1a) produce similar results. Only offer size is strongly significant and of the predicted sign for both equations. The nulls of zero slope coefficients are both rejected at $p < .01$ with almost identical χ^2 values (155.188 and 153.311) and pseudo-R^2 (0.3563 and 0.3520).[10] The real gain in favour of equation (1) seems to be in terms of a higher number of correct in sample predictions (135/206 compared to 130/206).[11]

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10 As noted by Greene (1997) and Maddala (1983), coefficients of the estimated model are not chosen to maximize any particular fit measure as in classic linear regression where the estimated coefficient vector maximizes R^2. An alternative for qualitative response models is based on the likelihood ratio index (or pseudo-R^2) developed by McFadden (1974). It is given as:

$$LRI = 1 - (\ln L / \ln L_0)$$

where L is the maximum estimated likelihood and L_0 is the restricted estimated likelihood found by setting the regression coefficients other than the constant to zero. This measure has intuitive appeal but runs into a problem at the upper bound where it implies that the likelihoods must explode. When this occurs, it is not so much an indication of a good fit as it is a problem with the model.

11 An alternative approach is to use the maximum score estimator which was investigated by Manski (1975). This nonparametric technique attempts to specify those coefficient estimates that will maximize the number of correct predictions and is appropriate for models that deal with binary choice

4.6 Additional Explanatory Variables

The logit models developed in equations (4.1) and (4.1a) provide strong explanations for the probability of obtaining particular realizations for the dependent variable. They are somewhat lacking however, in that they don't include characteristics that represent elements of risk that are inherent in the companies that intend to go public and may therefore help to explain the risk faced by the underwriting firm and the accompanying compensation. Fama and French (1996), refer to studies that suggest that average stock returns may be related to firm size (measured by market capitalization and denoted here as ME), book-to-market equity (measured as the ratio of book value of equity to market value of equity and denoted here as BEME), and the ratio of earnings to price (denoted here as EP), to name a few. In addition, there is a widely used measure of firm quality that is based on a discriminant analysis of financial ratios and attempts to estimate the probability that a firm will go bankrupt in the near future.[12]

We next incorporate these measures into the original model (based on equation (4.1)), and proceed to estimate the revised multinomial logit model written as:

$$\text{Prob.}[FEESIZE_{t} = \tau] = \frac{\theta_{\tau}}{1 + \sum_{k=1}^{2} \theta_{k}} \, , \; \tau = 1,2$$

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dependent variables. We therefore coded the probability of a 6% fee as 1 and the probability of obtaining a fee other than 6% as 0 as a precursor to estimation. Estimation results showed that the number of correct predictions improved slightly from 135/206 to 140/206. This improvement was not without a cost however, as none of the estimated coefficients were significant. The table of results was suppressed to save space. In this case, it is difficult to provide justification for the approach as anything other than a data fitting exercise.

12 The pioneering work in this area is by Altman (1968). There have been several claimed improvements of the original model over the years, but much of this more recent research is funded by banking groups and as such, the estimated coefficients are usually kept secret. See for example, Altman, Marco and Varetto (1994).

$$\text{Prob.}[FEESIZE_i = 0] = \frac{1}{1 + \sum_{k=1}^{2} \theta_k} . \qquad (4.2)$$

where $\theta_\tau = \exp(\gamma_{0,\tau} + \gamma_{1,\tau} DEMAND_i + \gamma_{2,\tau} REPUTE_i + \gamma_{3,\tau} OFFER_i + \gamma_{4,\tau} SYNDICAT_i +$

$\gamma_{5,\tau} EP_i + \gamma_{6,\tau} ME_i + \gamma_{7,\tau} BEME_i + \gamma_{8,\tau} ZSCORE_i)$

The variables $DEMAND_i$, $REPUTE_i$, $OFFER_i$ and $SYNDICAT_i$ are defined as earlier and:

EP_i	=	Earnings per share for IPO *i* in the year prior to IPO compared to the offer price
ME_i	=	Market capitalization based on the offer price for IPO *i*
$BEME_i$	=	The ratio of the book value of equity for IPO *i* in the year prior to IPO compared to the capitalized value of equity based on the offer price
$ZSCORE_i$	=	The computed value for IPO *i* of the Altman (1968), bankruptcy indicator.[13]

We gathered data on the companies in the sample for the year prior to their IPO in order to compute the value of the specified variables. In some cases, the prior data was unavailable and if this occurred, the issue was dropped from the study. The original sample of 206 TSE IPOs issued in the period 1993-1997 was reduced to 157 due to missing data.[14]

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13 The original Altman (1968), discriminant function can be written as:

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$$

where X_1 is the percentage ratio of working capital to total assets; X_2 is the percentage ratio of retained earnings to total assets; X_3 is the percentage ratio of earnings before interest and taxes (EBIT) to total assets; X_4 is the percentage ratio of the market value of equity to the book value of total debt; and X_5 is the ratio (not expressed as a percentage) of sales to total assets.

14 The reduced sample size raises the possibility of survivorship bias. We have tried to mitigate this effect by gathering prior year data for delisted companies when available. From the original sample of 206 companies, 33 were delisted within five years subsequent to their IPO. We obtained prior year

For the purpose of comparison with the previous logit model (equation (4.1)), and to establish a basis for comparison with subsequent versions of the model (equation (4.2)), we initially regressed the dependent variable *FEESIZE* on the original four independent variables that appeared in equation (4.1). We label this as equation (4.2a). The results of the estimation of the two equations appears in Table 4-9. The only really clear prior is associated with the size variable *ME*. Larger companies are likely to issue larger blocks of equity and face lower fees. The variable *ZSCORE* is a measure of firm quality in that higher values indicate a reduced likelihood of bankruptcy. However, the measure was designed to predict bankruptcy in the next one or two years and does not necessarily explain fee percentages which are paid long before bankruptcy is imminent.

[Please place Table 4-9 about here]

Equation (4.2a) produces results that are similar to those of equation (4.1) with a couple of important exceptions. First, the coefficient for the *REPUTE* variable is significant at $p < .10$ for the probability of a 6% fee relationship and is significant at $p < .05$ for the probability of a fee greater than 6%. Second, the percentage of correct in sample predictions improves slightly from 65.5% (135/206) to 67.5% (106/157). The null of zero slope coefficients is rejected at $p < .01$ and the pseudo-R^2 is only marginally larger (0.3655 compared to 0.3520).

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data for 22 of these companies.

The normalization required in the estimation procedure, does not allow for an examination of the variables that are relevant in explaining fees that are less than 6%. In order to get a better understanding of the effects of reputation and issue size on the probability of fees above, below and at 6%, we proceed to calculate the relevant probabilities while holding other variables constant at their means and allowing issue size and the reputation measure to vary. Specifically, we first set the variables *DEMAND* and *SYNDICAT* equal to their respective means. We then allow *OFFER* to vary in increments of five million dollars over the range of issue size from five million to one hundred million dollars. This range captures about 85% of all issues in the sample. Next, we compute the highest and lowest quartiles of the *REPUTE* variable.[15] Finally, we use the estimated regression coefficients from equation (4.2a) and compute the probabilities of obtaining fees above, below and at 6% for each combination of issue size and underwriter reputation. The results appear in Figure 4-5.

[Please place Figure 4-5 about here]

From the top (middle) chart, we can see that the probability of obtaining a fee less (greater) than 6% increases (decreases) monotonically with offer size, regardless of reputation. Low reputation underwriters are consistently less (more) likely to earn fees below (above) 6% at a given offer size compared to high reputation underwriters. This might

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15 Better reputation is indicated by a lower ranking with one being the best and eleven being the poorest. The highest reputation quartile was found to be three while the lowest was nine.

seem curious at first since the original supposition was that reputation has value and should lead to a higher probability of higher fees. A possible explanation for this finding lies in the familiar risk/reward relationship. High reputation underwriters bear less risk of not selling out the issue at a profit compared to their lower reputation counterparts and should therefore be entitled to reduced compensation.

Additionally, there is virtually no chance of underwriters earning less (more) than 6% fees for offers below (above) $10 ($90) million. Reputation appears to have more impact on the probability of earning less than 6% fees than it does on the probability of earning more than 6% fees. The maximum difference in probability due to reputation is 40.82% for fees less than 6% (at an offer size of $70 million), while the maximum difference in probability is 17.92% for fees greater than 6% (at an offer size of $55 million).

The bottom chart in Figure 4-5 shows the probability of earning a fee of exactly 6%. High reputation underwriters dominate weakly for offers below about $40 million. At an offer size just over $43 million (the crossover point) and a probability of 46.72%, underwriter reputation seems to be of little importance. Above the crossover point, lower reputation dominates and has the greatest impact at a probability difference of 28.17% (and an offer size of $75 million). Interestingly, lower reputation underwriters have the identical probability of earning a fee of exactly 6% at the extreme offer sizes of $5 million and $100 million.

Referring to Table 4-9, equation (4.2) results, it is clear that for the most part, the additional explanatory variables introduced, had little influence on the probability of fees at 6% or more. The only variable of any consequence was *ME* (the market value of equity), which had a significant influence on the probability of earning a fee in excess of 6%. The other variables, which can generally be interpreted as being proxies for firm-specific risk, may not be important since they are external to the fee setting decision. It is worth noting however, that equation (4.2) provides a better set of in-sample predictions. The number of correct predictions improved relative to equation (4.2a) from 106/157 (67.5%) to 114/157 (72.6%) as did the pseudo-R^2 (0.3655 to 0.4314).[16] In addition, there was a noticeable improvement in the ability of the model specified in equation (4.2), to correctly predict the number of fees that were exactly 6% (23/51 or 45.1% compared to 17/51 or 33.3%).

A final analysis considers the effect of delisted firms on the ability of the model given by equation (4.2) to explain fees. As mentioned earlier, 22 of the 157 firms in the sample were subsequently delisted. These firms may be outliers in terms of their financial performance in the years prior to being delisted and if delisting could be forecast with some accuracy, the resulting model would be expected to provide a better fit to the data. The multinomial logit regression given by equation (4.2), was re-run with delisted firms excluded. In terms of the significance of estimated coefficients, the results were quite similar

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16 There was some concern with the magnitude of the *ZSCORE* variable derived from the discriminant analysis equation. Several variations were examined in an effort to test for robustness of this measure and its effect on fee size probability. The main problem stemmed from large values of the ratio of the market value of equity to the book value of total debt which in turn produced large *ZSCORE* values. This ratio was consistently large and possibly biased upwards since it was calculated based on the total shares that were outstanding after the offering multiplied by the offer price, compared to the book value of debt at the end of the previous fiscal year. The most conservative alternative for this ratio did not consider the additional shares made available through the offering and also winsorized the resulting score by setting extreme values to their 10th and 90th percentiles respectively. Another class of variations considered the resulting discriminant score as a signal. Using the cutoffs specified in the Altman (1968), study, scores below 1.81, 1.81-2.99 and above 2.99 were set to 0, 1 and 2 respectively. None of these variations produced coefficient estimates that had a significant influence on fee size probability. Tables with these results are not reported herein.

to those obtained with the non-delisted sample. However, the model did in fact provide a better fit as the pseudo-R^2 increased to 0.5240 and the number of correct in-sample predictions increased to 74.81% (101/135).

4.7 Concluding Remarks

Fees charged by U.S. investment banks for distributing common equity IPOs are high compared to fees charged outside of North America but are only marginally greater on average than fees charged by Canadian firms. Canadian underwriters seem to concentrate fees charged for distributing medium sized IPOs ($10-50 million) at the 6% level compared to U.S. fee clustering at 7%. Further, the clustering of fees at 6% for medium sized Canadian IPOs follows a cyclical pattern over time in contrast to the steadily increasing proportion of fees at exactly 7% charged by American brokerages. While there exists some evidence to conclude that American brokerages may collude on fees charged, the Canadian evidence on this point is much weaker. In particular, paired *t*-tests for the difference in proportion of fees at exactly 6% charged by eleven leading Canadian underwriters showed that there were a substantial number of instances where significant differences did exist.

An examination of factors that influence the probability of particular fee size levels suggests that offer size is of primary importance. Apart from offer size, the importance of underwriter reputation should not be ignored. The risk (of an incomplete distribution) induced by underwriter reputation itself is seen as being critical in the determination of fees, as higher underwriter reputation tends to generate lower fees with greater likelihood compared with lower underwriter reputation.

Finally, it appears that measures of firm-specific risk that have been successful in explaining average returns and predicting bankruptcy, are not particularly important in explaining the probability of different fee levels. Only a size proxy measured by the market value of equity at the time of the new offering seems to be relevant.

To summarize, it is reasonably safe to say that any lawsuit directed at Canadian underwriters concerning collusion to set prices in the new issue market would be largely unsuccessful.

Chapter 5

An Empirical Analysis of Canadian Seasoned Equity Offerings

5.1 Introduction

In contrast to an initial public offering (IPO) of common stock wherein a firm issues equity to the public for the first time, a seasoned equity offering (SEO) occurs when a firm is already publicly traded and is simply selling additional common stock. Several studies document an observed negative stock price effect upon the announcement of a public SEO. Masulis and Korwar (1986) report a significant two-day mean announcement period return for a portfolio of NYSE/AMEX industrial firms in the period 1963-1980 of -3.25% compared with a corresponding two-day mean return for the market of 0.06%. For a similar time period (1963-1981), Asquith and Mullins (1986) find a mean excess return of -2.7%.

The price-pressure hypothesis of Scholes (1972) is one explanation for these negative price effects wherein the increase in the supply of shares causes a decline in a firm's stock price due to the supposition that the demand curve for shares is downward sloping. Myers' (1984) pecking order theory provides an alternative explanation and suggests that an announcement by a firm that it plans to raise external equity is a negative signal since the option to use cheaper internal equity or debt are seen to have been exhausted.

Private placement SEOs offer several advantages to the issuing firm compared to public offerings. One key advantage lies in reduced issuing costs resulting from relaxed disclosure requirements. While many studies are devoted to an analysis of public SEOs, far fewer use private SEOs as the focus.[1] These few studies have documented significant positive mean price effects on the issuing firms' shares. The explanation for positive private SEO returns is again linked to the hypothesis that the demand for stocks is downward sloping. Private placement shares are typically quite illiquid as investors may be prohibited from trading these shares for up to two years. The increased demand coupled with the restricted supply tends to produce the observed short-term mean price increase.[2]

Generally speaking, numerous studies dealing with aspects of SEO issuance exist for countries outside of Canada.[3] On the other hand, surprisingly few articles deal specifically with an analysis of Canadian SEOs. Thus, the primary goal of this research is to examine various facets of Canadian SEOs. Initially, the industry concentration of Canadian SEOs is examined. Canada is a country rich in natural resources. In times of global economic expansion, Canadian firms and the country as a whole benefit greatly from this dependence as premiums are earned from excess demand. On the other hand, Canadian current account balances suffer at times, and are linked to the weakening of the Canadian dollar relative to

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1 See for example Wruck (1989) and Hertzel and Smith (1993).

2 A study by Shleifer (1986) supports the conjecture that demand curves for stocks are indeed downward sloping.

3 Apart from the U.S., other international studies include, for the United Kingdom, see Levis (1995), for Japan, see Cai and Loughran (1998) and Kang, Kim and Stulz (forthcoming), and for Korea, see Dhatt, Kim and Mukherji (1996).

the currency value of many key trading partners during periods of declining demand for Canadian natural resources. This dependence on natural resources results in the call for greater diversification of Canadian industry into more technologically advanced areas such as communications and computer hardware and software. Whether or not progress towards so called "high tech" industries and away from traditional natural resource related industries is reflected in SEO incidence is examined.

In addition, measures of volume, number of trades and the amortized spread for Canadian private placement and public SEO offering firms for both resource and non-resource stocks are considered. Share volume and number of trades are important proxies for gauging information flow. The amortized spread is a recently developed approach to measuring investor transaction costs over the investor's investment horizon. Finally, returns for both private placements and public SEOs for resource and non-resource offerings are investigated over the ten month period around the announcement of the secondary offering.

This research is of particular interest to retail investors who are active participants in the market for new equity offerings. Institutional investors who subscribe to either private placements or public offerings also will benefit from some of the findings as will issuing firms.

The remainder of this chapter is organized as follows. In the next section, the SEO literature is briefly reviewed. Section three is devoted to a discussion of the data and the design of the SEO sample used in this study. Section four considers the industry concentration of SEOs and reports descriptive information. Section five investigates measures of SEO volume, number of trades and the amortized spread. Returns are examined in section six, and some concluding comments are offered in section seven.

5.2 Literature Review

The SEO literature is divided into three main areas of concentration and a fourth area of lesser importance. The first area of research concentration deals with valuation effects surrounding the issuance of a SEO. Hess and Frost (1982) conduct several empirical tests of seasoned issues on the NYSE and conclude that the market for SEOs is reasonably efficient as negative excess returns cannot be captured due to the costs of transacting. Parson and Raviv (1985) suggest that the underpricing of seasoned securities is a direct consequence of the likelihood of oversubscription and the ensuing rationing of shares. Asquith and Mullins (1986) demonstrate that common equity announcements are associated with reduced stock prices. Over 80% of the industrial firms in their sample exhibit negative excess returns. Masulis and Korwar confirm the negative announcement price effect and further observe that this price change is larger for industrial firms than it is for utilities. Hess and Bhagat (1986) present evidence that there is a positive relative size effect for utility SEOs during the announcement period but no similar effect for industrial offerings. Slovin, Sushka and Bendeck (1994) examine the first SEO after a NASDAQ IPO and find an excess return of -2.9%. They further note that there is an inverse relationship between returns and the proportion of shares sold by insiders in the offering. Finally, Hull and Kerchner (1996) find that issue costs account for 72% (OTC), 69% (AMEX) and 38% (NYSE) of every dollar decline in price. This leads to the conclusion that negative wealth effects from managerial signalling may be less important than commonly assumed.

The second area of research concentration deals with strategic behaviour around the time of the SEO announcement. Loderer and Mauer (1992) find little support for the conjecture that managers coordinate the announcement of new stock offerings with dividend declarations in an effort to garner higher prices for new shares. Gerard and Nanda (1993) use a game theoretic approach to assert that informed traders may seek to influence the SEO offer price by selling heavily in the secondary market prior to the offering with the intention of bidding heavily on the SEO shares and earning a net profit from the strategy. Bayless and Chaplinsky (1996) suggest that windows of opportunity (defined as time periods when information costs are reduced for all firms) exist wherein similar firms receive favourable prices for new seasoned equity. Controlling for firm and market characteristics as well as the price time trend, they find that the average price reaction upon the announcement of an SEO is significantly less (more) negative during hot (cold) markets compared to other times. Safieddine and Wilhelm (1996) examine short selling activity around NYSE and AMEX SEOs. Their evidence shows that SEOs are characterized by abnormally high levels of short selling and option open interest. These high levels of activity are in turn related to lower expected proceeds from the issuance of new shares. While the results of the study are consistent with the theoretical conclusions of Gerard and Nanda (1996), the authors advise caution in interpreting the findings as clear evidence of manipulation. In more recent articles, Rangan (1998) and Teoh, Welch and Wong (1998) focus on the apparent manipulation of earnings (which they refer to as earnings management) through creative accounting (effected by altering discretionary accruals) prior to an SEO. They imply that poor post issue performance is consistent with a market that initially (somewhat naively) overvalues issuing firms and is then disappointed by the inevitable decline in earnings.

The third major area of SEO research deals with the apparent underperformance of firms following SEO issuance. Spiess and Affleck-Graves (1995) conclude that returns for firms that issue SEOs underperform a matched sample of non-issuing firms when controlling for the trading system, offer size, age of firm and book-to-market ratio. Similar to the long-run underperformance of IPOs (Ritter (1991)), three (five)-year buy-and-hold strategies leave an investor with only 85.4 (78.6) cents relative to each dollar invested in a matched non-issuing firm. McLaughlin, Safieddine and Vasudevan (1996) report that industrial SEO firms exhibit significant improvements in operating performance prior to a seasoned offering followed by a significant decline in industry-adjusted and unadjusted profitability in the three years post issue. Also, the decline in profitability is larger for firms that have higher free cash flow, and that SEO firms that invest in fixed assets do less poorly. Loughran and Ritter (1997) confirm the weak post issue operating performance of SEO firms compared to matched non-issuing firms. They also document the inability of financial markets to predict this underperformance based on market-to-book multiples which erroneously tend to reflect expectations of above-average performance. Finally, Hertzel, Lemmon, Linck and Rees (1999) analyze the long-run performance of privately placed new equity issues. While a positive stock price reaction is documented upon announcement, three- and five-year returns are significantly below a control sample of firms. Their conclusion is that investors tend to be overoptimistic about the investment opportunities of firms that issue equity privately.

A less well-developed but potentially important area of research deals with the information content of SEOs. Slovin, Sushka and Polonchek (1991) examine multiple SEOs by bank holding companies. They find that the valuation effect of repeat issues is significantly negative which supports the Gale and Stiglitz (1989) hypothesis that repeat common stock issues reveal negative private information. McLaughlin, Safieddine and Vasudevan (1996) determine that equity-issuing firms with greater information asymmetry have larger post-issue performance declines. The effect is less pronounced for debt issuers. Findings are consistent with information models like Myers and Majluf (1984) that deal with the decision to issue securities.

The literature review conducted here represents but a small sample of the research that has been done on SEOs. It is somewhat surprising that the amount of space devoted to the study of SEOs in Canada and reported in major finance journals is so limited. Two Canadian studies were uncovered. Shaw (1969) examines both unseasoned and seasoned new equity issues and concludes that prices of industrial firms making seasoned rights offerings over an eleven year period (1956-1966) fell relative to the market index prior to 1961 but did relatively better in the period 1962-1965. Performance relatives of underwritten public offerings were generally disappointing. In fairness, the sample sizes involved are too small to allow for reliable generalizations. Kryzanowski and Phelan (1977) investigate seasoned TSE natural resource SEOs in the period 1965-1969 and find that for equivalent holding periods, ex post returns for new mining issues are similar to ex post market returns while ex post returns on new oil issues exceed ex post market returns.

Given the paucity of peer-reviewed investigations of Canadian SEOs and the importance of the topic to investors and issuing firms in particular, it seems appropriate to attempt to at least partially fill the existing void.

