

Size Premia in the Canadian Equity Market

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1 Introduction

Background

One of the most remarkable discoveries of empirical capital market research is that of a relationship between firm size and equity return. Many studies have shown that risk-adjusted equity returns of public firms are higher for small firms than for large firms. This phenomenon is known as the “small firm effect”.²

Some tests also find that smaller firms consistently generate returns that are above their expected returns predicted by the Capital Asset Pricing Model (“CAPM”).³ This suggests that the CAPM should be modified to account for firm size, which is referred to as the “size premium”. The CAPM is a commonly used and accepted model used by valuation professionals to calculate the opportunity cost of capital or required cost of capital.

Research Question

Size premia have been extensively investigated in the United States (“US”) and in many other developed markets. The Risk Premium Report by Duff & Phelps LLC and the SBBI Yearbook by Morningstar, Inc. are published annually and contain empirical size premia studies for the US market that are commonly used in the valuation community.⁴

To the author’s knowledge, the only similar empirical study of the ‘small firm effect’ in the Canadian equity marketplace was conducted by Elfakhani and Wei (2003) which examined the phenomenon over the period 1975 to 1994. However, Elfakhani and Wei do not examine “size premia” per se.

This research paper will investigate and discuss the existence of Canadian size premia based on an empirical model using historical data of Canadian equities from 1993 to 2007.⁵ In addition, this paper includes a comparison to the US results published by Morningstar.

² Banz (1981) and Reinganum (1981) have been the first to describe the phenomenon of the small firm effect.

³ CAPM in this paper refers to the conventional CAPM formula which assumes that the expected return on equity is equal to the risk-free return plus beta multiplied by the equity risk premium.

⁴ Most empirical studies including Morningstar (2008) use market value of equity as a measure of size. Duff & Phelps (2008) uses eight different measures of size (market value of equity, book value of equity, 5 year average net income, market value of invested capital, total assets, 5 year average EBITDA, revenue and number of employees). Note that the Risk Premium Report by Duff & Phelps has been published as the Standard & Poor's Corporate Value Consulting Risk Premium Report for Reports titled 2002 to 2004 and as the PricewaterhouseCoopers and Price Waterhouse Risk Premium Reports for years prior to 2002.

⁵ This paper does not discuss size premia for private firms.

2 Empirical Study

2.1 Basis of Data

Equity Sample

The empirical study includes all Canadian equities listed on the Toronto Stock Exchange (“TSX”) as at December 31, 2007 for which data was available. The study is based on equity data of the entire sample from January 1 1993 to December 31, 2007.

Equities listed at any time during the time period studied are included. Equities delisted during the period are excluded. See section 3.5 for a discussion of limitations resulting from these exclusions.

TSX-listed income trust units are included. However, the empirical study is also performed excluding income trust units, to isolate any bias that might be driven by some of the unique characteristics of these securities and the changes to the income trust marketplace in Canada over this period. For details see section 3.4.

The table below sets out the number of equities included in the study.

Number of equities included in sample

1993-2007

Year	Equities excl. Income Trusts	Income Trusts	Total Equities
2007	911	349	1,260
2006	832	294	1,126
2005	762	226	988
2004	696	170	866
2003	652	111	763
2002	595	82	677
2001	522	67	589
2000	443	62	505
1999	415	53	468
1998	375	36	411
1997	319	26	345
1996	234	16	250
1995	213	12	225
1994	195	8	203
1993	175	4	179

The number of equities in the 1990’s appears to be low. This is likely due to data availability and exclusion of delisted equities.

Types and Sources of Data

The market value of equity (“MVE”) is used as a measure of size. Data is obtained from data provider ‘Capital IQ’ and includes year end figures from 1992 to 2007.

Share price data is obtained from data provider ‘Capital IQ’ and includes monthly share prices adjusted for dividends and stock splits from December 1992 to December 2007. Returns based on dividend adjusted share prices reflect the total return representing a return from capital appreciation and a return from dividend distributions.

The 3-month Canadian Treasury bill is used as the money market rate. Data is obtained from Bank of Canada on a monthly basis from January 1993 to December 2007.

The monthly government bond yield with average maturity over 10 years is used as the risk-free rate. Data is obtained from 'Bank of Canada' on an annual basis from 1993 to 2007.

