Performance of Canadian Real Estate Investment Trusts

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ABSTRACT

PERFORMANCE OF CANADIAN REAL ESTATE INVESTMENT TRUSTS

Margarita Tcherednitchenko

The Canadian REIT sector has experienced rapid growth that has coincided with the strong performance of the real estate sector. Thus, this thesis examines the risk-adjusted return performance in the secondary and primary (IPO) markets and interest rate sensitivity of all non-mortgage REITS that traded on the TSX during the 1996-2004 period.

Smaller REITs offer lower risk-adjusted returns since the value-weighted REIT index has about the same mean monthly return but much lower standard deviation than its equally-weighted counterpart. Based on the Sharpe ratio and the Jensen alphas, both equally- and value-weighted REIT indexes outperform the market.

Although mean first-day unweighted and size-weighted IPO returns are significant and negative, the size-weighted counterparts are approximately equal to the commissions saved by new issue versus secondary market purchase. Mean mispricing in the first and not second subperiod suggests that earlier overpricing of IPOs has corrected, and that more recent REIT IPOs are approximately correctly priced on average. Consistent with studies of US REITs, Canadian REITs do not outperform (or underperform) the market during the year after initial issue. If past performance is reflective of what can be

expected in the future, REITs provide investors with a "fairly" priced vehicle for participating in real estate investment.

REITs are more interest-rate sensitive than other equities but the sensitivity depends upon the interest rate change proxy used. REIT returns are inversely related with bond premia. This interest-rate sensitivity has implications for the management of risk for this asset class within an investor's portfolio.

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1. INTRODUCTION

The Canadian market for Real Estate Investment Trusts (REITs) is still in its early years. While REITs have been a popular investment vehicle in the US since the 1960s, the first Canadian REIT was created in August 1993, when RealFund was converted from an open-ended mutual fund into a closed-end REIT structure.

The Canadian REIT sector has grown considerably over the last few years. The average market capitalization of REITs has more than doubled over the past five years to about $1.2 billion. According to Standard & Poor's Inc, the 26 REITs trading on the Toronto Stock Exchange (TSX) at the beginning of 2005 had a total market capitalization of $17.4 billion. The REIT sector represented about 13% of the $137 billion income trust market, which itself accounted for 11 percent of Canada's total market capitalization. Thus, REITs represented about 1 percent of the value of the TSX. Despite the relatively small size of the REIT market, S&P generally gives REITs a better rating on its stability-rating chart than the majority of the other income trusts. The rating assesses the stability of the cash flows of income trusts and indicates payout sustainability.

Based on table 1, 29 REITs have come to the Canadian market since 1993. Of these 29 REITs, 25 were created through an Initial Public Offering (IPO) and 4 were reorganized into the REIT structure from existing open-end funds. The year-by-year creations by type are reported in table 2. The Canadian REIT market also has experienced three consolidations, which have reduced the number of REITs to 26. The

consolidations include the acquisitions of RealFund by Riocan in February 1999, Avista by Summit in November 1999, and CPL by Retirement Residencies in April 2002.

In the literature, the after-market performances of REITs are examined primarily from a US context. Overall, the empirical evidence shows that the long-run, risk–adjusted performance of REITs is comparable to that of the market. However, Canadian REITs are structured as closed-ended mutual fund trusts while their US counterparts are limited corporations. Canadian REITs comply with various requirements of Canada's Income Tax Act and with the self-imposed Trust Declaration that outlines the obligations and restrictions applied to each REIT.

Given these differences in organizational design and the paucity of literature on the performance of Canadian REITs, the primary purpose of this thesis is to evaluate the performance of the Canadian REIT sector over the 1996-2004 period. This thesis contributes to the literature by examining the risk-adjusted return performance, interest-rate sensitivity and post-IPO performance of Canadian REITs. Given the rapid growth of the Canadian REIT sector and the increasing interest in the vehicle by individuals and institutional investors (especially pension funds), the findings of this study should be of interest to practitioners, regulators, plan sponsors and private investors.

The remainder of this thesis is organized as follows. The literature on REITs is briefly reviewed in the next section. The sample characteristics are discussed in section three. The risk-adjusted return performance of REITs over the 1996-2004 period is reported and assessed in section four. Section five presents and evaluates the after-market performance of REITs that begin public life with an IPO. The sensitivity of REIT returns

to changes in interest rates proxied by a variety of metrics is discussed and analyzed in section six. Section seven concludes the thesis.

2. LITERATURE REVIEW

2.1 Long-term REIT Return Performance

Previous literature demonstrates that REITs generally did not outperform the market on a risk-adjusted basis over the long run. In contrast, the performance of REITs differs significantly depending on the short-run sub-period considered.

In supposedly the first study to analyze REIT performance, Smith and Shulman (1976) compare the performance of REITs to the S&P index over the 1963-1974 period. The authors report that REITs outperformed the market in the 1963-1973 period but underperformed significantly in 1974 causing underperformance over the full time period.

