RE-EXAMINATION OF DIVERSIFICATION BENEFITS FROM FOREIGN REAL ESTATE INVESTMENT: A CANADIAN PERSPECTIVE

by

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ABSTRACT

This paper studies the diversification benefits of foreign real estate for Canadian investors. Monthly data from December 1994 to December 2006 are used. The evidence supports that foreign real estate is an effective diversification tool. Its low correlation with Canadian stock was consistent through the time period. During the 2001 "Tech Bubble" volatility period, it even had negative correlation. Adding foreign real estate to a portfolio can help reduce the risk and increase the return. Further analysis suggests that it is not necessary to replace Canadian real estate investment by foreign real estate investment to gain the diversification benefits from a portfolio without risk free asset, and it is really depends on the investors' risk tolerance levels to make the decision.

DEDICATION

I wish to thank and dedicate this project to God and to my wife Kelly. Without their love and support, I would not able to complete this paper. I also would like to thank my GAWM classmates George Zhu, Jeremy Ma, Y.S. Daniel Kim, Bill Huang, and Jeff Wang for their coaching, inspiration and support.

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1 INTRODUCTION

The purpose of this paper is to examine the benefits of diversification from foreign real estate investments from a Canadian's perspective. The benefits of diversification have been recognized by financial industry academics and practitioners for many decades. Such diversification may be obtained in various ways, such as diversification through various companies, sectors, industries, or geographical areas. Due to the advance of technology, the connection and information circulation among countries are more rapid than before. It brings the opportunities for investors to be able to access many investment opportunities that are not available before and permits investors to gain the benefits of international diversification. On the other hand, globalization also brings increased integration of financial markets among different countries and reduces the effect of international diversification.

The most commonly mentioned international diversification investment tools are international stocks and bonds. Many researchers have discussed the benefits of international diversification for stocks and bonds. However, the benefits of international diversification for real estate have not been studied too intensively. It is reasonable for people to focus on the most commonly mentioned investment tools such as stocks and bonds due to the easy access of information and convenience of transaction, but it is not wise to ignore the opportunities to diversify into alternative investment such as international real estate.

This paper is based on a paper by Conover, Friday and Sirmans (2002) (CFS) who studied how significant is the foreign real estate in efficient international portfolios and whether foreign real estate investment is more stable and can provide better diversification than that

obtainable from foreign stock. CFS discussed the issues from the U.S investors' points of view. In contrast, this paper is to study the same issues from a Canadian's perspective.

This study is similar to CFS in two ways: Firstly, I use the same methods to examine the stability of foreign real estate, and the time period I analyze encompasses a high volatility period. In CFS the high volatility period is the market crash of 1987, while in my case the high volatility period is the burst of high tech bubble in 2001 and 2002. Secondly, I also examine the diversification effects of adding foreign stock and foreign real estate to a diversified portfolio composed of domestic stock and domestic real estate. However, I add in another methodology to further examine the diversification effect of foreign real estate. I include bond investment to the portfolio to test and compare the effects of adding domestic real estate to adding foreign real estate.

My study is different from CFS in the data selection. First, I use MSCI All Country World Daily Total Return Gross Index to represent the overall foreign stock market, while CFS used the Index from Morgan Stanley of six countries (Canada, France, Great Britain, Hong Kong, Japan and Singapore) to represent the foreign stocks. My intention is to encompass all the developed and emerging markets to fully represent the global foreign stock investment. I use GPR 250 REIT World Index to represent the foreign real estate investment, while CFS used S & P Global Vantage for 140 real estate corporations' data of the same six countries (Canada, France, Great Britain, Hong Kong, Japan, and Singapore) to represent the foreign real estate investment. I take the Global Properties Research's global REIT Index to represent a wider spectrum of worldwide real estate investment.

The structure of this research will start with a summary of the literature related to this topic, and then continued by outlining the research design and source of the data. Finally, the results will be discussed and concluding remarks will be made.

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2 LITERATURE REVIEW

The purpose of investment is nothing but to increase the overall wealth of the investors, but the factor that needs to be considered is not only the expected return, but also the risks associated with the investment. How to select assets to form an optimal portfolio that maximizes the return giving a risk level, or minimizes the risk giving a return level has become the main concern for investors. With increasing uncertainties in the financial market, investors are facing much more difficulty in making their asset allocation decisions than before.

To measure the expected return and risk, the most common used methodology is mean-variance analysis. The term, created by Markowitz, describes the mathematical relation between the return and risk of individual securities to the risk and return of portfolios. Thus, individual investors or portfolio managers can make asset allocation decisions, which determine the weight of each asset class in a portfolio to form an ideal portfolio that is suitable for an investor's objective and risk tolerance.

The basic assumption is that investors are generally considered to be risk averse. A risk-averse investor prefers higher to lower expected returns at a given level of expected risk. On the other hand, such an investor prefers lower to higher risk for a given level of expected return. It implies that there is a positive relationship between expected returns and risks. Consequently, mean-variance analysis assumes that investors only care about the mean and variance of their portfolio return. Markowitz (1952) proposed that investors expect to be compensated for taking additional risks, and that infinite numbers of "efficient" portfolios exist along a curve defined by three variables: standard deviation or variance, correlation coefficient, and expected return. The efficient-frontier curve consists of portfolios with the maximum return for a given level of risk or the minimum risk for a given level of return. The factors used as input to form optimal portfolio

are variance, return and correlation. From historical data, we can find that not all assets move in the same direction or with the same magnitude. This gives us the opportunities to allocate the different categories of investment assets to form optimal portfolios.

Diversification of low correlation assets in a portfolio is the key to form an optimal portfolio. Among various asset classes, alternative investments may demonstrate lower correlation coefficient with traditional investments. Alternative investments collectively refer to the many asset classes that fall outside of the traditional definition of stock and bond. This category includes mutual fund, ETF (exchange-traded funds), real estate, venture capital, hedge funds, closely held company, distressed securities and commodities. Compared to traditional investments, alternative investments generally demonstrate some drawbacks such as low liquidity, difficulty in determining market values, and limited historical performance data. On the other hand, these drawbacks may provide another segmentation benefit through their less integration than traditional investments and low correlation with traditional asset classes. To take advantage of the low correlation traits of alternative investments, investors should add alternative investments to their portfolio and gain extra diversification benefits that are not available from traditional stocks and bonds.

2.1 Real Estate Investments

Since 2002, the real estate market in Canada has recovered and continued to show a strong performance. With the soaring house prices, many Canadians suddenly realize that their houses are not only pieces of shelter but also valuable investments. Rising house prices have also attracted many individual or institutional investors' attention, intriguing them to add real estate investments into their investment portfolios. Real estate has been deemed an alternative investment due to its many unique characteristics that behave very differently from the traditional investment tools like bonds and stocks. Real estates are unmovable, illiquid, and usually need large amount of money to invest in. Due to the fact that there are no two identical real estates and

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there are not centralized transaction markets for the daily trading of real estates, the value of real estates is mainly evaluated by appraisal instead of the daily transaction price. Although there are many different characteristics and constraints for the real estate investment, investors can overcome the illiquidity problem – thanks to the invention of securitized real estate investment, such as Real Estate Investment Trust (REIT) – and enjoy the benefits of investing in real estate. Since the first IPO of REIT in Canada in 1993, there has been 28 REITs listed on the Toronto Exchange which enable Canadian to add real estate into their investment portfolios without the inconvenience of investing in the real properties.

The booming real estate market is not the only phenomenon in Canada. In the other parts of the world, real estate seems are experiencing a bull market, but just in different paths. Real estate investment has demonstrated a much stronger cyclical phenomenon than other investment or industry. When considering adding real estate into their diversified portfolios, investors would like to know the risks and returns of real estate comparing to other investment tools, and whether foreign real estate provides more diversification benefits than the commonly used foreign stock investment.

2.2   Direct vs. Indirect Real Estate Investments

The first issue in evaluating real estate investment is to identify which kind of real estate investment to be measured. Real Estate investments can be obtained from various sources, either from directly investing in owning pieces of real properties or from indirectly investing in securitized real estate investments. In the U.S., the direct private real estate can be measured by using Russell - NCREIF (National Council of Real Estate Investment Fiduciaries) Property Index(formerly the Frank Russell Company Property Index), as a proxy of the performance. For the securitized real estate investment, the NAREIT (The National Association of Real Estate Investment Trusts) are used as the benchmark to measure the performance of REIT (Real Estate Investment Trust). The NCREIF has been established for 29 years since 1978, and provides

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quarterly appraisal based data, while the NAREIT (The National Association of Real Estate Investment Trusts) provides transaction data since 1979. The long history of data enables the comparison of direct and indirect real estate investments much easier in the U.S.