2.2 Methodology

The following is a step-by-step description of the study's methodology.

Calculation of Actual Size Portfolio Returns

First, monthly equity returns are calculated based on month-end share prices. A monthly return for a particular equity is determined by dividing the current month-end price by the previous month-end price and subtracting one.

Second, ten size portfolios are created by ranking all equities by market value of equity and splitting the ranked equities into ten equally populated portfolios (referred as to "size deciles" in this paper).⁶ Size deciles are rebalanced annually.

Third, monthly equity returns are multiplied by their respective size decile weights. Size decile weights are calculated by dividing the market value of a single equity by the market value of equity for the entire size decile.

Fourth, actual annual size decile returns are calculated by compounding the monthly size decile returns.

Calculation of Size Decile Betas

First, monthly market benchmark returns are calculated based on the total weighted average monthly equity returns of all equities included in the sample.

Second, monthly excess market benchmark returns are calculated by subtracting the monthly money market rates from monthly market benchmark returns.

Third, monthly excess size decile returns are calculated by subtracting monthly money market rates from monthly size decile returns.

Fourth, monthly excess size decile returns are regressed against monthly excess market benchmark returns over the entire time period studied to determine beta for each size decile.

Calculation of Expected Annual Size Decile Returns using CAPM

First, the risk free rate is determined by calculating the arithmetic average of the long-term government bond yield over the entire time period studied.

Second, annual market benchmark returns are calculated by compounding the monthly market benchmark returns.

Third, the equity risk premium is calculated by subtracting the average risk-free rate as determined above from arithmetic average annual market benchmark over the time period studied.

Fourth, expected size decile returns in the context of the CAPM are calculated using the risk-free rate plus the respective size decile betas multiplied by the equity risk premium.

Calculation of Size Premia

Size premia are calculated by computing the difference between the actual size decile returns and the expected size decile returns as defined by the CAPM.

⁶ Note that equities are ranked by market value of equity as at previous year-end to create size deciles for the current year. If deciles would be ranked by market value of equity at current year-end, equities with decreasing share prices during the current year would tend to be part of smaller size decile as a decreasing share price reduces market value of equity. This would bias downward returns of smaller size deciles.

3 Results

3.1 Composition of Size Deciles

The table below sets out the size of each decile, the largest firm and its MVE for each size decile as at December 2007.

Largest Firm by Decile and Size of Decile
December 31, 2007

Decile	Recent Decile MVE (in C\$ thousands)	Recent Percentage of Total MVE	MVE of Largest Firm (in C\$ thousands)	Firm Name
1 (Largest)	1,255,773,901	81.5%	71,008,421	Royal Bank of Canada
2	137,809,286	8.9%	1,769,738	West Fraser Timber Co. Ltd.
3	60,909,727	4.0%	676,777	Heritage Oil Corp.
4	32,097,282	2.1%	331,412	SCITI Trust
5	20,517,162	1.3%	199,232	Descartes Systems Group Inc.
6	13,772,645	0.9%	132,921	Amica Mature Lifestyles Inc.
7	9,168,088	0.6%	87,989	World Energy Solutions, Inc.
8	6,124,897	0.4%	59,408	Swiss Water Decaffeinated Coffee Income
9	3,639,187	0.2%	36,958	TORR Canada Inc
10 (Smallest)	1,523,080	0.1%	20,210	Northwater Top 75 Income Trusts
Mid-Cap(3-5)	113,524,171	7.4%	676,777	Heritage Oil Corp.
Low-Cap(6-8)	29,065,630	1.9%	132,921	Amica Mature Lifestyles Inc.
Micro-Cap(9-10)	5,162,267	0.3%	36,958	TORR Canada Inc
Total MVE	1,541,335,255	100.0%		

The above table indicates that large firms account for the majority of the market value of the Canadian equity market. As at December 31, 2007 the largest size decile represents 81.5% of the total MVE of the entire equity sample.

Morningstar (2008) groups deciles into three size categories: mid-cap equities are defined as the aggregate of decile 3 to 5; low-cap equities include equities in deciles 6 to 8 while micro-cap equities include equities in deciles 9 to 10.

Based on the study's decile breakpoints as at December 31, 2007 firms within the mid-cap category have MVE between \$132,921,000 and \$676,777,000. Low-cap equities include firms with MVE between \$36,958,000 and \$132,921,000 and micro-cap equities include firms with MVE up to \$36,958,000.