Kuhle, Walther and Wurtzebach (1986) evaluate REIT annual returns for the 1973-84 period. They find that REITs outperformed the S&P index over the 1977-84 sub-period but underperformed the market over the 1973-1976 sub-period. Titman and Warga (1986) evaluate REIT performance during 1973-1982. They find the risk-adjusted performance of REITs was not statistically different from that of the market. Goebel and Kim (1989) report that REITs underperformed the S&P index over the 1984-87 period.

Han and Liang (1995) evaluate the risk-adjusted performance of REITs over the 1970-93 period and find that performance varied depending on the sub-period considered. The authors report that an equally-weighted equity REIT portfolio underperformed the market in the 1970-1975 and 1988-93 sub-periods and outperformed the market in the 1976-81 and 1982-87 sub-periods. In contrast, the value-weighted REIT portfolio only underperformed during the 1970-1975 sub-period.

Chen and Peiser (1999) examine REIT performance over the period of 1993-97 and find that REITs underperformed the S&P 500 on a nominal basis and had comparable risk-adjusted returns to those of the market. Sanders (1998) finds that REITs underperformed the market over the entire sample period of 1978-96. Equity REITs earned an average annual return of 13.82% while the S&P 500 index earned 15.66%. However, REITs outperformed the market for the sub-periods of 1978-86 and 1990-96 on a risk-adjusted basis

Overall, the evidence demonstrates that REITs do not outperform the market over the long run, and that REIT returns are highly sensitive to the sample period considered.

2.2 First-day and Subsequent Returns for REIT IPOs

IPOs of operating firms often are underpriced. According to Ritter and Welch (2002), the average first-day return for common stock IPOs between 1980 and 2001 was 18.8%. Most previous studies suggest that REIT IPOs do not benefit from a similar first-day price increase although evidence of underpricing of REIT IPOs exists during the 1990s.

Wang, Chan and Gau (1992) report a 2.82% price decline in the first day of trading of equity REIT IPOs during the period 1971-88. They also find that REIT IPOs underperform seasoned REITs over the initial 190 trading days following the issue. The authors propose a number of possible rationales for this performance, such as a higher number of speculative issues and less participation by institutional investors in REIT IPOs compared to common stock IPOs. This conjecture is based on the untested observation that buyers in these IPOs were mostly individual investors (or non-13(f) institutional investors) who have little interest in investing in REIT IPOs.

Below, Zaman and McIntosh (1995) find that REIT IPOs are correctly priced for the period of 1972-89. They find that any overpricing is removed when the bid-ask midspread or the ask price is used to calculate returns. While this result is interesting, it ignores the trade costs that initial buyers of the IPOs would incur if they liquidated their positions during the first day of trading of an IPO since impatient sellers would sell at the bid and more patient sellers might be able to sell within the half-spread (i.e., between the inside bid and the bid-ask midspread). After considering transaction costs, the authors recommend that investors buy REITs at the IPO.

Ling and Ryngaert (1997) find that the conclusions of Wang et al. do not apply to the post-1990 period as this period exhibits underpricing of REIT IPOs. The authors report that the average REIT IPO increases in value by 3.50% on the first day of trading for the 1991-94 period. Moreover, they find that REITs slightly outperform a benchmark portfolio of seasoned equity REITs over the first 100 days following the IPO. Ling and Ryngaert attribute this result to increased institutional investor participation as compared to the period before the1990s, and to more valuation uncertainty due to a more active management of REITs in the 1990s. Shelor and Anderson (1998) report negative average returns in the first 20 to 25 trading days subsequent to the IPOs of REITs in the 1976-95 period. However, these returns become significantly positive within 180 days of the issue.

Londerville (2002) examines the IPO performance of 13 Canadian IPOs listed on the TSE in 1998. She reports evidence of underpricing over the 10 and 20 days following issue when cumulative market-adjusted returns are considered. However, neither raw nor

market-adjusted returns are significantly different from zero on any single day, except for day 17.

Chan, Erickson and Wang (2003) compare first-day returns of REIT IPOs to those of operating firms. They document that the average first-day return for REIT IPOs is -3.10% for the 1970-79 sub-period, or 12.10% higher than the 9% return for industrial firms over the same period. The spread is 18.44% over the average initial day return of -3.14% for REIT IPOs for the 1980-89 sub-periods, and is even larger at 21.44% over an average first-day return of 2.36% for REIT IPOs for the 1990-2000 sub-period.

Buttimer, Hyland and Sanders (2005, p.52) argue that the initial underpricing for REITs and not common stocks may be a function of the relative transparency of REITs compared to typical IPOs because "the market may have higher confidence in its estimate of a REIT IPO's value than in its estimate of a typical IPO's value." According to the authors, REITs are more transparent and therefore easier to value due to their nature as well as the regulatory restrictions they face. However, the speculation that REITs are more transparent is suspect because most of the holdings of a typical REIT are marked-to-appraisal values while most of the holdings of a typical corporate IPO are marked to either book values or investor assessments of going concern value. The authors examine the first-day performance of REIT IPOs for three waves of IPO issuance in the REIT market (specifically, 1985, 1993-94 and 1997-98, respectively). Buttimer et al. find negative but not statistically significant first-day returns for 1985 and the 1980s. They find positive and statistically significant first-day returns for REIT IPOs issued during the second and third waves of 3.21% and 5.57%, respectively. For the entire period of 1985-98, the authors find an average first-day return of 2.47%. They note that these positive

average first-day returns for REIT IPOs are significantly lower than those documented for the overall IPO market. For instance, Helwege and Liang (2003) report average first-day returns of between 17% and 30.6% for the period of 1975-2000.

