**THE LONG - TERM PERFORMANCE
AND SURVIVAL PATTERNS OF CANADIAN IPOs**

By

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Abstract

Majority of the results show that Canadian IPOs underperformed their benchmarks in five aftermarket years, however, most of these results are not significant. The results depend on selection of return calculation method, choice of benchmarks, time span used, and choice of portfolio weighting method.

Abnormal returns over TSE Composite index are higher than CFMRC Equal index, which is because the former index is more volatile than the later. Abnormal returns over matching firms are close to zero because comparing with the market index, the matching firms are very similar with the IPO firms.

Pre-IPO year revenue, market capitalization, capital raised, volatility just after issuance, and nature of market in issuing year do not significantly explain the IPOs' long-term performance. Distribution of IPOs abnormal returns is negatively skewed.

Survival IPO portfolio performs better than the total IPO portfolio. Medium and small IPOs performed better than large IPOs in a long run.

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The Long-Term Performance and Survival Patterns of Canadian IPOs

CHAPTER I. Introduction and Background

There are numerous studies on the issues about Initial Public Offerings (IPO). This thesis focuses on the empirical investigation of long-term performance and survival patterns of Canadian firms that issued their initial public offerings in Toronto Stock Exchange during the period 1971 through 2002.

Most of the previous research in this area has been based on IPOs in U.S. stock market, which focused on New York Stock Exchange and NASDAQ. These studies used cumulative abnormal returns (CAR) and residual cumulative wealth (RCW) as performance measures in documenting IPO long-term performance and considered market index and matching firms, based on market capitalization and market-to-book ratio, as benchmarks for evaluating the relative performance. The conclusions about long-term performance of IPOs have differed considerably across studies ranging from a poor performance to a somewhat neutral performance.

There are few existing Canadian studies in this area. The two most recent articles on long-term performance of Canadian IPOs are by Kooli, L'Her and Suret (2003) and Jog (1997). Jog (1997) documented long-term performance of 308 IPOs listing in Toronto Stock Exchange during the period 1971 through 1995. This study reported that Canadian IPOs underperformed benchmark (TSE 300) in first three aftermarket years and improved their performance from the fourth aftermarket year.

Through this study documented significantly change of IPO numbers in post-IPO period, it was conducted on only one aggregate benchmark and thus the robustness of the results and corresponding conclusion are doubtful since we believe that more rigorous examination of this important issue is warranted.

In a more recent but yet unpublished paper by Kooli, L'Her and Suret (2003), the results are mixed and depend on the type of portfolio construction methodology used (value-weighted versus equal-weighted). Their results, which are reviewed in more details in the literature review section, are based on a sample of 141 IPOs during the period from 1986-2000. Although they used more than one benchmark and matching firms based on the book-to-market ratio and market capitalization, the mixed results require further investigation in the robustness of selecting benchmarks and the impact of IPO characteristics on IPO performance.

This thesis aims at (1) documenting Canadian IPO long-term performance; (2) investigating the sensitivity of performance results to the choice of benchmark as well as the choice of methodology; (3) identifying, if any, the individual IPO characteristics that explain the long-term abnormal return of Canadian IPOs; (4) investigating certain characteristics of the survival patterns to explain the difference of IPO long-term performance between failed and successful IPOs. IPO characteristics include size, market capitalization, first-day underpricing, industry, capital raised, immediate post-issuance volatility, the nature of the market (Bull/Bear) in issuance year, and year of issuance. Data on non-financial IPO characteristics is not collected since they are not available. Variables of IPO characteristics are discussed in Section V.

This thesis is organized as follows: next section will review some previous studies in terms of both American and Canadian IPOs, mainly focusing on the studies that relate to long-term performance. Section III will state the research objectives of the thesis. Description of database is in Section IV. Research methodologies are introduced in Section V. Section VI documents results on long-term performance of Canadian IPOs and characteristics of five-year survival IPOs. The last section, Section VII, draws conclusions based on the results in the previous section and come out some issues that deserve further study.

CHAPTER II. Literature Review

Previous studies in IPOs long-term performance are reviewed in this section. Since this thesis only focuses on long-term performance, we only review literature in long-term performance aspect rather than other aspects of IPOs such as underpricing, accounting performance, the nature of underwriting process, etc. This section first reviews existing American studies in IPO long-term performance first, followed by Canadian studies. Appendix A summaries the features of each study that are briefly described in this section.

II-1. American Studies on IPOs Long-Term Performance

One of the most often cited studies is by Ritter (1991) who studied a sample of 1526 IPOs in the period from 1975 to 1984 in U.S. stock market and found that these firms significantly underperformed NASDAQ index and Amex-NYSE index as well as matching firms based on market capitalization and industry in the three-year post-IPO period. Average buy-and-hold returns at the end of the third aftermarket year is 34.47%, far less than 61.86% returns for the equivalent period on matching firm portfolio. The results were robust for both of the cumulative average abnormal return and the three-year buy-and-hold return under either benchmark (NASDAQ and Amex-NYSE index), or benchmark of matching firms. However, sub sample evidence showed that IPO long-term performance varied significantly by industry, by pre-IPO age and year of issuance. For example, IPOs going public in low market trading volume year outperformed those issued in high market trading volume year by a difference of 90.7%.

While Ritter (1991) showed robust evidence of IPOs underperformance in a long run, by studying a total sample of 5173 IPOs issued in U.S. stock market over the 1973 to 1996 period, Eckbo and Norli (2000) found similar results in the latter period when matching firms were selected based on only one variable — market capitalization. However, if matching firms were selected based on both market capitalization and book-to-market ratio, the underperformance disappeared. Therefore, Eckbo and Norli (2000) argued that matching firm selection procedure could affect the results of IPO long-term performance and the procedure used by Ritter (1991) omitted some important factors by simply using market capitalization as the selection criteria for the matching firm. They also argued that the IPO firms were younger; they had lower optimal debt to equity ratio and were more liquid compared to the firms that were matched simply based on market capitalization. Eckbo and Norli (2000) showed evidence that, in their sample, from the first to the fifth aftermarket year, IPO stocks were more liquid in aspects of trading volume and monthly turnover (trading volume divided by number of outstanding shares) than matching firms based on market capitalization. The difference in leverage and liquidity implies that the matching firm procedure used by Ritter (1991) only using total market capitalization as matching variable may not have captured the underlying difference of risk factors between IPOs and their corresponding matching firms. It is very possible that IPO firms are less risky than the selected matching firms, which thereby provides an explanation for the lower long-term performance of IPOs.

Brav and Gompers (1997) examined whether venture-backed IPO segment performs better than the nonventure-backed IPO segment. They found that although

within five aftermarket years the whole IPO sample did not underperform similar market capitalization and book-to-market ratio matching firms, the two IPO segments performed differently. Venture-backed segment has higher five-year equal-weighted IPO returns over nonventure-backed segment; however, a value-weighted return method dramatically reduced the performance difference between these two segments.

The results of IPO long-term performance are also found to be time sensitive both in terms of the IPO issuing year as well as the post-IPO time horizon. Ritter and Welch (2002) reported that with ending date before 1999, a sample of IPO firms did not underperform market index that badly. However, if the sample period was inclusive of 1999 and 2000, that is, the period when the Internet Bubble collapsed, performance was extremely bad. Moreover, in the three-year post - IPO period, IPO firms always underperformed market index, but if the time interval were extended to five years, cumulative average abnormal returns were insignificantly different from zero. Some studies argued that this was because of IPO survivorship bias since many non - performing IPO firms were acquired or went bankrupted within a short period in the aftermarket years.

The choice of the returns used for detecting performance also seems to have implications on the results. For instance, in the Gompers and Lerner (2003) study, although buy and hold returns were negative, which indicated that IPO firms underperformed and that the zero investment portfolio, including a short position in benchmark and a long position in IPOs from 1935 to 1972, did lose money, event time cumulative average abnormal returns were only insignificantly different from zero. Furthermore, calendar time analysis did not detect underperformance that was

found by using event time study. Both capital assets pricing model and Fama-French three-factor regression showed IPO firms did not underperform.

II-2. Survival of IPOs

Since the long-term performance of IPOs has been a topic of debate, some have attempted to investigate the IPO survival patterns of IPOs and their implications on the overall results. For example, Jain and Kini (1999), segmented their IPO sample into survivors, acquired firms and non-survivors (bankrupt) based on post-IPO states. Tracking 877 firms issued from 1977 to 1990 up to five-years after IPO, the study documented a strong relationship between post-IPO states and IPO individual state. Though the percentage of IPO survivors varied by industries, from 44.44% for Retail Trade to 85% for Chemical and Allied Products, there was an indication that industries with larger numbers of IPOs always had higher IPO survival rates. Second, Jain and Kini (1999) did not find any evidence on the impact of bull versus bear market issuances on survival rates. They found that IPOs issued in “bull” market years survived at an insignificantly different percentage from that of the overall sample. However they found some special characteristics of IPO survival patterns, such as lower risk, which was defined as aftermarket standard deviation of daily returns, and larger market capitalization than acquired and non-surviving IPOs. Jain and Kini (1999) argued that higher firm risk and small market capitalizations increased the probability of delisting from stock exchange, and decreased the probability of being acquired rather than going bankrupt and thereby influenced the overall performance results.

Another study on IPO survival patterns is by Hensler et al (1997), which examined a final sample of 741 IPOs issued from 1976 to 1992 in NASDAQ, including 333 IPO survivors that continued trading through 1992 and 408 IPOs that were delisting from NASDAQ for negative reasons, and excluding the IPOs that were merged, exchanged or moved to other stock exchange. This study aimed at using a log-logistic accelerated failure time (AFT) model to predict IPO survival time at the date when an IPO is issued. The study also found that IPOs, with larger market capitalization, longer pre-IPO ages, higher first-day returns and bigger percentage of insider ownership, had longer survival time. However, market level, which was defined as S&P 500 common stock index at issuance date, decreased IPOs survival time. Industry segmentation also significantly affected post-IPO states. Drug industries generally had long-life IPOs, while, if IPOs were from the computer and data processing, whole sale, restaurant or airline industries, they tended to have shorter aftermarket life.

II-3. Canadian Studies

As far as we can tell, there are only two studies on long-term performance pertaining to Canadian IPOs. Jog (1997) showed that Canadian IPOs underperformed both TSE 300 Composite and the equally weighted CFMRC index. Arbitrage portfolio inclusive of a short position in stock market index and a long position in IPO firms had significantly negative returns in each of first six aftermarket years.¹ While, average cumulative abnormal returns were not significantly different from zero at the end of the fifth aftermarket year. It seems that as time went by, IPO survivors began

¹ Since this thesis is about long-term performance, we do not review papers that provide evidence on underpricing in Canadian IPOs. These papers that we do not review include: Jog and Riding (1987), Ursel and Ljucovic (1998) and Ursel (2001).

to perform well. Moreover, long-term performance, in some level, had relationship with IPO characteristics. The IPOs with lower issue price, overpriced and IPOs with lower market capitalization at the issuance date displayed lower long-term performance. On the other hand, market condition in the issuing year did not significantly affect aftermarket performance; Canadian IPOs issued in both Bull and Bear market had significantly negative cumulative abnormal returns within four aftermarket years. Another study on Canadian IPOs is Jog and Srivastava (1997/98). This study used a sample including 399 IPO firms issued during a period from 1971 to 1995 and drew nearly the same conclusions as Jog (1997) did.