3.2 Summary Statistics

Based on the foregoing methodology, the table below summarizes the arithmetic mean return, beta, R-square and standard deviation by size decile over 1993 to 2007.

Summary Statistics for Decile Portfolios of the TSX

1993-2007

Decile	Arithmetic	Beta	R-Square [1]	Standard
	Mean Return			Deviation [2]
1 (Largest)	11.47%	1.02	0.97	13.1%
2	10.90%	0.89	0.76	14.6%
3	11.90%	0.85	0.69	15.3%
4	12.42%	0.84	0.65	16.1%
5	12.92%	0.89	0.55	20.1%
6	14.67%	0.80	0.47	21.3%
7	14.28%	0.94	0.47	24.8%
8	16.69%	1.11	0.49	28.0%
9	18.96%	0.91	0.37	30.7%
10 (Smallest)	22.78%	1.22	0.21	45.7%
Mid-Cap(3-5)	12.41%	0.86	0.63	17.2%
Low-Cap(6-8)	15.21%	0.95	0.48	24.7%
Micro-Cap(9-10)	20.87%	1.06	0.29	38.2%

Note 1: R-square is calculated by correlation of monthly excess size decile returns and monthly excess market benchmark returns.

Note 2: Monthly standard deviation is based on monthly size decile returns. Results are multiplied by the square root of 12 to determine annual standard deviation.

Arithmetic Mean Return

As can be seen from the table above, non risk-adjusted returns are inversely related to size: returns tend to increase as one moves from the largest decile to the smallest.

This trend is fairly consistent with the exception of decile 2 and 7. Returns of decile 2 are below returns of the larger size decile 1. The same applies to decile 7 where returns are lower than decile 6 returns.

Beta

The CAPM model gives a prediction of the relationship that should be observed between the risk of an equity and its expected return. The CAPM is based on the assumption that investors are only compensated for the degree of systematic risk for which they are exposed. Systematic risk is measured by beta, or the volatility of the equity's returns in excess of returns available from risk-free investments relative to the volatility of the market benchmark's excess returns (Bodie, Kane and Marcus 2002).

Systematic risk is also called market risk as it results from general market and economic conditions such as change in interest rates or weakening of the economy and affects many or all investments. Unsystematic risk arises from firm-specific risk and is not rewarded by the CAPM as, in theory, it can be mitigated by holding a highly diversified portfolio (Damodaran 2002).

The results above indicate that there is no consistent relationship between beta and size. Accordingly, beta does not seem to account for the inverse relationship between size and return. However, when grouping the smallest eight size deciles into three size categories (mid-cap, low-cap and micro-cap) beta appears to be inversely related to size.

It has been argued that betas for smaller, less frequently traded stocks are mismeasured. Morningstar (2008) uses different beta estimations such as the sum beta technique and measuring beta based on annual returns. These techniques decrease size premia but do not eliminate them.

R-Square

R-square measures the extent to which the movements of the returns for a size decile are explained by movements of the returns of the market benchmark. In other words, R-square is a measure of the explanatory power of beta and indicates the size of the systematic risk component. R-square of 0.97 for size decile 1 indicates that 97% of total risk is systematic while 3% is unsystematic. Note that R-square is a measure of the components of risks rather than a measure of the risk amount.

Low explanatory power of beta found in empirical tests has led to the development of a number of suggested corrections to the CAPM and alternative models for cost of equity estimation. Pratt, Reilly and Schweihs (2000) state that the implication would seem to be that the market does not ignore unsystematic risk and demands extra return for accepting it.

The results illustrate that R-square consistently decreases with decreasing firm size. This indicates that smaller firms tend to have higher unsystematic risk components and beta has low explanatory power to predict returns for smaller firms.

Standard Deviation

Standard deviation measures price volatility which represents the extent to which investors are exposed to unsystematic risk. Based on the CAPM this risk can be eliminated by diversification and the market does not compensate an investor for accepting exposure to unsystematic risk.

Based on the study's results, standard deviation of returns increases as one moves from large size deciles to smaller size deciles. This indicates that investors may be compensated for taking on this additional risk by higher returns generated by small firms.

3.3 Size Premia

The table below sets out the actual return in excess of the estimated return as predicted by the CAPM by size decile over 1993 to 2007.