2.3 Sensitivity of REIT Returns to Market Returns and Interest Rates

A number of studies examine the effect of interest rates on US REITs. While some authors report high correlations between the returns on REITs and interest rate changes, others find the relationship to be weak.

Mueller and Pauley (1995) find that REIT returns display less interest rate sensitivity than the stock market for the 1972-93 period. The authors report low negative correlations of -0.201 to -0.299 for REITs with all three proxies of interest rate changes (namely, short-, medium- and long-term). The correlations between the stock market (as proxied by the S&P 500 Price Index) and changes in interest rates are slightly more negative for the short- and medium-term interest rates, which suggest that REITs behave like stocks. Allen, Madura and Springer (2001) find the returns of equity REITs to be sensitive to long-term interest-rate changes. They report interest rate coefficients of -0.432 for equity and -0.334 for nonequity REITs for the 1992-96 period. Gyourko and Keim (1992) report a significant relationship between REIT returns and interest rate changes. Using data from 1978 to 1990, the authors report a correlation between REIT returns and long bonds of 0.43 and between the S&P 500 Index and long bonds of 0.39.

Buetow and Johnson (2001) examine the correlations of REIT returns with various asset classes for the period of 1973-2000 with respect to monetary policy environments. They report correlations between the prices of REITs and long-term government bonds of 0.229 and 0.183 during periods of expansive and restrictive monetary policy,

respectively. The correlations between the S&P 500 and long-term government bonds are slightly higher at 0.389 and 0.279 for the respective regimes.

Glascock, Lu and So (2000) find that REIT returns are cointegrated with the bond market over the 1980-1991 sub-period but not over the 1992-1996 (or second) sub-period. The authors conclude that a major shift occurred in the behaviour of REITs in the early 1990s suggesting a reduction in the diversification benefits provided by REITs.

Sanders (1998) uses a two-factor model to examine the effects of long-term government bond and high-yield corporate bond premia on REIT excess returns and market premiums for the 1978-1996 period. Sanders finds that the estimated coefficient for long-term government bonds is slightly lower for REITs than for the S&P500 (0.73 vs. 0.88), while the estimated coefficient for the risky interest rate proxy is slightly higher for REITs than for the market (0.77 versus 0.71). He concludes that studies that report higher interest rate sensitivity for the market than for REITs are misleading because they fail to consider government bonds in conjunction with high-yield corporate bonds.

Swanson, Theis and Casey (2002) evaluate the sensitivity of REIT returns to changes in interest rates by using a three-factor model that contains a market premium, maturity premium (spread between long-term and short-term bonds) and credit risk (spread between Baa bonds and the treasury-bill rate). They find that the estimated coefficients vary across sub-periods, and are 0.78, 0.22 and 0.08 for the market premium, the maturity premium and credit risk, respectively, over the overall 1989-1998 period.

He, Webb and Myer (2003) examine REIT returns sensitivity to seven proxies of interest rate changes for the 27-year period, 1972-1998. They estimate sensitivities of -0.31 and -0.37 for the returns of equity REITs with changes in yields on long-term

government bonds and high-yield corporate bonds, respectively. In comparison, market excess returns (as proxied by NYSE/ASE/NASDAQ monthly returns minus Treasury-bill rates) are slightly less responsive to the changes in these variables with coefficients of -0.28 and -0.29, respectively.

To summarize, the reviewed literature finds that the relationship between the returns of REITs with various interest-rate proxies depends on the time period and on the choice of proxies used to capture changes in interest rates.

3. SAMPLE CHARACTERISTICS

3.1 Cash Distributions to Unitholders

As income-producing vehicles, the rates of cash distributions are specified in the Trust Declaration of each REIT. All such clauses state that the REIT will distribute at least its taxable income to its unitholders. In practice, REITs usually distribute about 90-95% of distributable income. Thus, a REIT is not subject to tax provided its taxable income is allocated to its unitholders. Taxable income at the unitholder level is reduced by the capital cost allowance (CCA) that provides tax benefits similar to depreciation. Income is taxed at the unitholder level based on the marginal tax rate of each unitholder, and the portion of income so sheltered by the CCA can be distributed to unitholders and is taxed as capital gains only when the units are sold by unitholders.[1,2]

The dividend payout ratios (dividends per share/earnings per share) for our sample of Canadian REITs for the period 1999-2004 is reported in table 3. As expected, the median [mean] dividend payout ratio reveals that a typical [average] REIT pays out 120% [220%] of its EPS. Because REIT portfolios consist mainly of properties with material depreciation write-offs that reduce or shelter taxable income, the annual cash flows often exceed taxable income making it possible for individual funds to pay out a percentage exceeding taxable income. Nevertheless, the dividend payouts for individual funds vary considerably given the high cross-sectional standard deviation of these payout ratios.