5.3 Data Description

The data on SEOs used in this study comes from the *Record of New Issues* database supplied by the *Financial Post*. This source is an annual compilation of all new financing issues in Canada and contains information on equity issues as well as debt and preferreds. Initially, all completed, non-initial (i.e., not an IPO), Toronto Stock Exchange (TSE) common equity issues for the years 1993-1997 are extracted according to the offering announcement dates. This initial pass yielded 799 SEOs. The sample is then limited by including only those issues that contain full information on whether an offering is classified as a private placement or a public issue, and whether the purpose of the offering is listed. The next two screens exclude low priced offerings (defined as being priced below $2), and offerings that do not contain at least 100 days of return data before and after the announcement date on the *TSE/Western* database. Finally issues that did not trade on 25% or more of the 201 days around the announcement are excluded.

Additional daily closing data on volume, number of trades, bid and ask quotes and number of shares outstanding are also downloaded from the *TSE/Western* database. Thus, the final sample contains 427 issues. Over the five year period 1993-1997, the final sample is made up of 88, 84, 58, 68 and 129, issues respectively.

5.4 Descriptive Statistics and the Industry Composition of Canadian SEOs

Descriptive statistics for the sample of TSE SEOs are presented in Table 5-1. It is immediately apparent that there is a considerable amount of diversity in the sample as the maximum shares issued, maximum offering price and maximum gross dollars offered are in turn about 1,000 times, 200 times and 2,000 times the reported minimums.[4] The mean fee charged by underwriters of 4.45% (based on 328 issues where fees are reported) is 1.64% below the mean IPO fee of 6.09% (Table 4-1). This difference is consistent with the difference between mean IPO and SEO fees (1.87%) that Lee, Lochhead, Ritter, and Zhao (1996) report for U.S. underwriters.

[Please place Table 5-1 about here]

Table 5-2 gives details on sample SEOs annually separated according to offerings issued by resource and non-resource firms. Resource firms are defined as those carrying SIC codes beginning with 10 (Metal Mining), 13 (Oil and Gas Extraction) or 14 (Mining and Quarrying of Nonmetallic Minerals, Except Fuels).[5] The percentage of resource SEOs is remarkably stable over the period 1993-1996 (59.1% to 61.8%). There is a noticeable decline in 1997 to 53.5%. Over the full sample period, resource SEOs represent 58.1% of SEOs issued.

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4 A 1997 SEO for Fairfax Financial Holdings is priced at $395 per share while a 1997 issue by Newcourt Credit Group grossed $1.61 billion.

5 A case can be made to include SIC category 24 (Lumber and Wood Products Except Furniture) in the resource group but it was felt that the ones chosen are more homogeneous.

[Please place Table 5-2 about here]

Table 5-3 gives a more detailed breakdown of the industry frequency and percentage of SEOs in the sample. What is noticeable is the limited number of technology related issues. Communications (SIC category 48) and Electronic and Other Electrical and Computer Equipment (SIC categories 35 and 36) make up only 8.72% of the sample. On an annual basis (not shown) over the period 1993-1997, the percentages of technology SEOs are 8.0%, 4.8%, 8.6%, 11.8% and 7.0%, respectively. It may be that resource SEOs are beginning a declining trend in 1997 but it does not appear that the percentage is shifting away from a dependence on natural resources and toward a greater concentration in high technology industries.

[Please place Table 5-3 about here]

The purpose given for the offering and the terms of the offering are examined next. Table 5-4 lists the annual frequency and percentage of each of the reasons given for an SEO. Consistent with the Canadian dependence on natural resources, the number one reason given for raising new equity is Exploration/Development/Production (EDP). There is also a marginal decline in the percentage attributed to EDP in 1997. This is consistent with the drop in resource SEOs in the same year. The most dramatic change in reason given is for Acquisition/Investment which nearly doubled to 34.9% in 1997 compared to 17.6% in the previous year.

[Please place Table 5-4 about here]

Table 5-4 also lists the annual frequency and percentage of the offering arrangements between companies and their investment dealers. Firm commitment offerings are the most numerous type of arrangement in the period but are surpassed for the year 1997 by bought deals.[6] Best efforts agreements seem to be relatively limited in terms of importance but increase markedly in times of market uncertainty. The year 1995 was one of these times as evidenced by the relatively small number of offerings in total (only 58) and the relatively high percentage of best efforts arrangements (31%).

Table 5-5 gives some information on the breakdown of public and private resource and non-resource SEOs over the five year period of this study. Public SEOs dominate private SEOs overall (57.37% versus 42.63%). In particular, public resource SEOs are the most numerous of the four types considered. The reduced number of 1997 resource SEOs is primarily due to the drop in public resource offerings in the same year.

[Please place Table 5-5 about here]

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6 Bought deals represent an underwriting arrangement that is not practiced in the U.S. Here the underwriter purchases a SEO from the issuer at a discount, puts the shares into inventory, and later resells them to a handful of institutional investors. This occurs when the underwriter acts strategically and tries to time the market to increase profits. The supply of shares available for trading (market float) for a bought deal distribution changes at some point in time after underwriting closing which is unknown at the time of issue. Whether or not bought deal SEO distributions exhibit different market impacts than more traditionally distributed SEOs depends on the price elasticity of the demand curves of investors (i.e. if the demand curves of investors slope downwards). This possibility needs to be investigated further in future work.

5.5 SEO Volume, Number of Trades and Amortized Spreads

SEO share volumes, number of trades and the amortized spread are examined in this section. Throughout this section, the full sample of 427 SEOs is divided into four subsamples to facilitate a clearer understanding of the changes that occur in issue event time. Figure 5-1 presents the daily volume of resource companies that issue public SEOs. For most of the 201 days of event time, the median daily volume hovers in the range of 30-50,000 shares. The day before the announcement, the median volume is only 47,750 shares but jumps dramatically on the stated announcement date to over 129,000 shares before falling to 84,000 the following day, and then quickly returning to normal. Figure 5-2 exhibits a substantially different volume pattern for non-resource companies that issue public SEOs. The median volume of daily trading is generally below 25,000 shares and peaks at over 49,000 shares on the announcement day. Thereafter, the drop off in trading is not nearly as rapid as for resource stocks and remains relatively high out to day 100.

[Please place Figures 5-1 and 5-2 about here]

Share volumes for companies that issue SEOs through private placements are quite small compared with public offerings. Figures 5-3 and 5-4 show median daily share volumes for resource and non-resource private placement firms. Resource firm volumes bounce around 20,000 shares for the full 201 days. There are few extraordinary peaks and the maximum median volume occurs on day 51 post announcement at about 33,000 shares. It appears as though the market is virtually unaware of the announcement or simply takes no special notice of it. Non-resource private placement volumes rarely exceed a median of 15,000 shares peaking at about 28,000 shares one day after the stated announcement date.

[Please place Figures 5-3 and 5-4 about here]

The volumes of the four SEO categories are now analyzed statistically. To better quantify differences in volume, the pre-announcement period is defined as being comprised of the ninety pre-event days [-100, -11]. Mean volumes for each of the firms in each category are computed. Following Lakonishok and Vermaelen (1986 and 1990), volume ratios are formed by comparing volumes for each of the days in [-5, -2], [5, 2] and the mean of the announcement period [-1, 1] to the ninety day means.[7] The null that the mean volume ratio equals one is tested using a standard *t*-test and a nonparametric sign test.

Table 5-6 contains information on the constructed volume ratios as well as results of the statistical tests. After viewing Figure 5-1, it is not surprising that both statistical tests for public SEOs of resource firms are significant at better than the 1% level for the announcement period. The parametric test is significant at better than 1% for each of the other three SEO categories for the announcement period, but the nonparametric test is never significant at conventional levels. This seems to indicate that a number of extreme share volume data points may be driving the results.

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7 The announcement date as reported in the *Financial Post* database is denoted as day 0. Announcements are often made after the close of trading and the effects are only observed on day 1. To allow for the possibility of information leakage as well the possibility of reporting error, the day prior to the stated announcement is also included in the announcement period.

[Please place Table 5-6 about here]

The median number of daily trades by public SEO resource companies is considered next. Figure 5-5 traces out a pattern for the number of trades that is quite similar to that of Figure 5-1 for volume. Again there is a dramatic peak on the announcement day with the median number of trades reaching 49 before settling down near the pre-announcement daily level of around 22 trades by day 30. Figure 5-6 for public SEO non-resource firms shows a less well defined peak on the announcement day at 36 trades but also shows an increase in activity six days before the announcement when a median of 25 trades is reached. This level is noticeably higher than the more normal level of about 18 trades per day prior to the announcement. There are also intermittent peaks of 34 trades at both days 18 and day 51, and generally elevated trading during the hundred day post-announcement period.

[Please place Figures 5-5 and 5-6 about here]

Median daily trades for private placement SEO resource companies are plotted in Figure 5-7. In contrast to volume for the same category, there is a clear maximum median of 17 trades reached during the announcement period. However, the same level is actually reached two days before the announcement and remains there before dropping to 16 on the first post announcement day. It then falls further thereafter. For private placement SEO non-resource shares, the maximum median number of trades occurs on the day before and the day after the announcement at 20 trades. There also seems to be a steady increase in trades in the days leading up to the announcement, and a more gradual decline in activity post-announcement.

[Please place Figures 5-7 and 5-8 about here]

The same methodology as described earlier for volume is used to statistically examine the number of trades for the four SEO categories. These results appear in Table 5-7. Apart from private placements for SEO resource companies where only the *t*-test is significant (at a level of 0.009), all announcement period ratios are significant for both statistical tests. More than 71% of all public offering resource companies in the announcement period have ratios that exceed one, and private placement SEO non-resource companies have almost as high a proportion at just under 70%. The close agreement of the two statistical tests suggests that number of trades may be a more stable measure of information flow than volume.

[Please place Table 5-7 about here]

The amortized spread was discussed earlier in chapter 2 for IPOs. The effect of the SEO announcements on this measure of transactions costs is now examined. While the shares outstanding actually increase upon the completion of the offering, the market effectively infers the new amount of shares outstanding on the announcement date. Therefore this change is reflected in the calculation of the amortized spread for each stock in each category. In chapter 2, we saw that the amortized spread is unusually high initially for IPOs primarily due to enormous share turnover which in turn implies that investors are paying the cost of transacting over relatively short holding periods. The volume of shares traded for SEOs is not nearly as large. As such, the amortized spread is likely to be considerably smaller in each of the four SEO categories that are examined.

Similar to the approach taken for volume and number of trades, the abnormal amortized spread relative for each stock in each category is examined by forming the ratio of the relevant event day value to the ninety day pre-announcement mean. The ninety day mean amortized spreads for public resource, public non-resource, private placement resource and private placement non-resource SEOs are in turn 0.53%, 0.30%, 0.80%, and 0.60%. The grand mean is 0.55%. This compares closely with the study by Chalmers and Kadlec (1998) for AMEX and NYSE stocks. They report means for deciles four, seven and eight (decile ten contains the highest mean amortized spreads) of 0.28%, 0.56% and 0.78%, and a grand mean of 0.51%.[8]

[Please place Table 5-8 about here]

Table 5-8 contains the results of statistical tests on SEO amortized spread ratios. The parametric test is significant for each of the announcement periods but the nonparametric test is only significant and negative for private placement SEOs for resource firms. The ratio is greater than one in the majority of cases for only public SEO resource firms (52.31%), and

8 See Table 1, Panel A of Chalmers and Kadlec (1998).

is never larger than one for the majority of cases on any event day shown. It seems that the distribution of amortized spread ratios is quite skewed.[9]

5.6 SEO Returns

In this section, SEO returns for the four categories of offerings are investigated. Prior research has documented significant negative announcement period abnormal returns for public SEOs and similar but positive abnormal returns for private placement SEOs. In order to test for risk-adjusted abnormal returns for the current sample, regressions over the 201 event days are run and a series of dummy variables are used for days [-5, 5] to pick up daily abnormal returns for each SEO. In addition, a dummy variable is used to capture a potential shift in systematic risk that may result from the capital structure change produced by the new equity issue. The model takes the form:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \beta_i R_{mt} D_6 + \sum_{k=-5}^{5} D_k + \varepsilon_{it} \qquad (5.1)$$

for $i = 1,\ldots, n$ and n = sample size of each of the four SEO categories = {132, 113, 116, 66} and $t = 1,\ldots,201$ corresponding to the 201 event days around the announcement days and

R_{it} is the return for issue i on day t,

R_{mt} is the value-weighted return for the TSE 300 index on day t,

α_i is the intercept,

9 The sample size in each of the four categories in Table 5-8 is slightly smaller than those reported in previous tables as information on outstanding shares was not available for 10 of the 427 issues. It seems unlikely that this small deficiency in data would have an important impact on the results.

β_i is the systematic risk of issue i,

D_k are dummy variables with values of one on day k and zeros otherwise,

D_6 is a dummy variable with a value of one for event days [0, 100] and zeros otherwise,

ε_{it} is the error term with the usual properties.

Tables 5-9 and 5-10 contain the results of the regressions. Consistent with the literature, public non-resource SEOs and private non-resource SEOs have significantly negative (-1.162%, p-value = 0.009) and positive (1.816%, p-value = 0.024) mean cumulative abnormal returns (CARs) over the three-day announcement period. On the other hand, insignificant announcement period risk-adjusted returns with the correct sign are found for resource firms that issue either public (-0.819%, p-value = 0.240) or private placement (0.487%, p-value = 0.337) SEOs. Betas are all highly significant and there is no significant beta shift detected. There is a noticeable run-up prior to the announcement for public offerings by resource companies and even a more dramatic run-up for private placement offerings for non-resource companies. This last point opens the door to additional research on the windows of opportunity hypothesis of Bayless and Chaplinsky (1996) and the possibility of earnings manipulation suggested by Rangan (1998) and Teoh et al (1998).[10]

10 In addition the mean market adjusted CARs for the four SEO categories are quite similar to the risk-adjusted values. Also, mean (median) market adjusted pre-CAR [-100, -2] and post-CAR [2, 100] for each of public resource, public non-resource, private placement resource and private placement non-resource SEOs are 18.61% (15.55%) and -6.91% (-8.21%), 14.85% (12.13%) and 2.66% (1.44%), 22.27% (10.77%) and -3.68% (-5.73%) and finally 31.94% (23.83%) and -1.46% (-1.27%). These strong reversals in post- versus pre-announcement period returns add credence to the notion that firms issue equity to take advantage of windows of opportunity and/or to the possibility of earnings manipulation.

Finally, a simple cross-sectional regression model is estimated to explain market-adjusted returns over the three-day announcement period. The model takes the form:

$$CAR = \beta_0 + \beta_1 PreCAR + \beta_2 Private + \beta_3 Resource + \beta_4 Internal + \beta_5 External + \beta_6 Capstruc + \beta_7 Size + \varepsilon \qquad (5.2)$$

where:

CAR	is the three-day announcement period market-adjusted cumulative abnormal return,
PreCAR	is the cumulative pre-announcement market-adjusted return for days [-100, -2],
Private	is a dummy variable that equals one for a private placement and is zero otherwise,
Resource	is a dummy variable that equals one for a resource firm and is zero otherwise,
Internal	is a dummy variable that equals one if the reason for the SEO is for capital expenditure or exploration/development/production and is zero otherwise,
External	is a dummy variable that equals one if the reason for the SEO is for acquisition/investment and is zero otherwise,
Capstruc	is a dummy variable that equals one if the reason for the SEO is for debt reduction, and
Size	is a variable that represents the ratio of the funds raised in the offering to the pre-announcement capitalized value of the company.

A second regression model that includes the variables *Leads* (the number of lead underwriters) and *Syndsize* (the size of the syndicate responsible for distributing the issue) is run separately. The information on these last two variables is not always available from the database. As a consequence, 58 companies are excluded from these latter estimations.

This cross-sectional analysis has several objectives. One is to determine if there are significant differences between abnormal returns for private placements versus public offerings and for resource versus non-resource firms. Another is to determine if the purpose of the offering is important in explaining the observed return pattern and whether or not syndicate composition has any influence. A third motivation is to relate the importance of pre-announcement abnormal returns and issue size to announcement period abnormal returns.

Results for the two regressions appear in Table 5-11. For the first regression, the variable *PreCAR* is marginally significant (p-value = 0.067) and the dummy variable *Private* is strongly significant (p-value = 0.0035) as is the regression (p-value for F-test = 0.011). Variables that capture the type of firm (resource versus non-resource) and the purpose of the offering do not significantly contribute to an explanation of the announcement period abnormal returns.

[Please place Table 5-11 about here]

In the second regression (includes underwriting syndicate information), *PreCAR* is more strongly significant (p-value = 0.027) and the dummy variable *Private* remains significant (p-value = 0.046) but the regression is only marginally significant (p-value for F-test = 0.063). Thus it appear that past returns are generally important as is the type of offering (private placement versus public) in explaining announcement period abnormal returns. However, the purpose and size of the offering, as well as syndicate composition and industry classification, are not particularly relevant explanatory variables.

5.7 Conclusions

It appears that Canada remains a country that is strongly dependent on natural resources. Recent efforts to change this dependence are not as yet observable in capital markets since the industry composition of SEOs has not varied substantially over the five year period of this study.

There are significant announcement period changes in the number of trades according to parametric and nonparametric tests and for all but private placement SEOs for resource companies where only the parametric test is significant. Results for abnormal volume are more mixed as only public offerings for resource companies show significance for both statistical tests although the parametric tests are always significant. Amortized spreads are much smaller for SEOs than they are for IPOs due mainly to reduced share turnover which spreads the costs over longer periods of time. Abnormal amortized spreads for the announcement period only show up as being significant for the parametric tests.

Abnormal returns for the announcement period generally agree with literature findings and are significantly negative (positive) for public (private placement) non-resource companies. On the other hand, announcement period abnormal returns for SEOs of resource companies carry the correct sign but are not significant for both are public offerings and private placements.

Finally, pre-announcement period market-adjusted returns and the type of offering are important in explaining announcement period abnormal returns. However, industry classification, size, stated offering purpose and syndicate composition have little direct impact on explaining announcement period abnormal returns.

Chapter 6

Major Findings, Implications and Directions for Future Research

Equity markets are a dynamic and evolving arena within which firms seek out new capital as an aid to help them compete more effectively. A company's decision to go public by issuing an IPO is a significant undertaking that may take a year or more from the time the process begins, to the time the company's stock is listed on an organized exchange and starts to trade. The period of time leading up to the formal listing of the newly issued stock, as well as the early years after going public, are critical stages in a company's development. This period of time often determines whether or not a company can remain viable in the future.

From the company's viewpoint, it is essential that they understand and can justify the costs of going public before taking this important step. A private company must be able to trust the investment banker who is responsible for guiding them on the road to being a public company, and whose services the private company may require in the future if the need arises to raise additional equity through a seasoned offering.

Investors are attracted to the hype that surrounds the issuing of an IPO and expect to earn large returns by capitalizing on the underpricing phenomenon. Investors must be aware of research that suggests that long term, IPOs are generally overpriced since returns are typically poor beyond the first day of secondary market trading. On the other hand, even short term returns may not be positive. This is especially true if the issue cannot be purchased at the offer price.

This thesis has investigated various aspects of new equity offerings in Canada. The most significant findings are now summarized. With regard to the market performance of IPOs (the topic of chapter two), the initial volume of shares traded for underpriced (overpriced) issues is particularly high (low) suggesting that informed investors play active (inactive) roles in early IPO trading. Evidence from the number of trades supports the volume conclusions. Liquidity is lower for overpriced compared to underpriced issues, and the decline in liquidity over time is more volatile for overpriced issues. It is unlikely that the typical investor earns a short term profit from IPO investing as the median return is zero over the first calendar month of trading. If investors lack superior information, they maximize their return on average by trading at the open. Underpriced issues do increasingly well in the short-run, while overpriced issues do more poorly in the short-run. The amortized spread, which accounts for trading costs over the holding period of the investor, is very large at the beginning of secondary market trading for underpriced issues in particular. It remains an open question if underpricing is a form of compensation for the high amortized costs of transacting. It appears that the shape of the distribution of returns is important in explaining IPO returns as skewness risk unlike kurtosis risk is priced when systematic risk is reflected.

With regard to the stabilization of prices at the start of secondary market trading of IPOs (the topic of chapter three), underwriters with reputation capital at stake do not remain idle if a new issue performs poorly when trading begins. Consistent with stabilization, the distribution of IPO returns is positively skewed and leptokurtic. This positive skewness and excess kurtosis diminish with time as stabilizing forces are presumably reduced. Tobit regressions, which account for the censoring of the distribution of returns, produce adjusted means that are not significantly different from zero. This suggests that if it were not for stabilization, the true mean return would be zero instead of positive. Although the overallotment option is requested by underwriters for use as a stabilization tool, it is not clear that the presence of the OAO can be directly linked to stabilization. The OAO is significantly and positively associated with underwriter fees which points to the possibility that this option is an important revenue-enhancing tool for underwriters.

With regard to IPO underwriter fees (the topic of chapter four), a current class action lawsuit in the U.S. alleges that underwriters collude to set fees at exactly 7% for medium sized IPOs since the concentration of fees at 7% is over 90% and has been growing over time. In Canada, the highest concentration of fees is at exactly 6%. However, clustering at this level is not nearly as dramatic as for U.S. IPOs, and the proportion has not been increasing with time. Issue size is the primary determinant of the probability of underwriters charging various fee levels, underwriter reputation also is an important determinant. Firm-specific risk measures, which are successful in explaining average returns and predicting bankruptcy, are not particularly important in explaining fee level probabilities. Only a size proxy, as measured by the market value of equity at the time of the new offering, is relevant.

With regard to the market behaviour of seasoned equity offerings (the topic of chapter five), Canadian industry remains heavily dependent on natural resources. Evidence from the distribution of SEO SIC codes indicates that over 60% of new SEOs for a sample of TSE listed firms in the period 1993-1997 are by natural resource firms. Announcement period changes in the number of trades are significant and positive (for both parametric and nonparametric tests) for all but private placement SEOs for resource companies. Results for abnormal volume are less clear as only public offerings for resource companies show significance for both statistical tests although the parametric test is always significant. Although SEO amortized spreads are similar to levels reported for major U.S. stock exchanges, they are much smaller than those for IPOs as relatively lower share turnover distributes investor transactions costs over longer investment horizons.

Announcement period risk-adjusted abnormal returns generally agree with literature findings. They are significantly negative (positive) for public (private placement) non-resource companies. In contrast, announcement period abnormal returns for SEOs of resource companies carry the same sign as for non-resource firms but are not significant for both types of offerings. Pre-announcement period market adjusted returns and offering type are important in explaining announcement period market adjusted abnormal returns. Other explanatory variables, including industry classification, size, stated offering purpose and syndicate composition, have little influence on announcement period market-adjusted abnormal returns.