To clarify which kind of real estate investments can benefit the investors, Giliberto (1990) compared the Russell-NCREIF, which represents 1200 properties values managed by pension funds as of 1989 year end, to the NAREIT index, which represents the performance of Equity Real Estate Investment Trust. It appears that equity REITs were heavily influenced by the movements of stock and bond markets and had little direct correlation with traditional real estate. However, when the financial assets market influences were removed from the REIT, the NCREIF showed a significant positive correlation with the equity REIT, and confirmed that the common real estate effects are shared by both series. It also means that REIT data can be used as the proxy of real estate investment in spite of its securitized nature.

Georgiev, Gupta, and Kunkel (2003) researched the investment benefits of real estate as a part of a diversified portfolio by using the quarterly returns data from National Council of Real Estate Investment Fiduciaries (NCREIF) Index, a direct real investment index from 1990 to 2002 to compare the indirect real estate index, National Association of Real Estate Investment Trust Index (NAREIT). The result suggests that direct real estate investment may provide diversification benefits to stocks and bonds while securitized real estate (REIT) were shown to be poor substitutes to direct real estate investments because their returns seem to already incorporate a significant equity market component.

Ciochetti, Craft and Shilling (2002) examined the shares held by pension funds, mutual funds, insurance companies, bank trust departments, and endowments and foundations from 1993 and 1998. They developed a model in which institutions maximize the expected surplus return (assets minus liabilities) subject to a risk constraint on wealth losses and liquidity constraint on types of assets. This model discovered the fact that most institutional investors desire liquidity increase as the size of their current liabilities increases. It is also evidence that institutional

investors have a strong preference for REIT shares with greater market capitalization and greater liquidity. This phenomenon explains the strong demand of REITs for the institutional investors is not random.

Mueller and Mueller (2002) analyzed the inclusion of both public and private real estate in a mixed-asset portfolio using the mean-variance Markowitz efficient frontier methodology unconstrained. The 5-, 10-, 20-, and 25- year's results show that both public and private real estate can improve efficient frontiers substantially. An interesting finding in this research is that public and private real estate have low quarterly correlation for all time periods studied. The unrelated behaviour of these two real estate classes suggests that the inclusion of both in a mixed assets portfolio can enhance the diversification effect of the portfolio. The almost zero correlation between the two real estates is surprising due to the fact that their assets have the similar underlying real estates. Mueller finds that the constituents of the benchmarks may explain the interesting results. NAREIT is mainly consisted by the retail and multifamily in 1980, while NCREIF is mainly consisted by the office, retail, and industry.

2.3 Diversification Effect

From the mean-variance frame work, a mixed assets portfolio can achieve its diversification benefits by including assets with low correlations. Ziering, Liang and McIntosh (1999) found that REIT performance has been disconnected from other stock market indices. The NAREIT Equity Index correlation with the S&P 500 Index has declined from as high as 0.8 in the late 1970s and early 1990s to below 0.2 in 1996 and 1997. Meantime, less rapid declines are seen with other stock indices such as the Russell 3000 and 2000 Value and Growth indices.

People may criticize that it may be only a time varying effect because the research was based on the trading data of only 10 years time horizon. To investigate the issue of whether REITs have a position in an efficient portfolio over varying time horizons, Lee and Stevenson (2005) used the data sets beginning in 1980 and ending in 2002 to form four alternative rolling

time periods and examined the significant influences in the efficient frontiers. The time horizons used were 5, 10, 15, and 20 years. The findings show that REITs' attractiveness as a diversification asset increases as the holding period increases. In addition, their diversification qualities span the entire efficient frontier, providing return enhancement properties at the lower end of the frontier, extending to risk reduction qualities at the top end of the frontier.

By studying the similar long-term monthly data spanned from January 1980 through September 2004, Lee (2005) found that although strong linkages are evident between equity REITs and value sector of the equity market, there is still obvious distinctiveness between the two sectors. The variance decomposition results imply that diversification opportunities are maintained and that REITs will provide additional benefits to a portfolio already containing value stocks, and that the two can not be viewed as substitutable for each other.

2.4 International Diversification Effect

Eichholtz (1996) investigated the effectiveness of international real estate diversification relative to international diversification of stock and bond portfolios. He used Limburg Institute of Financial Economics (LIFE) property shares indexes for eight countries – the Netherlands, Sweden, United Kingdom, Hong Kong, Japan, Singapore, Canada, and the United States – to compare the correlations among each country's common stock index and bond index for the period of 1985 to 1994. His tests of international correlation matrixes of real estate returns, common stock returns, and bond returns indicate significantly lower correlations between real estate returns than between common stock or bond returns. The implication is that international diversification reduces the risk of a real estate portfolio more than that of common stock and bond portfolios.

Mull and Soenen (1997) examined the U.S REIT efficiency as a portfolio component from the perspective of all G-7 countries for the period 1985 through 1994. The result is a mixture; they concluded that U.S REITs offer both inflation hedge and diversification.

Nevertheless, it did not yield statistically significant increases in risk-adjusted return over the period as a whole.

Gordon, Canter and Webb (1998) studied the portfolio diversification effects of international real estate securities on a mixed-asset portfolio of U.S stocks, corporate bonds, real estate securities and international common stocks; they found that including the international real estate securities provided diversification benefits for portfolios over the 13-year period studied and also over the entire efficient frontier.

Chua (1999) studied the role of international real estate in a mixed-asset portfolio after controlling for higher taxes, transaction costs, and asset management fees incurred when investing in real estate, as well as the appraisal smoothing in real estate return indices. Chua finds that even after adjusting for additional costs associated with real estate, the optimal portfolio allocation to real estate ranges from 3.7% to 20.7% depending on an investor's attitude toward risk and return.

2.5 Home Ownership Effect

Home equity can be either a physical shelter or a financial asset, and is also an important investment. Especially for an individual investor, the value of home usually accounts for a large proportion of personal total assets and is one of their single largest investments. Some people may think that homeowners already own real estate and should not make additional real estate investments. Englund, Hwang and Quigley (2002) found that an efficient portfolio would include no housing for short holding periods but for longer periods, in a low-risk portfolio would include 15% to 50% housing in the portfolio after them analyzing single-family housing returns in Stockholm, Sweden from January 1981 to August 1993. Eichholtz, Koedijk and de Roon (2002) used house price indexes and a mean-variance framework to examine residential property holdings. They found that residential real estate offers significant diversification benefits. They

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also suggested that to form optimal portfolio and enjoy the diversification benefits, most America investors should allocate around 30% of their investment assets to residential houses.

By analysing seven assets classes (T-bill, Single house prices, REITs, Large stocks, Small stocks, Bonds, International stocks) return and volatility data from 1976 to 2001, Goodman (2003) concluded that portfolios with 10% to 20% REIT can achieve higher annual returns without increasing volatility. This holds not only for renters, but also for homeowners with one-third, or two-thirds of their wealth invested in their houses. Goodman attributed this finding to the low correlation between the changes of house prices and the returns in real estate stocks, together with the historically competitive returns on real estate stocks to other financial assets.

In many cases, when the home is included in the calculation of a family's asset mix, only the net value is counted. Reichenstein and Delaney (1995) and Reichenstein (1998) argued that it is not an appropriate handling in calculating real estate investment. They suggested including the mortgage loan value in the portfolio as a negative bond. Waggle and Johnson (2004) adopted this point of view. By using mean-variance analysis and the historical annual return data for EREITs, stocks, bonds, housing prices and mortgage loans for the period of 1983 to 2002, Waggle and Johnson (2004) found that the addition of EREITs to the portfolio improves efficiency at most level of home ownership and that optimal portfolios were often heavily weighted with EREIT. However, the inclusion of EREITs comes at the expense of bonds. The increase of annual return due to the inclusion of EREITs ranged from 0.1% to 0.4% without adding any additional risk to the portfolio. The assets used by Waggle and Johnson (2004) for the mean-variance analyses were large company stocks, long-term corporate bonds, single-family homes, 30-year fixed mortgage loans, and REITs. Although the assets used in the mean-variance analysis were different from Goodman (2003), the magnitude of the increased returns is consistent with the findings of Goodman (2003) who did not include mortgage loans and rental dividend in that analysis.