**Long-term Returns in Excess of CAPM Estimation for Size Deciles of the TSX
1993-2007**

Decile	Beta	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate	Estimated Return in Excess of Riskless Rate	Size Premia (Return in Excess of CAPM)
1 (Largest)	1.02	11.47%	5.38%	6.54%	-1.16%
2	0.89	10.90%	4.82%	5.71%	-0.89%
3	0.85	11.90%	5.81%	5.43%	0.38%
4	0.84	12.42%	6.33%	5.38%	0.96%
5	0.89	12.92%	6.83%	5.72%	1.11%
6	0.80	14.67%	8.58%	5.12%	3.46%
7	0.94	14.28%	8.19%	6.03%	2.16%
8	1.11	16.69%	10.60%	7.11%	3.49%
9	0.91	18.96%	12.87%	5.82%	7.05%
10 (Smallest)	1.22	22.78%	16.69%	7.79%	8.90%
Mid-Cap(3-5)	0.86	12.41%	6.32%	5.51%	0.82%
Low-Cap(6-8)	0.95	15.21%	9.13%	6.09%	3.04%
Micro-Cap(9-10)	1.06	20.87%	14.78%	6.81%	7.97%
Riskless Rate		6.09%			
Equity return [1]		12.50%			
Equity risk premium [2]		6.41%			

Note 1: Equity return is based on the weighted average monthly equity returns of all equities included in the sample.

Note 2: Equity risk premium is calculated as equity return minus the riskless rate

Size premia is defined as observed returns of firms (specifically small firms) in excess of returns predicted by the CAPM. Consistent size premia across size deciles suggests that the conventional CAPM should be modified.

The results as set out above indicate that there is a fairly clear inverse relationship between realized returns in excess of CAPM and size deciles with the exception of size decile 7. This indicates that there appears to be size premia in the Canadian equity market based on the methodology and data used in this study.

Size premia of size decile 1 and size decile 2 is negative 1.16% and negative 0.89%, respectively, implying that the expected return per CAPM is above the actual return. It appears that actual returns of the largest two size deciles were below the average market return over the last 14 years.

3.4 Size Premia excluding Income Trusts

The results discussed in section 3.3 are based on a sample including income trusts listed on the TSX. The significance of income trusts to the Canadian capital markets is illustrated by the fact that they represent 12.1% of total MVE of the equity sample as at December 31, 2007.

Income trusts have debt-like characteristics, have historically benefited from differential tax treatment in Canada, and arguably benefited from public-market dynamics/exuberance until October 2006. In order to test any potential impact on the results, income trusts have been excluded from the size premia calculation as set out in the table below.

Long-term Returns in Excess of CAPM Estimation for Size Deciles of the TSX (excluding Income Trusts)
1993-2007

Decile	Beta	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate	Estimated Return in Excess of Riskless Rate	Size Premia (Return in Excess of CAPM)
1 (Largest)	1.00	10.82%	4.74%	5.93%	-1.19%
2	0.91	10.16%	4.07%	5.39%	-1.32%
3	0.94	11.17%	5.09%	5.55%	-0.47%
4	0.91	12.37%	6.28%	5.37%	0.92%
5	0.87	12.92%	6.84%	5.13%	1.70%
6	0.91	14.31%	8.22%	5.40%	2.82%
7	1.04	14.81%	8.72%	6.17%	2.56%
8	1.03	15.70%	9.61%	6.10%	3.51%
9	1.03	18.28%	12.19%	6.08%	6.11%
10 (Smallest)	1.23	20.68%	14.59%	7.27%	7.32%
Mid-Cap(3-5)	0.90	12.16%	6.07%	5.35%	0.72%
Low-Cap(6-8)	0.99	14.94%	8.85%	5.89%	2.96%
Micro-Cap(9-10)	1.13	19.48%	13.39%	6.67%	6.72%
Riskless Rate		6.09%			
Equity return [1]		12.01%			
Equity risk premium [2]		5.92%			

Note 1: Equity return is based on the weighted average monthly equity returns of all equities included in the sample.

Note 2: Equity risk premium is calculated as equity return minus the riskless rate

The results above illustrate that fairly consistent size premia are still evident when excluding income trusts. Overall results do not change significantly.