Results highlighted herein point the way to future research opportunities. First, more work needs to be done to directly link underwriters to stabilizing activities in the IPO aftermarket. This necessitates an analysis of underwriter practices when they trade for their own account as well as when they trade on behalf of their clients.

Second, a more thorough investigation of the amortized spread for IPOs in particular is called for. The hypothesis that underpricing, at least in part, represents compensation to investors for bearing transactions costs can be tested empirically.

Third, the effect of issuers seizing windows of opportunity needs to be reflected in the tests of the market performance of both IPOs and SEOs. There is considerable evidence in the literature that issuers time their public offering to exploit periods of "hot" issue markets to float larger issuers at more favourable offering prices.

Fourth, a detailed investigation of information flow around SEOs can be conducted. One proxy for information flow prior to a SEO announcement would be the frequency and quality of news stories reported in recognized publications. News event data could then be linked to and may help explain the observed pattern in announcement period abnormal returns as well as the apparent reversal in pre- versus post-announcement period abnormal returns.

Appendix 1: Justification for the High Incidence of Zero Put Option Values

We outline here a brief explanation for the high incidence (44%) of zero put option values when this proxy for stabilization is used in chapter 3. We know that under the assumptions that $r_f = 0$ and $T-t = 1$, the value of a Black-Scholes European put option can be written:

$$p = (\text{Offer Price})\,N(-d_2) - (\text{Closing Bid Price})\,N(-d_1)$$

where: $d_1 = \dfrac{\ln(\text{Bid/Offer}) + (\frac{1}{2}\sigma^2)}{\sigma}$ and $d_2 = d_1 - \sigma$.

We can write $d_1 = \left(\dfrac{1}{\sigma}\right)\ln(\text{Bid/Offer}) + \dfrac{\sigma}{2}$. It is clear from Table 3-2 that over the first few weeks of secondary market trading the mean return, measured from the offer price to the closing price on a particular day, lies in the range of about 3-4%. This means that there are many cases where the closing bid is very close to or is equal to the offer price (indeed from Table 3-3, the median *Bid/Offer* = 1). Clearly when *Bid* = *Offer*, $d_1 = \dfrac{\sigma}{2}$. While many TSE IPOs experience considerable trading activity in the first few hours of their lives, there is far less activity thereafter and consequently for many IPOs the volatility of returns may approach zero. Therefore d_1 is small and $N(-d_1) \approx 0.5$. Similarly, when σ is small, $d_2 = d_1 - \sigma = \dfrac{\sigma}{2} - \sigma \approx 0$ and $N(-d_2) \approx 0.5$. As a result:

$$p \approx \frac{(\text{Offer Price})}{2} - \frac{(\text{Closing Bid Price})}{2} \approx 0$$ when *Offer Price* = *Closing Bid Price*.■

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Table 2-1
IPOs by Year

Year	IPOs Listed on the TSE	IPOs Included in Sample	IPOs in 4-Moment Study
1984	43	13	10
1985	33	8	6
1986	113	66	60
1987	81	30	30
1988	19	2	2
1989	27	9	7
1990	14	5	5
1991	17	5	5
1992	27	15	14
1993	89	68	64
Total	463	221	203

Table 2-2
Descriptive Statistics of IPOs According to Offer/Open Returns
Panel A: All - 221 Issues

	Open	Shares	QMV	Offer	New Financing	Off/Op Ret.
Mean	9.726	11,452,278	134,261,693	9.447	47,904,680	4.183 (0.000)
S.D.	4.472	20,519,765	296,056,446	4.466	102,282,473	13.694
Min	2.350	600,000	4,495,000	2.250	725,000	-62.500
25%	7.000	4,000,000	29,737,500	6.750	10,575,000	-1.358
Median	9.000	6,500,000	52,008,750	8.500	20,000,000	0.000
75%	11.750	10,396,950	101,650,000	11.759	42,515,000	6.667
Max	27.500	215,294,888	2,825,745,405	27.500	951,946,644	87.500

Panel B: Underpriced - 109 Issues

	Open	Shares	QMV	Offer	New Financing	Off/Op Ret.
Mean	9.867	12,231,861	149,476,856	8.949	44,691,667	12.138 (0.000)
S.D.	4.251	24,275,496	355,396,025	4.138	102,288,217	14.280
Min	2.350	600,000	4,495,000	2.250	725,000	0.500
25%	6.625	4,228,938	31,899,973	5.750	10,335,175	3.659
Median	9.375	6,115,161	52,787,500	8.250	15,562,500	6.897
75%	13.000	9,650,000	102,756,247	12.000	38,500,000	15.116
Max	25.125	215,294,888	2,825,745,405	25.000	851,346,660	87.500

Panel C: Correctly Priced - 46 Issues

	Open	Shares	QMV	Offer	New Financing	Off/Op Ret.
Mean	9.837	13,602,571	159,137,113	9.837	67,412,758	0.000
S.D.	4.871	22,380,880	294,188,622	4.871	145,728,214	0.000
Min	2.750	1,000,000	7,500,000	2.750	3,105,760	0.000
25%	7.000	4,443,710	34,700,946	7.000	14,250,000	0.000
Median	8.500	7,107,895	65,050,000	8.500	26,000,000	0.000
75%	11.438	13,608,077	133,659,768	11.438	48,975,000	0.000
Max	27.500	137,731,479	1,652,777,748	27.500	951,946,644	0.000

...Continuation of Table 2-2

Panel D: Overpriced - 66 Issues

	Open	Shares	QMV	Offer	New Financing	Off/Op Ret.
Mean	9.417	8,666,094	91,796,209	9.999	39,614,482	-6.040 (0.000)
S.D.	4.595	9,329,066	155,635,611	4.668	54,457,414	8.443
Min	3.000	925,317	7,980,859	3.750	2,700,000	-62.500
25%	7.031	3,092,522	26,793,750	7.500	11,253,125	-6.667
Median	8.688	5,895,450	42,796,753	9.125	21,800,000	-3.661
75%	10.844	10,180,678	72,764,063	11.569	41,924,944	-2.068
Max	24.875	49,595,585	1,066,305,077	25.000	301,455,000	-0.077

This table reports initial statistics for 221 IPOs that were issued on the TSE between 1984-1993. The sample is split in three according to whether the return (last column) calculated from the offer price (column four) to the opening price (column one) was negative (overpriced), zero (correctly priced) or positive (underpriced). The quoted market value (QMV) is the number of shares issued multiplied by the opening price. Figures in parentheses under the mean returns are p-values for the one-sided t-test of the null hypothesis that the mean return is zero.

Table 2-3: Market Model Regressions for 203 TSE IPOs 1984-1993.
This table reports OLS coefficient estimates and corresponding statistical test p-values for unadjusted excess returns and excess returns adjusted for covariance risk, co-skewness risk and co-kurtosis risk. Dummy variables capture total unadjusted and adjusted excess returns on days 2-10, days 11-20 and days 21-60 respectively. The intercept reflects excess returns on day 1.

Model 1: $R_{it} = \alpha_{i0} + \alpha_{i1} D_{i1} + \alpha_{i2} D_{i2} + \alpha_{i3} D_{i3} + \varepsilon_{it}$

	α_{i0}	α_{i1}	α_{i2}	α_{i3}
Coeff. Est.	**0.0298**	**-0.0362**	**-0.0296**	**-0.0284**
***t* - test**	**0.0048**	**0.0037**	**0.0052**	**0.0072**
sign test	**0.3997**	**1.0000**	**0.4829**	**0.8329**
Wilcoxon test	**0.1387**	**0.0744**	**0.1061**	**0.1702**

Model 2: $R_{it} = \alpha_{i0} + \beta_i R_{mt} + \alpha_{i1} D_{i1} + \alpha_{i2} D_{i2} + \alpha_{i3} D_{i3} + \varepsilon_{it}$

	α_{i0}	α_{i1}	α_{i2}	α_{i3}	β_i
Coeff. Est.	**0.0296**	**-0.0305**	**-0.0294**	**-0.0282**	**0.7234**
***t* - test**	**0.0050**	**0.0039**	**0.0053**	**0.0075**	**0.0001**
sign test	**0.8884**	**0.3258**	**0.4829**	**0.6225**	**0.0001**
Wilcoxon test	**0.0956**	**0.0584**	**0.1122**	**0.1603**	**0.0001**

Model 3: $R_{it} = \alpha_{i0} + \beta_i R_{mt} + \gamma_i R_{mt}^2 + \alpha_{i1} D_{i1} + \alpha_{i2} D_{i2} + \alpha_{i3} D_{i3} + \varepsilon_{it}$

	α_{i0}	α_{i1}	α_{i2}	α_{i3}	β_i	γ_i
Coeff. Est.	**0.0310**	**-0.0311**	**-0.0299**	**-0.0289**	**0.7373**	**-37.2858**
***t* - test**	**0.0033**	**0.0032**	**0.0046**	**0.0062**	**0.0001**	**0.0001**
sign test	**0.5746**	**0.3258**	**0.4829**	**0.7251**	**0.0001**	**0.0001**
Wilcoxon test	**0.0563**	**0.0488**	**0.0853**	**0.1291**	**0.0001**	**0.0001**

...Continuation of Table 2-3

Model 4: $R_{it} = \alpha_{i0} + \beta_i R_{mt} + \delta_i R_{mt}^3 + \alpha_{i1} D_{i1} + \alpha_{i2} D_{i2} + \alpha_{i3} D_{i3} + \varepsilon_{it}$

	α_{i0}	α_{i1}	α_{i2}	α_{i3}	β_i	δ_i
Coeff. Est.	**0.0277**	**-0.0287**	**-0.0276**	**-0.0265**	**0.6352**	**362.0861**
***t* - test**	**0.0099**	**0.0076**	**0.0104**	**0.0142**	**0.0001**	**0.7167**
sign test	**1.0000**	**0.3997**	**0.5746**	**0.8329**	**0.0001**	**0.0678**
Wilcoxon test	**0.1273**	**0.0898**	**0.1406**	**0.2109**	**0.0001**	**0.1888**

Model 5: $R_{it} = \alpha_{i0} + \beta_i R_{mt} + \gamma_i R_{mt}^2 + \delta_i R_{mt}^3 + \alpha_{i1} D_{i1} + \alpha_{i2} D_{i2} + \alpha_{i3} D_{i3} + \varepsilon_{it}$

	α_{i0}	α_{i1}	α_{i2}	α_{i3}	β_i	γ_i	δ_i
Coeff. Est.	**0.0296**	**-0.0300**	**-0.0286**	**-0.0277**	**0.6922**	**-31.7502**	**726.7399**
***t* - test**	**0.0055**	**0.0048**	**0.0073**	**0.0094**	**0.0001**	**0.0029**	**0.5526**
sign test	**0.7790**	**0.4829**	**0.6738**	**0.8329**	**0.0001**	**0.0019**	**0.8884**
Wilcoxon test	**0.1143**	**0.0898**	**0.1381**	**0.2006**	**0.0001**	**0.0001**	**0.7383**

Table 2-4: Market Skewness and the Distribution of Test Statistics for Skewness when Observations are Independent and Autocorrelated. This table shows statistics for market skewness for various periods of time that correspond to different numbers of trading days post IPO. Also shown are distributions of test statistics for the null that $\gamma_i = 0$ against the corresponding two-sided alternative when return observations are independent (Panel B) and when they are autocorrelated (Panel C).

Panel A: Market Skewness

	Days 1-60	Days 1-10	Days 11-20	Days 21-60
Mean	-0.4431	-0.2205	-0.1264	-0.4220
Median	-0.3881	-0.2637	-0.1301	-0.3788
Standard Dev.	0.6602	0.8105	0.7950	0.7064

Panel B: Distribution of Test Statistics with Independent Market Return Observations

	Days 1-60	Days 1-10	Days 11-20	Days 21-60
Mean	-2.5775	-1.2824	-0.7355	-2.4545
Median	-2.2573	-1.5340	-0.7565	-2.2032
Standard Dev.	3.8403	4.7143	4.6240	4.1086
Cases ≤ -1.96	106	92	76	104
% ≤ -1.96	52.22	45.32	37.44	51.23
Cases ≥ 1.96	24	54	54	27
% ≥ 1.96	11.82	26.60	26.60	13.30

Panel C: Distribution of Test Statistics with Autocorrelated Market Return Observations

	Days 1-60	Days 1-10	Days 11-20	Days 21-60
Mean	-1.1401	-0.3321	-0.1045	-1.2717
Median	-0.7631	-0.1761	-0.0969	-0.6568
Standard Dev.	1.8363	1.4921	1.1725	2.6370
Cases ≤ -1.96	53	9	9	48
% ≤ -1.96	26.11	4.43	4.43	23.65
Cases ≥ 1.96	2	4	3	2
% ≥ 1.96	0.99	1.97	1.48	0.99

Table 3-1
IPOs by Year in Stabilization Sample

Year	IPOs Listed on TSE	IPOs In Stabilization Study	IPOs No-OAO	IPOs With OAO
1984	43	12	7	2
1985	33	8	6	1
1986	113	66	50	5
1987	81	29	18	6
1988	19	2	1	-
1989	27	7	4	2
1990	14	4	1	3
1991	17	5	3	2
1992	27	15	7	4
1993	89	68	27	31
Total	463	216	124	56

Table 3-2. Characteristics of distributions of initial returns of 216 TSE IPOs brought to market in the period 1984-1993.

	1st half hour	1-day	1-week	2-weeks	3-weeks	4-weeks
Mean	0.042[a]	0.035[a]	0.035[a]	0.032[a]	0.033[a]	0.039[a]
90% CI	0.026,0.058	0.019,0.051	0.016,0.054	0.012,0.521	0.011,0.055	0.015,0.628
Tobit Mean	-0.008[b]	-0.022[b]	-0.022[b]	-0.019[b]	0.002[b]	0.006[b]
90% CI	-0.034,0.017	-0.049,0.006	-0.053,0.009	-0.051,0.013	-0.029,0.033	-0.028,0.039
Minimum	-0.644	-0.644	-0.663	-0.650	-0.638	-0.628
0.5%	-0.329	-0.232	-0.307	-0.381	-0.405	-0.433
Median	0.011[b]	0.002[b]	0.000[b]	0.000[b]	0.010[b]	0.011[b]
91% CI*	0.000, 0.020	0.000, 0.016	-0.007, 0.018	-0.008, 0.014	-0.006, 0.024	-0.013, 0.031
0.995%	0.696	0.699	0.569	0.789	0.675	0.812
Maximum	0.875	0.891	0.953	0.828	0.813	0.875
Std. Dev.	0.144	0.148	0.171	0.180	0.198	0.216
Skewness (γ_1)	1.457[a]	1.613[a]	1.254[a]	0.970[a]	0.709[a]	0.892[a]
Kurtosis (β_2)	12.520[c]	12.107[c]	8.317[c]	6.647[c]	4.856[c]	5.201[c]

Statistics are calculated from the offer price to the last price in each of the indicated time intervals. Ninety percent confidence intervals are calculated for both the ordinary mean and the mean derived from Tobit regressions for each interval. 0.5% and 0.995% refer to 0.5 and 99.5 percentiles of the frequency distributions at each interval respectively. $\gamma_1 = \beta_1^{1/2} = \mu_3 / \mu_2^{3/2}$ from Kendall and Stuart (1969) is a measure of skewness and is expressed as the third moment about the mean divided by the second moment about the mean raised to the 3/2 power. If $\gamma_1 = 0$, the distribution is symmetric, while $\gamma_1 < 0$ is indicative of negative skewness (a long left tail) and $\gamma_1 > 0$ is indicative of positive skewness (a long right tail). $\beta_2 = \mu_4 / \mu_2^2$ is a measure of kurtosis (concentration of data frequency around the centre of the distribution) and is expressed as the fourth moment about the mean divided by the square of the second moment about the mean. For the normal distribution, $\beta_2 = 3$. If $\beta_2 > 3$ the distribution is said to be leptokurtic (more peaked than the normal distribution) and if $\beta_2 < 3$ the distribution is said to be platykurtic (flatter than the normal distribution).

[a] Significantly different from zero at the 0.01 level.
[b] Not significantly different from zero at the 0.01 level.
[c] Significantly different from three at the 0.01 level.

* Given symmetrically chosen confidence limits u_i, u_{n-i+1} for the median $x_{0.5}$, based on order statistics from a sample of size n, the confidence coefficient for the inequality $u_i < x_{0.5} < u_{n-i+1}$, $1 \le i < n-i+1$ is given by:

$$C = \sum_{k=i}^{n-i} \binom{n}{k} \left(\frac{1}{2}\right)^n = 1 - 2\sum_{k=0}^{i-1} \binom{n}{k} \left(\frac{1}{2}\right)^n .$$

According to this expression, there is a 91% probability that the interval (u_{96}, u_{121}) contains the true median.

Table 3-3. Summary Statistics for Two Stabilization Proxies
Stabilization proxies are aggregated over a forty day period post IPO.

	Bid/Offer Proxy	Put Option Proxy
Mean	1.036	0.789
Median	1.000	0.005
Standard Deviation	0.216	1.321
Minimum	0.338	0.000
25th Percentile	0.911	0.000
75th Percentile	1.134	1.125
Maximum	2.400	14.000
Skewness	1.027	2.411
Kurtosis	6.359	11.284

Table 3-4. Daily cross-sectional regressions of relative spread on factors known to affect the spread and the bid/offer stabilization proxy.

Day	Intercept	ln(Volume)	ln(Midspread)	ln(Volatility)	ln(Bid price/ Offer price)	*N*	*Adj. R^2*
1	-1.654 (-8.296)	-0.071 (-4.631)	-0.624 (-10.717)	0.108 (3.420)	-0.007 (-0.042)	216	0.519
2	-2.301 (-10.757)	-0.021 (-1.205)	-0.637 (-10.587)	0.083 (2.498)	-0.024 (-0.135)	212	0.456
3	-1.894 (-7.207)	-0.072 (-3.493)	-0.502 (-7.191)	0.124 (3.141)	0.167 (0.790)	211	0.340
4	-1.646 (-7.254)	-0.085 (-4.584)	-0.533 (-7.653)	0.134 (3.561)	0.135 (0.694)	214	0.415
5	-1.864 (-9.743)	-0.065 (-4.090)	-0.554 (-9.046)	0.122 (3.780)	0.052 (0.320)	210	0.477
6	-1.818 (-7.843)	-0.093 (-4.603)	-0.533 (-7.651)	0.078 (2.084)	0.546 (2.894)	207	0.386
7	-2.060 (-9.991)	-0.049 (-2.553)	-0.616 (-9.512)	0.065 (2.645)	0.207 (1.247)	206	0.426
8	-2.034 (-8.683)	-0.070 (-3.143)	-0.567 (-8.460)	0.052 (2.030)	0.257 (1.421)	203	0.376
9	-2.026 (-9.021)	-0.041 (-2.205)	-0.609 (-9.259)	0.090 (2.911)	-0.079 (-0.467)	206	0.417
10	-1.888 (-8.443)	-0.059 (-3.195)	-0.626 (-9.248)	0.075 (2.372)	0.044 (0.247)	207	0.415
15	-1.272 (-4.965)	-0.100 (-5.319)	-0.480 (-6.731)	0.203 (4.237)	-0.266 (-1.638)	206	0.445
20	-1.652 (-5.820)	-0.035 (-1.663)	-0.619 (-8.077)	0.174 (3.302)	-0.082 (-0.490)	200	0.416
25	-1.459 (-5.829)	-0.074 (-3.832)	-0.639 (-9.042)	0.129 (2.687)	0.185 (1.274)	201	0.468
30	-1.660 (-5.644)	-0.070 (-3.521)	-0.544 (-6.978)	0.130 (2.387)	-0.116 (-0.732)	202	0.356
Total 1%	40	33	40	28	1		
Total 5%	40	36	40	38	2		
Total 10%	40	39	40	40	2		

The logarithm of the daily closing relative spread is regressed cross-sectionally on the respective logarithms of daily share *volume*, closing *midspread*, calculated as (closing bid + closing ask)/2, *volatility*, calculated on a rolling basis similar to Hanley, Kumar and Seguin (1993) and the ratio of *closing bid/offer price* for each issue. Coefficients are estimated for each of days 1-40 from regressions of the form:

$$\ln(\textit{Relative spread}_{jt}) = \alpha_t + \beta_{1t}\ln(\textit{volume}_{jt}) + \beta_{2t}\ln(\textit{midspread}_{jt}) + \beta_{3t}\ln(\textit{volatility}_{jt}) + \beta_{4t}\ln(\textit{bid/offer}_{jt})$$

t-statistics for the coefficient estimates appear in parentheses. The last three lines of the table give a summary of the number of times each coefficient is significantly different from zero at at least the 1%, 5% or 10% level over the forty day period.

Table 3-5. Daily cross-sectional regressions of relative spread on factors known to affect the spread and the put option stabilization proxy.