Jud, Wingle, and Winkler (2006) examined the returns and risks of a diversified portfolio of single-family house for 3-, 5-, and 10-year holding periods and explored the effect of combination of housing with other financial assets to form an efficient investment frontier. The studying assumed housing portfolio is invested in five metropolitan areas. The results suggested that homeownership offers higher returns to those who have higher tax brackets, longer investment horizons, and use more financial leverage. Housing returns are positively correlated with large-stock returns and negatively correlated with returns on small stocks and debt securities. The weight of housing in optimal portfolio is large in a minimum variance portfolio, and it increases with longer holding periods and higher tax brackets.

2.6 REIT in Canada

REITs (Real Estate Investment Trusts) are publicly traded unit funds which mainly invest in income-producing real estate properties. REITs allow investors to invest in the liquidity and securitized real estates with relatively small amounts of money. These units are traded in the stock markets from which daily trading records are available for the most updated information of their market values. REITs also are attractive to the institutional investors for its liquidity, diversification, and transparency of information and daily market valuations that are not available from investing in the direct real estate properties. In addition, it also avoids the troublesome management problems associated with direct real estate ownership.

REITs were introduced in the U.S. in the early 1960's, but for Canadian investors REITs were not available until 1990's. At least 95% of each year's income earned by the REIT must be distributed to the unit holders and realized capital gains must be distributed annually. Tax is not paid in the REIT level, but flow-through to the individual unit holders. This taxation rule avoids the double taxation problem that happens in the dividends paid by companies and makes it like the taxation paid by directly owning the real estate property. The Canadian REIT taxation rules are similar to those in the U.S. In Canada, as long as at least 80% of its investments are situated in

Canada, the trust can also invest in shares, bonds, mortgages, marketable securities, cash and/or real property. It also allows the investors to claim applicable CCA deductions.

Due to the change to the Income Tax Act in 1995, REITs emerged largely in Canada. This taxation change allowed REITs to qualify as closed-end trusts, benefiting from more favourable tax treatment. The legislation also removed the 21-year deemed disposition rule, which is one of the major drawbacks of the open-end real estate trust funds. When 1997, there were 13 REITs trading in the TSX with a market value of 4 Billion. In the recent 10 years, REITs continued to grow along with the demands from many retirees who deemed the income trusts as a fixed income source despite the fact that income trusts are equity investments. Until the end of 2006, there are 28 REITs trading in TSX with market value of 27 billion, which accounts for 15.5% of the Canadian Income Trust market. On October 31, 2006 after the close of market, the Canadian federal government announced the elimination of income trust tax benefit after 4 years. The changes of policy shocked the income trust market. The only type of income trust excluded is the REIT. As the result, REITs are becoming more important for many retirees who are relying on the income from their previous income trusts investments.

3 RESEARCH DESIGN AND DATA

3.1 Research Design

The study is constructed in three methods to investigate whether foreign real estate can benefit Canadian investors beyond the benefits available from foreign stock.

The first method is that I divide the whole study period into two sub-periods. One is the six years from 1995 to 2000, which represents the tech fever booming period. Another one is also six years from 2001 to 2006, which represents the turndown and recover of the stock market. I will compare the correlations among the different sub-periods to see whether the lower correlation trait of foreign real estate is consistent.

Then, I follow the CFS's method to examine if the increased integration of global financial markets existed during periods of higher volatility period, such as the stock market crash of 1987. CFS utilized a rolling basis of monthly dollar denominated return data from the previous twelve months to calculate the correlation coefficients. They concluded that in the U.S. the lower correlation characteristic of foreign real estate is consistent through time, even in periods of increased volatility. Furthermore, there is no pattern of increasing correlations through time.

My research data period happens to cross the technology bubble period of 2001 and 2002. It provides a good chance to examine if foreign real estate is integrated with the financial market as other assets do during the higher volatility period. I will use the same previous twelve month rolling basis of monthly return data from December 1995 to December 2006 to examine the correlation coefficients between Canadian stock and other three assets (foreign stock, Canadian real estate, and foreign real estate).

The second method is following the methodology from the CFS: by comparing the efficient frontiers of different portfolios to examine the diversification benefits of foreign real

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estate. In CFS's paper, portfolio one is U.S. stock plus U.S. real estate, portfolio two is U.S. stock plus U.S. real estate plus foreign stock, and portfolio three is U.S. stock plus U.S. real estate plus foreign stock plus foreign real estate. Through the maximization process and by plotting the efficient frontiers of portfolios, it is easy to compare the changes of the efficient frontiers and the effectiveness of risk-return trade off. I use the same methodology but replace Canadian data for U.S. data. Portfolio one consists of two assets: Canadian stock plus Canadian real estate. Portfolio two consists of three assets: Canadian stock plus Canadian real estate plus foreign stock. Portfolio three consists of four assets: Canadian stock plus Canadian real estate plus foreign stock plus foreign real estate.

Third method is diverging from CFS's study. In the CFS's study, fixed income assets were not mentioned. They considered only equity assets to be included in the portfolios of their study. To address this shortfall and provide a more practical portfolio comparison, the third method is structured in this paper. I compare two portfolios: Canadian stock, Canadian bond and Canadian real estate vs. Canadian stocks, Canadian bond and foreign real estate to see if foreign real estate offers more attractive benefits than those available from domestic real estate investment. The reasoning behind this method is that the most commonly structured portfolio suggested by practitioners usually is the combination of equity and fixed income. By adding domestic real estate or foreign real estate to the most commonly structured portfolio that composed of domestic stock and domestic bond would make the research more realistic and may help shed some light for practitioners in their assets allocation decisions.

3.2 Data

Monthly data from December 1994 to December 2006 of S&P TSX Composite Total Return Index, Scotia Universal Bond Index and Scotia Real Estate Income Trust Index, are used to examine Canadian stock, bond, and real estate investment returns. MSCI All Country World Daily Total Return Gross and Globe Property Research's REIT Global 250 Index are used for

foreign stock and foreign real estate investments respectively. All the data have been converted to Canadian dollars according to the monthly foreign exchange rates from Bloomberg to get the monthly index and then the index data are used to obtain the monthly return. All the data are based on total return instead of price only return.

3.2.1   Canadian Stock

In this paper, I use the S&P TSX Composite Total Return Index (SPTSX) to measure he performance of Canadian stock. It consists of 279 members companies listed on the Toronto Stock Exchange and is a capitalization –weighted index. The index was developed with a base level of 1000 as of 1975. From December 19, 2005 the index also includes the Income Trusts. The S&P/TSX Composite is the most used index and the essential broad market measure for the Canadian equity markets. The constituents of the S&P/TSX Composite are also members of the S&P/TSX Equity indices, which are the S&P/TSX Equity, the S&P/TSX Equity MidCap, the S&P/TSX Equity SmallCap, S&P/TSX Income Trust, and the S&P/TSX 60.

The stocks in the TSX are classified by the Global Industry Classification Standard (GICS®). There are 10 GIC sectors for the classification of the stocks: Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Information Technology, Materials, Telecommunication Services and Utilities.

The Total Return Index includes stock dividends paid, stock dividends paid with the securities of an issuer other than the issuer declaring such dividend, rights distributions, and cash distributions less than 4% of the underlying stock price.

S&P/TSX Composite Index Family includes many sub-indexes such as the S&P/TSX 60 and S&P/TSX Mid Cap cover large and mid cap securities. The S&P/TSX Small Cap represents the remaining securities of the S&P/TSX Composite.