In a recent yet unpublished paper, Kooli et al (2003) used a sample of 141 Canadian IPOs from 1986 to 2000 and used matching firms based on market capitalization and book-to-market ratio as benchmark. They documented three-aftermarket year IPOs performance and found that long-term performance results are sensitive to the period chosen, the methodology and the weighting schema used in calculating portfolio returns. In their study, equal-weighted cumulative abnormal returns of IPOs were significantly larger than zero in each of the three aftermarket years. However, value-weighted cumulative abnormal return was significantly positive only in IPOs first-aftermarket year. In their second and third aftermarket year, though value-weighted cumulative abnormal returns were declining to be negative, but were not significant. Similar to the value-weighted cumulative abnormal returns, value-weighted residual cumulative wealth also implied that IPOs significantly outperformed their matching firms in the first aftermarket year, and then neither outperformed nor underperformed the matching firms in the second and third aftermarket year. Kooli et al (2003) argued that the difference between the results

based on equal-weighted and value-weighted portfolios were due to the existence of outliers, especially due to the IPOs with small market capitalization.

Appendix A provides brief summaries of the articles reviewed above.

CHAPTER III. Research Objectives

Given the conflicting evidence about the results on long-term performance of U.S IPOs and many unanswered questions about the long-term performance of Canadian IPOs, this thesis has the following research objectives:

- 1) To document Canadian IPOs long-term performance during a long time period (from 1971 to 1997) by using multiple benchmarks (TSE 300 Composite index \ CFMRC Equal index \ Matching Firms);
- 2) To investigate the importance of the various methods of return calculations on results (Cumulative Abnormal Returns / Residual Cumulative Wealth);
- 3) To study cross-sectional difference in performance by linking performance to key IPO characteristics;
- 4) To investigate the differences in key IPO characteristics for survival versus delisting companies.

CHAPTER IV. Database

This thesis relies on database of IPOs issued in the TSE from 1971 to 2002 created by Dr. Vijay Jog. As this study is focusing on long-term performance, the study sample is restricted to IPOs that were issued prior 1997 so that in this sample, IPOs have at least five aftermarket-year data on post-IPO performance, another sub sample of five-year survival IPOs (for pre 1997 IPOs) is also set up. The total sample has 650 IPOs, thus in this thesis, conclusions on IPO long-term performance and regression on IPO characteristics is expected to have sufficient generality. Key IPO variables that may explain IPO abnormal returns and the survival patterns of IPOs were collected and are discussed in the next section.

Appendix B provides a detailed description of these variables.

CHAPTER V. Research Methodology

In this thesis, a variety of methods are used to document results based on (1) the type of returns used in calculating long-term returns, (2) the type of benchmark chosen, and (3) the choice of the methodology used for comparison between the two samples. For the determination of survival patterns, reliable data on the reason for delisting in the post-IPO period is not available. Therefore post-IPO states are determined by a visual inspection of the IPO price patterns during the post-IPO period. More specifically, if a steeply rising (falling) price pattern prior to the delisting from stock exchange is detected, the conclusion is that the reason for delisting was because of an acquisition/going private transaction (bankruptcy). Furthermore, this conclusion is confirmed wherever possible by reviewing the Financial Post publications on bankrupt companies.

V-1. Rate of Return Estimation

Since previous studies have shown that the results are sensitive to the choice of return calculations, two different methods are used for calculating up to five post-IPO years' abnormal return. Return calculations are also performed for both equal-weighted and value-weighted portfolios so that the influence of small capitalization firms on the overall returns can be indirectly investigated. Two market benchmarks are used, namely the TSE 300 Composite and CFMRC Equal index. The third benchmark is constructed by using a "matching firm" methodology (explained below) to show the robustness of results to benchmark selection as well.

V-1-1) Cumulative Abnormal Returns

Monthly abnormal returns are calculated based on aftermarket return period in calendar time, starting from the first month closing date. For instance, if initial public offering is in January then aftermarket returns period calculations begins on the first day of February. Thus, in this example, calendar month 1 is February and calendar month 2 is March, etc.

The benchmark-adjusted abnormal return of IPO stock i in event month t is defined as:

$$AR_{it} = R_{it} - R_{mt} \quad (1)$$

Where R_{it} is the raw return of IPO stock i in event month t and R_{mt} is return on the corresponding benchmark portfolio in event month t . The equal-weighted benchmark-adjusted abnormal return of the whole sample in event month t can be calculated as:

$$AR_t = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (2)$$

Where, N is the number of IPO firms in the sample.

And the value-weighted benchmark-adjusted abnormal return is:

$$AR_t = \sum_{i=1}^N \left(\frac{MK_{it}}{\sum_{i=1}^N MK_{it}} * AR_{it} \right) \quad (3)$$

where, MK_{it} is market value of IPO firm i in month t .

Cumulative abnormal return (CAR) represents the benchmark-adjusted aftermarket performance from event month q to event month s :

$$CAR_{q,s} = \sum_{t=q}^s AR_t \quad (4)$$

V-1-2) Residual Cumulative Wealth

An alternative method involving R_{it} is residual cumulative wealth (RCW), which in Ritter (1991) was called buy-and-hold return. As per Jog and Srivastava (1997/98), cumulative wealth of IPO stock i from event month l to event month t is defined as:

$$CW_{it} = \prod_t (1 + R_{it}) \quad (5)$$

Where R_{it} is raw return of IPO stock i in event month t . CW_{it} represents the return of investing in IPO stock i from event month 1 to event month t . Residual cumulative wealth is defined as:

$$RCW_{it} = CW_{it} - CW_{mt} \quad (6)$$

Where CW_{mt} is cumulative wealth of benchmark portfolio, calculated similarly to the IPO return. RCW represents the premium of investment returns of IPO stock i over benchmark; in another words, it represents the return of an arbitrage portfolio that consists of a long position in IPO stock i and a short position in benchmark portfolio. The equal-weighted an Average residual cumulative wealth ($ARCW$), which is the return of an arbitrage portfolio of holding all IPO stocks from event month 1 till event month t , representing the equal-weighted $RCWs$, is defined as:

$$ARCW_t = \frac{1}{N} \sum_{i=1}^N RCW_{it} \quad (7)$$

And the value-weighted average residual cumulative wealth is:

$$ARCW_t = \sum_{i=1}^N \left(\frac{MK_{it}}{\sum_{i=1}^N MK_{it}} * RCW_{it} \right) \quad (8)$$

where, MK_{it} is market value of IPO firm i in month t .

V-2. Comparative Tests

This thesis compares difference in returns using three methods: (1) classical parametric methods relying on the t-statistics; (2) the bootstrapped method, used by Barber, Lyon and Tsai (1999), which is a skewness-adjusted t-statistics and has more power in testing difference of residual cumulative wealth; and (3) non-parametric t-statistics on ranks, introduced by Corrado (1999). The null hypothesis in each case is that *CAR* and *RCW* of IPO firms are zero. The possible results and their corresponding conclusions are listed below:

Null Hypothesis for *CAR*

	<u>Rejected</u>	<u>Not Rejected</u>
<i>CAR</i> > 0	IPOs Outperformed Comparative	
		IPOs Performed As Much As Comparative
<i>CAR</i> < 0	IPOs Underperformed Comparative	

Null Hypothesis for *RCW*

	<u>Rejected</u>	<u>Not Rejected</u>
<i>RCW</i> > 0	IPOs Outperformed Comparative	
		IPOs Performed As Much As Comparative
<i>RCW</i> < 0	IPOs Underperformed Comparative	

V-2-1) Testing for Cumulative Abnormal Return

Similar as noted above, individual IPO firm's cumulative abnormal return is defined as:

$$CAR_{it} = \sum_{j=1}^t (R_{ij} - R_{mj}) \quad (9)$$

Where R_{ij} is raw return of IPO stock i in month j , R_{mj} is the corresponding return of benchmark in month j and CAR_{it} is cumulative abnormal return of IPO stock i from month 1 to month t .

Classical parametric t-statistics for cumulative abnormal return is:

$$t = \frac{\overline{CAR}_t}{\sigma(CAR_t)/\sqrt{N}} \quad (10)$$

Where $\overline{CAR}_t$ is sample mean of cumulative abnormal return, $\sigma(CAR_t)$ is sample standard deviation and N is number of IPO stocks.

Barber et al (1997) bootstrapped skewness-adjusted t-statistics for cumulative abnormal return is:

$$t_{sa} = \sqrt{N} * \left(S + \frac{1}{3} \hat{\gamma} S^2 + \frac{1}{6N} \hat{\gamma} \right) \quad (11)$$

Where $S = \frac{\overline{CAR_t}}{\sigma(CAR_t)}$ and $\hat{\gamma} = \frac{\sum_{i=1}^n (CAR_{it} - \overline{CAR_t})^3}{N \sigma(CAR_t)^3}$

V-2-2) Testing for Residual Cumulative Wealth

Individual IPO stock residual cumulative wealth is defined as:

$$RCW_{it} = CW_{it} - CW_{mt} \quad (12)$$

Where CW_{it} is cumulative wealth of IPO stock i till month t , CW_{mt} is cumulative wealth of corresponding benchmark in month t .

Classical parametric t-statistics for residual cumulative wealth is:

$$t = \frac{\overline{RCW_t}}{\sigma(RCW_t)/\sqrt{N}} \quad (13)$$

Where $\overline{RCW_t}$ is sample mean of residual cumulative wealth in period t , $\sigma(RCW_t)$ is sample variance and N is number of IPO stocks.

Barber et al (1997) bootstrapped skewness-adjusted t-statistics for residual cumulative wealth is:

$$t_{sa} = \sqrt{N} \left(S + \frac{1}{3} \hat{\mathcal{S}}^2 + \frac{1}{6N} \hat{\mathcal{Y}} \right) \quad (14)$$

$$\text{Where } S = \frac{\overline{RCW_t}}{\sigma(RCW_t)} \text{ and } \hat{\mathcal{Y}} = \frac{\sum_{i=1}^n (RCW_{it} - \overline{RCW_t})^3}{N\sigma(RCW_t)^3}$$

V-2-3) Testing for Time Series of Abnormal Returns

Corrado (1999) introduced a non-parametric t-statistics on ranks of mean abnormal returns, which is robust in making comparison of IPO abnormal returns by transforming each IPO's time series of abnormal returns into their respective ranks. Based on the preliminary that this test requires IPO abnormal returns of identical time span, we only use the test on our sub sample of five aftermarket-year IPO survival patterns.

The rank of monthly abnormal returns AR_{it} in an IPO's time series of 60 aftermarket months is defined as:

$$K_{it} = rank(AR_{it}) \quad (15)$$

Where K_{it} is the rank of abnormal return of IPO stock i in month t .² Thus, $AR_{it} \geq AR_{ij}$ implies $K_{i,t} \geq K_{i,j}$. Since, in this thesis, we plan to test IPO survival patterns performance within a time span of 60 aftermarket months, t arranges from 1 to 60, $60 \geq K_{it} \geq 1$ for 60-month survival patterns.

Nonparametric t-statistics on ranks for abnormal returns of sub sample of 60-month survival patterns in aftermarket month t is:

$$T = \frac{1}{N} \sum_{i=1}^N (K_{it} - 30.5) / S(K) \quad (16)$$

Where N is number of IPO survival IPOs. And the denominator, $S(K)$, is standard deviation and can be calculated as follows:

$$S(K) = \sqrt{\frac{1}{60} \sum_{t=1}^{60} \left(\frac{1}{N} \sum_{i=1}^N (K_{it} - 30.5) \right)^2} \quad (17)$$

V-3. Selection of Benchmarks

This thesis uses three benchmarks, (1) TSE 300 Composite index, (2) CFMRC Equal index (or CFMRC index) and (3) Matching Firms, to investigate Canadian IPOs long-term performance and to prove the robustness of the conclusions on the results of this research.

² Per mid ranks method, tied observations will be assigned to a number that is the single average of their ranks if they were not tied.

Monthly returns on TSE 300 Composite index, which is a value-weighted market index, and CFMRC Equal index, which is a equal-weighted market index, are collected in CFMRC database.