Day	Intercept	ln(Volume)	ln(Midspread)	ln(Volatility)	ln(1 + put option value)	*N*	*Adj. R^2*
1	-1.559 (-7.731)	-0.066 (-4.370)	-0.558 (-8.784)	0.173 (4.165)	-0.192 (-2.242)	216	0.530
2	-2.230 (-10.470)	-0.014 (-0.760)	-0.569 (-8.808)	0.149 (3.571)	-0.197 (-2.381)	212	0.471
3	-1.847 (-7.013)	-0.065 (-3.115)	-0.428 (-5.611)	0.187 (3.775)	-0.157 (-1.626)	211	0.346
4	-1.652 (-7.191)	-0.086 (-4.546)	-0.528 (-7.003)	0.135 (2.839)	0.024 (0.266)	214	0.414
5	-1.855 (-9.625)	-0.063 (-3.918)	-0.533 (-8.016)	0.139 (3.394)	-0.038 (-0.478)	210	0.477
6	-1.856 (-7.776)	-0.090 (-4.285)	-0.481 (-6.264)	0.107 (2.202)	0.028 (0.299)	207	0.361
7	-2.088 (-10.141)	-0.048 (-2.481)	-0.603 (-9.112)	0.067 (2.657)	0.018 (0.280)	206	0.422
8	-2.073 (-8.902)	-0.069 (-3.033)	-0.561 (-8.222)	0.052 (1.957)	0.061 (0.866)	203	0.372
9	-2.010 (-8.998)	-0.042 (-2.231)	-0.621 (-9.384)	0.086 (2.713)	0.009 (0.138)	206	0.416
10	-1.873 (-8.407)	-0.062 (-3.264)	-0.635 (-9.401)	0.071 (2.195)	0.049 (0.710)	207	0.416
15	-1.184 (-4.765)	-0.093 (-5.082)	-0.405 (-5.525)	0.259 (5.175)	-0.232 (-3.554)	206	0.471
20	-1.651 (-6.002)	-0.029 (-1.347)	-0.549 (-6.857)	0.211 (3.855)	-0.153 (-2.221)	200	0.430
25	-1.543 (-6.317)	-0.070 (-3.552)	-0.594 (-8.080)	0.140 (2.763)	-0.019 (-0.312)	201	0.463
30	-1.630 (-5.641)	-0.070 (-3.453)	-0.541 (-6.613)	0.137 (2.430)	-0.043 (-0.658)	202	0.355
Total 1%	40	33	40	30	1		
Total 5%	40	36	40	37	4		
Total 10%	40	38	40	39	4		

The logarithm of the daily closing relative spread is regressed cross-sectionally on the respective logarithms of daily share ***volume***, closing ***midspread***, calculated as (closing bid + closing ask)/2, ***volatility***, calculated on a rolling basis similar to Hanley, Kumar and Seguin (1993) and ***(1+put option)*** for each issue. Coefficients are estimated for each of days 1-40 from regressions of the form:

$$\ln(\textit{Relative spread}_{jt}) = \alpha_t + \beta_{1t}\ln(\textit{volume}_{jt}) + \beta_{2t}\ln(\textit{midspread}_{jt}) + \beta_{3t}\ln(\textit{volatility}_{jt}) + \beta_{4t}\ln(1 + \textit{put option}_{jt})$$

t-statistics for the coefficient estimates appear in parentheses. The last three lines of the table give a summary of the number of times each coefficient is significantly different from zero at at least the 1%, 5% or 10% level over the forty day period.

Table 3-6: Overallotment Option Frequency Distribution

OAO Range	Frequency	Percent	Cumulative %
0.000	124	68.9	68.9
0.001 < 0.025	0	0.0	68.9
0.025 < 0.050	3	1.7	70.6
0.050 < 0.075	5	2.8	73.3
0.075 < 0.100	10	5.6	78.9
0.100 < 0.125	21	11.7	90.6
0.125 < 0.150	3	1.7	92.2
0.150	14	7.8	100.00
Total	180	100.00	

Table 3-7

Characteristics of IPOs With/Without an Overallotment Option			
	OAO Mean	No-OAO Mean	*p-value*
Offer Price ($)	9.187	9.608	0.280
Opening Price ($)	9.475	9.974	0.244
Shares Issued	4,909,380	4,470,961	0.384
Offer Size ($)	55,036,638	48,087,932	0.345
Under Open (%)	3.497	5.018	0.209
Volume Day1	283,788	203,603	0.216
Fee (%)	6.261	5.972	0.050

A sample of 180 Toronto Stock Exchange initial public offerings are examined for the period 1984-1993. For each issue a final prospectus was available and the sample was split according to whether an issue contained an overallotment option (56) or not (124). Underpricing is calculated from the offer price to the opening price on the first day of secondary market trading. Volume Day1 is the number of shares traded on the first day. The fee is the underwriter's spread expressed as a percentage of the offer price. One-sided *t*-tests were conducted for the difference between means and the corresponding *p-value* is reported. Apart from the *t*-tests for the difference between means for the percentage of underpricing and for volume, prior *F*-tests could not reject the hypotheses of equal variances between the two samples for each of the other variables considered.

Table 3-8
Ordinary and Adjusted Mean Returns With/Without an Overallotment Option

	OAO Returns: 56 issues			No-OAO Returns: 124 issues		
	Ordinary mean	Tobit mean	Difference in means	Ordinary mean	Tobit mean	Difference in means
1 Day	3.933 (3.089)	-2.003 (-0.734)	5.936	3.860 (2.452)	-2.257 (-0.894)	6.117
5 Day	4.997 (2.484)	-1.429 (-0.400)	6.426	3.474 (2.101)	-2.585 (-0.959)	6.059
10 Day	4.601 (2.052)	-1.433 (-0.374)	6.034	3.386 (1.954)	-1.614 (-0.604)	5.000
15 Day	4.916 (1.775)	0.979 (0.245)	3.937	3.439 (1.917)	-0.289 (-0.111)	3.728
20 Day	7.123 (2.414)	2.701 (0.632)	4.422	3.267 (2.008)	0.611 (0.226)	2.656
40 Day	11.176 (2.974)	6.449 (1.254)	4.727	5.290 (2.462)	-1.795 (-0.470)	7.085
60 Day	11.580 (2.529)	7.611 (1.281)	3.969	7.820 (2.922)	-1.013 (-0.222)	8.833

Notes: Returns are calculated from the offer price to the price at the end of the day shown in the first column for each issue depending on whether there was an overallotment option granted or not. Mean returns are then computed cross-sectionally at each point in time and *t*-test values are included in parentheses for the hypothesis that the respective mean is equal to zero. In addition, differences between ordinary and adjusted means for the OAO sample and the No-OAO sample are computed. Differences between the two sample differences are not significantly different from each other at both 5% and 10% levels.

Table 3-9: Correlation between underwriter rankings over different time intervals

Years	84-93	84-88	85-89	86-90	87-91	88-92
84-88	0.85					
85-89	0.83	0.95				
86-90	0.83	0.93	0.98			
87-91	0.79	0.82	0.87	0.91		
88-92	0.75	0.64	0.69	0.74	0.85	
89-93	0.85	0.57	0.63	0.66	0.71	0.78

Table 3-10: Ordinary least squares regression results for the sample of 180 IPOs over the period from 1984-1993 are reported in this table.

	Regression					
	1	2	3	4	5	6
Intercept	15.188 (0.0001)	14.938 (0.0001)	16.392 (0.0001)	15.383 (0.0001)	14.433 (0.0001)	16.257 (0.0001)
lnoffer	-0.590 (0.0001)	-0.542 (0.0001)	-0.629 (0.0001)	-0.603 (0.0001)	-0.531 (0.0001)	-0.628 (0.0001)
demand	0.016 (0.3524)			0.016 (0.3783)		0.017 (0.3392)
oaoprcnt	0.027 (0.0149)	0.032 (0.0032)	0.030 (0.0073)	0.057 (0.0316)	0.064 (0.0154)	0.054 (0.0412)
rank	0.036 (0.0143)		-0.010 (0.6819)	0.034 (0.0216)	0.035 (0.0165)	-0.010 (0.6699)
synd	0.067 (0.1056)		0.053 (0.1982)	0.063 (0.1301)		0.049 (0.2387)
retstdev	0.096 (0.0125)		-0.035 (0.5942)	0.112 (0.0057)	0.106 (0.0092)	-0.015 (0.8307)
oao*std				-0.009 (0.2097)	-0.011 (0.1560)	-0.007 (0.3163)
rank*std		0.009 (0.0001)	0.012 (0.0186)			0.011 (0.0246)
Adj. R^2	0.527	0.543	0.539	0.528	0.525	0.539

Notes: The dependent variable is the underwriter fee (percentage). Lnoffer is the log of the offer price. Demand is a variable that represents the number of issues that were offered in the same month. Oaoprcnt is the overallotment option expressed as a percentage of the number of shares offered and ranges from 0 to 15. Rank is a measure of underwriter reputation. The higher the rank the lower the reputation. Synd is the number of members in the underwriting syndicate. Retstdev is the standard deviation of daily returns over the first sixty days of secondary market trading. Oao*std captures the interaction between the overallotment option percentage and the standard deviation of returns. Rank*std is the interaction between underwriter reputation and the standard deviation of returns. The slope coefficient estimates (*p-values*) are reported in the table.

Table 4-1. IPO Fee Frequency Distribution and Descriptive Statistics.
The tables below give freqency distributions and descriptive statistics for fees charged by underwriters for common equity IPOs that listed on the TSE in the period 1984-1997.

IPO Fee Frequency Distribution

Fee Range	Frequency	Percentage
< 5.00%	18	5.45%
= 5.00%	31	9.39%
5.01-5.99%	43	13.03%
= 6.00%	93	28.18%
6.01 - 6.99%	97	29.39%
= 7.00%	21	6.36%
> 7.00%	27	8.18%

IPO Fee Descriptive Statistics

Minimum	2.50%
25%	5.75%
Mean	6.09%
Median	6.00%
Mode	6.00%
75%	6.50%
Max	11.00%
SD	0.99%
Skewness	0.46
Kurtosis	4.67

Table 4-2. IPOs by Year, Offer Size, and Underwriter Fee, 1984-1997.
The table below gives a breakdown of the number and percentage of common equity IPOs that listed on the TSE in the period 1984-1997 according to fee range and issue size.

	Below $10 Million				$10 - 50 Million				Above $50 Million				All			
Year	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All
1984, 1985	0	0	5	5	1	3	3	7	2	2	0	4	3 (18.8%)	5 (31.3%)	8 (50.0%)	16
1986	0	1	7	8	3	11	20	34	13	0	0	13	16 (29.1%)	12 (21.8%)	27 (49.1%)	55
1987	0	1	4	5	3	2	6	11	6	1	1	8	9 (37.5%)	4 (16.7%)	11 (45.8%)	24
1988, 1989, 1990	0	1	0	1	2	0	3	5	4	0	1	5	6 (54.5%)	1 (9.1%)	4 (36.4%)	11
1991, 1992	0	0	0	0	8	3	2	13	5	0	0	5	13 (72.2%)	3 (16.7%)	2 (11.1%)	18
1993	0	2	4	6	2	21	25	48	12	3	0	15	14 (20.3%)	26 (37.7%)	29 (42.0%)	69
1994	0	3	7	10	2	12	8	22	7	1	0	8	9 (22.5%)	16 (40.0%)	15 (37.5%)	40
1995	0	0	2	2	0	5	7	12	1	0	0	1	1 (6.7%)	5 (33.3%)	9 (60.0%)	15
1996	0	0	5	5	1	10	19	30	8	1	0	9	9 (20.5%)	11 (25.0%)	24 (54.5%)	44
1997	0	3	3	6	1	5	12	18	11	2	1	14	12 (26.3%)	10 (26.3%)	16 (42.1%)	38
Totals	0	11	37	48	23	72	105	200	69	10	3	82	92 (27.9%)	93 (28.2%)	145 (43.9%)	330

Table 4-2a. Underpriced IPOs by Year, Offer Size, and Underwriter Fee, 1984-1997.

The table below gives a breakdown of the number and percentage of underpriced common equity IPOs that listed on the TSE in the period 1984-1997 according to fee range and issue size. An IPO is said to be underpriced if the price at the start of secondary market trading exceeds that of the original offer price.

	Below $10 Million				$10 - 50 Million				Above $50 Million				All			
Year	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All
1984, 1985	0	0	2	2	0	3	0	3	1	0	0	1	1 (16.7%)	3 (50.0%)	2 (33.3%)	6
1986	0	1	6	7	0	5	13	18	8	0	0	8	8 (24.2%)	6 (18.2%)	19 (57.6%)	33
1987	0	1	2	3	2	1	1	4	2	0	1	3	4 (40.0%)	2 (20.0%)	4 (40.0%)	10
1988, 1989, 1990	0	0	0	0	0	0	0	0	0	0	1	1	0 (0.0%)	0 (0.0%)	1 (100.0%)	1
1991, 1992	0	0	0	0	2	2	1	5	3	0	0	3	5 (62.5%)	2 (25.0%)	1(12.5%)	8
1993	0	2	3	5	1	12	14	27	7	2	0	9	8 (19.5%)	16 (34.0%)	17 (41.5%)	41
1994	0	3	4	7	1	2	2	5	2	0	0	2	3 (21.4%)	5 (35.7%)	6 (42.9%)	14
1995	0	0	2	2	0	2	5	7	0	0	0	0	0 (0.0%)	2 (22.2%)	7 (77.8%)	9
1996	0	0	5	5	0	6	11	17	6	1	0	7	6 (20.7%)	7 (24.1%)	16 (55.2%)	29
1997	0	3	2	5	1	4	5	10	5	1	1	7	6 (27.3%)	8 (36.4%)	8 (36.4%)	22
Totals	0	10	26	36	7	37	52	96	34	4	3	41	41 (23.7%)	51 (29.5%)	81 (46.8%)	173

Table 4-2b. Non-Underpriced IPOs by Year, Offer Size, and Underwriter Fee, 1984-1997.

The table below gives a breakdown of the number and percentage of non-underpriced common equity IPOs that listed on the TSE in the period 1984-1997 according to fee range and issue size. An IPO is said to be non-underpriced if the price at the start of secondary market trading is less than or equal to that of the original offer price.

	Below $10 Million				$10 - 50 Million				Above $50 Million				All			
Year	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All	< 6%	6%	> 6%	All
1984, 1985	0	0	3	3	1	0	3	4	1	2	0	3	2 (20.0%)	2 (20.0%)	6 (60.0%)	10
1986	0	0	1	1	3	6	7	16	5	0	0	5	8 (36.4%)	6 (27.3%)	8 (36.4%)	22
1987	0	0	2	2	1	1	5	7	4	1	0	5	5 (35.7%)	2 (14.3%)	7 (50.0%)	14
1988, 1989, 1990	0	1	0	1	2	0	3	5	4	0	0	4	6 (60.0%)	1 (10.0%)	3 (30.0%)	10
1991, 1992	0	0	0	0	6	1	1	8	2	0	0	2	8 (80.0%)	1 (10.0%)	1 (10.0%)	10
1993	0	0	1	1	1	9	11	21	5	1	0	6	6 (21.4%)	10 (35.7%)	12 (42.9%)	28
1994	0	0	3	3	1	10	6	17	5	1	0	6	6 (21.4%)	10 (35.7%)	12 (42.9%)	28
1995	0	0	0	0	0	3	2	5	1	0	0	1	1 (16.7%)	3 (50.0%)	2 (33.3%)	6
1996	0	0	0	0	1	4	8	13	2	0	0	2	3 (20.0%)	4 (26.7%)	8 (53.3%)	15
1997	0	0	1	1	0	1	7	8	6	1	0	7	6 (37.5%)	2 (12.5%)	8 (50.0%)	16
Totals	0	1	11	12	16	35	53	104	35	6	0	41	51 (32.5%)	42 (25.8%)	64 (40.8%)	157

Table 4-3. Average IPO Fees by Year and Offer Size, 1984-1997.
Equally weighted and value weighted (by issue size) fees are illustrated for small (less than $10 million), medium ($10-50 million) and large (more than $50 million) TSE IPOs for selected time intervals in the period 1984-1997. The number of IPOs in each category is shown as well as the standard deviation (in parentheses).

	Small IPOs		**Medium IPOs**		**Large IPOs**		**All IPOs**	
Year	VW Fee	EW Fee	VW Fee	EW Fee	VW Fee	EW Fee	VW Fee	EW Fee
1984 - 1987	7.64	7.73 (1.31) 18	6.17	6.28 (0.49) 52	5.20	5.24 (0.75) 25	5.54	6.28 (1.13) 95
1988 - 1993	6.38	6.36 (0.38) 7	5.90	6.04 (0.94) 66	4.66	5.10 (0.75) 25	4.94	5.82 (0.96) 98
1994 - 1997	6.80	6.89 (0.92) 23	6.25	6.27 (0.67) 82	5.05	5.31 (0.50) 32	5.37	6.15 (0.86) 137

Table 4-4. Test of Independence Between IPO Fee Size and Time for Medium Sized Issues.
A chi square test of independence between fee size and time period based on observed frequencies listed below is conducted for medium IPOs ($10-50 million) that listed on the TSE in the period 1984-1997.

Observed Frequencies

Year/Fee	< 6%	6%	> 6%	Row Totals
1984-1990	9	16	32	57
1991-1997	14	56	73	143
Column Totals	23	72	105	200

$\chi^2 = 2.87 < \chi^2_{.05,2} = 5.99$

Table 4-5. TSE IPO Syndicate Participation by Leading Canadian Underwriters.
The table indicates the number of IPO syndicates in which each underwriter participated in the five year period from 1993-1997.

Underwriter	Syndicates - All IPOs	Syndicates - Medium IPOs
RBC Dominion	101	49
Midland Walwyn	89	56
Nesbitt Burns	86	45
CIBC Wood Gundy	79	41
ScotiaMcleod	65	39
First Marathon	53	31
Gordon Capital	37	21
Levesque Beaubien Geoffrion	34	19
Marleau Lemire	32	25
Toronto Dominion	26	8
Yorkton	24	17
Other	165	73
Total	791	424

Table 4-6. Mean Fee for Medium TSE IPOs by Brokerage Firm, 1993-1997.

This table lists average fees charged by eleven prominent Canadian brokerage firms for the common equity IPOs that they participated in that subsequently listed on the TSE in the period 1993-97. The dagger (†) and asterisk (*) indicate the only two pairs of average fees that were significantly different from each other at less than the 5% level.

Underwriter	Mean Fee %
RBC Dominion	6.201
Midland Walwyn	6.254
Nesbitt Burns	6.136 †
CIBC Wood Gundy	6.280
ScotiaMcleod	6.167 *
First Marathon	6.228
Gordon Capital	6.421
Levesque Beaubien Geoffrion	6.254
Marleau Lemire	6.400
Toronto Dominion	6.663 * †
Yorkton	6.375

Table 4-7. Tests of Significance for the Difference in Proportion of Fees at 6%.

The table below contains *p*-values for two-sided paired *t*-tests for the difference in the proportion of fees at 6% for eleven prominent Canadian underwriters of medium sized ($10-50 million) IPOs that listed on the TSE in the period 1993-1997.

Firm	TD Securities	Marleau Lemire	Levesque Beaubien Geoffrion	Gordon Capital	First Marathon	Scotia Mcleod	CIBC Wood Gundy	Nesbitt Burns	Midland Walwyn	RBC Dominion
Yorkton Securities	0.3341	0.9167	0.9228	0.8239	0.0684	0.1174	0.6065	0.0906	0.3515	0.3067
TD Securities		0.3603	0.2656	0.2147	0.0065	0.0122	0.1152	0.0083	0.0508	0.0412
Marleau Lemire			0.8263	0.7200	0.0331	0.0628	0.4819	0.0440	0.2422	0.2025
Levesque Beaubien Geoffrion				0.8903	0.0490	0.0924	0.6401	0.0658	0.3401	0.2882
Gordon Capital					0.0585	0.1112	0.7479	0.0791	0.4075	0.3470
First Marathon						0.6616	0.0440	0.7341	0.1380	0.1609
Scotia Mcleod							0.0998	0.8945	0.2825	0.3282
CIBC Wood Gundy								0.0592	0.5123	0.4203
Nesbitt Burns									0.1949	0.2291
Midland Walwyn										0.8896

Table 4-8. Multinomial Logit Model for TSE IPO Fees Charged, 1993-1997.
Two-tailed significance at $p < .01$ is indicated by ***.

	Equation (4.1)		Equation (4.1a)	
Variable	6% Fee	> 6% Fee	6% Fee	> 6% Fee
Intercept *t*-statistic	4.493 *** 2.941	4.973 *** 3.165	3.593 *** 2.999	4.580 *** 3.699
DEMAND *t*-statistic	-0.018 -0.171	-0.054 -0.506	0.815×10^{-3} 0.008	-0.043 -0.423
REPUTE *t*-statistic	0.145 1.135	0.194 1.504	0.156 1.249	0.191 1.509
OFFER *t*-statistic	-0.637×10^{-4} *** -3.811	-0.964×10^{-4} *** -4.920	-0.723×10^{-4} *** -4.622	-0.985×10^{-4} *** -5.467
SYNDICAT *t*-statistic	-0.272 -1.046	-0.106 -0.395		
χ^2, df	155.188, 8 ***		153.311, 6 ***	
Log likelihood, Restricted log likelihood	-140.191, -217.784		-141.129, -217.784	
pseudo-R^2	0.3563		0.3520	

Eq. 4.1	Predicted			
Actual	0	1	2	Total
0	37	3	5	45
1	3	19	46	68
2	1	13	79	93
Total	41	35	130	206

Eq. 4.1a	Predicted			
Actual	0	1	2	Total
0	37	5	3	45
1	5	16	47	68
2	1	15	77	93
Total	43	36	127	206

Table 4-9. Multinomial Logit Model for TSE IPO Fees Charged, 1993-1997 with Additional Explanatory Variables. Two-tailed significance at $p < .10, .05, .01$ is indicated by *, **, ***.

	Equation (4.2)		Equation (4.2a)	
Variable	6% Fee	> 6% Fee	6% Fee	> 6% Fee
Intercept *t*-statistic	4.579 ** 2.391	3.840 * 1.943	5.307 *** 2.597	5.050 ** 2.449
DEMAND *t*-statistic	-0.334×10^{-2} -0.023	-0.343 -0.023	-0.086 -0.647	-0.089 -0.665
REPUTE *t*-statistic	0.309 * 1.654	0.374 ** 1.987	0.273 * 1.646	0.341 ** 2.043
OFFER *t*-statistic	-0.486×10^{-4} * -1.902	-0.541×10^{-4} * -1.650	-0.673×10^{-4} *** -3.387	-0.103×10^{-3} *** -4.349
SYNDICAT *t*-statistic	-0.445 -1.081	-0.015 -0.035	-0.498 -1.315	-0.171 -0.443
ME *t*-statistic	-0.623×10^{-5} -0.972	-0.233×10^{-4} *** -2.621		
BEME *t*-statistic	1.078 0.310	1.229 0.351		
EP *t*-statistic	2.189 0.456	1.322 0.269		
ZSCORE *t*-statistic	-0.663×10^{-2} -0.137	0.077 1.476		
χ^2, df	142.115, 16 ***		120.413, 8 ***	
Log likelihood, Restricted log likelihood	-93.661, -164.719		-104.513, -164.719	
pseudo-R^2	0.4314		0.3655	

Eq. 4.2	Predicted				Eq. 4.2a	Predicted			
Actual	0	1	2	Total	Actual	0	1	2	Total
0	30	1	2	33	0	27	3	3	33
1	2	23	26	51	1	3	17	31	51
2	0	12	61	73	2	0	11	62	73
Total	32	36	89	157	Total	30	31	96	157

Table 5-1. SEO Descriptive Statistics

	Shares Issued	Price	Gross $ Size	Fee %
Mean	4,396,766	15.38	58,541,144	4.45
Minimum	80,860	2.00	770,500	1.67
25%	1,500,000	5.15	10,146,875	4.00
Median	2,500,000	10.00	30,000,000	4.00
75%	4,840,000	18.56	64,650,000	5.00
Maximum	83,103,392	395.00	1,610,000,000	10.00
S.D.	6,708,426	25.83	106,466,002	0.79

Table 5-2. Resource versus Non-Resource SEOs by Year.