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[1] This is drawn from *Taxation of Real Estate, REITs and Royalty Trusts*, which is found at: www.professionalreferrals.ca.

[2] Because REITs are qualified investments for retirement savings plans (RRSPs), registered retirement income funds (RRIFs), registered education savings plans (RESPs) and deferred profit sharing plans (DPSPs), investors can take advantage of additional tax deferrals by investing in REITs through such plans.

3.2 Leverage Usage by the Sample of REITs

The allowable degree of leverage is specified in each REIT's Declaration of Trust. REITs have less of a tax-shelter incentive for using debt since they are not taxed at the trust level if they pay out all income to unitholders. The long-term debt to total capital ratio is used to assess the level of leverage in Canadian REITs, where total capital is defined as the sum of long-term debt, preferred stock, minority interest and common equity. On average, Canadian REITs use moderate leverage. As reported in table 4, the leverage of the typical [average] REIT is 50% [45%] over the 1996-2004 period.

3.3 Book-to-market Ratios for the Sample of REITs

Summary statistics for the annual book-to-market ratios (book value of common equity divided by its market value counterpart) for the sample of REITs for the 1996-2004 period are reported in table 5. The mean book-to-market ratio is 0.91 over the entire period, and has only exceeded one during 1997, 1998 and 1999. This mean book-to-market ratio is comparable to the average for Canadian stocks of 0.96 that Kortas, L'Her and Plante (2004) report for the 1988-2001 period. Therefore, the absence of substantial relative market overpricing does not provide an incentive for Canadian REITs to increase the amount of leverage used to acquire more properties. This may be at least partially responsible for the moderate degree of leverage found for the sample of REITs.

4. RISK-ADJUSTED RETURN PERFORMANCE OF REITs

4.1 Data, A Priori Expectations and Methodology

The sample consists of all non-mortgage REITs that traded on the TSX during the 1996-2004 period. The reason for excluding mortgage REITs is that they exhibit behavior that is different from equity REITs. As a result, all studies on REITs separate E-REITS (equity REITs) from M-REITS (mortgage REITs). M-REITs commonly refer to trusts that have at least 75% of their holdings in mortgages and short-term loans, whereas E-REITs are at least 75% invested in real properties.

The sample of REITs was identified by using various databases, such as *SEDAR*, *CFMRC, GlobeinvestorGold* and *Investcom*. The monthly returns for this sample of 29 REITs are obtained from *CFMRC*. Market returns are proxied by the monthly S&P/TSX total monthly return index. The 91-day T-Bill rate is used to calculate the monthly t-bill rate, which is used as the proxy for the risk-free rate of return. Values for both proxies are obtained from *CFMRC*. Monthly market capitalizations used in the construction of the value-weighted REIT Index are obtained from *Bloomberg*.

Other IPO information is obtained from the *Financial Post New Issue*, *SDC*, *Investcom* and *Bloomberg* databases. In the case of conflicting IPO dates, REITs' individual filings with *SEDAR* and press releases were consulted. In order to accurately distinguish between IPOs and reorganizations into a REIT structure, individual REITs were contacted with a request for information. All contacted REITs provided the requested information.

To examine the risk-adjusted return performance of our sample of REITs, equally- and value-weighed portfolios of all REITs in the sample are constructed at a monthly

frequency for the 1996-2004 period. The value weights are derived using the monthly market capitalizations for each fund. The return series for each fund are adjusted for stock splits and missing values. The equally- and value-weighted portfolios place relatively more weight on smaller and larger REITs, respectively.

Sharpe ratios are calculated for both types of REIT indices and the market in order to compare the total risk-adjusted return performance of the REITs with that of the market. Sharpe ratios, *Sh*, are calculated as follows:

$$Sh = \frac{r_i - r_f}{\sigma_i} \tag{1}$$

where r_i is the return on the REIT index;

r_f is the risk-free return; and

σ_i is the standard deviation of index i.

The market- and risk-adjusted performances of the two types of REIT portfolios also are assessed using Jensen's Alpha as a measure of abnormal return. This metric or $\alpha_{i,t}$ is obtained by estimating the following regression:

$$(r_{i,t} - r_{f,t}) = \alpha_{i,t} + \beta(r_{m,t} - r_{f,t}) + \varepsilon_{i,t} \tag{2}$$

where $r_{i,t}$ is the return on the REIT index for month *t*,

$r_{f,t}$ is the risk-free rate of return for month *t*,

$r_{m,t}$ is the rate of return on the market for month *t*,

β is the beta coefficient or sensitivity of the rate of return on REIT *i* with the market, and

$\varepsilon_{i,t}$ is the error term with the usually assumed properties.