Table 3-1 S&P TSX Composite Index Family

Index Family


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                    ┌─────────────────────────────┐
                    │     S&P TSX Composite*       │
                    └─────────────────────────────┘
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Equity Indices	Income Trust Indices	GICS* Indices	Market Cap Indices
S&P TSX Equity Index* S&P TSX Equity MidCap S&P TSX Equity SmallCap	S&P TSX Income Trust Index S&P TSX Capped REIT S&P TSX Capped Energy Trusts	S&P TSX Sector Indices (End-of-day) S&P TSX Global Gold Index* (Real-time) S&P TSX Capped Sector Indices (Real-time)	S&P TSX 60* S&P TSX MidCap S&P TSX SmallCap
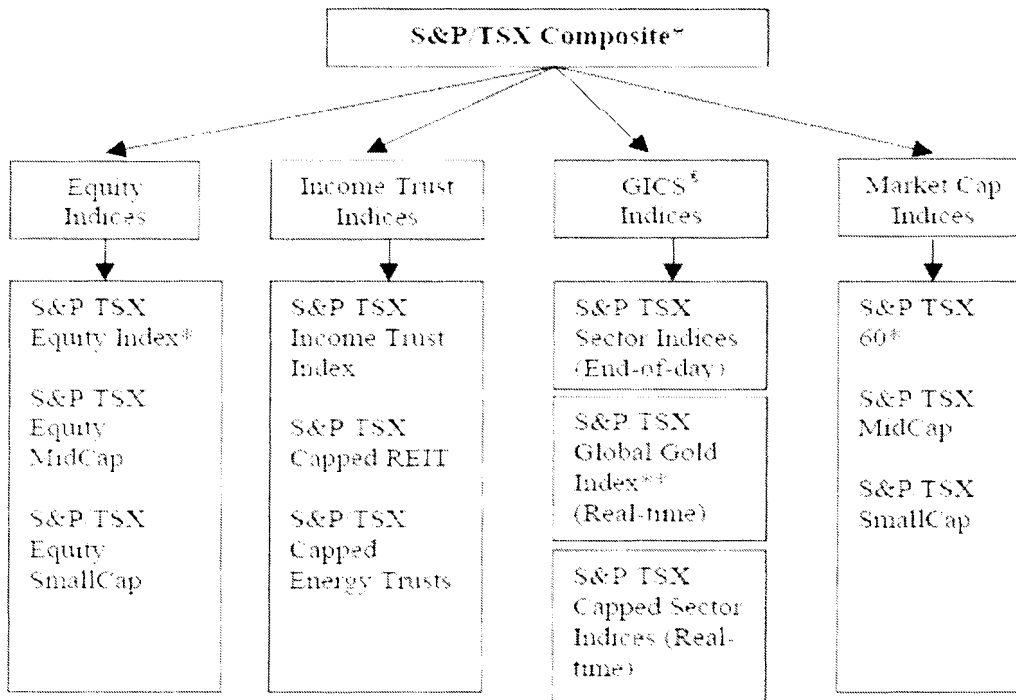
Indices marked with an asterisk are also available in Capped versions.
Source: Toronto Stock Exchange company website

3.2.2   Canadian Real Estate

Scotia Capital Canada REIT Total Return (SCTIRETT Index) is used to represent the Canadian Real Estate. The Scotia Capital Canada REIT Total Return index is the sub-index of Scotia Capital Income Trust Index. The Scotia Capital Income Trust Index has been developed to track the performance of all eligible listed income units trading on the Toronto Stock Exchange (TSX). As of September 2006, SCITI includes 247 issues with a total float capitalization of $188 billion. There are 28 issues in the Scotia Capital Real Estate sub-index, with a capitalization of 27.684 million, which accounts for 15.23% of the total Income Trust Index.

Table 3-2 Scotia Capital REIT Total Return Index

Symbol	Name of REIT	Market Capitalization(millions)	Weight
AN.UN	Alexis Nihon REIT	374.3	1.35%
AP.UN	Allied Properties REIT	423.1	1.53%
AX.UN	Artis REIT	348.9	1.26%
BEI.UN	Boardwalk REIT	1885.7	6.81%
CAR.UN	Canadian Apartment Properties REIT	1236.3	4.47%
CRR.UN	Crombie Real Estate Investment Trust	300.7	1.09%
CSH.UN	Chartwell Seniors Housing REIT	1145.8	4.14%
CUF.UN	Cominar REIT	694	2.51%
CWT.UN	Calloway REIT	1944.6	7.02%
D.UN	Dundee REIT	1530.6	5.53%
EXE.UN	Extendicare REIT	730.3	2.64%
HNT.UN	Huntingdon REIT	176.1	0.64%
HOT.UN	Canadian Hotel Income Properties REIT	531.8	1.92%
HR.UN	H&R REIT	3070.7	11.09%
INN.UN	Innvest REIT	759.6	2.74%
IUR.UN	IPC US REIT	610.9	2.21%
LGY.UN	Legacy Hotels REIT	1159.4	4.19%
LRT.UN	Lanesborough REIT	96.6	0.35%
MRT.UN	Morguard REIT	557.5	2.01%
NPR.UN	Northern Property REIT	520	1.88%
PMZ.UN	Primaris Retail REIT	1186.3	4.29%
REF.UN	Canadian REIT	1790.7	6.47%
REI.UN	RioCan REIT	5143.8	18.58%
RMM.UN	Retrocom Mid-Market REIT	102.3	0.37%
RYL.UN	Royal Host REIT	140.7	0.51%
SRQ.UN	Scott's REIT	51.2	0.18%
SZR.UN	Sunrise Senior Living Real Estate Investment Trust	1070.3	3.87%
WRK.UN	Whiterock REIT	102.7	0.37%
	Total	**27684.9**	**100.00%**

Source: Scotia Capital company website

3.2.3 Canadian Bond

Scotia Universal Bond Index (SCUBI): The Universe Bond Index is the most widely used fixed income performance benchmarks in Canada. The index is designed to be a broad measure of the Canadian investment-grade fixed income market. As of December 31 2003, the Universe Index consisted of 921 securities, with a total market value of approximately $528 billion. Returns are calculated daily, and are weighted by market capitalization, so that the return on a bond influences the return on the index in proportion to the bond's market value. The Universe Index has been published since 1979.

The Universe Index is divided into a variety of sub-indices according to term and credit. The main term sub-sectors are Short, Mid, and Long terms. The Short term sub-indices include bonds which remain effective terms greater than 1 year and less than or equal to 5 years. The Mid sub-indices include bonds remaining terms greater than 5 years, less than or equal to 10 years, The Long sub-indices include remaining terms greater than 10 years. The Short sector made up around 45.6% of the Universe Index, while the Mid and Long sectors made up 28.2% and 26.2% in the end of 2003.

There are four main credit categories in the bond index: first is the bonds issued by the Government of Canada (including Crown Corporations); second is the Provincial bonds; third is the Municipal Bonds, and fourth is the Corporate Bonds. The weights of each category are as follows: The Canada and Crown Corporation sector accounted for almost 46.7% of the Universe Bond Index. The provincial sector was 24.5%, the Municipal sector was 1.3% and the Corporate Sector was 27.5% in the end of 2003.

The Corporate sector is further divided into sub-sectors based on major industry groups and credit ratings. As a result, there are Financial, Communication, Industrial, Energy, Infrastructure, Real Estate, and Securitization sub-sectors such as AAA, AA, A and BBB sectors.

The Index consists of semi-annual pay fixed rate bonds issued domestically in Canada and denominated in Canadian dollars, with a remaining effective term to maturity of at least one

year. It is an investment grade index, and thus only includes securities rated BBB and higher. The majority of the bonds in the index are semi-annual pay bullet securities with no call or other option features. Most bonds in the index are public issues but private issues that meet the criteria are also included.

3.2.4 Foreign stock

MSCI All Country World Daily Total Return Gross (Bloomberg tick: GDUEACWF Index) is used to represent the foreign stock investment. MSCI Index is the most recognized measurement of world equities. Morgan Stanley Capital International Inc. (MSCI) created a family of index globally. The four major categories of indexes are as follows:

The **MSCI ACWI (All Country World Index) Index** is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global developed and emerging markets. As of June 2006 the MSCI ACWI consisted of 48 developed and emerging market country indices: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Korea, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore Free, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, the United Kingdom, and the United States.

The **MSCI World Index** is a free float-adjusted market capitalization index that is designed to measure global developed market equity performance. As of June 2006 the MSCI World Index consisted of the following 23 developed market country indices: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States.

The **MSCI EAFE Index (Europe, Australasia, Far East)** is a free float-adjusted market capitalization index that is designed to measure developed market equity performance, excluding the US & Canada. As of June 2006 the MSCI EAFE Index consisted of 21 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom.

The **MSCI Emerging Markets Index** is a free float-adjusted market capitalization index that is designed to measure equity market performance for the global emerging markets. As of June 2006 the MSCI Emerging Markets Index consisted of 25 emerging market country indices: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey.

Among the four categories of indexes, I would rather choose MSCI All Country World Total Return Gross as the representation of foreign stock investment. The reason is that it includes both developed and emerging markets and can fairly represent the overall global stock market performance. The limitation is that the index also contains Canada stocks. Although Canada represents only less than 3% of the world market, it is still not so perfect to include it in the index and takes it as the representation of foreign stock investment. The problem is that there is not an index that represents world stocks excluding Canada. The only index that can be considered is the MSCI EAFE & Emerging Index, but it started from 1998 and is not long enough to match the studying.