	Resource SEOs		**Non-Resource SEOs**	
Year	Number	Percentage	Number	Percentage
1993	52	59.1	36	40.9
1994	50	59.5	34	40.5
1995	35	60.3	23	39.7
1996	42	61.8	26	38.2
1997	69	53.5	60	46.5
Total	248	58.1	179	41.9

Table 5-3. Grouped SIC Codes in SEO Sample

SIC Major Category Description	SIC Major Category Codes	Frequency	%
Metal Mining	10	64	14.99
Oil & Gas Extraction	13	181	42.39
Lumber & Wood Products Except Furniture	24	13	3.04
Paper, Printing, Publishing & Allied Products and Industries	26, 27	15	3.51
Chemicals, Rubber & Plastic Products	28, 30	10	2.34
Primary Metal Ind., Fabricated Metal Products Except Machinery	33, 34, 37	17	3.98
Electronic & Other Electrical and Computer Equipment	35, 36	25	5.85
Transportation Related Except Equipment	40, 42, 45	7	1.64
Communications	48	8	1.87
Wholesale Trade-durable Goods & Miscellaneous Retail	50, 53, 54, 59	11	2.58
Financial Institutions & Insurance Carriers	60, 61, 63	11	2.58
Real Estate	65	11	2.58
Holding & Other Investment Offices	67	12	2.81
Personal, Business, Amusement & Health Services	72, 73, 79, 80	21	4.92
All Others	14, 20, 32, 38, 49, 70, 75, 78, 87, 99	21	4.92
Totals		427	100.00

Table 5-4. SEO Purpose and Terms of Offering

Annual frequencies appear in the upper triangle while annual percentages appear in the lower triangle.

	Purpose of Offering						Terms of Offering			
Year	Acquisition/ Investment	Capital Expenditure	Debt Reduction	Exploration/ Development/ Production	General Corporate	Working Capital	Best Efforts	Bought Deal	Firm Commitment	Other/ Unknown
1993	16 18.2	14 15.9	23 26.1	22 25.0	7 8.0	6 6.8	6 6.8	28 31.8	54 61.4	0 0.0
1994	14 16.7	8 9.5	18 21.4	32 38.1	4 4.8	8 9.5	8 9.5	26 31.0	48 57.1	2 2.4
1995	8 13.8	7 12.1	13 22.4	21 36.2	3 5.2	6 10.3	18 31.0	17 29.3	23 39.7	0 0.0
1996	12 17.6	8 11.8	11 16.2	21 30.9	6 8.8	10 14.7	3 4.4	30 44.1	35 51.5	0 0.0
1997	45 34.9	12 9.3	19 14.7	36 27.9	7 5.4	10 7.8	16 12.4	57 44.2	55 42.6	1 0.8
Total	95	49	84	132	27	40	51	158	215	3

Table 5-5. Breakdown of Public and Private Resource and Non-Resource Based SEOs by Year

	Public SEOs						Private Placement SEOs					
Year ↓	Resource	% Public SEOs/Yr	% All SEOs/Yr	Non-Resource	% Public SEOs/Yr	% All SEOs/Yr	Resource	% Private SEOs/Yr	% All SEOs/Yr	Non-Resource	% Private SEOs/Yr	% All SEOs/Yr
1993	27	52.94	30.68	24	47.06	27.27	25	67.57	28.41	12	32.43	13.64
1994	21	50.00	25.00	21	50.00	25.00	29	69.05	34.52	13	30.95	15.48
1995	20	66.67	34.48	10	33.33	17.24	15	53.57	25.86	13	46.43	22.41
1996	31	62.00	45.59	19	38.00	27.94	11	61.11	16.18	7	38.89	10.29
1997	33	45.83	25.58	39	54.17	30.23	36	63.16	27.91	21	36.84	16.28
Totals	132	53.88	30.91	113	46.12	26.46	116	63.74	27.17	66	36.26	15.46

Table 5-6. Public and Private Resource and Non-resource SEO Volume Ratios

Ratios for each company on each event day are compared to their respective average over days [-100,-11]. Means are then tested for significance.

Event Day	Public Resource SEOs (*N*=132) %>1	S.D.	Mean	*t*-test	*p*-value	Sign test	*p*-value	Public Non-Resource SEOs (*N*=113) %>1	S.D.	Mean	*t*-test	*p*-value	Sign test	*p*-value
-5	34.85	2.21	1.28	1.445	0.151	-3.482	0.000	24.78	1.98	1.09	0.484	0.629	-5.362	0.000
-4	31.82	3.55	1.47	1.522	0.130	-4.178	0.000	29.20	2.00	1.25	1.296	0.198	-4.421	0.000
-3	42.42	1.54	1.26	1.925	0.056	-1.741	0.082	30.09	3.35	1.52	1.634	0.105	-4.233	0.000
-2	41.67	3.17	1.64	2.303	0.023	-1.915	0.056	32.74	3.40	1.54	1.685	0.095	-3.669	0.000
[-1,1]	62.12	3.25	2.36	4.809	0.000	2.785	0.005	57.52	4.79	2.73	3.822	0.000	1.599	0.110
2	31.82	1.55	1.15	1.105	0.271	-4.178	0.000	38.05	2.27	1.38	1.780	0.078	-2.540	0.011
3	39.39	4.11	1.72	2.021	0.045	-2.437	0.015	41.59	4.19	1.96	2.429	0.017	-1.787	0.074
4	27.27	1.25	0.95	-0.449	0.654	-5.222	0.000	37.17	2.44	1.37	1.615	0.109	-2.728	0.006
5	33.33	2.40	1.36	1.708	0.090	-3.830	0.000	40.71	2.69	1.64	2.504	0.014	-1.976	0.048

Event Day	Private Resource SEOs (*N*=116) %>1	S.D.	Mean	*t*-test	*p*-value	Sign test	*p*-value	Private Non-Resource SEOs (*N*=66) %>1	S.D.	Mean	*t*-test	*p*-value	Sign test	*p*-value
-5	25.86	3.29	1.43	1.397	0.165	-5.199	0.000	36.36	2.01	1.45	1.805	0.076	-2.216	0.027
-4	30.17	3.29	1.48	1.568	0.120	-4.271	0.000	34.85	3.52	1.83	1.913	0.060	-2.462	0.014
-3	31.03	4.14	1.53	1.383	0.169	-4.085	0.000	46.97	6.04	2.80	2.419	0.018	-0.492	0.622
-2	36.21	3.21	1.54	1.809	0.073	-2.971	0.003	40.91	6.83	2.91	2.274	0.026	-1.477	0.140
[-1,1]	46.55	3.74	2.27	3.660	0.000	-0.743	0.458	56.06	3.86	3.07	4.359	0.000	0.985	0.325
2	27.59	4.16	1.45	1.160	0.248	-4.828	0.000	43.94	2.96	2.06	2.917	0.005	-0.985	0.325
3	31.03	2.57	1.25	1.059	0.292	-4.085	0.000	36.36	4.04	2.20	2.409	0.019	-2.216	0.027
4	18.97	3.83	1.07	0.196	0.845	-6.685	0.000	30.30	2.57	1.50	1.573	0.121	-3.200	0.001
5	25.00	1.35	0.90	-0.811	0.419	-5.385	0.000	31.82	1.73	1.12	0.584	0.561	-2.954	0.003

Table 5-7. Public and Private Resource and Non-resource SEO Number of Trades Ratios

Ratios for each company on each event day are compared to their respective average over days [-100,-11]. Means are then tested for significance.

	Public Resource SEOs (N=132)							Public Non-Resource SEOs (N=113)						
Event Day	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value
-5	49.24	0.96	1.29	3.437	0.001	-0.174	0.862	53.10	0.92	1.26	2.963	0.004	0.659	0.510
-4	65.15	1.56	1.51	3.741	0.000	3.482	0.000	50.44	1.06	1.30	3.045	0.003	0.094	0.925
-3	57.58	1.45	1.54	4.258	0.000	1.741	0.082	46.02	1.22	1.29	2.573	0.011	-0.847	0.397
-2	56.82	1.58	1.56	4.089	0.000	1.567	0.117	47.79	1.31	1.37	3.017	0.003	-0.470	0.638
[-1,1]	71.21	4.08	2.24	3.483	0.001	4.874	0.000	69.03	1.47	1.84	6.044	0.000	4.045	0.000
2	55.30	1.86	1.66	4.068	0.000	1.219	0.223	61.06	1.28	1.59	4.895	0.000	2.352	0.019
3	54.55	1.99	1.59	3.407	0.001	1.044	0.296	63.72	1.17	1.56	5.048	0.000	2.916	0.004
4	53.79	1.35	1.35	2.946	0.004	0.870	0.384	53.10	1.29	1.48	3.982	0.000	0.659	0.510
5	52.27	1.51	1.37	2.786	0.006	0.522	0.602	59.29	1.52	1.47	3.319	0.001	1.976	0.048

	Private Resource SEOs (N=116)							Private Non-Resource SEOs (N=66)						
Event Day	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value
-5	42.24	1.28	1.22	1.835	0.069	-1.671	0.095	51.52	2.16	1.81	3.052	0.003	0.246	0.806
-4	48.28	1.56	1.32	2.189	0.031	-0.371	0.710	50.00	3.11	1.91	2.376	0.020	0.000	1.000
-3	49.14	3.44	1.59	1.845	0.068	-0.186	0.853	65.15	3.38	2.28	3.070	0.003	2.462	0.014
-2	39.66	4.76	1.78	1.765	0.080	-2.228	0.026	56.06	4.40	2.68	3.094	0.003	0.985	0.325
[-1,1]	43.97	1.99	1.49	2.662	0.009	-1.300	0.194	69.70	3.62	2.46	3.271	0.002	3.200	0.001
2	42.24	1.38	1.28	2.192	0.030	-1.671	0.095	54.55	3.47	2.09	2.543	0.013	0.739	0.460
3	46.55	1.68	1.30	1.906	0.059	-0.743	0.458	60.61	2.88	1.89	2.498	0.015	1.723	0.085
4	40.52	0.93	1.05	0.523	0.602	-2.043	0.041	51.52	1.34	1.38	2.333	0.023	0.246	0.806
5	40.52	1.06	1.09	0.867	0.388	-2.043	0.041	51.52	2.60	1.76	2.386	0.020	0.246	0.806

Table 5-8. Public and Private Resource and Non-resource SEO Amortized Spread Ratios

Ratios for each company on each event day are compared to their respective average over days [-100,-11]. Means are then tested for significance.

Event Day	Public Resource SEOs (N=130)							Public Non-Resource SEOs (N=111)						
	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value
-5	30.77	2.71	1.21	0.904	0.368	-4.385	0.000	25.23	2.48	1.11	0.470	0.640	-5.220	0.000
-4	31.54	6.35	1.80	1.441	0.152	-4.210	0.000	27.03	1.93	1.16	0.879	0.381	-4.841	0.000
-3	35.38	2.26	1.29	1.450	0.150	-3.333	0.001	25.23	5.48	1.47	0.899	0.371	-5.220	0.000
-2	27.69	2.41	1.31	1.472	0.144	-5.087	0.000	22.52	3.34	1.34	1.073	0.286	-5.790	0.000
[-1,1]	52.31	2.22	1.77	3.942	0.000	0.526	0.599	45.95	3.54	2.11	3.311	0.001	-0.854	0.393
2	30.00	2.05	0.97	-0.178	0.859	-4.561	0.000	25.23	1.28	0.81	-1.567	0.120	-5.220	0.000
3	30.77	16.15	2.54	1.089	0.278	-4.385	0.000	34.23	6.42	1.84	1.384	0.169	-3.322	0.001
4	26.15	1.00	0.73	-3.058	0.003	-5.438	0.000	26.13	2.78	1.06	0.227	0.821	-5.031	0.000
5	25.38	2.21	1.13	0.670	0.504	-5.613	0.000	28.83	2.69	1.33	1.293	0.199	-4.461	0.000

Event Day	Private Resource SEOs (N=114)							Private Non-Resource SEOs (N=62)						
	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value	%>1	S.D.	Mean	t-test	p-value	Sign test	p-value
-5	23.68	2.27	1.01	0.059	0.953	-5.620	0.000	33.87	1.71	1.25	1.158	0.251	-2.540	0.011
-4	20.18	3.20	1.11	0.357	0.722	-6.369	0.000	30.65	3.80	1.68	1.402	0.166	-3.048	0.002
-3	28.95	2.87	1.12	0.452	0.652	-4.496	0.000	37.10	6.97	2.33	1.503	0.138	-2.032	0.042
-2	29.82	1.62	1.02	0.109	0.914	-4.308	0.000	25.81	4.96	1.88	1.395	0.168	-3.810	0.000
[-1,1]	38.60	4.69	2.37	3.110	0.002	-2.435	0.015	50.00	7.04	3.37	2.655	0.010	0.000	1.000
2	20.18	3.18	1.17	0.585	0.560	-6.369	0.000	33.87	1.82	1.35	1.532	0.131	-2.540	0.011
3	25.44	2.16	0.92	-0.396	0.693	-5.245	0.000	30.65	3.96	1.98	1.942	0.057	-3.048	0.002
4	15.79	3.81	1.02	0.063	0.950	-7.305	0.000	24.19	3.74	1.41	0.865	0.391	-4.064	0.000
5	18.42	1.52	0.75	-1.790	0.076	-6.743	0.000	27.42	1.57	0.91	-0.446	0.658	-3.556	0.000

Table 5-9. Public Resource and Non-resource SEO Returns
Significance at the 0.10 (0.05, 0.01) level is indicated by * (**, ***)

	Public Resource SEOs (*N*=132)				Public Non-Resource SEOs (*N*=113)			
Event Day	Mean Risk Adjusted Returns (%)	Sig	% Negative Returns	CAR	Mean Risk Adjusted Returns (%)	Sig	% Negative Returns	CAR
-5	0.545	**	42.424	0.545	-0.027		52.212	-0.027
-4	0.741	**	46.212	1.286	0.373		44.248	0.346
-3	0.997	***	42.424	2.283	0.177		52.212	0.523
-2	0.472		46.970	2.755	-0.319		48.673	0.204
-1	0.452		51.520	3.207	0.101		53.097	0.305
0	-0.936	***	61.360	2.271	-0.501	*	59.292	-0.196
1	-0.335		52.270	1.936	-0.762	***	66.372	-0.958
2	-0.131		51.515	1.805	-0.209		53.982	-1.167
3	-0.365		53.030	1.440	-0.070		53.982	-1.237
4	-0.342		57.576	1.098	-0.057		60.177	-1.294
5	0.267		45.455	1.365	0.181		46.903	-1.113

	Public Resource SEOs	Public Non-Resource SEOs
Three-day announcement return	-0.819	-1.162
t-stat	-1.180	-2.672
p-value	0.240	0.009
beta	0.923	0.684
t-stat	17.211	12.263
p-value	0.000	0.000
beta shift	0.035	0.101
t-stat	0.546	1.636
p-value	0.586	0.105

Table 5-10. Private Placement Resource and Non-resource SEO Returns
Significance at the 0.10 (0.05, 0.01) level is indicated by * (**, ***)

Event Day	Private Resource SEOs (*N*=116) Mean Risk Adjusted Returns (%)	Sig	% Positive Returns	CAR	Private Non-Resource SEOs (*N*=66) Mean Risk Adjusted Returns (%)	Sig	% Positive Returns	CAR
-5	-0.006		45.690	-0.006	0.764	*	59.091	0.764
-4	0.392		49.138	0.386	1.100	**	53.030	1.864
-3	0.461		52.586	0.847	1.072	**	57.576	2.936
-2	0.801	**	59.483	1.648	1.384	***	68.182	4.320
-1	0.149		46.600	1.797	0.578		50.000	4.898
0	-0.097		52.600	1.700	1.045	*	54.600	5.943
1	0.436		52.600	2.136	0.193		48.500	6.136
2	-0.104		46.552	2.032	-0.278		45.455	5.858
3	-0.612	**	43.966	1.420	0.353	*	50.000	6.211
4	-0.402		43.103	1.018	-0.449		42.424	5.762
5	0.208		48.276	1.226	0.343		54.545	6.105
Three-day announcement return		0.487				1.816		
t-stat		0.964				2.306		
p-value		0.337				0.024		
beta		1.001				0.568		
t-stat		12.090				6.835		
p-value		0.000				0.000		
beta shift		-0.141				0.103		
t-stat		-1.489				0.858		
p-value		0.139				0.394		

Table 5-11. Regressions to Explain SEO CARs

Three-day abnormal returns are regressed on a series of explanatory variables. The explanatory variables in the top panel include: *PreCAR*, which is the market-adjusted cumulative abnormal return for each firm in the pre-announcement period [-100, -2]; *Private*, which is a dummy variable that equals one for a private placement and is zero for a public offering; *Resource*, which is a dummy variable that equals one for a resource firm and is zero otherwise; *Internal*, which is a dummy variable that equals one if the purpose of the offering is either for capital expenditure or exploration and is zero otherwise; *External*, which is a dummy variable that equals one if the purpose of the offering is acquisition or investment and is zero otherwise; *Capstruc*, which is a dummy variable that equals one if the purpose of the offering is for debt reduction; and *Size*, which is a variable that reflects the ratio of the value of the offering to the pre-offer capitalized value of the company. In the lower panel, the two additional variables are: *Leads*, which represents the number of lead underwriters for an offering; and *Syndsize*, which represents the number of members in the syndicate that distributed the offering.

$$CAR = \beta_0 + \beta_1 PreCAR + \beta_2 Private + \beta_3 Resource + \beta_4 Internal + \beta_5 External + \beta_6 Capstruc + \beta_7 Size$$

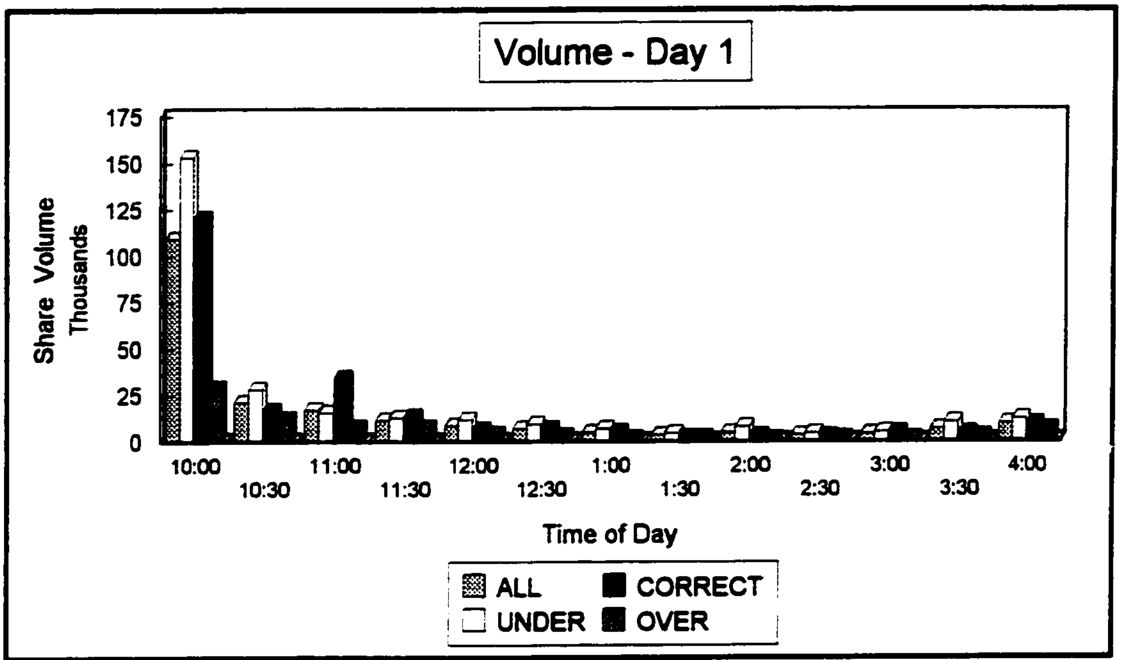
	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7
Coefficient	-0.015	0.147	0.019	-0.001	-0.004	0.009	-0.003	0.028
p-value	0.098	0.067	0.004	0.933	0.706	0.408	0.804	0.209
	Adjusted R-squared = 0.027				Regression significance = 0.011			

$$CAR = \beta_0 + \beta_1 PreCAR + \beta_2 Private + \beta_3 Resource + \beta_4 Internal + \beta_5 External + \beta_6 Capstruc + \beta_7 Size + \beta_8 Leads + \beta_9 Syndsize$$

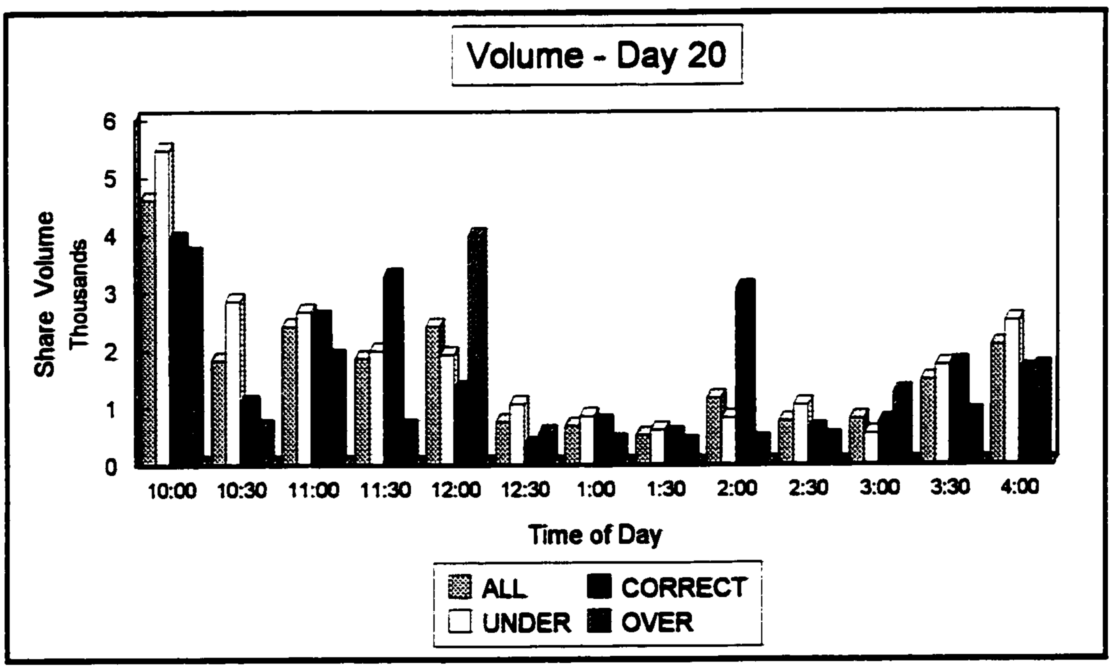
	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9
Coefficient	-0.0176	0.2074	0.0153	0.0027	-0.0154	0.0025	-0.0074	0.0276	0.0050	-0.0001
p-value	0.237	0.027	0.046	0.769	0.292	0.828	0.517	0.239	0.560	0.924
	Adjusted R- squared = 0.021					Regression significance = 0.063				

Figure 2-1. IPO Intraday Volume for Day 1 and Day 20

Panel A shows the intraday pattern of the cross-sectional mean share volume for the first day of trading by 30-minute interval for all 221 IPOs in the sample as well as the 109 underpriced, 46 correctly priced and 66 overpriced firms respectively. Panel B shows activity for Day 20.