To assess the market- and not risk-adjusted performance of the two types of REIT portfolios, equation (1) is modified by implicitly restricting beta to one for each REIT so that alpha can be calculated as follows:

$$\alpha_{i,t} = (r_{i,t} - r_{f,t}) - (r_{m,t} - r_{f,t}) \tag{3}$$

The null hypothesis is that alpha is equal to zero, which implies that the market- and (non)risk-adjusted REIT performance is not significantly different from zero. Under the alternative hypothesis, alpha is not equal to zero indicating the presence of excess returns with positive [negative] alphas indicating superior [inferior] performance for the REITs on a market- and (non)risk-adjusted basis.

4.2 Empirical Results

(Non)risk-adjusted mean (excess) returns and their standard deviations and Sharpe ratios for the equally- and valued-weighted REIT and market indices over the 1996-2004 period are reported in table 6. The mean non-risk-adjusted returns for the equally- and value-weighted REIT indexes are the same at 2.1%. However, the standard deviation of these returns is much higher for the equally-weighted index at 7.6 % versus 4.6 % for the value-weighted index.

The risk-adjusted mean excess returns also are the same at 1.8% for the equally- and value-weighted REIT indexes. The standard deviation of the corresponding excess returns for the equally-weighted REIT index of 7.6 % is much higher than that of 4.6% for the value-weighted REIT index. Therefore, the value-weighted REIT index shows the better risk-adjusted performance.

The Sharpe ratios are higher for both REITs indexes (0.24 and 0.40 for the equally- and value-weighted indexes, respectively) than for the market (0.09). Similar inferences

result from the tests of the Jensen alphas that are reported in table 7. The Jensen alpha estimates are equal , positive and significant for both equally- and value-weighted REIT indexes both based on market-adjusted returns (1.4%) and on market- and risk-adjusted returns (1.6%). Thus, while a portfolio tilted towards larger REITs outperforms one tilted towards smaller REITs over the period based on the Sharpe values, this difference vanishes for a comparison based on the estimated Jensen alphas.

The statistically significant β estimate of 0.475 for the value-weighted REIT index is smaller in magnitude than its counterpart of 0.518 for the equally-weighted REIT index. Thus, the equally-weighted REIT index is slightly more sensitive to market risk than its value-weighted counterpart. Both of the REIT indices have very high diversifiable levels of non-market risk given their adjusted R^2 values of 0.13 and 0.10 for the equally- and value-weighted REIT indexes, respectively.[3] This suggests that the returns of REITs are driven by factors in addition to equity market risk.

To conclude, Canadian REITs outpeformed the Canadian equity market on a market- and risk-adjusted basis over the studied period. Both types of REIT indexes outperformed the equity market as proxied by the S&P/TSX Composite based on the Sharpe (or excess-return to total volatility) ratio as well on the Jensen alphas.

[3] The value (1- R^2) provides a measure of the proportion of diversifiable risk in the total variability of returns. A low R^2 indicates a high level of diversifiable risk relative to the risk of the benchmark index.

5. POST-ISSUE PERFORMANCE OF REIT IPOs

5.1 Data, A Priori Expectations and Methodology

Information on Canadian REIT IPOs, including IPO dates and gross proceeds, is obtained from the *FP New Issues* and *SDC Platinum* databases. Prospectuses and press releases for the individual trusts that are available on *SEDAR* also are consulted. Price data for the first 250 trading days following the IPO are obtained from *CFMRC*.

The sample consists of 25 IPOs by REITS over the period from 1993 to 2004 (see table 1 for the number by year). To examine the time-period sensitivity of the findings, the sample is further subdivided into two sub-periods of 1993 to 1998 (10 IPOs) and 1999 to 2004 (15 IPOs).

The first-day and subsequent short-run performances of both equally- (or unweighted) and issue-size-weighted samples of the REIT IPOs are examined, where issue size is measured by the relative size of the IPO in terms of dollar proceeds. The mean and median returns (not) adjusted by the market return from issue to open and issue to close on the first trading day are tested for significance using the t- and Wilcoxon tests, respectively. Our expectation is that first-day returns for REIT IPOs are negative even when market adjusted, as is found by most previous studies. The first-day price decline is a well-documented phenomenon for US REITs. Considering that institutional interest in Canadian REITs is still minimal, there is no reason to believe that Canadian REITs will behave differently than their US counterparts based on institutional interest. However, the amount of overpricing of Canadian REITs may be somewhat less than in the US given the literature findings that very little underpricing occurs for nonREIT IPOs in Canada compared to their counterparts in the US (Kryzanowski, Lazrak and Rakita, 2006).

Compound and average compound daily returns (not) adjusted by the market return are calculated for post-IPO trading periods of 5, 10, 21, 63, 125, 188 and 250 days after the IPO date. These periods correspond to periods of approximately 1 week, 2 weeks, 1, 3, 6, 9 and 12 months, respectively. The means and medians of these returns for the various post-IPO trading periods are similarly tested using t- and Wilcoxon tests, respectively. With regard to short-run performance after the first day of trading, our expectation is that the average REIT returns will be positive and significant, and zero and not significant if they are unadjusted and adjusted for market returns, respectively.