3.2.5 Foreign Real Estate

GPR 250 REIT World Index (Bloomberg tick: REITGLOB Index) beginning from 12/29/89 daily data available, the GPR 250 REIT World consists of the 250 most liquid property companies worldwide, and only uses the tradable market capitalization of these companies as

index weights. The index reflects the performance of property companies with a free float market capitalization of at least US$ 50 M, and that are structured as a REIT. The index is calculated on a daily basis and the constituents are revised quarterly. The indices are constructed on a total return basis.

Currently, there are the 167 companies included in the GPR 250 REIT Index, of which 122 are from North America, 14 from Europe, 9 from Asia, 20 from Oceania and 2 from Africa. The total free float market capitalization amounts to US$ 262 billion.

3.3 Limitations and Constraints

The first limitation and constraint of this studying is the choosing of data to represent the real estate investment. Using real estate company shares data to represent the real estate may not be appropriate because it may behave much like a stock instead of real estate. Using the appraisal based data from physically direct real estate investment, on the other hand, needs to deal with to the problems of lagging and smoothing inherited from the physically direct real estate investment. After taking these factors into account, the studying chooses REIT data to represent the real estate investment, but it is still not a perfect representation of real estate investment. Secondly, I could not find the foreign stock and foreign real estate data that exclude Canada. Although the Canada's 3% inclusion in the global assets is not too huge to influence the result, the overlap of data is still a small problem.

4 RESULTS

4.1 Method 1

4.1.1 The Whole Period of 1995-2006

The average monthly returns and standard deviations for whole studying period of 1995

to 2006 for the Canadian stock, Canadian bond, Canadian real estate, foreign stocks and foreign

real estate are summarized in the following table:

Table 4-1 Statistic Summary 1995-2006

	Mean	Median	Standard Deviation	Sharpe Ratio
Stock	0.010369132	0.017364471	0.044998288	0.137837807
Bond	0.006811409	0.006838179	0.012295436	0.215099484
Real Estate	0.015265399	0.021500796	0.039407622	0.28163923
Foreign Stock	0.006975146	0.008392747	0.036486158	0.076973825
Foreign Real Estate	0.012312473	0.013364593	0.032566741	0.250126533
Note: This table shows the whole period of 1995-2006. Totally 144 monthly return data are used to obtain the mean, median and standard deviation. Sharpe Ratios are obtained by assuming annual risk free rate of 5%.				

Table 4-2 Correlation Matrix 1995-2006

Correlation	Stock	Bond	Real Estate	Foreign Stock	Foreign Real Estate
Stock	1				
Bond	0.17357765	1			
Real Estate	0.50829834	0.39691284	1		
Foreign Stock	0.71538973	0.00141215	0.33516980	1	
Foreign Real Estate	0.20619800	0.06835474	0.42621732	0.27598641	1
Note: The correlation is calculated from 1995-2006 totally 144 monthly return data. The lowest correlation with the Canadian stock is bond and followed by foreign real estate.					

Overall, the table presented above suggests that the correlations with Canadian stock from lowest to highest are Canadian bond, foreign real estate, Canadian real estate, and foreign stock. The high correlation between Canadian stock and the foreign stock (0.7153897) is evidence of the integration of global stock market. Foreign real estate demonstrates the second lowest correlation (0.206198) with Canadian stock market, which is only a little bit higher than the Canadian bond (0.1735777). However, the mean monthly return of foreign real estate (0.0123) is much higher than those of Canadian bond (0.00681). It implies that foreign real estate could be an excellent asset to help the Canadian investors achieve their diversification benefits

4.1.2   The Sub-Period of 1995-2000

This period includes the high tech booming era and stock market performed very well. The mean return of stock and bond are better than the whole period, but real estate (domestic and foreign) is worse than the whole period. The correlation with Canadian stock in this period also has different pattern with the whole period. The lowest correlation was shifted to foreign real estate and bond followed to the next.

Table 4-3 Statistic Summary 1995-2000

	Mean	Median	Standard Deviation	Sharpe Ratio
Stock	0.013285997	0.018831429	0.04982231	0.183037082
Bond	0.008031285	0.007840071	0.013573355	0.284720892
Real Estate	0.013507591	0.019535807	0.046600171	0.200448276
Foreign Stock	0.011723854	0.013032997	0.035102479	0.215289276
Foreign Real Estate	0.009986846	0.010240262	0.030729839	0.189398312
Note: This table shows the sub-period of 1995-2000. Totally 72 monthly return data are used to obtain the mean, median and standard deviation. Sharpe Ratios are obtained by assuming annual risk free rate of 5%.				

Table 4-4 Correlation Matrix 1995-2000

Correlation	Stock	Bond	Real Estate	Foreign Stock	Foreign Real Estate
Stock	1				
Bond	0.338615115	1			
Real Estate	0.532645668	0.480258174	1		
Foreign Stock	0.707595699	0.128678941	0.400614114	1	
Foreign Real Estate	0.17143731	0.082828349	0.371015579	0.14913817	1

Note: The correlation is calculated from 1995-2000 totally 72 monthly return data. The lowest correlation with the Canadian stock is foreign real estate and followed by bond.

4.1.3 The Sub-Period of 2001-2006

This period is the time with higher volatility when the high tech bubble burst and stock market turndown in 2001 and 2002, but it recovered from 2003. The return of both stock and bond are worse than the whole period, but the real estate is better than the whole period. It demonstrates that the real estate is booming during this period. The correlation with Canadian stock consists with the whole period, with the bond lowest and foreign real estate followed.

Table 4-5 Statistic Summary 2001-2006

	Mean	Median	Standard Deviation	Sharpe Ratio
Stock	0.007452267	0.016128727	0.038325791	0.085728186
Bond	0.005591532	0.006045669	0.010439088	0.136493319
Real Estate	0.017023207	0.022780917	0.029417156	0.437042275
Foreign Stock	0.002226438	0.002876812	0.036484697	-0.053179255
Foreign Real Estate	0.014638099	0.016312391	0.03350591	0.312524928

Note: The correlation is calculated from 2001-2006 totally 72 monthly return data. The lowest correlation with Canadian stock is bond, and followed by foreign real estate.

Table 4-6 Correlation Matrix 2001-2006

Correlation	Stock	Bond	Real Estate	Foreign Stock	Foreign Real Estate
Stock	1				
Bond	-0.119679109	1			
Real Estate	0.478687779	0.251537907	1		
Foreign Stock	0.741222205	-0.187720529	0.284493539	1	
Foreign Real Estate	0.26708809	0.070518754	0.540110652	0.411728193	1
Note: The correlation is calculated from 2001-2006 totally 72 monthly return data. The lowest correlation with Canadian stock is bond, and followed by foreign real estate.					

The evidence suggests that the foreign real estate consistently demonstrates the low correlation with Canadian stock in both periods. Although the correlation increased from 0.1714 in 1995-2000 to 0.267 in 2000-2006, it is still much lower than the correlation of foreign stock, which increased the correlation from 0.7076 in 1995-2000 to 0.7412 for 2000-2006.

4.1.4   The Rolling 12 month Correlation Analysis 1996-2006

I follow the CFS and construct the rolling previous 12 month correlation with Canadian stock for the three assets: Canadian real estate, foreign stock, and foreign real estate. I use the same data to get the rolling 12 months return data. There are totally 133 observations available starting from December 1995 until December 2006. Then I run the correlation for each asset and get the result to plot the figure 4-1.

The result of the method one can be seen from   Figure 4-1.