Per Barber, Lyon and Tsai (1999), due to the nature of market index calculation method, using market index as benchmark for calculating abnormal returns could meet with problems of selection bias, rebalancing bias, and skewness bias. To avoid the biases above, matching firm is used as a third benchmark. The matching firms are selected from the firms listed on the Toronto Stock Exchange. They are selected first based on the industry code, then based on the closest market capitalization and they must be existing for at least six months on Toronto Stock Exchange in the year when their counterpart IPOs were issued. For IPOs which counterpart matching firms cannot be found within the similar industry, market capitalization is the only criteria.

V-4. Key IPO Characteristics

Some key IPO characteristics are defined as independent variables and a measure of variable importance is used to detect some IPO characteristics that have significant impact on abnormal returns within five aftermarket years.

V-4-1) Independent Variables

The following characteristics for IPOs are identified in this thesis: size, market capitalization, first-day underpricing, industry, capital raised, immediate post-issuance volatility, the nature of market, year of issuance. (Please see detail description of these key variables in Appendix B).

V-4-2) Measure of Variable Importance

Abukari, Jog and McConomy (2001) used a measure of variable importance that was extended by Thomas et al (1996 and 1998) to investigate the contribution of independent variables. The measure is:

$$d_j = \tilde{\beta}_j \tilde{\rho}_j / R^2 \quad (18)$$

where d_j is the variable importance, $\tilde{\beta}_j$ is the standardized regression coefficient and $\tilde{\rho}_j$ is the simple correlation between dependent and independent variables.

V-5. Research Methodologies of Survival Patterns

Since previous American studies reported IPOs performance difference subject to post-IPO states and there is not any existing Canadian study in this performance difference of IPO sub sample, this thesis documents the difference of IPOs characteristics among five-year survival, acquired and delisting IPOs.

Furthermore, based on some specific IPO characteristics, a multinomial logit model is used to link this characteristics difference to the three post-IPO states.

Variables of IPO characteristics are discussed in the preceding part in this section (also see Appendix B).

A multinomial logit model used by Jain and Kini (1999) is employed in this thesis to investigate difference in IPO characteristics between survival and non-survival IPOs. The multinomial logit model is as follows:

$$\ln(P_A/P_S) = \beta_{11} + \beta_{12}X_1 + \beta_{13}X_2 + \beta_{14}X_3 + \cdots + \beta_{1n}X_n \quad (19)$$

$$\ln(P_D/P_S) = \beta_{21} + \beta_{22}X_1 + \beta_{23}X_2 + \beta_{24}X_3 + \cdots + \beta_{2n}X_n \quad (20)$$

where P_A is the probability of acquired IPOs, P_D is the probability of delisting IPOs and P_S is the probability of survival IPOs. X_1 through X_n are variables of IPO characteristics that are defined in Appendix B.

CHAPTER VI. Empirical Results

VI-1. Description of Canadian IPOs

Table A shows that totally 705 firms went public in the period from 1971 through 2001. IPO numbers vary along with issuance years, from the highest number of 91 IPOs in 1993 to the lowest number of 0 in 1975 and 1977. We also detect the same results as Jog (1997) that IPO numbers are cyclical in issuance years, from 81 IPOs in 1986 down to 8 IPOs in 1988, then up to 91 IPOs in 1993. This pattern confirms the finds of previous studies that reported that IPO numbers are correlated with the nature of issuance year stock market.

Table A

Post-IPO States Categorized by Issuance Year

Issuance Year	Total IPOs ³	IPO State	Aftermarket Year														Total		
			1	2	3	4	5	6	7	8	9	10	11-15	16-20	21-25	26-31			
1971	8	A ⁴					1				1		3			1	1	A	7
		D ⁵								1								D	1
1972	21	A			1	3	2			2		1	2			1	2	A	14
		D										1	2			2		D	5
1973	15	A				1	1			1		1	2		2	2		A	10
		D									1		1		1	1		D	4
1974	2	A								1								A	1
		D				1												D	1
1975	0	A																A	0
		D																D	0
1976	1	A																A	0
		D							1									D	1
1977	0	A																A	0
		D																D	0
1978	1	A													1			A	1
		D																D	0
1979	3	A			1						1					1	-	A	3
		D																D	0

Table A (Cont.)

³ Total number of IPOs issued in certain year.

⁴ A refers to the number of IPOs that were acquired.

⁵ D refers to the number of IPOs that were delisting.

Issuance Year	Total IPOs ⁶	IPO State	Aftermarket Year														Total
			<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11-15</u>	<u>16-20</u>	<u>21-25</u>	<u>26-31</u>	
1980	8	A	1							1		1	1	1		-	A 4
		D						1			1		1			-	D 3
1981	16	A				1	1		1				1		1		A 5
		D			2	1	2	1					4	1			D 11
1982	4	A											1	1	-	-	A 2
		D												1	-	-	D 1
1983	24	A					1	1	3	1		1	3	1	-	-	A 11
		D	1				1			1		1				-	D 4
1984	17	A				1		1	1			1	4	2	-	-	A 10
		D				1					1			2	-	-	D 4
1985	6	A					1						1	1	-	-	A 3
		D								1					-	-	D 1
1986	81	A	2	8	3	2			1	2	2	1	7		-	-	A 28
		D		1	2	3	4	1	2	3	1		4	1	-	-	D 22
1987	43	A	1	3	2	1	1		4	1	1	1	6	-	-	-	A 21
		D			1	3		3	1		1	1	3	-	-	-	D 13
1988	8	A			1				1		1			-	-	-	A 3
		D	2										1	-	-	-	D 3
1989	13	A						1	1			1	3	-	-	-	A 6
		D					2	1					1	-	-	-	D 4
1990	12	A			1		2	1		1	1	1	1	-	-	-	A 8
		D					1		1					-	-	-	D 2
1991	15	A						1		3				-	-	-	A 4
		D								1				-	-	-	D 1
1992	19	A		1			2	1	1	1	1		-	-	-	-	A 7
		D				1		1				2	-	-	-	-	D 3
1993	91	A	3		2	10	5	3	4	6	3	-	-	-	-	-	A 36
		D		1	3	1		7	4	2	1	-	-	-	-	-	D 19
1994	53	A		2	2	5	3	5	5	1	-	-	-	-	-	-	A 24
		D				4	1	4		3	-	-	-	-	-	-	D 12
1995	24	A				1	1	2	2	-	-	-	-	-	-	-	A 6
		D			2			1	1	-	-	-	-	-	-	-	D 4
1996	58	A	1	3	2	4	2	2	-	-	-	-	-	-	-	-	A 14
		D		3	2	1	4	3	-	-	-	-	-	-	-	-	D 13
1997	48	A	3	5	7	2	2	-	-	-	-	-	-	-	-	-	A 19
		D			1	2	2	-	-	-	-	-	-	-	-	-	D 5
1998	44	A		4	4		-	-	-	-	-	-	-	-	-	-	A 8
		D		2	2	1	-	-	-	-	-	-	-	-	-	-	D 5
1999	22	A	1			-	-	-	-	-	-	-	-	-	-	-	A 1
		D		2		-	-	-	-	-	-	-	-	-	-	-	D 2
2000	38	A	1	1	-	-	-	-	-	-	-	-	-	-	-	-	A 2
		D		1	-	-	-	-	-	-	-	-	-	-	-	-	D 1
2001	20	A		-	-	-	-	-	-	-	-	-	-	-	-	-	A 0
		D		-	-	-	-	-	-	-	-	-	-	-	-	-	D 0
'71-'01	705	A	13	27	26	31	25	18	25	20	12	8	35	9	6	3	A 258
		D	0	13	15	19	17	22	10	12	6	5	17	6	3	30	D 175

⁶ Total number of IPOs issued in certain year.

Post-IPO states are shown in Table B. Most of IPOs survive their first aftermarket year, but only about 75% of them can survive through the next four years. For IPOs that have two to five aftermarket years, nearly 16% of them get acquired and 9.3% of them are delisting from the stock exchange because of bankrupt. The sixth to tenth aftermarket years are also critical to Canadian IPOs since another 25% left the stock exchange.

Table B

Post-IPO States of 1971-2001 IPOs Categorized by Aftermarket Year						
Aftermarket Year(s)	Number of IPOs	Post-IPO States				
		Acquired		Delisting		Total
1	705	13	(1.84%) ⁷	0	(0.00%) ⁸	13 (1.84%)
2-5	685	109	(15.91%)	64	(9.34%)	173 (25.26%)
6-10	543	86	(15.84%)	52	(9.58%)	138 (25.41%)
11-15	298	35	(11.74%)	17	(5.70%)	52 (17.45%)
16-20	207	9	(4.35%)	6	(2.90%)	15 (7.25%)
21-25	75	6	(8.00%)	3	(4.00%)	9 (12.00%)
26-31	47	3	(6.38%)	0	(0.00%)	3 (6.38%)

Different aftermarket years have varied IPO non-survival rate. As is shown in Figure A, 8% of IPOs are acquired or delisting in the fourth aftermarket year, which is a peak year among the ten aftermarket years. And in each year of the period of aftermarket year 3 through aftermarket year 8, non-survival rate is over 6%. Another

⁷ Percentage of acquired IPOs in the total IPO sample that has at least one aftermarket year

⁸ Percentage of delisting IPOs in the total IPO sample that has at least one aftermarket year

observation is that in most of the aftermarket years, more Canadian IPOs are delisted from the stock exchange because of acquisition rather than bankruptcy.

Figure A

Table C and Table D show that post-IPO states of the sub samples categorized by issuance period. 25.42% of 1971-1980 IPOs are acquired and delisting in aftermarket year 6 to 10 and 1981-1990 IPOs tend to get acquired and delisting in their aftermarket year 2 to 5, at a non-survival rate of 25%. However, also in Table E, 1991-2001 IPOs have a non-survival rate of 26.37% in their aftermarket year 2 to 5; and 27.31% in aftermarket year 6 to 10. It seems that 1991-2001 IPOs are struggling to survive in nine out of first ten aftermarket years.

Table C

Post-IPO States of 1971-1980 IPOs Categorized by Aftermarket Year						
Aftermarket Year(s)	Number of IPOs	Post-IPO States				
		<u>Acquired</u>		<u>Delisting</u>		<u>Total</u>
1	59	1	(1.69%) ⁹	0	(0.00%) ¹⁰	1 (1.69%)
2-5	59	10	(16.95%)	1	(1.69%)	11 (18.64%)
6-10	59	9	(15.25%)	6	(10.17%)	15 (25.42%)
11-15	59	8	(13.56%)	4	(6.78%)	12 (20.34%)
16-20	59	4	(6.78%)	1	(1.69%)	5 (8.47%)
21-25	59	5	(8.47%)	3	(5.08%)	8 (13.56%)
26-31	47	3	(6.38%)	0	(0.00%)	3 (6.38%)

⁹ Percentage of acquired IPOs in the 1971-1980 IPO sample that has at least one aftermarket year

¹⁰ Percentage of delisting IPOs in the 1971-1980 IPO sample that has at least one aftermarket year

Table D

Post-IPO States of 1981-1990 IPOs Categorized by Aftermarket Year						
Aftermarket Year(s)	Number of IPOs	Post-IPO States				
		<u>Acquired</u>		<u>Delisting</u>		<u>Total</u>
1	224	3	(1.34%) ¹¹	0	(0.00%) ¹²	3 (1.34%)
2-5	224	29	(12.95%)	27	(12.05%)	56 (25.00%)
6-10	224	32	(14.29%)	20	(8.93%)	52 (23.21%)
11-15	224	27	(12.05%)	13	(5.80%)	40 (17.86%)
16-20	148	5	(3.38%)	5	(3.38%)	10 (6.76%)
21-25	16	1	(6.25%)	0	(0.00%)	1 (6.25%)
26-31	-	-	-	-	-	- -

¹¹ Percentage of acquired IPOs in the 1981-1990 IPO sample that has at least one aftermarket year

¹² Percentage of delisting IPOs in the 1981-1990 IPO sample that has at least one aftermarket year

Table E

Post-IPO States of 1991-2001 IPOs Categorized by Aftermarket Year						
Aftermarket Year(s)	Number of IPOs	Post-IPO States				
		<u>Acquired</u>		<u>Delisting</u>		<u>Total</u>
1	422	9	(2.13%) ¹³	0	(0.00%) ¹⁴	9 (2.13%)
2-5	402	70	(17.41%)	36	(8.96%)	106 (26.37%)
6-10	260	42	(16.15%)	29	(11.15%)	71 (27.31%)
11-15	15	0	(0.00%)	0	(0.00%)	0 (0.00%)
16-20	-	-	-	-	-	- -
21-25	-	-	-	-	-	- -
26-31	-	-	-	-	-	- -

¹³ Percentage of acquired IPOs in the 1991-2001 IPO sample that has at least one aftermarket year

¹⁴ Percentage of delisting IPOs in the 1991-2001 IPO sample that has at least one aftermarket year

Table F, survived IPOs have pre-IPO year revenues significantly larger than acquired IPOs, which means that small Canadian IPOs tends to be acquired. Besides, stock market has already recognized the uncertainty of an IPO when it goes public since survival IPOs has volatility significantly less than delisted IPOs.