5.2 Empirical Results

The mean and median market-(un)adjusted first-day returns are reported in table 8. For the full period, the mean first-day unweighted returns are significant and negative (approximately -10%). Median first-day unweighted returns are substantially smaller and more negative than their mean counterparts and are only significant based on the issue to open period. Thus, the first-day mean results are biased towards negative performance, which is caused by a few large negative returns. The mean first-day size-weighted returns are less negative than their unweighted counterparts. While all the mean first-day size-adjusted returns are negative (-0.006%) and significant, none of their median counterparts (all 0.000%) are significantly different from zero.

An examination of the first-day returns for the two sub-periods finds that mean mispricing occurs in the first and not second subperiod. While none of the mean (and median) first-day returns are significantly different from zero in the second subperiod, all of the mean (and median) first-day returns in the first subperiod are negative and significant. As for the full time period, the average unweighted first-day returns are

more negative than their size-weighted counterparts. However, unlike the case for the full time period, the median is more negative than the mean for each of the unweighted first-day returns. This implies that the overpricing evident in earlier IPOs has corrected, and REIT IPOs were correctly priced during the more recent past on average.

Median and mean average compound daily as well as compound un- and size-weighted REIT returns, both unadjusted and adjusted for market returns, during the post-IPO periods running from one week through one year are reported in table 9. The unweighted and nonmarket-adjusted mean and median average compound daily returns are slightly positive and statistically significant for all but the shortest time period considered (the first week) based on the mean and median, and for the first 3 months post-IPO period based on the median. In contrast, the unweighted and market-adjusted average compound daily mean and median returns are not statistically significant except for the periods consisting of the first three and six months post-IPO where they are positive at 0.001 and 0.003, respectively.

As expected, most of the size-weighted average compound daily mean market-adjusted returns are not significantly different from zero. The exceptions include the mean return of 0.3% over the first week post-IPO for the size-weighted mean nonmarket-adjusted returns, and the mean return of 0.1% over the first three month period post-IPO for the size-weighted mean market-adjusted returns.

The unweighted and nonmarket-adjusted mean and median compound returns are positive (statistically significant for all but the 1 week period.). When adjusted for the market, unweighted mean and median compound returns become positive after the first week of trading.

Size-weighted unadjusted mean compound returns are slightly positive while median returns are not significantly different from zero. Thus, while first-day returns are negative, after one week of trading, unweighted and size-weighted compound returns become positive both on a nominal and market-adjusted basis.

6. SENSITIVITY OF REIT RETURNS TO MARKET RETURNS AND INTEREST RATES

By design REITs are high yield investments. Because of their typically high payout ratios, REIT returns can reasonably be expected to show high sensitivity to changes in interest rates. Thus, the last aspect examined in this thesis is the co-movement of REIT price changes with changes in interest rates. Because a number of previous studies that were reviewed above find interest rate sensitivities to be dependent on the proxies used, this study considers a number of proxies for interest rate changes. Thus, changes in monthly interest rates are proxied by changes in the long-term government bond rate, the corporate bond rate and the five-year mortgage rate (for definitions of interest rate proxies used, see table 10).

The correlations between the monthly returns for the value-weighted index of Canadian REITs and the Canadian stock market, as proxied by the S&P/TSX Composite Index, with the various Canadian interest rate series are examined first. Based on the results, which are summarized in table 11, the mean correlations between the returns on the REITs and the rates on the various types of bonds are negative and significantly different from zero. Not surprisingly, the strongest negative correlation of -0.42 is with the corporate bond rates, followed by those with long-term and ten-year bond rates (-0.36 and -0.37, respectively). While the average correlations between the returns on the equity market are similarly negative with all four bond series, only the one with corporate bonds of -0.25 is significantly different from zero. This suggests that REITs are more interest-rate sensitive than other equities.

To further investigate the relationship between the returns of the REITs and interest rate movements, the returns on the value-weighted REIT index are regressed on the market return and on each interest rate series to determine the average sensitivity of REIT returns to changes in each interest rate series. Based on the results summarized in table 12, all of the estimated betas are significant. As expected, the beta estimates are positive for the market and negative for each of the four interest-rate series coefficients. The most negative coefficient estimate of -0.08 occurs for the corporate bond rate series.

According to Allen, Madura and Springer (2001), the determinants of the returns on REITs are better assessed using a multifactor model that contains the market proxy as well as both short-term and long-term interest rate proxies. These authors argue that the short-term proxy captures the effect of changes in the cost of capital while the long-term proxy captures the market expectations of future interest rates.