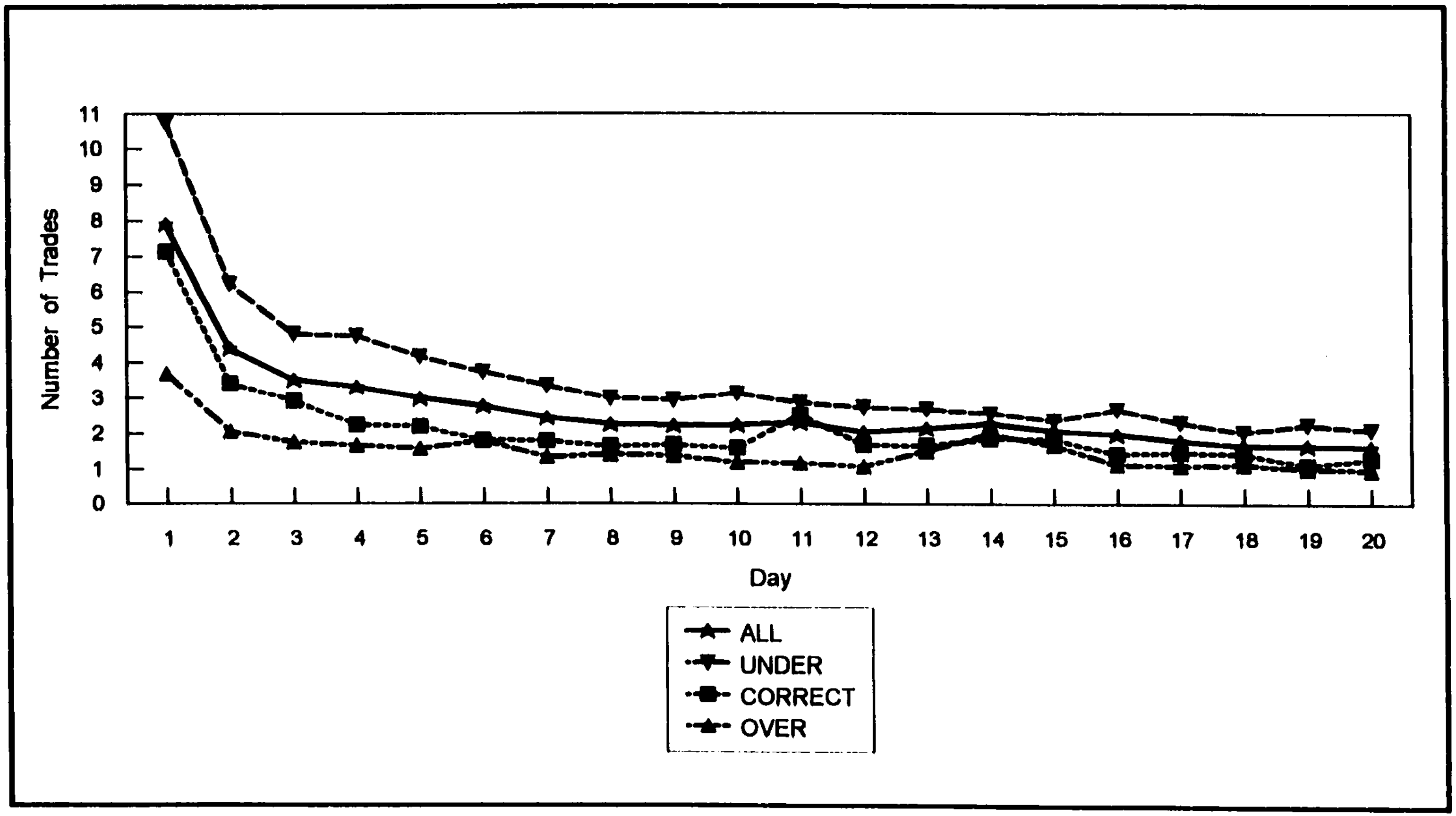
Panel A



Panel B

Figure 2-2. Number of Trades per 30 Minute Interval

The mean number of trades per 30-minute interval over the first twenty days of trading for 221 TSE IPOs is shown. The full sample is split according to whether a given issue is underpriced, correctly priced or overpriced.



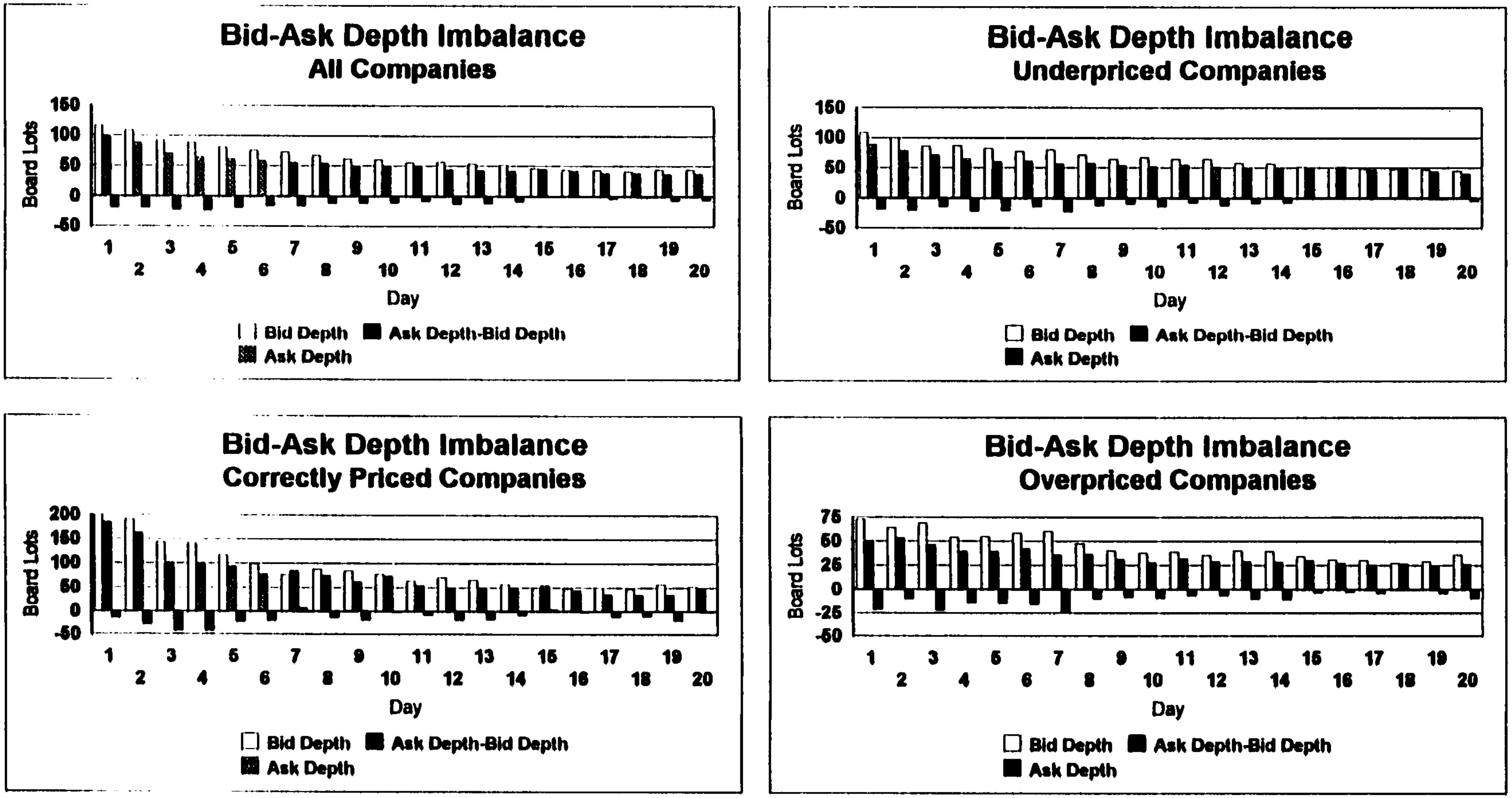
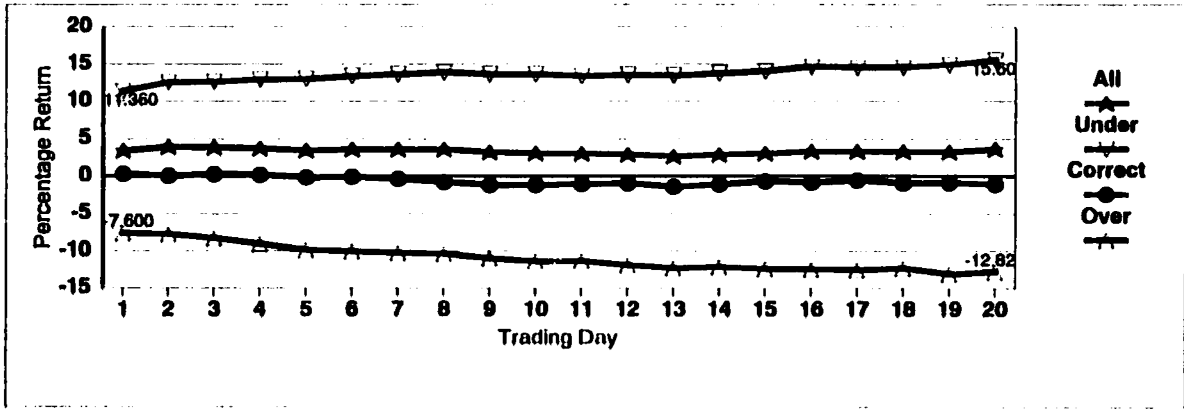


Figure 2-3. IPO Bid-Ask Depth Imbalance
The intraday bid-ask depth imbalance for 221 IPOs that listed on the TSE during the period 1984-1993 is shown. Values are cross-sectional means calculated at the end of each thirty minute interval over the first twenty days of trading according to whether each company in the sample is underpriced, correctly priced or overpriced.

Panel A: Mean Returns



Panel B: Median Returns

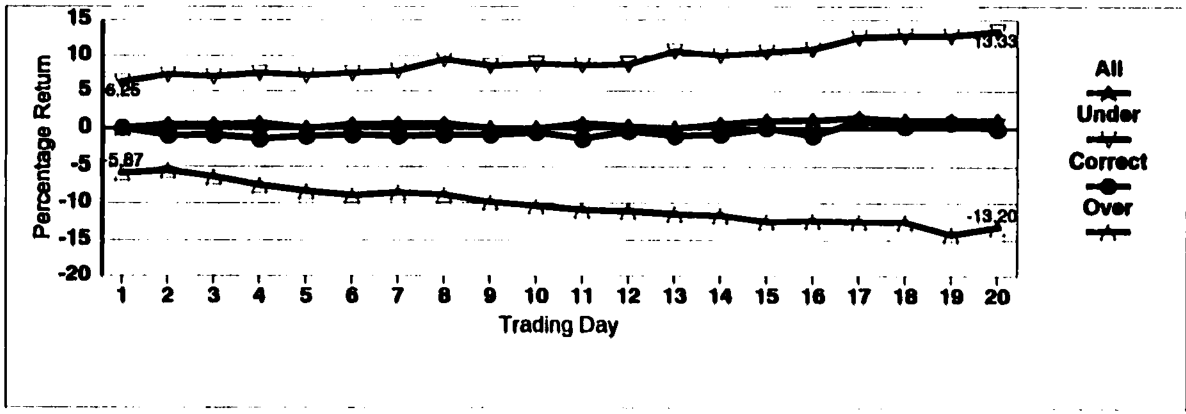
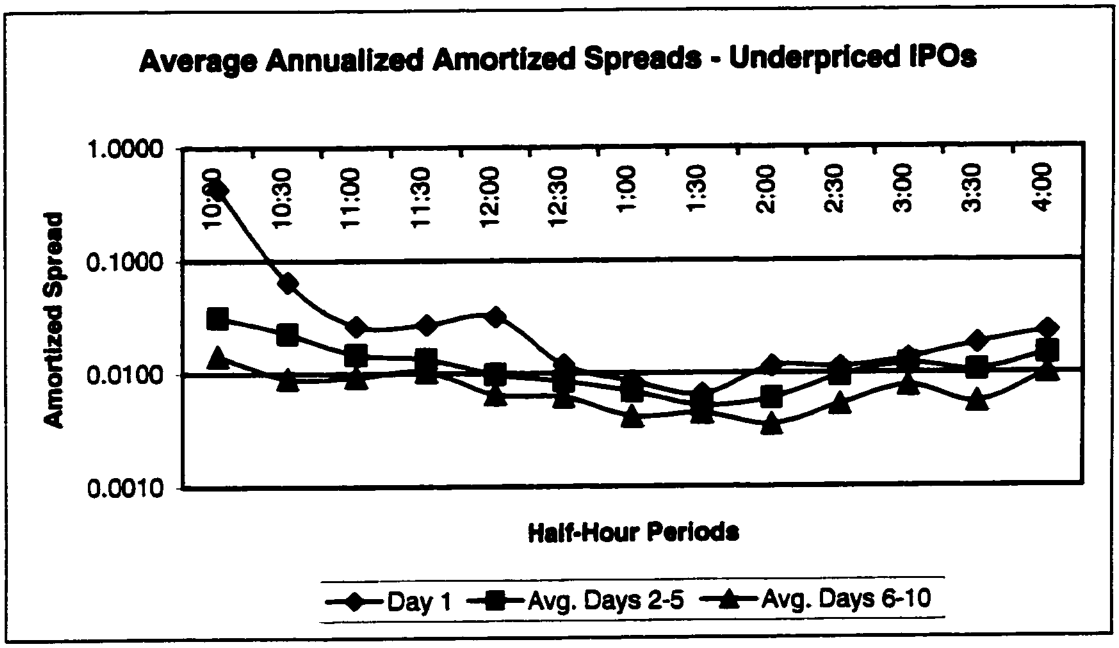


Figure 2-4. Mean and Median IPO Returns Over the First Twenty Trading Days
Panel A depicts the cross-sectional mean return patterns of 221 TSE IPOs according to whether a given issue is underpriced, correctly priced or overpriced. Returns are calculated from the offer price to the closing price in each trading day. By comparison, Panel B shows the corresponding median returns.

Figure 2-5. Annualized Amortized Spreads for Underpriced and Overpriced IPOs
The mean intraday annualized amortized spreads per 30-minute interval for TSE IPOs over the period 1984-1993 is shown. The upper (lower) plot refers to 109 underpriced (66 overpriced) issues.



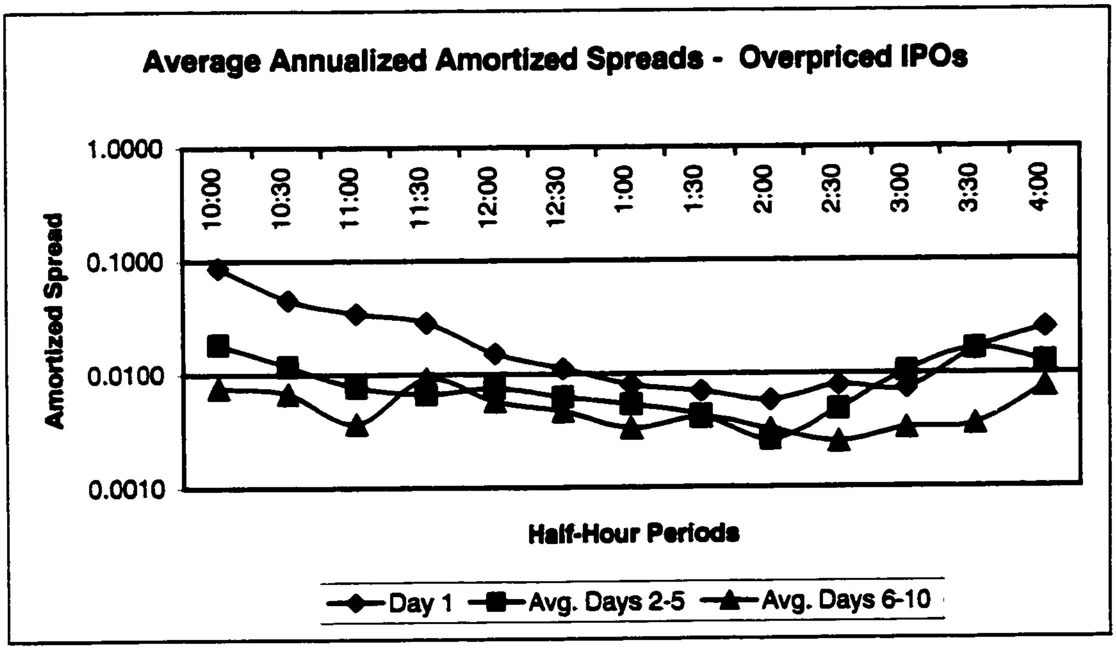


Figure 3-1. Initial return histograms of 216 TSE IPOs, 1984-1993.

Initial return histograms of TSE IPOs, 1984-1993 for different intervals are shown. Each range starts at the first indicated value and continues to, but does not include, the second. For example, the range 0:5 includes returns of 0 through 4.999 percent.

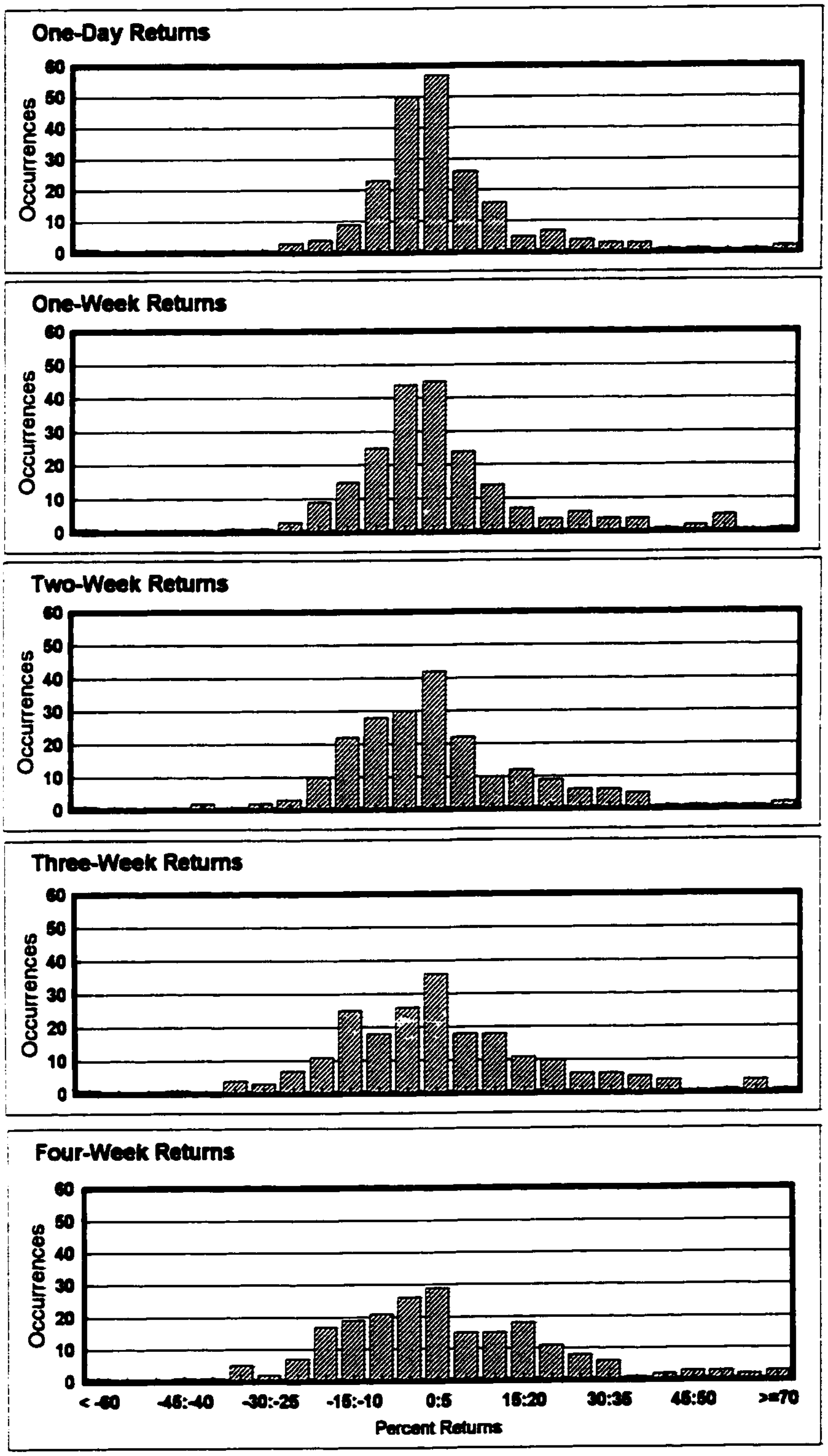


Figure 4-1. Fee Distribution for TSE IPOs 1984-1997 by Offer Size of Issue. The four charts below show the percentage of fees charged by underwriters for selected time intervals according to whether a new equity issue in terms of 1997 dollars was deemed to be small (less than $10 million), medium ($10-50 million) or large (more than $50 million).