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Figure 4-1   Correlation of Assets with Canadian Stocks

Correlation of Assets with Canadian stocks

2006-12

Canadian REIT   — Foreign Stock   — Foreign REIT

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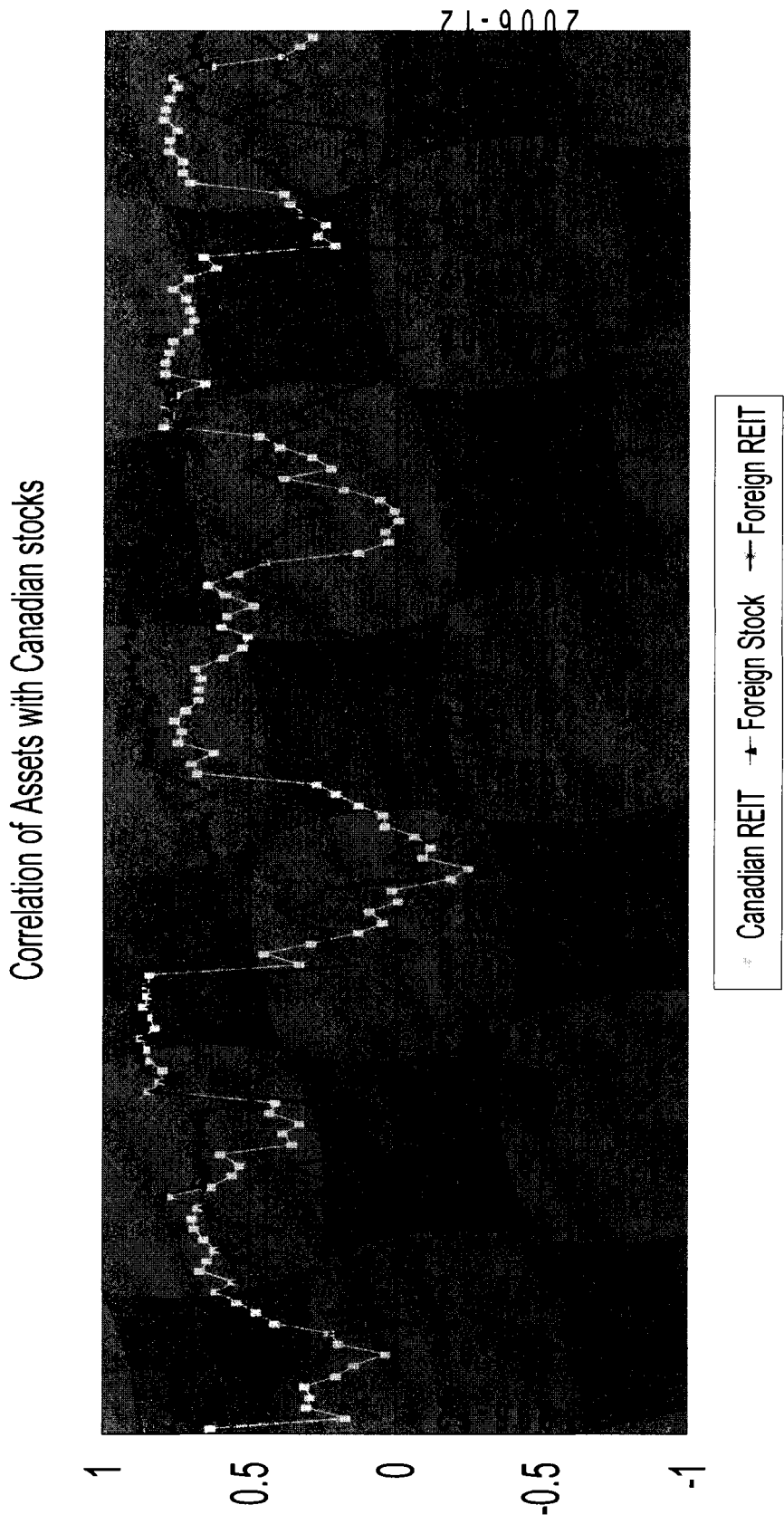
The first interesting find is that the increased correlation phenomenon during highly market volatilities (such as 1987 stock market crash in CFS's case, 2001 high tech bubble in this studying) did not happen in Canada. On the contrary, the correlation between Canadian stocks and foreign real estate is in its lowest during the "Tech Bubble" period in 2001. It not only demonstrated the lowest level of correlation but also almost all at the zero to negative correlation level throughout the higher volatility period of 2001.

The correlation between the Canadian stocks and foreign real estate is lower than that between Canadian stocks and foreign stocks for 127 of the 133 months examined. The only exceptions are 6 months in 2004 and 2005. Thus, the overall 95.5% of time of lower correlations for foreign real estate are stable through out the time period.

Another interesting finding is that foreign stock has been thought to be an effective diversification tool due to its low correlation which is not available from other Canadian assets. However, after I compare the correlation between Canadian stock and foreign stock to the correlation between Canadian stock and Canadian real estate, the result shows that in only 38 of the 133 months (28.57%) is the correlation of foreign stock lower than those of Canadian real estate. It looks like the integration of global stock market makes diversification of foreign stocks not as attractive as of domestic real estate.

In summary, the result strongly suggests that the foreign real estate does not integrate with other assets during periods of higher volatility period in Canada as previous researchers (Bertero and Mayer, 1990; King and Wadhwani, 1990; and King, Sentana and Wadhwani, 1994) found in the U.S., but it is consistent with the CFS's finding that the lower correlation for foreign real estate is consistent through time, even in periods of increased volatility.

4.2 Method 2

Method 2 of the studying is conducted by utilizing the Quadratic Optimization System-version 15(QOS-15) software developed by Financeometrics Inc. to make the optimization processes and to draw the efficient frontiers for various testing portfolios.

The process starts with using mean, variance, and covariance values (Table 4-7) obtained from the monthly total returns of every representative index data and put these values to QOS-15. Then the optimization is executed by setting the optimization parameters in the given risk aversion starting at 100 to 0, and to generate 20 frontier points.

There are two constraints in this method. The first one is that many studies include risk free asset in the optimization, but CFS did not. To make two studies comparable, I do not include risk free asset in the optimization. As a result, only risky assets are tested in this study and the efficient frontiers may be different from the commonly held portfolio that includes risk free asset. Another constraint is that short-selling does not allowed in this study. The reason is also because CFS did not and in practice short-selling is not feasible for many investors. In addition, I do not look at optimal portfolios for the two sub-periods because the parameter inputs to the optimizer don't change that much from sub-period to sub-period.

Table 4-7 Covariance Matrix

	Stock	Bond	Real Estate	Foreign Stock	Foreign Real Estate
Stock	0.002024846	0.00009537	0.000895094	0.001166381	0.000300074
Bond	0.00009537	0.000151178	0.000190982	0.00000063	0.00002718
Real Estate	0.000895094	0.000190982	0.001552961	0.000478571	0.000543199
Foreign stock	0.001166381	0.00000063	0.000478571	0.00133124	0.000325659
Foreign Real Estate	0.000300074	0.00002718	0.000543199	0.000325659	0.001060593

Table 4-8 Efficient Frontier of Two Assets Portfolio

Portfolio of Two Assets (Stock + Real Estate)				Weights (%)	
Frontier Point	Expected Return	Standard Deviation	Sharpe Ratio	Stock	Real Estate
1	0.01359762	0.03622426	3.62242565	34.0623	65.9377
2	0.01360507	0.03622637	3.43197193	33.9101	66.0899
3	0.01361340	0.03622887	3.24153028	33.7400	66.2600
4	0.01362276	0.03623185	3.05110299	33.5487	66.4513
5	0.01363338	0.03623544	2.86069291	33.3319	66.6681
6	0.01364551	0.03623984	2.67030372	33.0841	66.9159
7	0.01365952	0.03624528	2.47994023	32.7981	67.2019
8	0.01367585	0.03625214	2.28960887	32.4645	67.5355
9	0.01369515	0.03626095	2.09931836	32.0703	67.9297
10	0.01371832	0.03627254	1.90908091	31.5972	68.4028
11	0.01374663	0.03628819	1.71891416	31.0190	68.9810
12	0.01378202	0.03631006	1.52884447	30.2962	69.7038
13	0.01382752	0.03634193	1.33891320	29.3669	70.6331
14	0.01388819	0.03639098	1.14918896	28.1278	71.8722
15	0.01397312	0.03647219	0.95979453	26.3931	73.6069
16	0.01410052	0.03662122	0.77097303	23.7911	76.2089
17	0.01431286	0.03694114	0.58328113	19.4544	80.5456
18	0.01473753	0.03784029	0.39831886	10.7810	89.2190
19	0.01526540	0.03940761	0.20740849	0.0000	100.0000
20	0.01526540	0.03940761	0.00000004	0.0000	100.0000

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Table 4-9 Efficient Frontier of Three Assets Portfolio