Table F

Comparison Between IPO Characteristics of Post-IPO States

	Survival Mean (Median)	Acquired Mean (Median)	Delisting Mean (Median)	Survival V.S. Acquired t-statistics	Survival V.S. Delisting t-statistics
Size (\$ CND millions)	190 (27)	150 (54)	190 (90.43)	2.89 **	-0.77
Market Cap (\$ CND millions)	167 (59.5)	153 (69.43)	239 (48.54)	1.58	-0.46
Underpricing (%)	5.02% (0.57%)	7.56% (0.63%)	2.65% (0.00%)	-1.41	0.01
Capital Raised (\$ CND millions)	40 (16)	38 (21)	21 (15)	0.81	1.58
Volatility (%)	3.57% (3.13%)	3.64% (3.08%)	4.09% (3.78%)	-1.49	-2.44 *

* significant at 5% level (two-tailed) ** significant at 1% level (two-tailed)

Table G shows that Canadian IPOs issuing prices vary considerably from year to year. The highest issuing price, CAN\$133.84 (in 2000 Canadian dollars) appeared

in 1998 and the lowest issuing price is CAN\$0.16 (in 2000 Canadian dollars) in 1997. Mean issuing price in each ten-year period tend to decrease from 1971-1980's CAN\$31.4 (in 2000 Canadian dollars) down to 1991-2000's CAN\$9.42 (in 2000 Canadian dollars) and this trend continues according to 2001-2002's mean issuing price CAN\$9.14 (in 2000 Canadian dollars).

In terms of nominal (original) prices, the results are different. Table H shows an increasing trend of issuing price. Unadjusted mean issuing price is CAN\$7.18 in 1971-1980 period and upward to CAN\$8.88 in 1991-2000 period. 2001-2002 mean issuing price reaches to CAN\$9.48.

Table I documents Canadian IPOs market capitalization at issuance day. At both the beginning and ending years of 1990's, mean market capitalization exceeds CAN\$100 million (in 2000 Canadian dollars). The largest company (Canadian Pacific Railway Ltd.) emerged in 2001 with a market capitalization of CAN\$1,560.14 million (in 2000 Canadian dollars) at issuance date.

Unadjusted mean market capitalization at issuance (see Table J) is CAN\$31.15 million in 1980's, CAN\$67.64 million in 1990's and CAN\$197.04 million in 2001-2002. Both adjusted and unadjusted IPO market capitalization at issuance date indicates that Canadian IPOs are getting larger and larger.

Table G

Description of Canadian IPOs Issuing Price
(in 2000 Canadian dollars)

Issuance Year	Number of IPOs	Median	Mean	Standard Deviation	High	Low
1971	9	38.52	41.09	14.6	59.06	12.84
1972	22	39.01	41.19	14.4	67.83	19.22
1973	16	23.23	26.23	10.87	48.47	8.08
1974	2	6.48	6.48	2.19	8.03	4.93
1975	0	-	-	-	-	-
1976	1	12.24	12.24	0	12.24	12.24
1977	0	-	-	-	-	-
1978	1	29.94	29.94	0	29.94	29.94
1979	4	17.89	17.35	9.68	26.23	7.39
1980	8	20.31	17.03	6.46	22.74	7.58
1971-1980	63	29.94	31.4	16.2	67.83	4.93
1981	17	10.12	14.09	10.06	48.17	2.99
1982	5	12.17	13.52	4.7	21.07	8.26
1983	31	11.5	13.15	9.89	42.71	0.74
1984	21	11.02	12.84	8.01	33.06	4.33
1985	8	13.62	12.18	6.62	20.81	1.66
1986	87	11.63	12.33	7.13	42.14	1.6
1987	54	9.4	12.64	12.23	69.63	1.04
1988	11	3.01	16.62	39.13	133.84	0.94
1989	14	11.96	13.11	9.1	35.07	0.96
1990	8	11.93	9.18	6.13	14.6	0.55
1981-1990	256	11.26	12.8	11.8	133.84	0.55
1991	7	14.09	12.26	6.75	22.47	0.58
1992	13	9.36	10.47	4.65	17.88	3.12
1993	82	8.92	9.43	4.81	31.22	1.11
1994	50	6.07	7.62	4.78	20.59	1.1
1995	12	8.17	8.39	3.62	15.79	3
1996	45	7.5	7.7	4.01	16.08	0.54
1997	45	7.65	9.22	7.18	33.75	0.16
1998	28	9.93	10.5	7.24	30.31	1.15
1999	20	11.04	11.66	5.54	23.28	1.54
2000	34	10.38	12.69	8.89	38.55	1.5
1991-2000	336	8.48	9.42	5.99	38.55	0.16
2001	10	7.32	9.64	9.54	28.08	0.98
2002	9	8.11	8.6	8.65	23.84	0.29
2001-2002	19	8.11	9.14	8.89	28.08	0.29
TOTAL	674	10.27	12.81	11.63	133.84	0.16

Table H

Description of Canadian IPOs Issuing Price
(In Issuance Year Canadian dollars)

Issuance Year	Number of IPOs	Median	Mean	Standard Deviation	High	Low
1971	9	7.5	8	2.84	11.5	2.5
1972	22	8.63	9.33	3.19	15	4.25
1973	16	5.75	6.5	2.69	12	2
1974	2	1.78	1.78	0.6	2.2	1.35
1975	0	-	-	-	-	-
1976	1	4	4	0	4	4
1977	0	-	-	-	-	-
1978	1	11.5	11.5	0	11.5	11.5
1979	4	7.5	7.28	4.06	11	3.1
1980	8	9.38	7.86	2.98	10.5	3.5
1971-1980	63	8	7.18	3.31	15	1.35
1981	17	5.25	7.31	5.22	25	1.55
1982	5	7	7.78	2.71	12.13	4.75
1983	31	7	8	6.02	26	0.45
1984	21	7	8.15	5.09	21	2.75
1985	8	9	8.04	4.37	13.75	1.1
1986	87	8	8.48	4.91	29	1.1
1987	54	6.75	9.08	8.78	50	0.75
1988	11	2.25	12.41	29.24	100	0.7
1989	14	9.38	10.28	7.13	27.5	0.75
1990	8	9.8	7.55	5.04	12	0.45
1981-1990	256	7.5	8.66	8.41	100	0.45
1991	7	12.23	10.64	5.85	19.5	0.5
1992	13	8.25	9.23	4.1	15.75	2.75
1993	82	8	8.45	4.32	28	1
1994	50	5.45	6.85	4.3	18.5	0.99
1995	12	7.5	8.15	3.08	14.5	2.78
1996	45	7	7.18	3.75	15	0.5
1997	45	7.25	8.74	6.8	32	0.15
1998	28	9.5	10.04	6.93	29	1.1
1999	20	10.75	11.35	5.39	22.67	1.5
2000	34	10.38	12.69	8.89	38.55	1.5
1991-2000	336	8	8.88	5.76	38.55	0.15
2001	10	7.5	9.89	9.78	28.8	1
2002	9	8.5	9.02	9.07	25	0.3
2001-2002	19	8.5	9.48	9.2	28.8	0.3
TOTAL	674	8	8.7	6.83	100	0.15

Table I

Description of Canadian IPOs Market Capitalization on Issuing Day
(in millions in 2000 Canadian dollars)

Issuance Year	Number of IPOs	Market Capitalization ¹⁵					
		Total	Median	Mean	Standard Deviation	High	Low
1983	10	456.05	24.31	45.61	66.49	232.22	11.64
1984	11	279.34	11.02	25.39	30	106.61	14.53
1985	5	140.67	19.67	28.13	21.83	66.59	14.53
1986	65	1887.69	17.88	29.04	28.74	147.07	1.96
1987	23	2023.87	20.89	87.99	136.28	488.82	3.38
1988	5	355.24	4.02	71.05	144.64	329.46	0.74
1989	8	632.22	71.88	79.03	58.59	163.75	9.56
1990	5	60.75	5.11	12.15	17.99	43.79	1.31
1983-1990	132	5835.83	19.04	44.21	73.3	488.82	0.74
1991	6	1107.79	83.54	184.63	234.34	599.64	1.44
1992	12	1896.39	34.27	158.03	243.91	737.75	4.54
1993	75	2918.19	22.4	38.91	65.87	507.29	3.34
1994	43	2186.85	17.8	50.86	130.86	834.56	3.34
1995	10	305.51	25.76	30.55	20.87	82.45	7.65
1996	44	1661.35	26.79	37.76	48.08	289.38	2.16
1997	43	4064.72	21.1	94.53	162.37	857.65	0.06
1998	27	1969.86	32.26	72.96	115.3	553.95	2.2
1999	20	2507.25	37.33	125.36	239.02	888.37	4.37
2000	34	4013.31	42	118.04	191.44	937.13	10
1991-2000	314	22631.27	26.79	72.07	141.94	937.13	0.06
2001	10	2750.28	29.27	275.03	494.28	1560.14	2.73
2002	7	504.62	56.75	72.09	66.85	190.76	5.25
2001-2002	17	3254.9	48.79	191.46	386.91	1560.14	2.73
TOTAL	463	31722.05	24.87	68.51	145.23	1560.14	0.06

¹⁵ Adjusted Market Capitalization

= Original Market Capitalization × Year 2000 Consumer Price / Issuing Year Consumer Price

Table J

Description of Canadian IPOs Market Capitalization on Issuing Day
(in millions in issuing year Canadian dollars)

Issuance Year	Number of IPOs	Market Capitalization					
		Total	Median	Mean	Standard Deviation	High	Low
1983	10	277.66	14.8	27.77	40.48	141.38	7.09
1984	11	177.46	7	16.13	19.06	67.73	2.5
1985	5	92.96	13	18.59	14.42	44	9.6
1986	65	1298.94	12.3	19.98	19.78	101.2	1.35
1987	23	1453.28	15	63.19	97.86	351	2.43
1988	5	265.42	3	53.08	108.07	246.16	0.56
1989	8	495.76	56.37	61.97	45.94	128.4	7.5
1990	5	49.94	4.2	9.99	14.78	36	1.08
1983-1990	132	4111.42	12.88	31.15	52.76	351	0.56
1991	6	961.39	72.5	160.23	203.37	520.39	1.25
1992	12	1670.83	30.19	139.24	214.9	650	4
1993	75	2617.39	20.09	34.9	59.08	455	3
1994	43	1965.3	16	45.7	117.6	750	3
1995	10	280.47	23.65	28.05	19.16	75.69	7.02
1996	44	1550.13	25	35.23	44.86	270	2.02
1997	43	3853.42	20	89.61	153.93	813.06	0.06
1998	27	1884.82	30.87	69.81	110.33	530.04	2.1
1999	20	2440.98	36.35	122.05	232.71	864.89	4.25
2000	34	4013.31	42	118.04	191.44	937.13	10
1991-2000	314	21238.05	25	67.64	134.19	937.13	0.06
2001	10	2820.55	30.02	282.06	506.91	1600	2.8
2002	7	529.08	59.5	75.58	70.09	200	5.5
2001-2002	17	3349.63	50.04	197.04	396.68	1600	2.8
TOTAL	463	28699.1	20.25	61.99	139.29	1600	0.06

VI-2. Long-Term Performance

Canadian IPOs' five-aftermarket-year performance as well as the associated t-statistics and non-parametric test are shown in Appendix C and Appendix D.