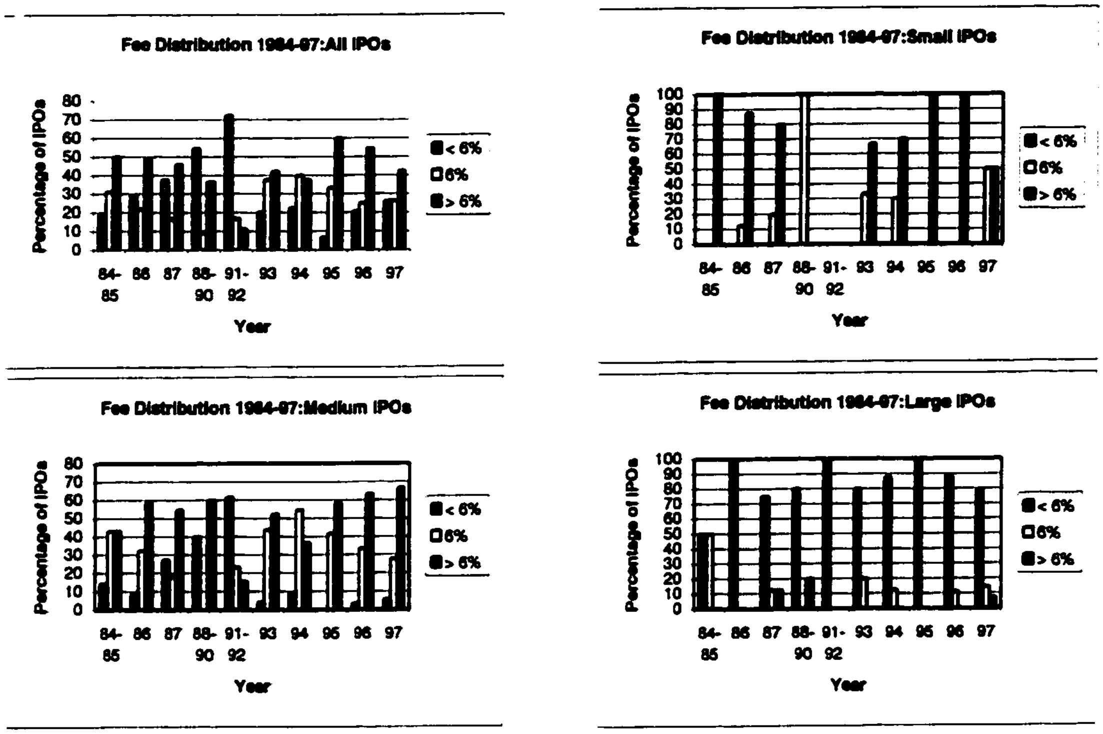
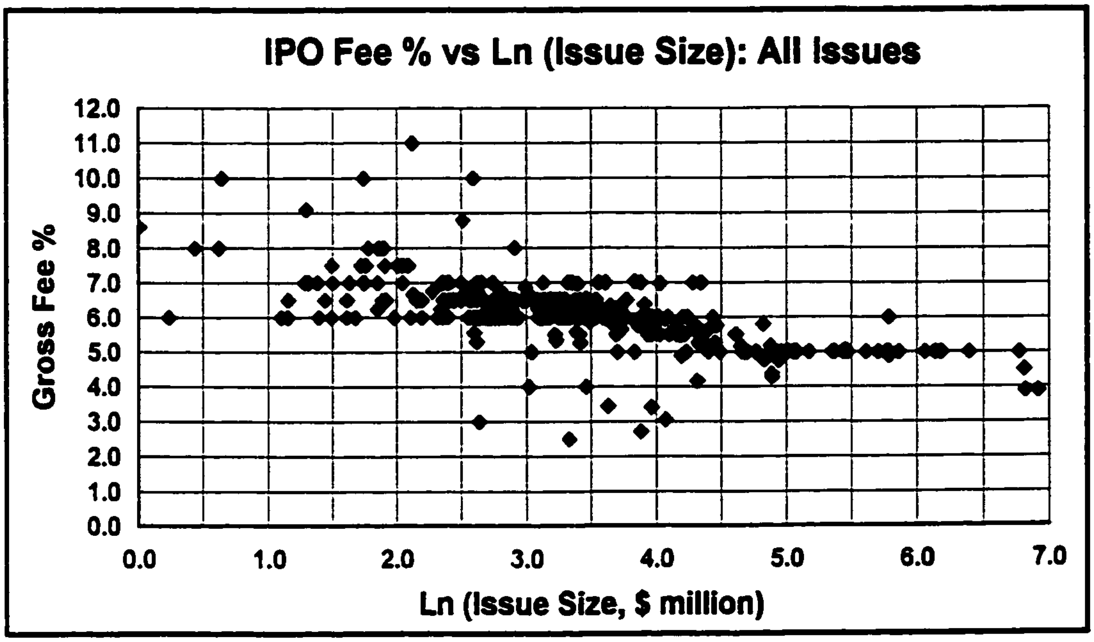


Figure 4-2. Scatter plot of TSE IPO Fees Versus Log of Issue Size 1984-1997.
The charts below show the natural log of IPO issue size expressed in millions of 1997 dollars against the fee charged by underwriters for both All issues in the period as well as only Medium sized issues ($10-50 million).



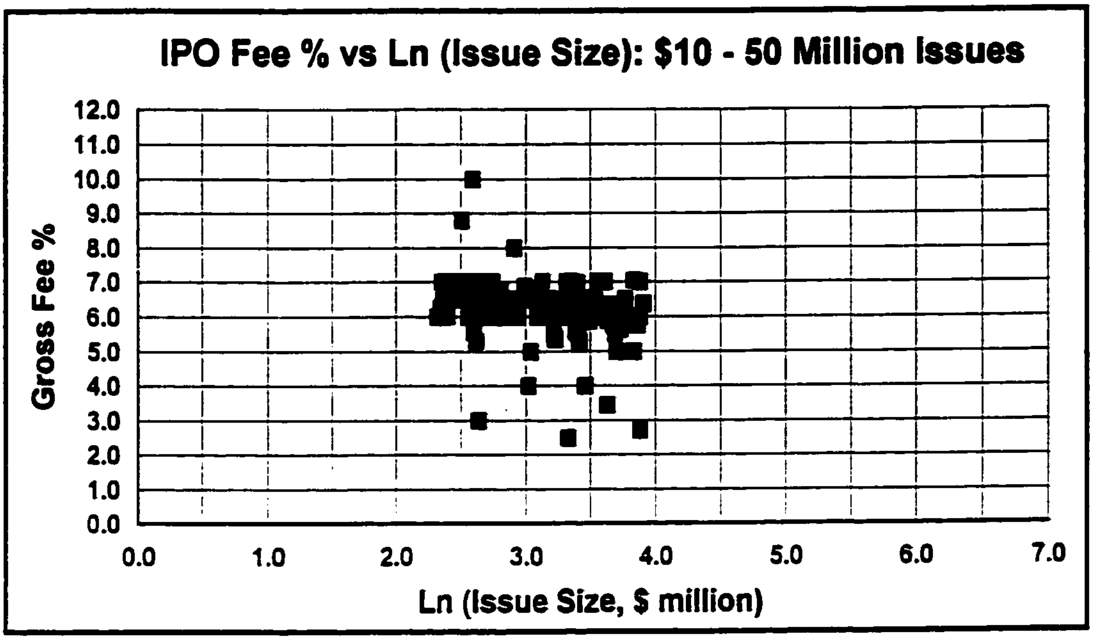


Figure 4-3. TSE IPO Fee Distributions for Leading Canadian Underwriters 1993-1997.
The charts below show the number and percentage of fees charged by category by eleven prominent Canadian investment banks for all common equity IPOs that listed on the TSE in the period 1993-1997.

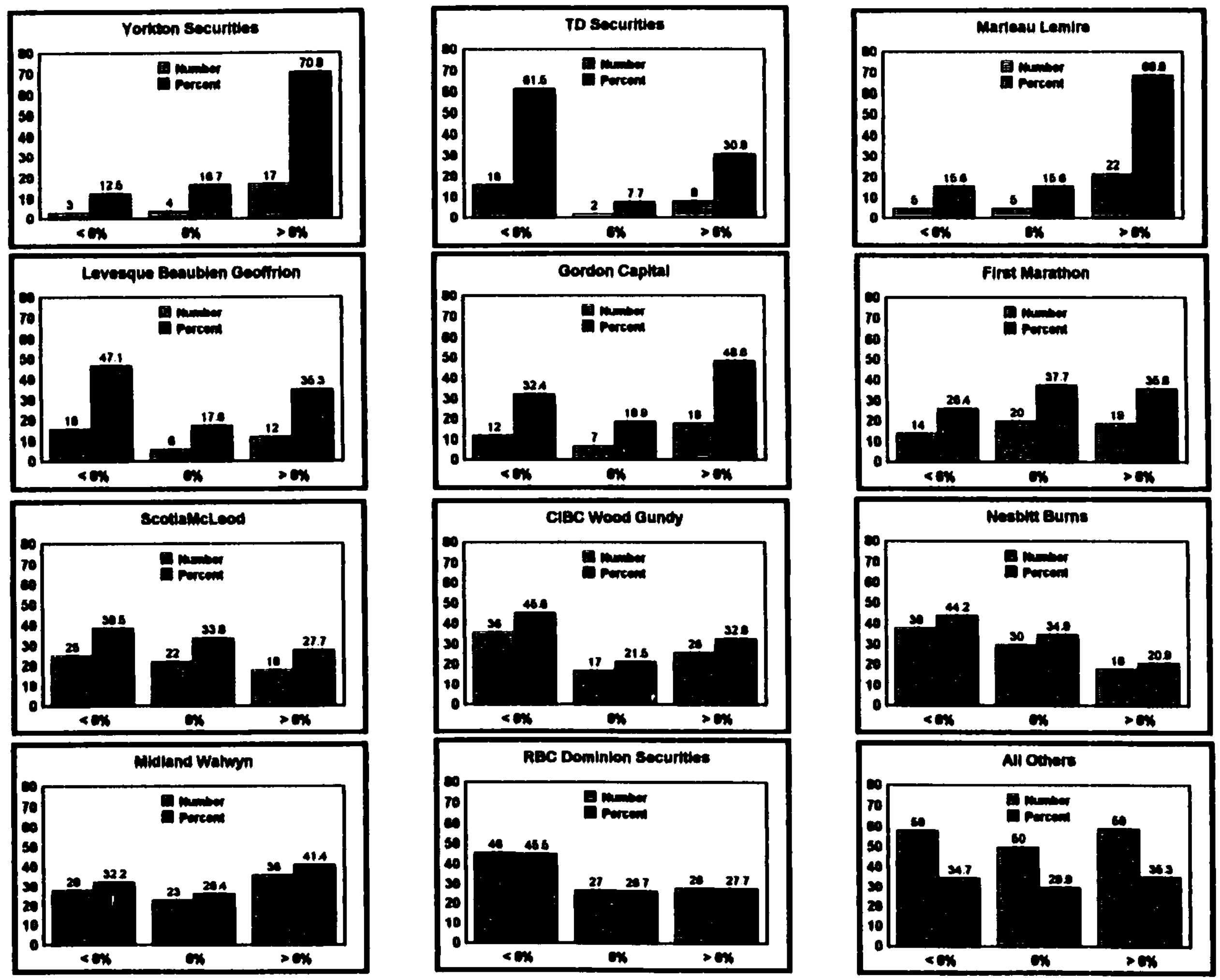


Figure 4-4. TSE IPO Fee Distributions for Leading Canadian Underwriters 1993-1997, Medium Sized Issues.
The charts below show the number and percentage of fees charged by category by eleven prominent Canadian investment banks for all medium sized common equity IPOs that listed on the TSE in the period 1993-1997.

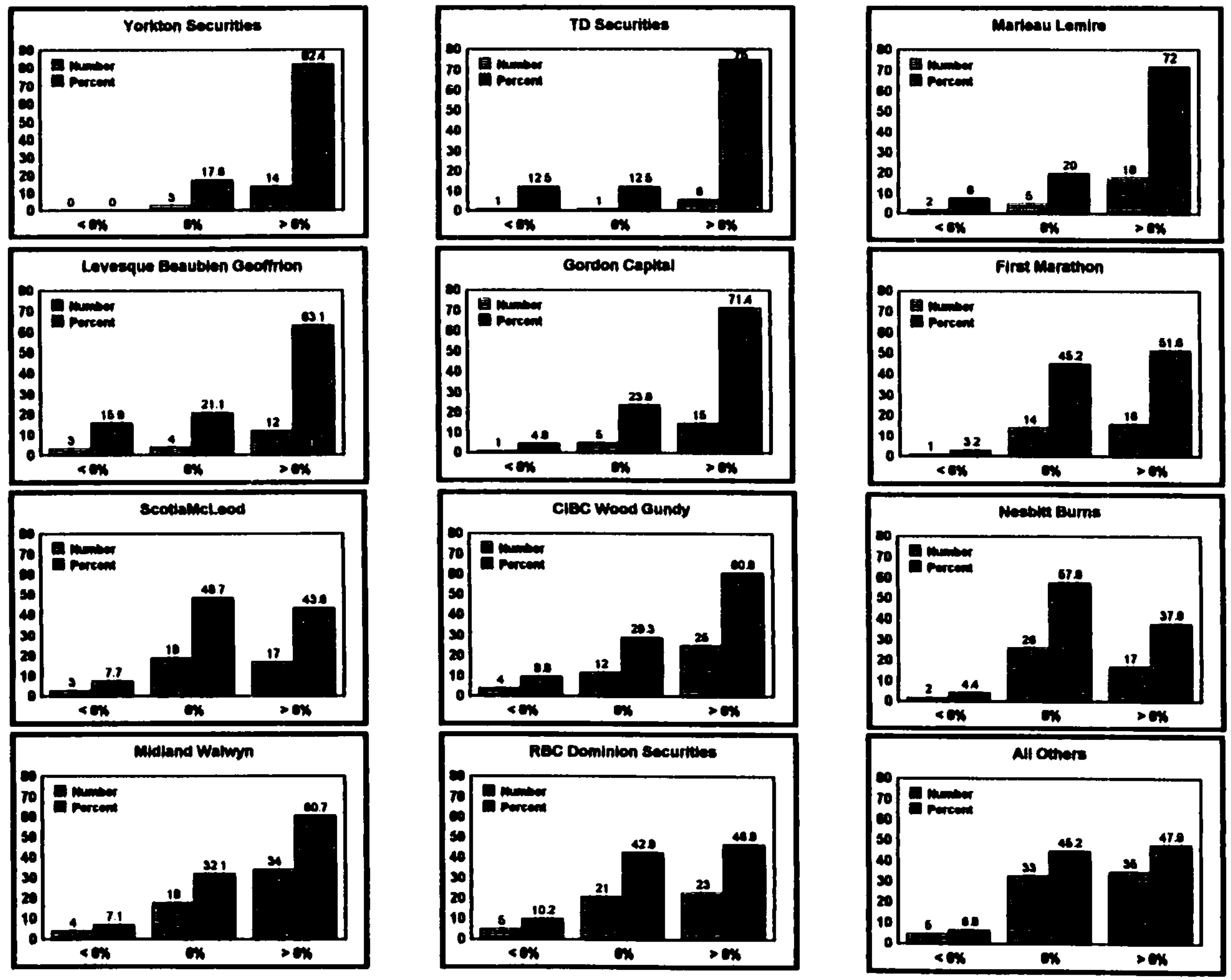
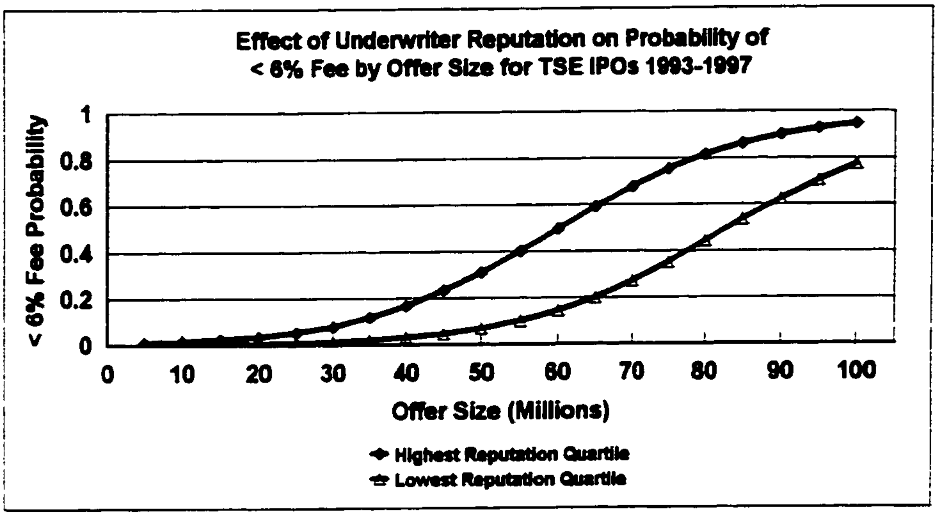
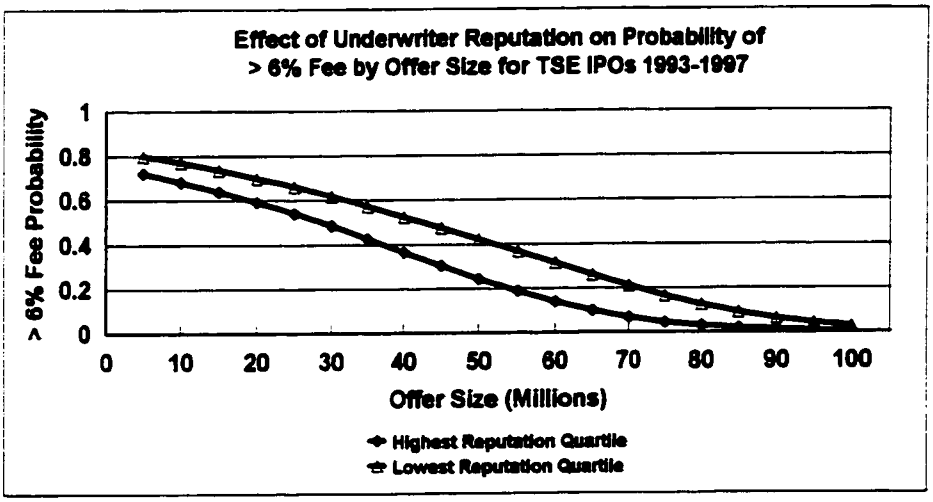


Figure 4-5. Probability of IPO Fee Level by Offer Size and Reputation of Underwriter.





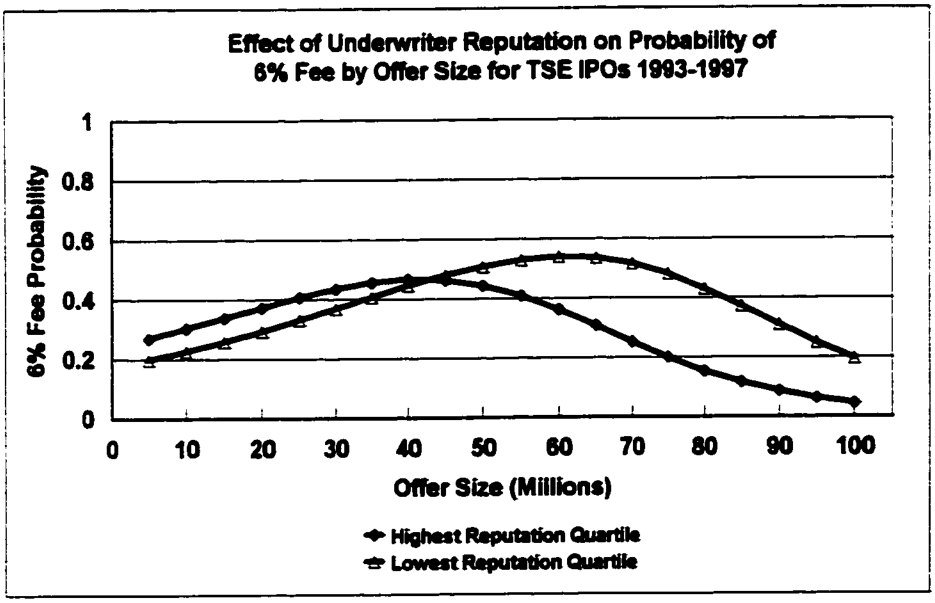


Figure 5-1. Public Resource Companies SEO Median Daily Share Volumes
Median daily share volumes for 132 Toronto Stock Exchange companies that issued public SEOs over the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

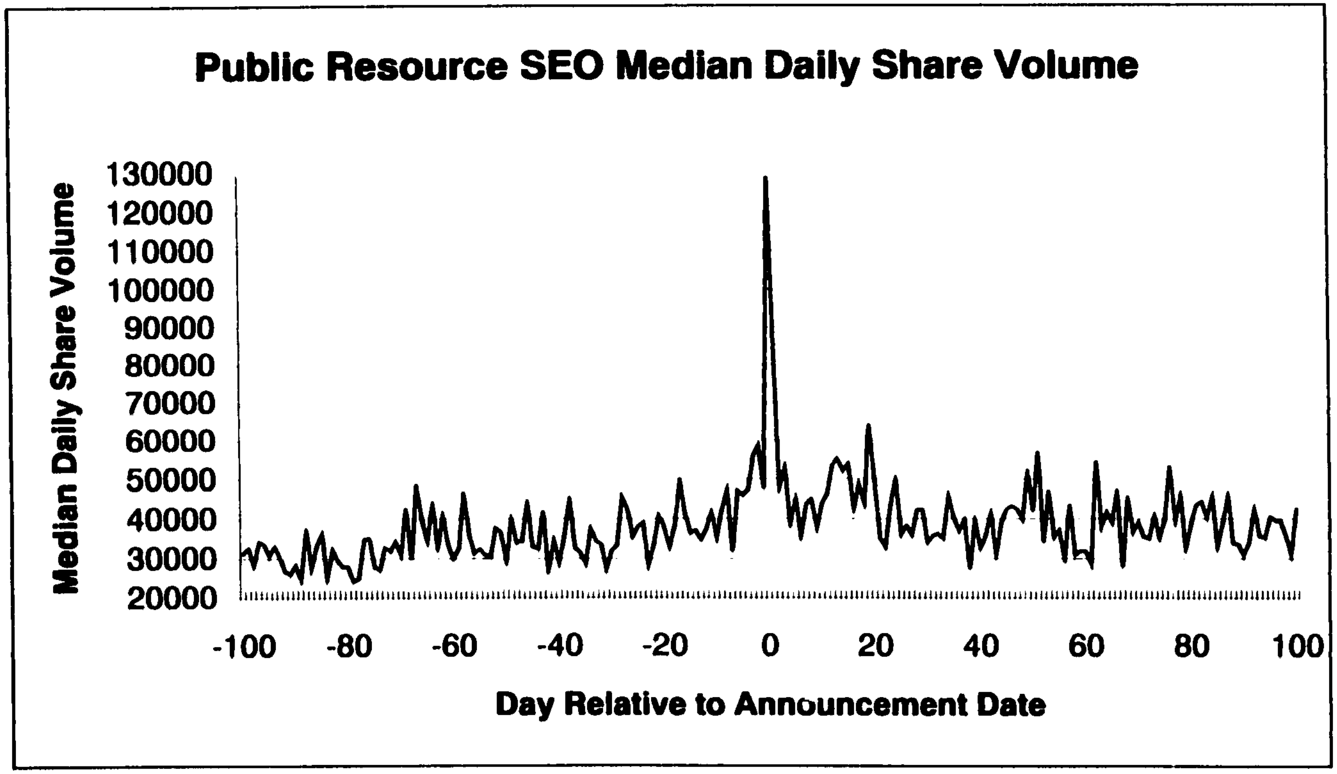


Figure 5-2. Public Non-Resource Companies SEO Median Daily Share Volumes
Median daily share volumes for 113 Toronto Stock Exchange companies that issued public SEOs over the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