Thus, a three-factor model involving the regression of the returns on the value-weighted REIT index on the market proxy (S&P/TSX composite total return index), the short-term interest rate proxy (1 year t-bill) and a long-term proxy is estimated next. Two proxies are used for the Canadian long-term interest rate; namely, the long-term government bond rate series and 10-year government bond rate series. Because all interest rate series are highly correlated, orthogonalization is used to remove the effects of collinearity. The process of orthogonalization involves regressing an independent variable against another independent variable and then using the residuals from the regression instead of actual returns or rates for the regressed independent variable. [4]

[4] The process involves using the residuals that reflect the removal of the common factor(s) believed to be responsible for the correlation between the variables. To illustrate the procedure with three independent variables (X1, X2 and X3), we can first regress X2 on X1 to get residuals X2*, and then regress X3 on X1 and X2 to get residuals X3*, and then regress the dependent variable on X1, X2* and X3*. Since the order

The R-square values for both versions of this model, which are reported in table 13, are reasonable at 0.27 (using the long-term government bond rate) and 0.24 (using the 10 year government bond rate). The estimated coefficient for the short-term interest rate proxy is slightly negative and statistically significant for the model with the long-term government bond rate. While the estimated coefficients for both long-term government bond rate proxies are significant, the estimated coefficient for the long-term government bond rate is positive (0.09) and that for the 10-year government bond rate is negative (-0.04).

Sanders (1998) and Swanson et al. (2002) propose regressing excess REIT returns on the spreads between rates on long-term government bonds and t-bills and on the spreads between high-yield (Baa) corporate bonds and long-term government bonds (what are respectively commonly referred to as the term and default premiums). Since the Canadian bond market is much less developed as compared to the US market, no high yield corporate bond series exists over the entire period examined herein. Therefore, the model proposed by Sanders is modified to include an equity market premium and a government bond premium as independent variables. Two benchmarks are used for long-term government bond rates; specifically, the 10-year and long-term government bond rates.

As is evident from the summarized regression results presented in table 14, similar results are obtained for the model with either government bond benchmark. The betas for both government bond premia are negative and statistically significant varying from -0.04 to -0.06. This implies that an inverse relationship exists between bond premia and REIT returns. The estimated beta coefficients for the equity market premium are positive at

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of the orthogonalization may affect the results if more than one independent variable is orthogonalized, we examine the sensitivity of the results to order choice.

0.04 and statistically significant. These results are robust to both the choice of ordering of the orthogonalization and to the choice of the proxy for the long-term bond rate.

7. MAJOR FINDINGS, IMPLICATIONS AND DIRECTIONS FOR FURTHER RESEARCH

The risk-adjusted return performance of Canadian REITs over the 1996-2004 period was examined. Smaller REITs appear to offer lower returns relative to their level of risk since the value-weighted REIT index had about the same mean monthly return as its equally-weighted counterpart but with a much lower standard deviation. The Sharpe ratios indicate that both the equally- and value-weighted Canadian REIT indexes outperformed the Canadian equity market over the studied period and that the size-weighted index outperformed its equal-weighted counterpart. These results are robust since the Jensen alphas indicated that both the equally- and value-weighted Canadian REIT indexes earned significantly positive alphas over the studied period.

Consistent with studies of US REITs, Canadian REITs do not perform better than the market in the year after issue. Because the Canadian REIT market is still young and presents limited data, this result should not be used to draw generalizations. Further analysis is required in the future to determine whether this result holds over longer periods of time after issue and when the Canadian market is more seasoned.

Beta estimates for both equally- and value-weighted REIT indexes are below one with the smaller value associated with the latter being closer to zero. Therefore, REITs offer potential diversification benefits if included in common stock portfolios.

The first-day and subsequent short-run performances of both equally- and issue-size weighted samples of Canadian REIT IPOs were examined. The mean first-day IPO returns are –0.6% if size-weighted and –10% if equally weighted (unweighted), and most of this overpricing occurred in the first sub-period. This implies that the IPOs of smaller

REITs performed worse that their larger counterparts, and that any overpricing was corrected as the market experience of IPO participants with the REIT vehicle increased over time. After one week of trading, the unweighted and size-weighted average daily compound market-adjusted returns were not significantly different from zero. This finding is consistent with the previous literature and implies that while investors might have been wise to wait to buy REIT IPO issues in the more distant past, such appears to be no longer the case.

The returns of Canadian REITs respond positively to movements of the stock market and negatively to interest rate changes. Furthermore, Canadian REITs display more sensitivity to interest rate changes than other Canadian equities, and display the greatest sensitivity to changes in Canadian corporate bond rates. This implies that Canadian REITs are potentially good candidates for reducing the risk of portfolios of Canadian stocks. Returns of Canadian REIT are not only inversely related with Canadian bond premia but bond premia appear to explain Canadian REIT returns slightly better than Canadian stock market premia. In future work, it would be interesting to examine whether differences in financial leverage practices influence the interest rate sensitivity of individual Canadian REITs.

Another suggestion for future research is to analyze the changes in Canadian REIT returns in different interest rate environments (such as declining and increasing interest-rate environments). This analysis was not possible for the time period investigated herein because interest rates showed mainly a declining trend. Further analysis also is needed to assess other factors that may affect the performance of Canadian REIT returns. One factor affecting REIT returns may be the value of underlying assets (properties) of the

fund. It may be valuable to examine whether the REIT market and the real estate property market are in fact integrated. Finally, it would be interesting to examine whether there is any relationship between interest rate sensitivity of an equity REIT in Canada and the interest rate proxy whose duration best matches that of the equity REIT being studied.