Table K summaries the results on IPOs long-term performance. Though ten out of twelve results show that Canadian IPOs underperformed in a five-year run, only two of the abnormal returns are significantly negative. Besides, one significant result, which is based on equal-weighted residual cumulative wealth, shows that Canadian IPOs outperformed TSE Composite Index at the end of fifth aftermarket year. The mixed results in Table K shows that factors such as the selection of return calculation methods, the choice of benchmarks, and portfolio weighting methods could affect the results and conclusions on IPOs long-term performance.

Table L shows that when categorized by return calculation, only the selection of TSE Composite Index as benchmark might result in positive abnormal returns. And the selection of CFMRC as benchmark results in the most negative abnormal return among the three benchmarks. This result is as expected that abnormal returns, when taking TSE Composite index as benchmark, should be higher than the abnormal returns with CFRMC Equal index as benchmark. This is because TSE Composite index is a value-weighted index, while CFMRC Equal index is an equal-weighted index and CFMRC Equal index is more volatile than TSE Composite index. Abnormal returns over matching firms should be random and close to zero because these matching firms are very similar with the IPO firms.

Table K

**Summary of Results on Five-Aftermarket Year Portfolio of Market Cap Based
IPO Sample¹⁶**

Return Calculation	Benchmark	Portfolio Weighting Method	Abnormal Return Positive (+) or Negative (-)	Significant (S) or Not Significant (N) *
CAR	TSE ¹⁷	EW ¹⁸	+	N
CAR	TSE	VW ¹⁹	-	N
CAR	CFMRC ²⁰	EW	-	S
CAR	CFMRC	VW	-	S
CAR	M.F. ²¹	EW	-	N
CAR	M.F.	VW	-	N
RCW	TSE	EW	+	S
RCW	TSE	VW	-	N
RCW	CFMRC	EW	-	N
RCW	CFMRC	VW	-	N
RCW	M.F.	EW	-	N
RCW	M.F.	VW	-	N

* Traditional t test and skewness adjusted t test have the same results except two items: RCW_{EW,TSE} and RCW_{VW,CFMRC}. We use results of skewness adjusted t test in this table.

¹⁶ IPOs that have data of market capitalization

¹⁷ With TSE Composite index as benchmark

¹⁸ Equal-Weighted abnormal return

¹⁹ Value-Weighted abnormal return

²⁰ With CFMRC Equal index as benchmark

²¹ With Matching Firms as benchmark

Table L

**Rank of Results of Five-Aftermarket-Year Market Cap
Based IPO Sample
(in a descending order)**

<u>Rank</u>	<u>CAR</u>	<u>RCW</u>
1	CAR _{EW,TSE} ²²	RCW _{EW,TSE}
2	0 ²³	0
3	CAR _{EW,M.F.}	RCW _{VW,M.F.}
4	CAR _{VW,TSE}	RCW _{EW,CFMRC}
5	CAR _{VW,M.F.}	RCW _{VW,TSE}
6	CAR _{EW,CFMRC}	RCW _{EW,M.F.}
7	CAR _{VW,CFMRC}	RCW _{VW,CFMRC}

Residual cumulative wealth with matching firms as benchmark, which has the most volatile returns, among the three benchmarks, have a high abnormal return of 41.22% at the end of the fourth aftermarket year, and a low abnormal return of negative 38.20% at the end of the fifth aftermarket year. Previous American and Canadian researches used different ways to choose matching firms and get different results. For example, Ritter (1991) documented that IPOs underperformed their counterpart matching firms that are selected based on market capitalization and industry, but Eckbo and Norli (2000) found that IPOs did not underperform the matching firms based on market capitalization and book-to-market ratio. In this thesis, with matching firms as benchmark, we detected the same results as Ritter (1991).

²² Equal-weighted CAR with TSE Composite Index as benchmark

²³ Higher rank than zero means that the abnormal return is larger than zero, vice versa.

However, our results are not significant. IPOs long-term performance over matching firms is subjective to how matching firms are chosen.

Also in Table L, equal-weighted cumulative abnormal return and residual cumulative wealth are different from value-weighted ones. Details of comparison on the portfolio weighting method are in Table M, which shows the balance of equal-weighted abnormal returns (cumulative abnormal return and residual cumulative wealth) minus value-weighted abnormal returns. Except for residual cumulative wealth over CFMRC Equal Index, equal-weighted abnormal returns with market index as benchmark are lower than value-weighted abnormal returns at the end of the third aftermarket year. It means that large IPOs perform over market index better than small IPOs within their first three aftermarket years. But both of the balances with matching firms as benchmark are positive, which means that in a three-year run, small IPOs perform over matching firms better than large IPOs.

However, if the time span extends to five aftermarket years, with market index as benchmarks, all the equal-weighted abnormal returns are higher than value-weighted abnormal returns, which means that in a five-year view, small perform over market index better than larger IPOs.

Table M

**Difference of Abnormal Returns of Market Cap Based IPO
Sample²⁴ between Two Weighting Methods**
(Abnormal Return of Equal-Weighted Portfolio minus Abnormal Return
of Value-Weighted Portfolio)

Panel A		Three-Aftermarket-Year Portfolio		
		<u>TSE</u> ²⁵	<u>CFMRC</u> ²⁶	<u>M.F.</u> ²⁷
<u>CAR</u>		-13.27% ²⁸	-0.97%	1.43%
<u>RCW</u>		-10.44%	4.44%	10.89%

Panel B		Five-Aftermarket-Year Portfolio		
		<u>TSE</u>	<u>CFMRC</u>	<u>M.F.</u>
<u>CAR</u>		7.04%	26.33%	11.34%
<u>RCW</u>		46.44%	79.93%	-32.88%

²⁴ Sample of IPOs that have data of market capitalization at issuance

²⁵ with TSE Composite index as benchmark

²⁶ with CFMRC Equal index as benchmark

²⁷ with Matching Firms as benchmark

²⁸ Equals to equal-weighted CAR minus value-weighted CAR, with TSE Composite as benchmark

VI-3. t-statistics

In Table N, when taking market index as benchmark, under both of the two return calculation methods, skewness adjusted t value are always larger than traditional t value, which is the evidence that the distribution of Canadian IPOs' abnormal returns are negative skewed. However, with matching firms as benchmark, results on a question that which t value of the two comparison methods is larger are random. This is the evidence that from a statistical view, matching firms are better benchmark than market index.

Table N

Difference of t-statistics of Market Cap Based IPO Sample
(Traditional t value minus Skewness Adjusted t value)

Panel A		Three-Aftermarket-Year Portfolio		
	<u>TSE</u> ²⁹	<u>CFMRC</u> ³⁰	<u>M.F.</u> ³¹	
<u>CAR</u> <u>EW</u> ³²	- ³³	-	-	
<u>CAR</u> <u>vw</u>	-	-	+ ³⁴	
<u>RCW</u> <u>EW</u>	-	-	-	
<u>RCW</u> <u>vw</u>	-	-	-	

Panel B		Five-Aftermarket-Year Portfolio		
	<u>TSE</u>	<u>CFMRC</u>	<u>M.F.</u>	
<u>CAR</u> <u>EW</u>	-	-	+	
<u>CAR</u> <u>vw</u>	-	-	+	
<u>RCW</u> <u>EW</u>	-	-	+	
<u>RCW</u> <u>vw</u>	-	-	+	

²⁹ with TSE Composite index as benchmark

³⁰ with CFMRC Equal index as benchmark

³¹ with Matching Firms as benchmark

³² Equal-Weighted CAR

³³ "-" means that traditional t value is less than skewness adjusted t value

³⁴ "+" means that traditional t value is larger than skewness adjusted t value

VI-4. Non-Parametric Test

Because of meeting with missing values in database, the non-parametric test that has been talked in methodology section does not apply in this thesis. Thus, a non-parametric test designed by Doctor Vijay Jog is employed, which is that if the number of negative abnormal return months is more than half of the number of total aftermarket months, we say this IPO underperformed.

Table O

Percentage of Underperformed IPOs of Market Cap Based IPO Sample ³⁵		
Panel A	Three-Aftermarket-Year Portfolio	
<u>TSE</u> ³⁶	<u>CFMRC</u> ³⁷	<u>M.F.</u> ³⁸
65.95%	68.25%	50.50%
Panel B	Five-Aftermarket-Year Portfolio	
<u>TSE</u>	<u>CFMRC</u>	<u>M.F.</u>
67.53%	65.97%	45.90%

Table O shows the results of the non-parametric test. No matter time span is three years or five years, results are the same: more than half of the Canadian IPOs underperformed market index and less than half of the Canadian IPOs underperformed their matching firms.

³⁵ also see Appendix A

³⁶ with TSE Composite index as benchmark

³⁷ with CFMRC Equal index as benchmark

³⁸ with Matching Firms as benchmark

VI-5. IPOs Characteristics

In Table P, Size, Market Capitalization, Capital Raised and Volatility are significantly bivariately correlated. IPOs with larger revenues in pre-IPO year have larger market capitalization, thus they can raise more market capital and have lower volatile on their returns. Besides, nature of market and underpricing are positively correlated, it means that firms that go public in bull market tend to have higher underpricing level.

While IPOs, which have larger market capitalization, higher level of underpricing, and been issued in bear market year, tend to have higher abnormal returns, Table Q shows that none of the IPOs characteristics explain IPOs long-term performance very well. Only the variable-size has regression coefficients with matching firms as benchmark consistently significant. These results also show that IPOs with larger revenue in pre-IPO year have worse performance over matching firms than those with smaller pre-IPO year revenue.