	Portfolio with Three Assets (Stock + Real Estate + Foreign Stock)			Weights (%)		
Frontier Points	Expected Return	Standard Deviation	Sharpe Ratio	Stock	Real Estate	Foreign Stock
1	0.01081474	0.03073129	3.07312928	0.0000	51.8165	48.1835
2	0.01083592	0.03073838	2.91205668	0.0000	52.0458	47.9542
3	0.01085959	0.03074674	2.75102443	0.0000	52.3021	47.6979
4	0.01088623	0.03075673	2.59004005	0.0000	52.5904	47.4096
5	0.01091641	0.03076877	2.42911307	0.0000	52.9172	47.0828
6	0.01095091	0.03078347	2.26825571	0.0000	53.2907	46.7093
7	0.01099071	0.03080169	2.10748390	0.0000	53.7216	46.2784
8	0.01103715	0.03082463	1.94681884	0.0000	54.2243	45.7757
9	0.01109203	0.03085409	1.78628934	0.0000	54.8185	45.1815
10	0.01115788	0.03089278	1.62593554	0.0000	55.5314	44.4686
11	0.01123837	0.03094499	1.46581511	0.0000	56.4028	43.5972
12	0.01133899	0.03101783	1.30601389	0.0000	57.4921	42.5079
13	0.01146835	0.03112377	1.14666534	0.0000	58.8926	41.1074
14	0.01164083	0.03128630	0.98798852	0.0000	60.7599	39.2401
15	0.01188230	0.03155401	0.83036860	0.0000	63.3741	36.6259
16	0.01224451	0.03204098	0.67454687	0.0000	67.2954	32.7046
17	0.01284819	0.03306860	0.52213575	0.0000	73.8309	26.1691
18	0.01406662	0.03586823	0.37756034	1.6663	86.2388	12.0949
19	0.01526540	0.03940761	0.20740849	0.0000	100.0000	0.0000
20	0.01526540	0.03940761	0.00000004	0.0000	100.0000	0.0000

Table 4-10 Efficient Frontier of Four Assets Portfolio

Portfolio with Four Assets (Stock + Real Estate + Foreign Stock +Foreign Real Estate)				Weights (%)			
Frontier Points	Expected Return	Standard Deviation	Sharpe Ratio	Stock	Real Estate	Foreign Stock	Foreign Real Estate
1	0.01132796	0.02673385	2.67338503	3.9245	23.5836	25.5356	46.9563
2	0.01135007	0.02674235	2.53348585	3.9724	23.7602	25.2519	47.0155
3	0.01137479	0.02675239	2.39363501	4.0260	23.9576	24.9348	47.0816
4	0.01140259	0.02676437	2.25384151	4.0862	24.1797	24.5780	47.1560
5	0.01143411	0.02677881	2.11411672	4.1545	24.4314	24.1737	47.2404
6	0.01147012	0.02679645	1.97447523	4.2326	24.7191	23.7116	47.3367
7	0.01151168	0.02681830	1.83493606	4.3226	25.0510	23.1785	47.4479
8	0.01156016	0.02684580	1.69552447	4.4277	25.4382	22.5564	47.5776
9	0.01161745	0.02688111	1.55627474	4.5519	25.8959	21.8213	47.7309
10	0.01168621	0.02692746	1.41723459	4.7009	26.4450	20.9392	47.9149
11	0.01177024	0.02698997	1.27847239	4.8830	27.1162	19.8610	48.1398
12	0.01187528	0.02707713	1.14008965	5.1107	27.9552	18.5133	48.4208
13	0.01201034	0.02720375	1.00224355	5.4034	29.0340	16.7805	48.7822
14	0.01219041	0.02739770	0.86519063	5.7936	30.4723	14.4701	49.2640
15	0.01244251	0.02771637	0.72937815	6.3400	32.4859	11.2355	49.9386
16	0.01282066	0.02829362	0.59565521	7.1596	35.5063	6.3837	50.9504
17	0.01337061	0.02933390	0.46316692	7.4230	40.7187	0.0000	51.8584
18	0.01385534	0.03060772	0.32218652	0.0000	52.2489	0.0000	47.7511
19	0.01439778	0.03303675	0.17387762	0.0000	70.6183	0.0000	29.3817
20	0.01526540	0.03940761	0.00000004	0.0000	100.0000	0.0000	0.0000

The empirical result of the second method can be demonstrated in two steps. The first step is adding foreign stocks into the domestic Canadian stock and Canadian real estate portfolio (two assets portfolio) to diversify the domestic portfolio and form a three assets international portfolio.

In the lower part of the frontier (left side of risk level), risk was largely reduced but accompanied with lower returns for the international three assets portfolio. The lowest standard deviation available without the inclusion of foreign stock is 3.62% accompanying the return of 1.36% for the two assets portfolio which consists 34% of domestic stocks and 66% of domestic

real estate. However, if the foreign stocks are included to form an international portfolio, the domestic stocks are completely crowded out and replaced by foreign stocks. This international three assets portfolio consists of 51.81% domestic real estate and 48.18% foreign stocks, and the minimum standard deviation drops to 3.07% accompanied with return drops to 1.08% as well. Obviously, the effect of adding foreign stock to the portfolio can achieve risk reduction rather than return increasing.

In the upper (right) part of risk level, the effect of adding foreign stocks appears to provide some return enhancing effect. As we can see, the minimum return of Canadian stock and Canadian real estate two assets portfolio is 1.36% with a standard deviation of 3.62% a month. At this same standard deviation risk level, the international three assets stock portfolio has a higher return of 1.43%.

The second step of method two is adding the foreign real estate to form a new diversified four assets portfolio. When foreign real estate is added into the international portfolio to form another well diversified international portfolio that includes Canadian stock, Canadian real estate, foreign stock, and foreign real estate, as shown in Figure 4-2, the latter frontier dominates the former two.

Figure 4-2 Risk and Return for Efficient Portfolios of International Assets

Risk and Return for Efficient Portfolios of International Assets
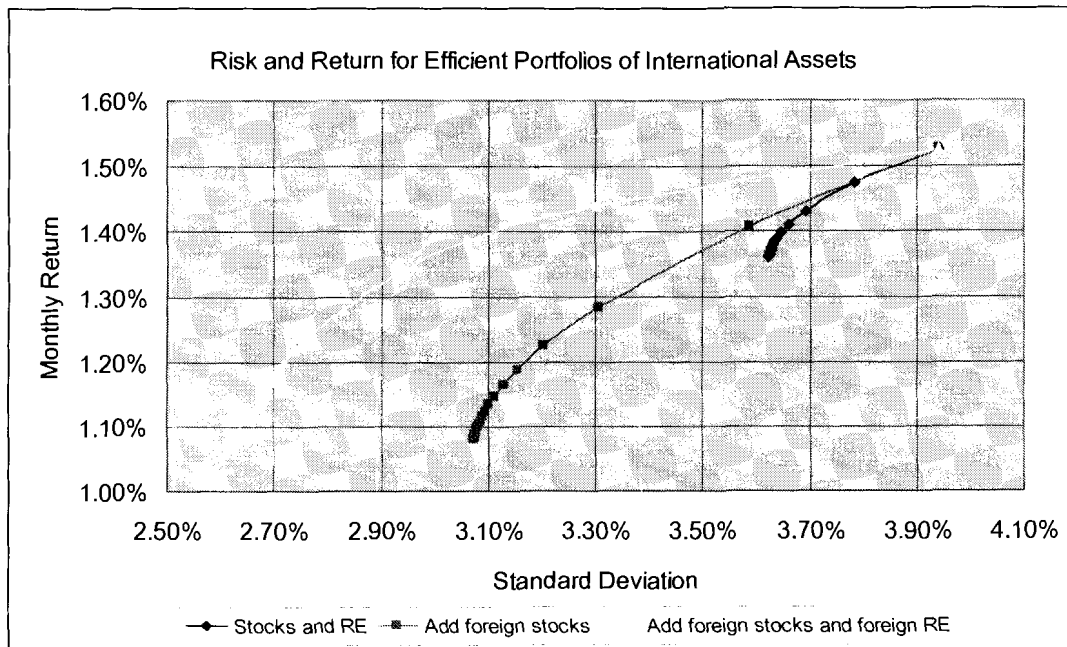
We can observe from the four assets (adding foreign stock and foreign real estate)

frontiers. Giving the almost same return level at around 1.1%, the lowest standard deviation

available from the well diversified international four assets portfolio is 2.67%. The weight of the

portfolio is made of Canadian stock 3.9%, Canadian real estate 23.6%, foreign stock 25.5%, and

foreign real estate 47%. When we compared it with the three assets portfolio (without foreign real

estate) at the same return level, the risk of the three assets is at 3.07% standard deviation, which is

much higher than the 2.67% of the four assets portfolio. The four assets portfolio with foreign

real estate obviously provides much better risk reduction function.

Giving the same risk level of 3.07% in lowest risk level of the three assets portfolio, we

can obtain the return of 1.38% from the four assets portfolio frontier point. It increase the return

from 1.08% to 1.38% (a 28% increase) without adding any risk. It demonstrates that foreign real

estate can benefit the investor by reducing the risk and increasing the return.

4.3 Method 3

To investigate the issue in more detail and from a different angle, the third method is utilized by comparing two portfolios: one is the diversified portfolio with Canadian stock, Canadian bond, and Canadian real estate; the other is using foreign real estate to replace Canadian real estate, to see which real estate investment provides a better diversification effect.