However, actual returns and size premia decrease when income trusts are excluded. Income trusts may have had higher returns than equities listed on the TSX. This hypothesis is consistent with an empirical study by Cleary and MacKinnon (2007) who found that income trusts exhibited very strong performance from 1995 to 2004, with risk-adjusted performance outperforming equities in Canada over that period.

3.5 *Limitations*

Illiquid Shares

The breakpoints of smaller size deciles as illustrated in section 3.1 indicate that those deciles include very small firms whose shares may be illiquid. These shares are often not followed to the same degree as larger capitalized stocks especially by institutional investors, and the market for small firm equities may be illiquid due to low trading activity.

Therefore illiquid shares may not reflect all available information, and their quoted prices may not adjust to market fluctuations on a timely basis in comparison to more marketable stocks. Roll (1981) argues that price changes of infrequently traded shares tend to occur at discrete intervals. As a result, their market risk as measured by beta is understated as returns of infrequently traded shares are less correlated to market returns. An empirical test by Roll shows that this bias lead to an overstatement of size premia. This may also apply to this study.

The study by Roll raised the question whether size premia exists after controlling for liquidity. Amihud and Mendelson (1986) hypothesize that investors demand compensation for lack of liquidity and that size premia are a proxy for an illiquidity premium. Their empirical test reveals that the small firm effect is negligible after controlling for liquidity, measured by the bid-ask spread. Reinganum (1982) find the illiquidity bias insufficient to explain the full magnitude of the small firm effect.

Data

The study covers 14 years of historical data which is substantially less compared to other empirical size premia studies. Morningstar (2008) and Duff and Phelps (2008) cover 82 years and 44 years of historical data respectively. Long-term equity studies are generally considered to be more representative.

Events that have occurred during the last 14 years that have significantly impacted the Canadian equity market may have distorted the study's results.

During the time period examined numerous firms within the mining sector have been floated on the TSX and have experienced a significant rise in share price. A majority of those firms tend to be small in size and may have distorted results. In addition, the bursting of the dot-com bubble may have also biased results in comparison to US-based studies, as well as the indirect impact of Enron and income trusts on the Canadian equity marketplace.

Morningstar (2008) notes that size premia are cyclical in nature. It is not unusual for size premia to follow several years of consistently positive values with several years of consistently negative values.

Delisted Firms

The study does not include equities that have been delisted. Omitting delisted equities may create a potential bias as delisted equities may be concentrated in small firms and generally experience negative returns towards delisting. This has been offered as a partial explanation of size premia.

Elfakhani and Wei (2003) study the effect of excluding delisted equities on the small firm effect using data for the Canadian equity market during the 1975-1994 period. They find that the difference is weak at best.

Shumway (1997) found that the database used by Morningstar and Duff & Phelps omits delisted returns for a large number of firms. However, Duff & Phelps (2008) take into account the Shumway evidence and size premia results in the Duff & Phelps risk premia study are not greatly affected.

4 Comparison to US Size Premia Study by Morningstar

4.1 Methodology

The main difference in methodology between this study and the US size premia study by Morningstar is that Morningstar rebalances size deciles on a quarterly basis whereas size deciles are rebalanced annually in this study.

Furthermore, the Morningstar study includes delisted equities (some delisted returns for a large number of firms are omitted based on Shumway, see above) while this study omits all delisted equities.

Also, the equity risk premium by Morningstar is based on the total return of the New York stock Exchange (NYSE) size deciles 1 to 2 whereas the equity risk premium in this empirical study is based on the equity returns of the entire sample (all equities listed in the TSX for which data was available).

Note that information on the Morningstar methodology is based on a brief methodology description published in the SBBI 2008 yearbook by Morningstar. There may be other differences of which the author is not aware.

4.2 Market

Size

The US equity market is significantly larger in size than the Canadian equity market. As a result, size decile breakpoints and sample size between the two studies differ significantly.

The Morningstar study includes 4,242 equities⁷ as at September 30, 2007 while this empirical study only includes 911 equities (excluding income trusts) as at December 31, 2007.

The table below sets out the most recent size decile breakpoints of the Morningstar study and this study.