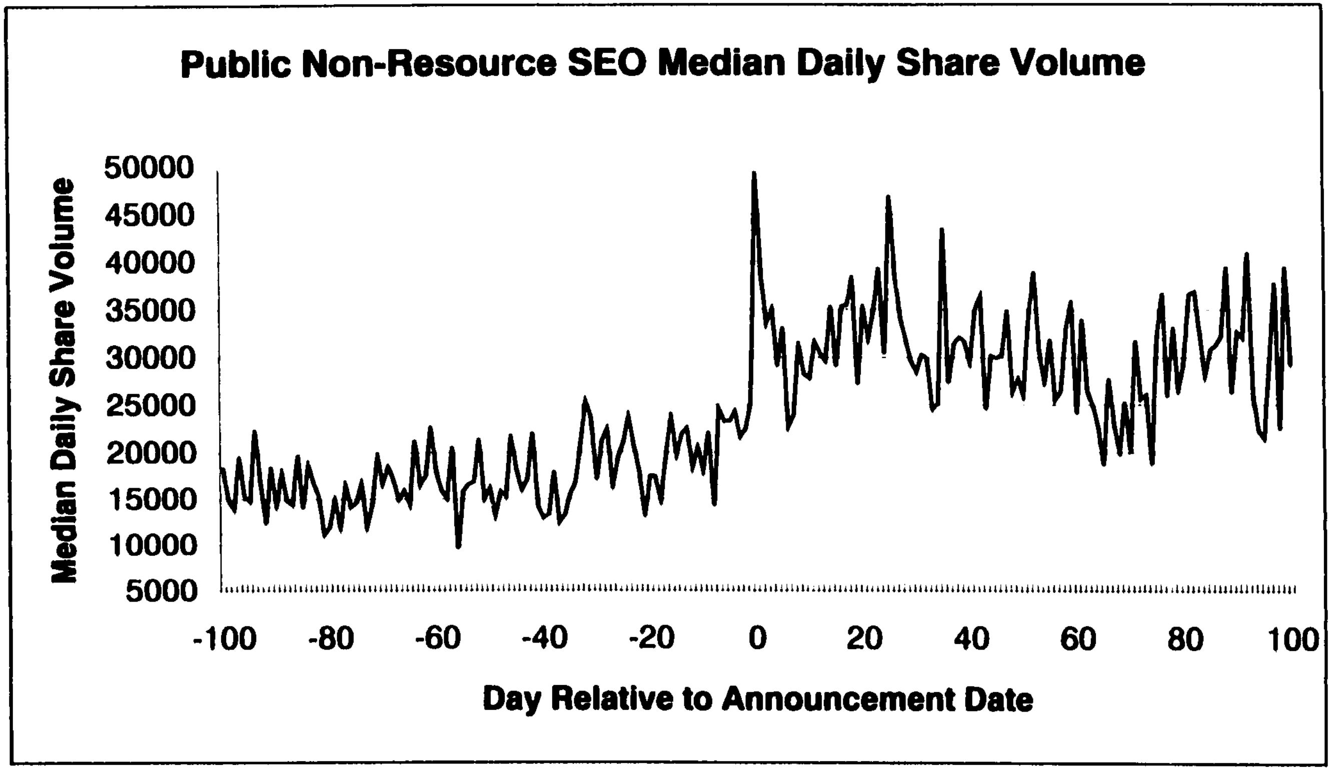


Figure 5-3. Private Placement Resource Companies SEO Median Daily Share Volumes
Median daily share volumes for 116 Toronto Stock Exchange companies that issued private placement SEOs in the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

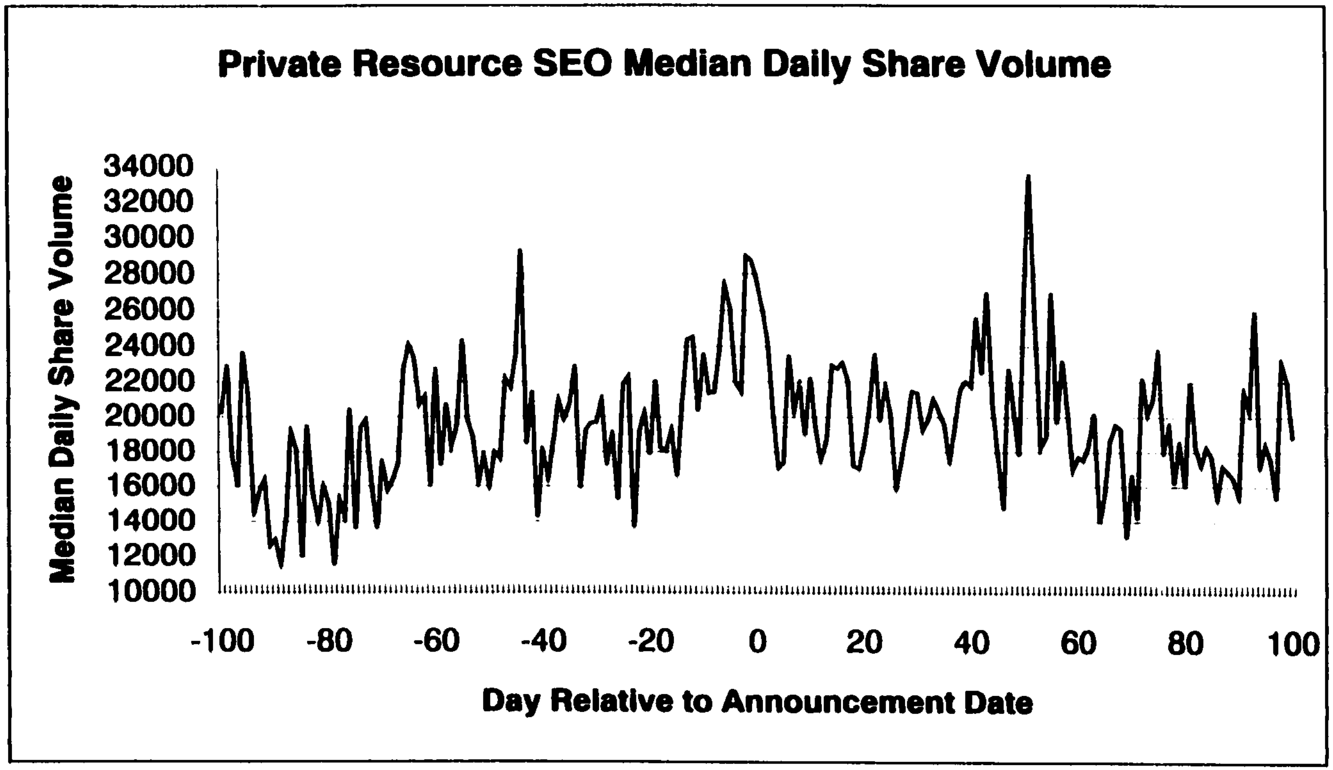


Figure 5-4. Private Placement Non-Resource Companies SEO Median Daily Share Volumes
Median daily share volumes for 66 Toronto Stock Exchange companies that issued private placement SEOs in the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

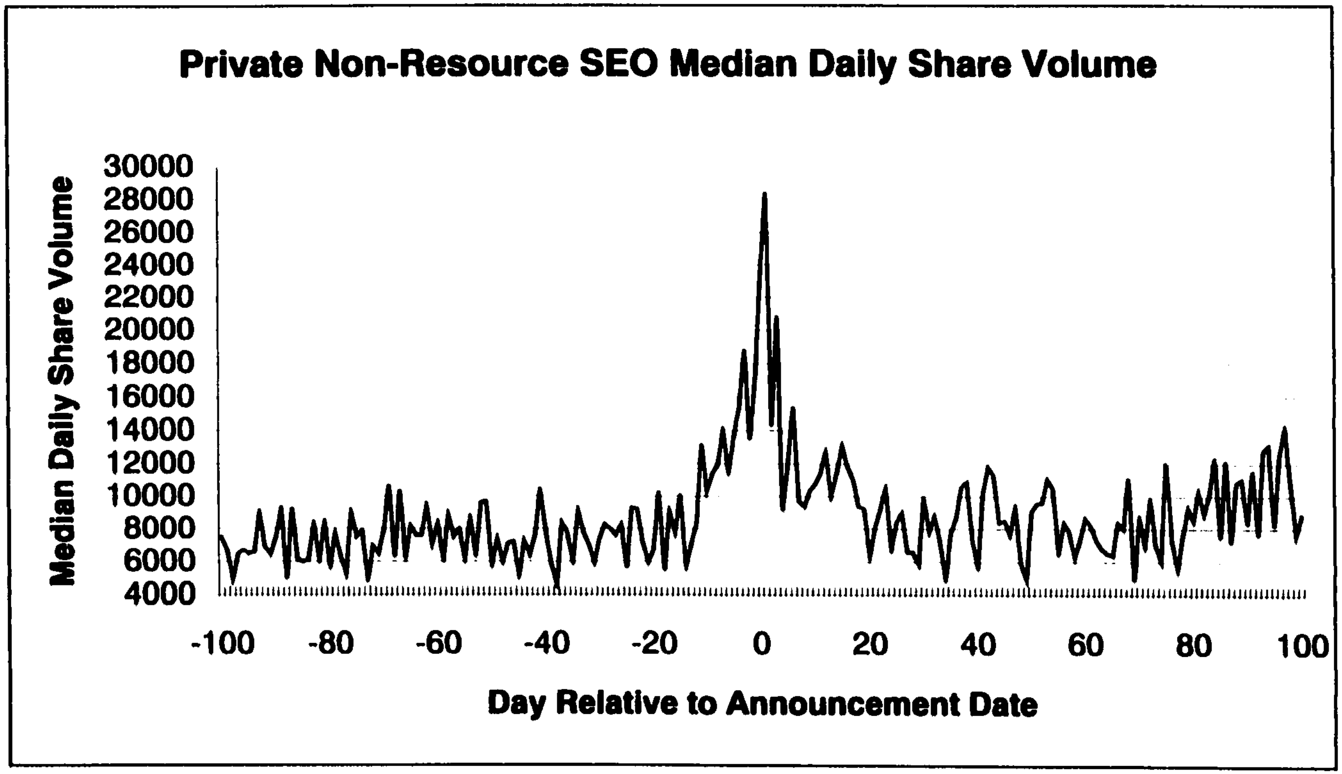


Figure 5-5. Public Resource Companies SEO Median Daily Number of Trades
Median daily number of trades for 132 Toronto Stock Exchange resource companies that issued public SEOs over the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

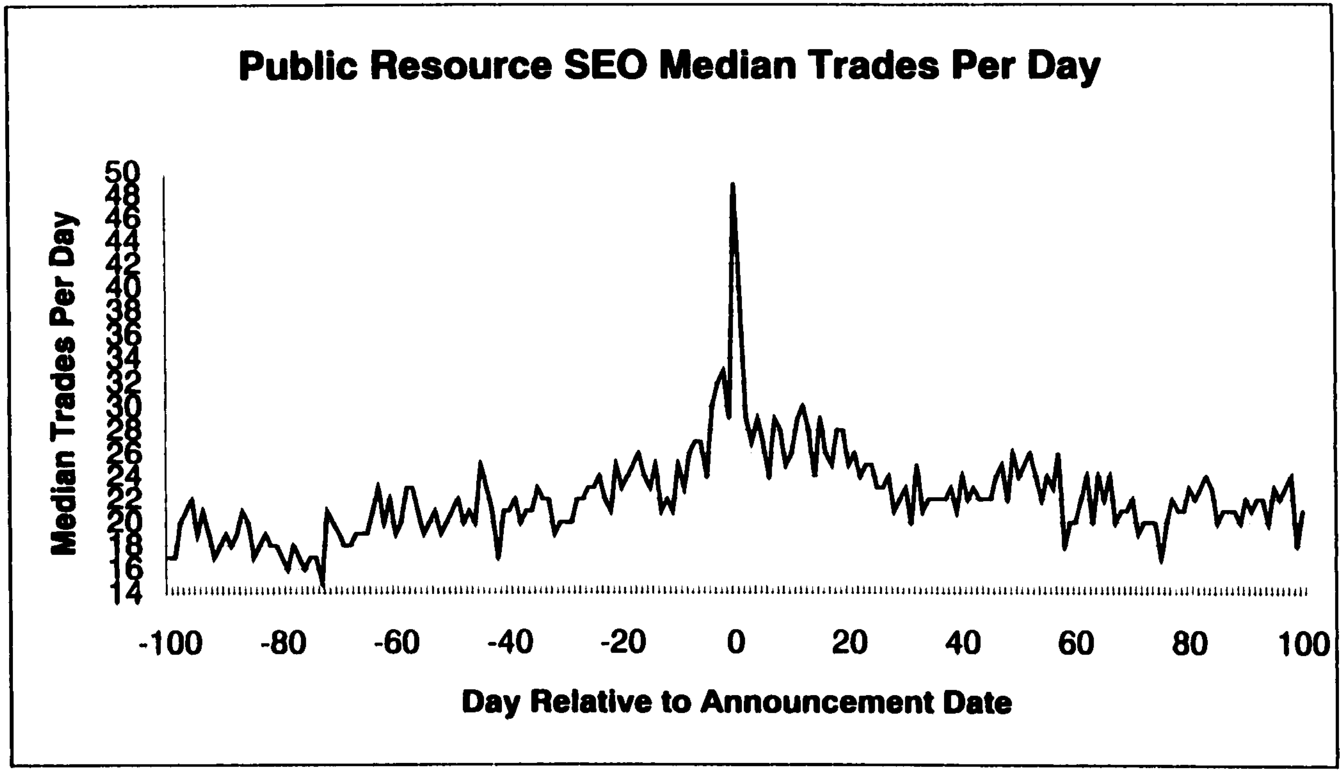


Figure 5-6. Public Non-resource Companies SEO Median Daily Number of Trades
Median daily number of trades for 113 Toronto Stock Exchange non-resource companies that issued public SEOs over the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

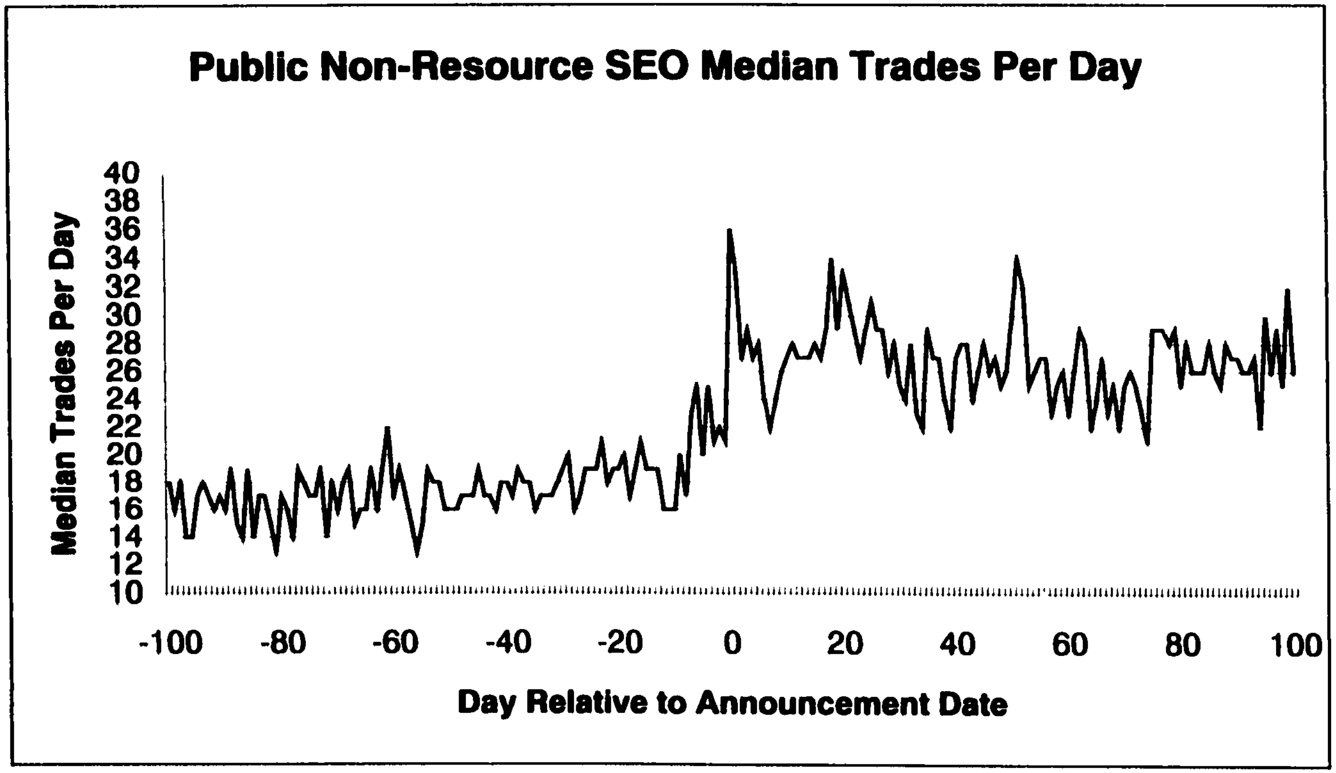


Figure 5-7. Private Placement Resource Companies SEO Median Daily Number of Trades
Median daily number of trades for 116 Toronto Stock Exchange resource companies that issued private placement SEOs in the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.

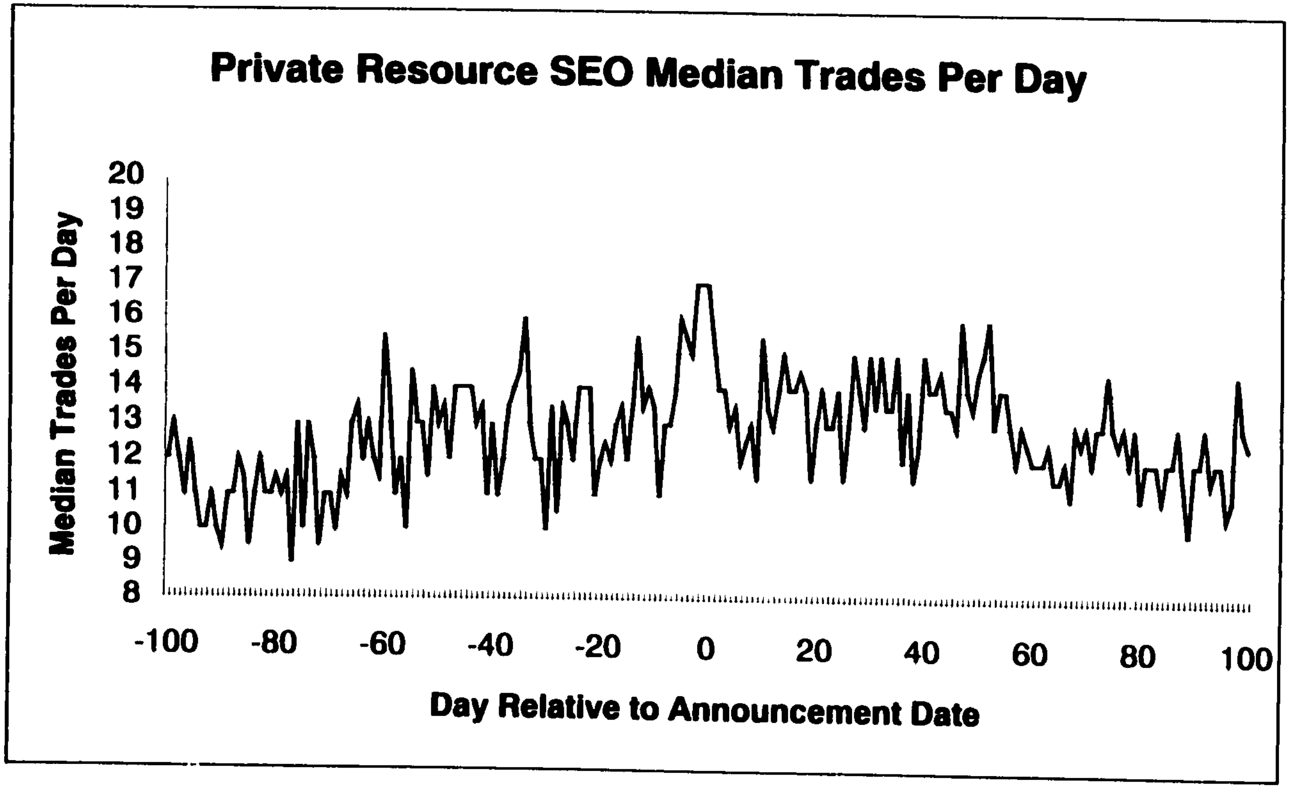


Figure 5-8. Private Placement Non-Resource Companies SEO Median Daily Number of Trades
Median daily number of trades for 113 Toronto Stock Exchange non-resource companies that issued private placement SEOs in the period 1993-1997 for event days starting 100 trading days before the announcement and ending 100 days after the announcement are shown.