In the CFS's studying, they do not include any fixed income into their portfolio for analysis. I would like to improve the shortfall by forming another portfolio including bond investment. The reasoning behind this method is that the most common structured portfolio usually is the combination of equity and fixed income. By adding domestic real estate or foreign real estate to the most common structured portfolio that composed of domestic stock and domestic bond would make the research more realistic.

By using the same data from previous methods, I run the QOS 15 maximization to form two efficient frontiers. The related frontiers point's tables are as follows:

Table 4-11 Efficient Frontier of Portfolio with Domestic Real Estate

| Portfolio with Domestic Real Estate				Weights (%)		
Frontier Point	Expected Return	Standard Deviation	Sharpe Ratio	Stock	Bond	Real Estate
1	0.70%	1.23%	1.2308	4.2410	94.8127	0.9463
2	0.71%	1.23%	1.1685	4.1943	94.4773	1.3283
3	0.71%	1.24%	1.1063	4.1421	94.1025	1.7553
4	0.71%	1.24%	1.0442	4.0834	93.6808	2.2357
5	0.72%	1.24%	0.9824	4.0169	93.2029	2.7801
6	0.72%	1.25%	0.9207	3.9409	92.6568	3.4023
7	0.73%	1.26%	0.8594	3.8532	92.0266	4.1203
8	0.74%	1.26%	0.7984	3.7508	91.2913	4.9578
9	0.74%	1.27%	0.7379	3.6299	90.4224	5.9477
10	0.75%	1.29%	0.6779	3.4847	89.3797	7.1355
11	0.77%	1.31%	0.6186	3.3074	88.1053	8.5873
12	0.78%	1.33%	0.5603	3.0856	86.5123	10.4021
13	0.80%	1.37%	0.5033	2.8005	84.4642	12.7353
14	0.82%	1.42%	0.4480	2.4204	81.7333	15.8463
15	0.86%	1.50%	0.3953	1.8882	77.9101	20.2017
16	0.91%	1.64%	0.3462	1.0900	72.1753	26.7348
17	1.00%	1.92%	0.3024	0.0000	62.5150	37.4850
18	1.17%	2.53%	0.2658	0.0000	42.2674	57.7326
19	1.53%	3.94%	0.2074	0.0000	0.0000	100.0000
20	1.53%	3.94%	0.0000	0.0000	0.0000	100.0000

Note: the expected monthly return is ranged from 0.70% to 1.53% and standard deviation is ranged from 1.23% to 3.94%.

Table 4-12 Efficient Frontier of Portfolio with Foreign Real Estate

Portfolio with Foreign Real Estate				Weights (%)		
Frontier Points	Expected Return	Standard Deviation	Sharpe Ratio	Stock	Bond	Foreign Real Estate
1	0.77%	1.19%	1.1853	2.1432	82.9989	14.8578
2	0.77%	1.19%	1.1242	2.2018	82.6929	15.1052
3	0.77%	1.19%	1.0632	2.2673	82.3509	15.3817
4	0.78%	1.19%	1.0023	2.3410	81.9662	15.6928
5	0.78%	1.19%	0.9414	2.4245	81.5301	16.0454
6	0.78%	1.20%	0.8807	2.5199	81.0318	16.4483
7	0.78%	1.20%	0.8202	2.6300	80.4568	16.9132
8	0.79%	1.20%	0.7599	2.7585	79.7859	17.4556
9	0.79%	1.21%	0.6998	2.9103	78.9931	18.0966
10	0.80%	1.22%	0.6400	3.0925	78.0417	18.8658
11	0.80%	1.23%	0.5806	3.3151	76.8789	19.8060
12	0.81%	1.24%	0.5218	3.5935	75.4253	20.9812
13	0.82%	1.26%	0.4638	3.9513	73.5565	22.4922
14	0.83%	1.29%	0.4069	4.4284	71.0648	24.5068
15	0.85%	1.34%	0.3516	5.0964	67.5763	27.3273
16	0.88%	1.42%	0.2988	6.0984	62.3437	31.5580
17	0.92%	1.58%	0.2501	7.7683	53.6225	38.6091
18	1.01%	1.98%	0.2086	11.1082	36.1803	52.7115
19	1.20%	2.97%	0.1564	15.7440	0.0000	84.2560
20	1.23%	3.26%	0.0000	0.0000	0.0000	100.0000

Note: The expected monthly return is ranging from 0.77% to1.23% and the standard deviation is ranging from 1.18% to3.26%.

Figure 4-3 Canadian V.S. Foreign Real Estate

Canadian V.S. Froeign Real Estate
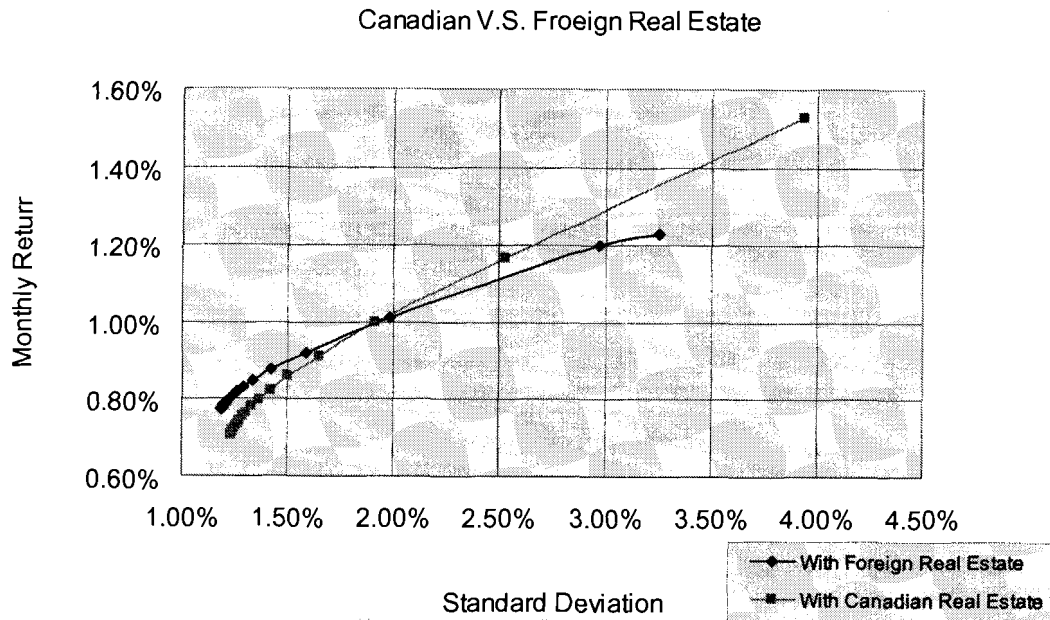
The empiric results of the third method are illustrated in Figure 4-3, which indicate the mixed diversification effects. The two frontiers intersect at around the point of 2% standard deviation and 1% returns. Left of the point, the lower risk of the frontier, the portfolios with foreign real estate dominate the portfolio with Canadian real estate. On the other hand, right of the point, which is the higher risk portion, the portfolios with Canadian real estate dominate the portfolio with foreign real estate. It implies that to gain the diversification benefits from a portfolio without risk free asset, Canadian real estate investment does not necessarily have to be replaced by foreign real estate, and it really depends on the investors' risk tolerance levels to make the decision. Furthermore, it may imply that in the direct real estate investment situation, Canadian real estate is a better choice than direct foreign real estate investment after adjusted for the transaction and information cost for foreign real estate investment.

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5 CONCLUSION

The research examines the diversification benefits from foreign real estate investment from a Canadian investor's perspective. Based on the data from the time period of 1994 to 2006, the research not only follows the Conover, Friday, and Sirmans methodology, but also investigates the issue by utilizing another method to see the diversification benefits of foreign real estate from a Canadian perspective. The results are twofold. One is to affirm the Conover, Friday, and Sirmans conclusion that foreign real estate investment can provide diversification benefits beyond that obtainable from foreign stock. On the other hand, the re-examination research also finds that to gain the diversification benefits from a portfolio without risk free asset, it is not necessary to replace Canadian real estate by foreign real estate and it really depends on the investors' risk tolerance. In case of a portfolio with risk free asset, the tangency portfolio will replace the efficient frontier portfolio and the previous conclusion will not be valid. The only concern is the short history of Canadian REIT data that constrains the research to only a 12- year time frame. Whether the period fairly represents the overall Canadian real estate behaviour is a question that deserves to be further explored.

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