Comparison between Canada and US study - MVE of Largest Company by Decile

Decile	MVE of Largest Company - CANADA (in C\$ thousands) [1]	MVE of Largest Company - US (in US\$ thousands) [2]	MVE of Largest Company - Canada as a % of US
1 (Largest)	71,008,421	472,518,672	15.0%
2	1,769,738	20,234,526	8.7%
3	676,777	9,206,713	7.4%
4	331,412	5,012,577	6.6%
5	199,232	3,422,743	5.8%
6	132,921	2,411,794	5.5%
7	87,989	1,633,320	5.4%
8	59,408	1,128,765	5.3%
9	36,958	723,258	5.1%
10 (Smallest)	20,210	363,479	5.6%

Note 1: MVE as at December 31, 2007

Note 2: MVE as at September 30, 2007

The table above illustrates that the US equity market is substantially larger than the Canadian equity market. A firm with a market value of equity of \$1.8 billion would be in size decile 1 in Canada but would be included in size decile 6 in the US.

⁷ Morningstar exclude closed-end mutual funds, preferred stocks, real estate investment trusts, foreign stocks, American depository receipts, unit investment trusts and Americus trusts.

Industry

It has been argued that size premia are only relevant for specific industries. The industry mix of the Canadian equity market may be significantly different compared to the US equity market. For instance, the Canadian equity market is dominated by large firms in the financial services and resource sector whereas the US equity market is dominated by large industrial firms. Therefore results may not be comparable.

Morningstar attempts to test whether size premia are industry specific and find evidence that smaller firms have generally outperformed larger firms across industries. However, due to limited data, Morningstar does not test whether size premia are industry specific.

4.3 Results

The table below compares beta and size premia by size decile of the Canadian study with results of the US study by Morningstar.

Comparison between Canada and US Study by Decile - Size Premia and Beta

Decile	US Study (1926 - 2007)		Canadian Study (1993 - 2007) [1]		Variance	
	Beta	Size Premium	Beta	Size premium	Beta	Size Premium
1 (Largest)	0.90	-0.16%	1.00	-1.18%	0.10	-1.02%
2	1.11	0.90%	0.91	-1.31%	-0.20	-2.21%
3	1.17	1.07%	0.94	-0.46%	-0.23	-1.53%
4	1.20	1.23%	0.91	0.92%	-0.29	-0.31%
5	1.23	1.82%	0.87	1.71%	-0.36	-0.11%
6	1.25	1.96%	0.91	2.83%	-0.34	0.87%
7	1.32	1.88%	1.04	2.57%	-0.28	0.69%
8	1.38	2.60%	1.03	3.52%	-0.35	0.92%
9	1.43	3.00%	1.03	6.12%	-0.40	3.12%
10 (Smallest)	1.49	6.33%	1.23	7.34%	-0.26	1.01%
Riskless Rate	5.21%		6.09%		0.88%	
Equity return	11.56%		12.01%		0.45%	
Equity risk premium	6.35%		5.92%		-0.43%	

Note 1: Results as presented exclude income funds.

Note that results of the two studies lack comparability. For details see Section 4.4 below.

Beta

Results of the US study illustrate a clear inverse relationship between beta and firm size. Therefore beta and the CAPM do take into account the risk of smaller equities to a certain extent.

Results of the Canadian study show a less clear inverse relationship between beta and firm size. Beta does not appear to account for the small firm risk. In addition, low R-squares especially in smaller size deciles as found in section 3.2 above indicate that the power of beta to explain expected returns is low.

Size Premia

The Morningstar study would suggest using size premia for firms in size decile 2 and 3 whereas no size premia (or a negative size premia) would be applied for the same deciles based on Canadian results.

Size premia of smaller size deciles appear to be higher based on Canadian results when compared to the US results. This is likely due to the fact that Canadian size deciles include significantly smaller firms compared to US size deciles.

The table below compares size premia by size group between the US and Canadian; however, for the purposes of this comparison, results based on results covering historical data from 1993 to 2007 for both the US and Canada.

Size premia

1993-2007

Size Group	US Study [1]	Canadian Study [2]	Variance
Mid-Cap(3-5)	0.4%	0.7%	0.3%
Low-Cap(6-8)	1.3%	3.0%	1.7%
Micro-Cap(9-10)	3.9%	6.7%	2.8%

Note 1: Beta and equity risk premium estimated using Standard and Poor's 500 index.