Table P

Pearson Correlation Coefficients of IPO Characteristics						
	<u>LN (Size)</u>	<u>LN (Market Cap)</u>	<u>Underpricing</u>	<u>LN (Capital Raised)</u>	<u>Volatility</u>	<u>Nature of Market</u>
<u>LN (Size)</u>	1.000	0.447 **	-0.056	0.419 **	-0.312 **	-0.056
<u>LN (Market Cap)</u>		1.000	-0.076	0.89 **	-0.195 **	0.059
<u>Underpricing</u>			1.000	-0.037	-0.056	0.092 *
<u>LN (Capital Raised)</u>				1.000	-0.182 **	0.079
<u>Volatility</u>					1.000	-0.063
<u>Nature of Market</u>						1.000

* significant at 5% level (two-tailed) ** significant at 1% level (two-tailed)

Table Q

Regression Coefficients of IPO Characteristics³⁹

Panel A Three-Aftermarket-Year Portfolio

	<u>Intercept</u>	<u>LN (Size)</u>	<u>LN (Market Cap)</u>	<u>Underpricing</u>	<u>LN (Capital Raised)</u>	<u>Volatility</u>	<u>Nature of Market</u>	<u>R square</u>
	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	
CAR TSE ⁴⁰	0.35 (0.20)	-0.14 (-2.09 *)	0.20 (1.00)	0.41 (0.91)	-0.09 (-0.44)	2.04 (0.52)	-0.21 (-0.92)	0.055
CAR CFMRC	0.52 (0.31)	-0.11 (-1.72)	0.08 (0.37)	0.44 (0.98)	-0.01 (-0.03)	3.18 (0.80)	-0.17 (-0.77)	0.047
CAR M.F.	-0.75 (-0.30)	-0.25 (-2.56 *)	0.13 (0.43)	0.12 (0.20)	0.18 (0.57)	-2.46 (-0.47)	-0.05 (-0.16)	0.072
RCW TSE	-1.82 (-0.52)	-0.26 (-1.92)	0.31 (0.75)	0.66 (0.71)	0.08 (0.18)	-4.50 (-0.55)	-0.46 (-1.00)	0.041
RCW CFMRC	-1.45 (-0.40)	-0.26 (-1.88)	0.23 (0.53)	0.77 (0.81)	0.13 (0.29)	-3.74 (-0.44)	-0.35 (-0.75)	0.037
RCW M.F.	-1.03 (-0.20)	-0.52 (-2.55 *)	0.21 (0.36)	0.58 (0.47)	0.42 (0.67)	-14.14 (-1.32)	0.05 (0.08)	0.08

Panel B Five-Aftermarket-Year Portfolio

	<u>Intercept</u>	<u>LN (Size)</u>	<u>LN (Market Cap)</u>	<u>Underpricing</u>	<u>LN (Capital Raised)</u>	<u>Volatility</u>	<u>Nature of Market</u>	<u>R square</u>
	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	(t-statistics)	
CAR TSE	5.09 (2.07 *)	-0.14 (-1.37)	0.23 (0.68)	0.69 (1.02)	-0.38 (-1.14)	0.85 (0.16)	-0.36 (-1.00)	0.089
CAR CFMRC	6.15 (2.50 *)	-0.07 (-0.70)	0.07 (0.20)	0.69 (1.02)	-0.36 (-1.06)	1.73 (0.33)	-0.37 (-1.05)	0.101
CAR M.F.	0.40 (0.13)	-0.44 (-3.39 **)	0.90 (1.99 *)	1.24 (0.93)	-0.50 (-1.10)	-11.25 (-1.88)	-0.25 (-0.57)	0.204
RCW TSE	3.81 (1.01)	-0.12 (-0.75)	0.31 (0.59)	1.51 (1.45)	-0.37 (-0.72)	-8.77 (-1.10)	-1.03 (-1.88)	0.069
RCW CFMRC	6.59 (1.70)	-0.08 (-0.51)	0.03 (0.05)	1.54 (1.45)	-0.30 (-0.57)	-7.26 (-0.89)	-0.76 (-1.37)	0.073
RCW M.F.	0.29 (0.07)	-0.37 (-2.08 *)	0.28 (0.47)	1.13 (0.60)	0.11 (0.18)	-15.12 (-1.93)	-0.47 (-0.79)	0.115

* significant at 5% level (two-tailed) ** significant at 1% level (two-tailed)

³⁹ Abnormal Return = Intercept + a*Ln(Size) + b*Ln(Market Cap) + c*Underpricing + d*Ln(Capital Raised) + e*Volatility + f*Nature of Market⁴⁰ CAR with TSE as benchmark

VI-6. Survival IPOs

Canadian IPOs' five-aftermarket-year performance as well as the associated t-statistics and non-parametric test are shown in Appendix F and Appendix G.

As in Table R, results of survival IPOs long-term performance are as mixed as the total IPO portfolio. Only two of twelve results are significant: one is significantly outperforming and the other is significantly underperforming.

Table R

Summary of Results on Five-Aftermarket Year Portfolio of Market Cap Based Survival IPO Sample

Return Calculation	Benchmark	Portfolio Weighting Method	Abnormal Return Positive (+) or Negative (-)	Significant (S) or Not Significant (N) *
CAR	TSE	EW	+	N
CAR	TSE	VW	-	N
CAR	CFMRC	EW	-	N
CAR	CFMRC	VW	-	S
CAR	M.F.	EW	+	N
CAR	M.F.	VW	-	N
RCW	TSE	EW	+	S
RCW	TSE	VW	-	N
RCW	CFMRC	EW	-	N
RCW	CFMRC	VW	-	N
RCW	M.F.	EW	-	N
RCW	M.F.	VW	-	N

* Traditional t test and skewness adjusted t test have the same results except two items: RCW_{EW,TSE} and RCW_{EW,M.F.}. We use results of skewness adjusted t test in this table.

Comparing with the performance of the total IPO portfolio, in Table S, in a three-aftermarket year run, equal-weighted abnormal returns of survival IPOs portfolio are always higher than those of the total IPOs portfolio. It means that medium and small survival IPOs perform better than medium and small acquired and bankrupt IPOs within three aftermarket years. And at the end of the fifth aftermarket year, survival IPOs portfolio makes higher returns than total IPOs portfolio, which means that IPOs can survive five years because they have higher returns than delisted IPOs.

Table S

Performance Difference between Survival IPO Sample and Total IPO Sample⁴¹

(Abnormal Returns of Survival IPO Portfolio minus Abnormal Returns of Total IPO Portfolio)

Panel A Three-Aftermarket-Year Portfolio			
	<u>TSE</u>	<u>CFMRC</u>	<u>M.F.</u>
<u>CAR_{EW}</u>	14.39% ⁴²	19.83%	9.03%
<u>CAR_{VW}</u>	-7.94%	2.09%	7.39%
<u>RCW_{EW}</u>	13.69%	14.23%	14.13%
<u>RCW_{VW}</u>	0.09%	-5.06%	-0.69%

Panel B Five-Aftermarket-Year Portfolio			
	<u>TSE</u>	<u>CFMRC</u>	<u>M.F.</u>
<u>CAR_{EW}</u>	9.90%	14.97%	4.19%
<u>CAR_{VW}</u>	15.33%	3.70%	2.50%
<u>RCW_{EW}</u>	0.88%	1.49%	0.00%
<u>RCW_{VW}</u>	0.37%	0.69%	0.00%

⁴¹ These two samples only include IPOs that have data of market capitalization at issuance day

⁴² Equals to equal-weighted CAR of Survival IPO Sample minus that of the Total IPO Sample, with TSE Composite index as benchmark

Table T shows that coefficients of volatility and nature of market are positive. Survival IPOs have the lowest volatility and tend to go public in bear market year. Besides, IPO survivals have an underpricing level higher than delisting IPOs, but lower than acquired IPOs. However, none of the coefficients are significant.

Table T

Prediction of Post-IPO States by Using Multinomial Logit Model

	<u>LN (P_A / P_S)</u>	<u>LN (P_D / P_S)</u>
Intercept	-5.754 *	2.633
Size	0.183	-0.208
Market Cap	-0.065	0.348
Underpricing	0.344	-0.183
Capital Raised	0.104	-0.458
Volatility	6.681	4.209
Nature of Market	0.534	0.030
Chi-Square = 16.043		

* significant at 5% level (two-tailed) ** significant at 1% level (two-tailed)

VI-7. Limitations of This Thesis

Because we met with missing values and outliers when doing research, the accuracy of the results in this thesis might be affected. Besides, some new methodologies cannot be applied in the research because of missing values.

CHAPTER VII. Conclusions

This thesis finds that long-term performance of Canadian IPOs have the similar results as previous American researches. Though most of the results in this thesis show that Canadian IPOs underperformed, the results are not significant. Results on the long-term performance are mixed. The selection of benchmarks, return calculation methods, portfolio weighting methods and time span of post-issue performance used (three years versus five years aftermarket period) could affect the conclusion on the long-term performance.

Canadian IPOs only outperformed TSE Composite Index and with CFMRC Equal Index as benchmark, abnormal returns are the lowest among the three benchmarks, which is as expected because CFMRC Equal index is more volatile than TSE Composite index. And abnormal returns over matching firms are close to zero because they are very similar with IPO firms. Furthermore, since medium and small Canadian IPOs performed better within five aftermarket years, equal-weighted portfolio with market index as benchmark has higher abnormal returns than value-weighted portfolio. On the other hand, within a three-year view, large IPOs performed over market index better than medium and small IPOs.

No matter what benchmarks, portfolio weighting methods, and time spans are selected; non-parametric test is consistent: more than half of the Canadian IPOs underperformed. And the distribution of Canadian IPOs abnormal returns with market index as benchmarks is negatively skewed.

Except for the pre-IPO-year revenue, none of the IPOs characteristics significantly explain the long-term performance.

The results on the long-term performance of survival Canadian IPOs are also mixed. The consistent result is: investment in five-year survival IPOs portfolio does have higher return than investment in the total IPOs portfolio. However, though survival IPOs tend to have low volatility, median market capitalization, median level of underpricing, and be issued in bear market year, since these variables are not significant, it is still hard to tell which IPO can survive five years at the time it goes public.

This thesis uses a sample of IPOs that are collected in every available Canadian reference, the most inclusive Canadian benchmarks, and all the return calculation and portfolio weighting methods that are used in academics, to document the long-term performance of Canadian IPOs. Upon the results in this thesis which are based on a much longer time period than any other study, we believe that further research attempting to explain the long-term performance of Canadian IPOs may show results which are the same as in this thesis that dependent on the return calculation methodology and the benchmark chosen for comparison. Besides, given these mixed results, we also do not believe that the inclusion of additional variable of IPO characteristics in explaining aftermarket performance would yield new insights.

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Appendix A: Summary of Literature Review

Author (s)	Sample	Methodology	Conclusions
Brav & Gompers (1997)	<i>Venture Capital Journal</i> 1972-1992 934 IPO Firms <i>Investment Dealer's Digest of Corporate Finance</i> 1975-1992 3407 IPO Firms	Split IPO firm samples included venture-back IPO firms sample and nonventure-back IPO firms' sample. Raw returns and wealth relatives for each of the sub samples were calculated within five aftermarket years. Yearly IPO performance was compared with benchmark results. Calendar time portfolio of IPO firms was set up. Capital Asset Pricing Model and Fama French three factor regressions were used to test cross-sectional performance. Equal-weighted IPO firms' portfolio was compared with value-weighted IPO firms' portfolio.	Venture-backed IPO firms did not underperform the market. Venture-backed IPO firms outperformed nonventure-backed IPO firms. Total IPO firms' portfolio did not underperform the firms with matching size and book-to-market ratio. Performance measures on IPO firms under event time tended to exaggerate the underperformance.
Eckbo & Norli (2000)	<i>Securities Data Corporation's (SDC's) New Issues</i> 1973-1996 Ritter(1991)'s sample 5173 IPO Firms	Leverage variables and liquidity variables were employed for analysis. Weighted average holding-period returns and abnormal returns were calculated with five aftermarket years. Expected returns regressed on leverage variables and liquidity variables separately. Fama-French three-factor regression was used. Contribution of leverage and liquidity variables to expected return was analyzed. Equal-weighted and value-weighted matching firms were as benchmarks.	IPO firms tended to have more liquidity and lower leverage than matching firms. Matching firm procedure omitted risk factors. Higher liquidity factors and lower leverage factors of IPO firms contributed to their lower expected returns. Negative abnormal returns did not mean IPO firms underperformed.
Gompers & Lerner (2003)	<i>Issuer Summary</i> 1934-1949 Corporate Financing 1950-1959 Decade of Corporate and International Finance 1960-1969 <i>Investment Dealer's Digest</i> 1970-1972 3661 IPOs	Raw returns, average annual abnormal return and post-IPO cumulative residual wealth were calculated within three and five aftermarket years. Value-weighted CRSP index and size and book-to-market firms were benchmarks. Capital assets pricing model and Fama-French three-factor regression were used. Calendar-time returns were calculated. Adjusted critical value for t statistic was calculated.	IPO firms' underperformance under event-time cumulative residual wealth method was not significant in both three and five aftermarket years. Cumulative abnormal returns, Fama-French three-factor regression, capital assets pricing model and calendar time analysis showed that IPO firms did not significantly underperformance. And conclusions on IPO firms' performance were dependent on measuring method.

Appendix A (Cont.)

Author (s)	Sample	Methodology	Conclusions
Jain & Kini (1999)	<i>Securities Data Corporation's (SDC) New Issues</i> 1977-1990 877 IPO Firms	Industry and yearly distribution of post-IPO state. Set up variables related to industry structure, pre-IPO performance, strategic variables, valuation uncertainty, and pre-market demand and offering characteristics. Used multinomial logit modal to do regression. Employed t statistic and Wilcox on z to test difference.	IPO survivals were significantly related to industry growth and attractiveness. Larger IPO firms tended to survive. Valuation uncertainty, higher lever of managerial ownership, strong pre-IPO performance and more diversified contributed to IPO firms' survivorship. Industry market-to-book ratio was not significantly related to IPO survival. R&D expense of IPO firms helped their independency.
Jog (1997)	Toronto Stock Exchange 1984-1992 383 IPO Firms	Residual cumulative wealth and average cumulative abnormal returns were calculated within sixty aftermarket months. TSE 300 Composite Index and value-weighted index of TSE-Western Database were benchmarks. Multivariate regression was used to factor contribution to IPO firms' abnormal returns. Accounting numbers and ratios were calculated to evaluate IPO firms' aftermarket performance.	IPO issued in bull markets tended to be more underpriced than in bear markets. IPO firms' underperformed index and arbitrage portfolio inclusive of short in index and long in IPO firms got negative returns within seventy-two aftermarket months. And sixty-month IPO firms did not significantly underperform benchmark, but arbitrage portfolio kept losing money.
Jog & Srivastava (1997/98)	Toronto Stock Exchange 1971-1995 399 IPO Firms	Using a longer time period, Cumulative abnormal returns and residual cumulative wealth were calculated. TSE 300 and value-weighted index of TSE-Western Database were used as benchmarks.	IPO firms underperformed TSE 300 index within first four aftermarket years and tended to recover from the fifth aftermarket year. Zero investment portfolios inclusive of IPO firms and index kept getting negative returns on both equal and value weighted index with first three aftermarket years. Canada had attractive IPO environment, but market maybe over expect intrinsic value of IPO firms.

Appendix A (Cont.)

Author (s)	Sample	Methodology	Conclusions
Kooli & L'Her & Suret	<i>Record of New Issues (RNI)</i> 1986-2000 141 IPO Firms	Cumulative abnormal return and residual cumulative wealth are calculated within three aftermarket years and under both equal-weighted and value-weighted schema. Matching firms based on market capitalization and book-to-market ratio are selected as benchmark. Traditional and skewness-adjusted t statistics are used.	Equal-weighted cumulative abnormal returns are significantly positive in three aftermarket years. Both equal-weighted and value-weighted residual cumulative wealth is significantly positive in first aftermarket year and then is not significantly different from zero in second and third year. Outliers in IPO sample affect conclusion on long-term IPO performance.
Ritter (1991)	NYSE & NASDAQ 1975-1984 1526 IPO Firms	Cumulative average returns are calculated and are rebalanced monthly. Three-year average residual cumulative wealth was calculated based on monthly rebalancing. Adjusted returns are calculated using NASDAQ value-weighted index, NYSE value-weighted index as well as listed matching firms. Cross-sectional and time-series are used to compare IPO firms' performance. Regression on IPO factors.	IPO firms underperformed the market as well as matching firms. Firms going public during heavy volume year did even worse. Except for financial institution, drugs and airlines industries, all the industries underperformed. Either investor is overoptimistic about the IPO firms or IPO firms were taking advantage of the "window of opportunity".
Hensler & Rutherford & Springer (1997)	NASDAQ 1976-1992 741 IPO Firms	Sample is split into Survival patterns and Delisting patterns. Log-logistic accelerated failure time (AFT) model is used to predict IPO survival time by IPO characteristics.	Market capitalization, pre-IPO ages, first-day returns and percentage of insider ownership increase IPO survival time. Market level decreases IPO survival time. Different industries tend to have varied average IPO survival time.
Ritter & Welch (2002)	AMEX, NASDAQ & NYSE 1980-2001 6249 IPO Firms	Multiyear residual cumulative wealth was calculated within five aftermarket years. IPO firms' performance compared with market and matching firms with similar market capitalization and book-to-market value to IPO firms. Calendar time Fama-French three factors model were used to test abnormal performance. Sub sample of different time period.	Three equal-weighted portfolio of IPO firms underperformed value-weighted market portfolio. Public traded firms with similar market capitalization and book-to-market value performed same as IPO firms. Both IPO firms and their matching firms underperformed broad market.

Appendix B: Definition of IPOs Characteristics

<u>Symbol</u>	<u>Variable</u>	<u>Description</u>	<u>Measure</u>
Size	Size	IPO's economic scale in the pre-IPO period	Revenues in the preceding year before going public
Market Cap	Market Capitalization	Market value at the time of issuance	Number of common shares * issuing price
Underpricing	First-day underpricing (or first-day return)	Return on IPO stock in IPO first market-trading day	(First-day closing price – Issuing price) / Issuing price
Industry	Industry	The industry that IPO firm belongs to	Refer to four-digit SIC code
Capital Raised	Capital raised	Wealth raised from stock market at the time of IPO	Number of shares offered to stock market at issuance date * Issuing price
Volatility	Immediate Post-Issuance Volatility	Aftermarket volatility on IPO stock in the first post-issuing year	Standard deviation of daily return on IPO stock within 1 st aftermarket year ⁴³
Nature of Market	Nature of the market	Stock market condition in IPO issuance year	Bull market, if benchmark index return > T-bill return; Bear market, if benchmark index return < T-bill return
Issuance Year	Issuance year	The year when an IPO stock is issued	Refer to calendar

⁴³ If an IPO is acquired or delisting within the first aftermarket year, volatility is calculated based on its total survival time.

Appendix C: Five-Year Cumulative Abnormal Returns of Canadian IPOs

Five-Year Cumulative Abnormal Returns of Canadian IPOs
Panel A Benchmark: TSE Composite Index

Total IPO sample

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-5.97%	-2.12 *	-2.02 *	58.58%	(372 ⁴⁴ / 103 ⁴⁵ / 160 ⁴⁶)
2	-11.35%	-2.60 **	-2.52 *	65.86%	(407 / 50 / 161)
3	-10.69%	-1.83	-1.67	68.80%	(397 / 38 / 142)
4	-5.70%	-0.76	-0.71	71.04%	(395 / 33 / 128)
5	-4.66%	-0.47	-0.43	73.37%	(383 / 22 / 117)

Sample of IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-2.37%	-0.69	-0.65	58.38%	(209 / 53 / 96)
2	-4.74%	-0.89	-0.86	65.22%	(210 / 26 / 86)
3	-3.47%	-0.46	-0.41	65.95%	(184 / 24 / 71)
4	2.90%	0.30	0.34	65.47%	(146 / 29 / 57)
5	1.83%	0.15	0.18	67.53%	(131 / 7 / 56)

Aftermarket Year	Value Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	8.46%	2.46 *	2.65 **	58.38%	(209 / 53 / 96)
2	18.23%	3.42 **	3.52 **	65.22%	(210 / 26 / 86)
3	9.80%	1.29	1.40	65.95%	(184 / 24 / 71)
4	1.88%	0.20	0.23	65.47%	(146 / 29 / 57)
5	-5.21%	-0.42	-0.36	67.53%	(131 / 7 / 56)

⁴⁴ Number of IPOs, more than 50% of aftermarket months of which are negative-abnormal-return months

⁴⁵ Number of IPOs, 50% of aftermarket months of which are negative-abnormal-return months

⁴⁶ Number of IPOs, less than 50% of aftermarket months of which are negative-abnormal-return months

Appendix C (Cont.)

Five-Year Cumulative Abnormal Returns of Canadian IPOs

Panel B Benchmark: CFMRC Equal Index

Total IPO sample

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-11.65%	-4.08 **	-3.82 **	58.81%	(374 / 109 / 154)
2	-21.54%	-4.90 **	-4.69 **	65.15%	(402 / 62 / 153)
3	-30.99%	-5.43 **	-4.05 **	70.52%	(409 / 43 / 128)
4	-35.30%	-4.71 **	-3.60 **	72.43%	(402 / 27 / 126)
5	-37.61%	-3.84 **	-3.00 **	72.94%	(380 / 26 / 115)

Sample of IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-9.53%	-2.71 **	-2.48 *	58.59%	(208 / 60 / 87)
2	-16.63%	-3.10 **	-2.90 **	63.95%	(204 / 28 / 87)
3	-25.31%	-3.33 **	-2.62 **	68.25%	(187 / 24 / 63)
4	-28.65%	-2.93 **	-2.37 *	67.42%	(149 / 15 / 57)
5	-31.46%	-2.52 *	-2.02 *	65.97%	(126 / 12 / 53)

Aftermarket Year	Value Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	3.04%	0.86	0.89	58.59%	(208 / 60 / 87)
2	-0.69%	-0.13	-0.12	63.95%	(204 / 28 / 87)
3	-24.52%	-3.23 **	-2.56 *	68.25%	(187 / 24 / 63)
4	-41.08%	-4.20 **	-2.98 **	67.42%	(149 / 15 / 57)
5	-57.79%	-4.63 **	-2.75 **	65.97%	(126 / 12 / 53)

Appendix C (Cont.)

Five-Year Cumulative Abnormal Returns of Canadian IPOs

Panel C Benchmark: Matching Firms

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-4.33%	-0.90	-0.92	40.38%	(107 / 60 / 98)
2	-2.83%	-0.40	-0.40	45.61%	(104 / 23 / 101)
3	-2.47%	-0.25	-0.23	50.50%	(101 / 16 / 83)
4	-2.48%	-0.04	-0.20	47.40%	(74 / 20 / 61)
5	-2.13%	-0.03	-0.18	45.90%	(56 / 7 / 58)

Aftermarket Year	Value Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	14.17%	2.94 **	2.62 **	39.84%	(100 / 58 / 93)
2	10.97%	1.53	1.51	45.16%	(98 / 22 / 97)
3	-3.80%	-0.39	-0.36	50.00%	(96 / 15 / 81)
4	-3.48%	-0.05	-0.21	46.62%	(69 / 19 / 60)
5	-13.47%	-0.16	-0.32	45.76%	(54 / 7 / 57)

* significant at 5% level (two-tailed)

** significant at 1% level (two-tailed)

Appendix D: Five-Year Residual Cumulative Wealth of Canadian IPOs

Five-Year Residual Cumulative Wealth of Canadian IPOs

Panel A Benchmark: TSE Composite Index

Total IPO sample

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-4.87%	-1.87	-1.78	539
2	-1.78%	-0.36	-0.33	484
3	2.81%	0.32	0.37	408
4	33.44%	1.36	1.91	333
5	26.49%	1.51	1.78	275

Sample of IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-4.42%	-1.44	-1.37	356
2	1.05%	0.17	0.20	322
3	13.56%	1.12	1.29	275
4	46.01%	1.29	1.83	222
5	36.91%	1.60	1.96 *	191

Aftermarket Year	Value Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	6.89%	2.24 *	2.33 *	356
2	22.69%	3.58 **	4.22 **	322
3	24.00%	1.99 *	2.40 *	275
4	25.56%	0.72	0.97	222
5	-9.53%	-0.41	-0.33	191

Appendix D (Cont.)