Note 2: Beta and equity risk premium estimated using equity returns of all equities included in the sample (all equities listed on TSX where data was available).

Canadian size premia approximate US size premia for the mid-cap size group. Low-cap and micro-cap size premia in Canada are significantly above corresponding size premia in the US. This is likely to the fact that Canadian size deciles include significantly smaller firms compared to US size deciles.

4.4 Lack of Comparability

Differences in methodology and market between the two studies as described above represent lack of comparability. The two major differences are the data period covered and the size decile breakpoints.

The empirical study covers 14 years of historical data which is substantially less compared to 82 years covered by the Morningstar study. Morningstar (2008) noted that size premia are cyclical in nature. It is not unusual for size premia to follow several years of consistently positive values with several years of consistently negative values.

As noted above size decile breakpoint of the two studies differ significantly. For instance, a firm with a market value of equity of \$1.8 billion would be in size decile 1 in Canada but would be included in size decile 6 in the US.

The CAPM is adjusted for size premia based on firm size. Accordingly the cost of equity of a firm with a current MVE of \$1.8 billion should be adjusted by a size premium of 1.96% based on results by Morningstar. Based on Canadian results the firm would be categorized in decile 1 and the cost of equity would have to be reduced by the size premium of (1.18%).

4.5 Directions for Further Research

Further research should be conducted to mitigate the lack of comparability between the Morningstar study and the Canadian study. The following represent suggested directions.

First, the Morningstar size decile breakpoints should be used to assign firms traded on the TSX to the Morningstar breakpoints.

Second, the data period of 14 years should be extended if possible to mitigate the fact that size premia are cyclical and to increase comparability.

Third, size decile should be rebalanced quarterly rather than annually.

Fourth, delisted equities should be included as omitting delisted equities may create a potential size premia bias.

Fifth, equities with infrequent trading activity should be excluded as the inclusion of illiquid shares may distort results and overstate size premia.

Sixth, size premia should be tested whether they only exist in certain industries.

5 Conclusion

The empirical study on the Canadian equity market demonstrates the existence of size premia based on data from 1993 to 2007. Results also indicate that beta, the CAPM's risk measure, was a weak measure to explain expected returns for smaller firms as smaller firms have a high unsystematic risk component.

The inclusion of equities with illiquid shares, the exclusion of delisted firms and the fact that only 14 years of historical data are covered represent inherent limitations of the study.

Size premia found in the study are not comparable to US size premia found in the Morningstar study primarily due to the fact that size decile breakpoints used to create size decile differ significantly. As discussed above, further research should be conducted to mitigate the lack of comparability.

Bibliography

- Amihud , Y and Mendelson, H 1986, 'Liquidity and Stock Returns', *Financial Analysts Journal*, vol. 42, pp. 43-49
- Banz, R 1981, 'The relationship between return and market value of common stock', *Journal of Financial Economics*, vol. 9, pp.3-18
- Bodie Z, Kane, A, Marcus, A 2002, 'Investments', 5th edition
- Cleary, S and MacKinnon G 2007, 'The investment nature of income trusts and their role in diversified portfolios', *Canadian Journal of Administrative Sciences*, vol. 24, pp. 314-326
- Damodaran A, 2002, 'Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2nd edition
- Duff & Phelps LLC 2008, Risk Premium Report 2008
- Elfakhani, S and Wei, J 2003, 'The survivorship bias, share price effect, and the small form effect in Canadian Markets', *Review of Financial Economics*, vol. 12, pp. 397-411
- Morningstar Inc. 2008, Stocks, Bonds, Bills and Inflation Valuation Edition 2008 Yearbook, pp. 129-162
- Pratt, S, Reilly, R and Schweihs R 2000, *Valuing a Business*, 4th edition
- Reinganum, M 1981, 'Misspecification of capital asset pricing: empirical anomalies based on earnings, yields, and market values', *Journal of Financial Economics*, vol. 19, pp. 19-46
- Reinganum, M 1982, 'A Direct Test of Roll's Conjecture on the Firm Size Effect', *Journal of Finance*, vol. 37, pp. 27-35
- Roll, R 1981, 'A possible explanation of the small firm effect', *Journal of Finance*, vol. 36, pp. 879-888
- Shumway T, 1997, 'The Delisting Bias in CRSP Data', *Journal of Finance*, vol. 52, pp. 327-340