Five-Year Residual Cumulative Wealth of Canadian IPOs
 Panel B Benchmark: CFMRC Equal Index

Total IPO sample

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-10.00%	-3.79 **	-3.54 **	541
2	-10.78%	-2.16 *	-1.95	478
3	-18.81%	-2.14 *	-1.72	407
4	-5.41%	-0.22	-0.09	332
5	-15.52%	-0.90	-0.78	273

Sample of IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-10.06%	-3.21 **	-3.02 **	357
2	-7.73%	-1.21	-1.10	318
3	-9.50%	-0.78	-0.67	274
4	2.46%	0.07	0.20	223
5	-8.94%	-0.39	-0.32	191

Aftermarket Year	Value Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	4.11%	1.31	1.32	357
2	8.23%	1.28	1.38	318
3	-13.94%	-1.15	-0.97	274
4	-32.51%	-0.91	-0.57	223
5	-88.87%	-3.90 **	-1.87	191

Appendix D (Cont.)

Five-Year Residual Cumulative Wealth of Canadian IPOs
Panel C Benchmark: Matching Firms

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-3.80%	-0.77	-0.80	236
2	8.44%	0.71	0.83	204
3	34.78%	1.59	1.94	181
4	41.22%	0.72	0.96	138
5	-38.20%	-0.65	-0.89	109

Aftermarket Year	Value Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	8.81%	1.78	1.60	229
2	18.20%	1.51	1.85	199
3	23.89%	1.08	1.27	178
4	51.91%	0.89	1.20	135
5	-5.32%	-0.09	-0.22	108

* significant at 5% level (two-tailed) ** significant at 1% level (two-tailed)

Appendix E: Variable Importance of IPO Characteristics

Variable Importance of IPO Characteristics

Panel A Three-Aftermarket-Year Portfolio

	<u>LN (Size)</u>	<u>LN (Market Cap)</u>	<u>Underpricing</u>	<u>LN (Capital Raised)</u>	<u>Volatility</u>	<u>Nature of Market</u>
CAR _{TSE}	0.70	0.02	0.11	0.02	0.09	0.06
CAR _{CFMRC}	0.65	-0.05	0.14	0.00	0.20	0.05
CAR _{M.F.}	0.78	0.10	0.00	0.15	-0.04	0.00
RCW _{TSE}	0.45	0.29	0.08	0.07	0.00	0.11
RCW _{CFMRC}	0.56	0.17	0.12	0.10	-0.01	0.06
RCW _{M.F.}	0.60	0.10	0.03	0.21	0.06	0.00

Panel B Five-Aftermarket-Year Portfolio

	<u>LN (Size)</u>	<u>LN (Market Cap)</u>	<u>Underpricing</u>	<u>LN (Capital Raised)</u>	<u>Volatility</u>	<u>Nature of Market</u>
CAR _{TSE}	0.49	-0.41	0.11	0.72	0.02	0.08
CAR _{CFMRC}	0.19	-0.13	0.10	0.72	0.03	0.09
CAR _{M.F.}	0.73	0.06	0.07	0.07	0.06	0.01
RCW _{TSE}	0.07	-0.17	0.27	0.20	0.17	0.47
RCW _{CFMRC}	0.08	-0.03	0.29	0.31	0.10	0.25
RCW _{M.F.}	0.36	0.05	0.09	0.02	0.39	0.09

Appendix F: Five-Year Cumulative Abnormal Returns of Canadian Survival IPOs

Five-Year Cumulative Abnormal Returns of Canadian Survival IPOs

Panel A Benchmark: TSE Composite Index

Total Survival IPO Sample

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs
1	-0.16%	-0.04	-0.02	57.55% (183 ⁴⁷ / 48 ⁴⁸ / 87 ⁴⁹)
2	-3.22%	-0.62	-0.61	62.54% (197 / 29 / 89)
3	1.71%	0.24	0.27	65.27% (203 / 18 / 90)
4	5.55%	0.67	0.72	66.08% (189 / 21 / 76)
5	4.50%	0.45	0.49	67.42% (180 / 11 / 76)

Sample of Survival IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs
1	4.51%	0.97	1.07	56.74% (122 / 31 / 62)
2	4.95%	0.77	0.81	60.93% (131 / 17 / 67)
3	10.92%	1.17	1.29	65.12% (140 / 11 / 64)
4	14.63%	1.39	1.54	64.50% (129 / 18 / 53)
5	11.73%	0.93	1.03	67.36% (130 / 7 / 56)

Aftermarket Year	Value Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs
1	0.41%	0.09	0.12	56.74% (122 / 31 / 62)
2	2.71%	0.42	0.45	60.93% (131 / 17 / 67)
3	1.86%	0.20	0.23	65.12% (140 / 11 / 64)
4	-16.47%	-1.57	-1.34	64.50% (129 / 18 / 53)
5	-20.54%	-1.63	-1.36	67.36% (130 / 7 / 56)

⁴⁷ Number of IPOs, more than 50% of aftermarket months of which are negative-abnormal-return months

⁴⁸ Number of IPOs, 50% of aftermarket months of which are negative-abnormal-return months

⁴⁹ Number of IPOs, less than 50% of aftermarket months of which are negative-abnormal-return months

Appendix F (Cont.)

Five-Year Cumulative Abnormal Returns of Canadian Survival IPOs
Panel B **Benchmark: CFMRC Equal Index**

Total Survival IPO Sample

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-3.72%	-0.99	-0.95	55.06%	(174 / 57 / 85)
2	-9.18%	-1.80	-1.73	60.70%	(190 / 34 / 89)
3	-15.88%	-2.28 *	-2.01 *	68.27%	(213 / 25 / 74)
4	-21.00%	-2.56 *	-2.23 *	70.18%	(200 / 11 / 74)
5	-26.42%	-2.70 **	-2.30 *	68.18%	(180 / 14 / 70)

Sample of Survival IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-1.51%	-0.32	-0.29	54.93%	(117 / 36 / 60)
2	-3.35%	-0.53	-0.50	58.69%	(125 / 19 / 69)
3	-5.48%	-0.59	-0.54	65.57%	(139 / 19 / 54)
4	-11.63%	-1.11	-1.01	67.68%	(134 / 11 / 53)
5	-16.49%	-1.32	-1.17	65.79%	(125 / 12 / 53)

Aftermarket Year	Value Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	-3.37%	-0.72	-0.66	54.93%	(117 / 36 / 60)
2	-11.25%	-1.77	-1.61	58.69%	(125 / 19 / 69)
3	-22.41%	-2.42 *	-1.98 *	65.57%	(139 / 19 / 54)
4	-43.44%	-4.14 **	-2.81 **	67.68%	(134 / 11 / 53)
5	-61.49%	-4.93 **	-2.73 **	65.79%	(125 / 12 / 53)

Appendix F (Cont.)

Five-Year Cumulative Abnormal Returns of Canadian Survival IPOs
Panel C Benchmark: Matching Firms

Aftermarket Year	Equal Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	2.75%	0.49	0.50	38.46%	(60 / 37 / 59)
2	6.33%	0.79	0.80	42.96%	(61 / 14 / 67)
3	6.56%	0.56	0.59	49.02%	(75 / 12 / 66)
4	3.90%	0.05	-0.11	45.39%	(64 / 19 / 58)
5	2.06%	0.02	-0.13	46.67%	(56 / 7 / 57)

Aftermarket Year	Value Weighted CAR	Traditional t-statistics	Skewness Adjusted t-statistics	Percentage of Underperformed IPOs	
1	0.97%	0.17	0.18	38.00%	(57 / 36 / 57)
2	4.67%	0.58	0.60	43.48%	(60 / 13 / 65)
3	3.59%	0.31	0.33	48.97%	(71 / 11 / 83)
4	0.42%	0.01	-0.15	44.44%	(60 / 18 / 57)
5	-10.97%	-0.13	-0.29	46.15%	(54 / 7 / 56)

* significant at 5% level (two-tailed)

** significant at 1% level (two-tailed)

Appendix G: Five-Year Residual Cumulative Wealth of Canadian Survival IPOs

Five-Year Residual Cumulative Wealth of Canadian Survival IPOs

Panel A Benchmark: TSE Composite Index

Total Survival IPO Sample

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	2.27%	0.67	0.69	320
2	5.27%	0.85	0.92	320
3	11.28%	1.03	1.17	313
4	38.04%	1.38	1.95	294
5	27.06%	1.54	1.82	274

Sample of Survival IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	3.48%	0.90	0.94	210
2	15.13%	1.78	2.05 *	206
3	27.25%	1.80	2.19 *	211
4	56.25%	1.42	2.05 *	199
5	37.79%	1.63	2.00 *	190

Aftermarket Year	Value Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	1.66%	0.43	0.45	210
2	9.62%	1.13	1.27	206
3	24.09%	1.59	1.91	211
4	33.86%	0.85	1.17	199
5	-9.16%	-0.39	-0.31	190

Appendix G (Cont.)

Five-Year Residual Cumulative Wealth of Canadian Survival IPOs

Panel B Benchmark: CFMRC Equal Index

Total Survival IPO Sample

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-2.46%	-0.72	-0.70	321
2	-2.65%	-0.42	-0.39	315
3	-9.22%	-0.85	-0.73	312
4	1.35%	0.05	0.17	292
5	-14.44%	-0.84	-0.73	274

Sample of Survival IPOs that have data of market capitalization

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-2.33%	-0.60	-0.58	210
2	6.42%	0.75	0.82	206
3	4.73%	0.31	0.37	211
4	14.90%	0.38	0.54	199
5	-7.35%	-0.32	-0.25	190

Aftermarket Year	Value Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-2.56%	-0.66	-0.64	210
2	-14.21%	-1.66	-1.41	206
3	-19.00%	-1.25	-1.02	211
4	-23.43%	-0.59	-0.37	199
5	-88.18%	-3.86 **	-1.86	190

Appendix G (Cont.)

Five-Year Residual Cumulative Wealth of Canadian Survival IPOs
Panel C Benchmark: Matching Firms

Aftermarket Year	Equal Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	2.81%	0.45	0.42	132
2	15.84%	0.93	1.14	129
3	48.91%	1.73	2.14 *	136
4	49.11%	0.79	1.06	126
5	-38.20%	-0.65	-0.89	109

Aftermarket Year	Value Weighted RCW	Traditional t-statistics	Skewness Adjusted t-statistics	Number of IPOs
1	-2.31%	-0.36	-0.39	130
2	0.77%	0.04	0.13	127
3	23.20%	0.80	0.95	133
4	57.55%	0.90	1.22	123
5	-5.32%	-0.09	-0.22	108

* significant at 5% level (two-tailed)

** significant at 1% level (two-tailed)

Appendix H: Equal-Weighted CAR of Total IPO Sample

Appendix I: CAR of Market Cap Based IPO Sample over TSE Composite Index

Appendix J: CAR of Market Cap Based IPO Sample over CFMRC Index

Appendix K: CAR of Total IPO Sample over Matching Firms

Appendix L: Equal-Weighted RCW of Market Cap Based IPO Sample

Appendix M: Value-Weighted RCW of Market Cap Based IPO Sample

Appendix N: RCW of Market Cap Based IPO Sample over TSE Composite Index

Appendix O: RCW of Market Cap Based IPO Sample over CFMRC Equal Index

Appendix P: RCW of Total IPO Sample over Matching Firms

Appendix Q: Equal-Weighted CAR of Survival IPO Sample

Appendix R: CAR of Market Cap Based Survival IPO Sample over TSE Composite Index

Appendix S: CAR of Market Cap Based Survival IPO Sample over CFMRC Equal Index

Appendix T: CAR of Survival IPO Sample over Matching Firms

Appendix U: Equal-Weighted RCW of Survival IPO Sample

Appendix V: RCW of Market Cap Survival IPO Sample over TSE Composite Index

Appendix W: RCW of Market Cap Based Survival IPO Sample over CFMRC Equal Index

Appendix X: RCW of Survival IPO Sample over Matching Firms

Appendix Y: Equal-Weighted RCW of Market Cap Based Survival IPO Sample

Appendix Z: Value-Weighted RCW of Market Cap Based Survival IPO Sample