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Table 1

REITs that traded on the TSX over the period 1996-2004

Name	Trading Symbol	Period
Alexis Nihon REIT	AN.UN	01/03 - 12/04
Allied Properties REIT	AP.UN	03/03 - 12/04
Avista REIT	AVS.UN	08/03 - 10/04
Boardwalk REIT	BEI.UN	01/96 - 12/04
Calloway REIT	CWT.UN	12/02 - 12/04
Canadian Apartment Properties REIT	CAR.UN	05/97 - 12/04
Canadian Hotel Income Properties REIT	HOT.UN	06/98 - 12/04
Canadian REIT	REF.UN	01/96 - 12/04
Chartwell Seniors Housing REIT	CSH.UN	12/03 - 12/04
CPL REIT	CPL.UN	06/97 - 04/02
Cominar REIT	CUF.UN	06/98 - 12/04
Dundee REIT	D.UN	08/97 - 12/04
H&R REIT	HR.UN	01/97 - 12/04
InnVest REIT	INN.UN	08/02 - 12/04
IPC US REIT	IUR.UN	01/02 - 12/04
Legacy Hotels REIT	LGY.UN	12/97 - 12/04
Morguard REIT	MRT.UN	11/97 - 12/04
Northern Property REIT	NPR.UN	04/00 - 12/04
O&Y REIT	OYR.UN	06/01 - 12/04
Primaris Retail REIT	PMZ.UN	08/03 - 12/04
RealFund REIT	RFN.UN	01/96 - 05/99
Residential Equities REIT	REE.UN	03/98 - 05/04
Retirement Residences REIT	RRR.UN	05/01 - 12/04
Retrocom Mid-Market REIT	RMM.UN	04/04 - 12/04
Riocan REIT	REI.UN	01/96 - 12/04
Royal Host REIT	RYL.UN	11/97 - 12/04
Summit REIT	SMU.UN	02/96 - 12/04
Sunrise Senior Living REIT	SZR.UN	12/04 - 12/04
TGS North American REIT	NAR.UN	01/03 - 12/04

Table 2

Number of REIT entrants by IPO and by reorganization for each year over the period 1993-2004

Year	Number of IPOs	Number of Reorganizations
1993	0	2
1994	0	1
1995	0	0
1996	1	1
1997	7	0
1998	2	0
1999	0	0
2000	0	0
2001	3	0
2002	5	0
2003	4	0
2004	3	0
Total	25	4

Table 3

Annual summary statistics for the dividend payout ratios for the sample of REITs over the 1999-2004 period

	Dividend Payout Ratio		
Year	**Median**	**Mean**	**Standard Deviation**
1999	1.05	-0.30*	6.71
2000	1.08	1.81	2.31
2001	1.14	2.05	2.11
2002	1.16	5.18	15.81
2003	1.07	1.71	3.23
2004	1.69	2.77	4.34
1999-2004	1.20	2.20	5.75

* The negative payout ratio is due to negative earnings reported for the period

Table 4

Leverage ratios for the sample of REITs for the 1996-2004 period

Year	Ratio of Long-term Debt to Total Capital		
	Median	Mean	Standard Deviation
1996	0.37	0.33	0.31
1997	0.43	0.40	0.23
1998	0.48	0.41	0.23
1999	0.52	0.43	0.25
2000	0.60	0.61	0.04
2001	0.49	0.46	0.22
2002	0.51	0.45	0.23
2003	0.54	0.50	0.19
2004	0.56	0.48	0.20
1996-2004	0.50	0.45	0.21

Table 5

Annual book-to-market ratios for the sample of REITs

over the 1996-2004 period

	Book-to-market ratio	
Year	**Mean**	**Standard deviation**
1996	0.75	0.55
1997	0.74	0.24
1998	1.12	0.37
1999	1.10	0.39
2000	1.02	0.36
2001	0.91	0.37
2002	0.97	0.33
2003	0.77	0.20
2004	0.79	0.44
1996-2004	0.91	0.35

Table 6

Mean returns for the 1996-2004 period

Returns	Index		
	Equally-weighted REIT	Value-weighted REIT	Market (S&P/TSX)
Unadjusted for risk			
Mean	0.021***	0.021***	0.007
Standard deviation	0.076	0.046	0.049
Adjusted for risk			
Mean excess	0.018***	0.018***	0.004
Standard deviation	0.076	0.047	0.049
Sharpe ratio	0.238	0.396	0.09

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, using a t-test for the mean differences.

Table 7

Market- and risk-adjusted measures of performance for the REIT indexes

This table reports the Jensen alpha measure of performance for the value- and equally-weighted indexes of REITs.

	Value-weighted REIT Index		Equally-weighted REIT Index	
Statistic	**Market- and risk-adjusted**	**Market-adjusted only**	**Market- and risk-adjusted**	**Market-adjusted only**
Jensen alpha	0.016**	0.014**	0.016**	0.014***
Beta	0.475**		0.518***	
Adjusted R^2	0.243		0.132	

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, using a t-test for the mean differences.

Table 8

Initial day returns of REIT IPOs

	Raw Returns				Size-weighted Returns			
	Not adjusted for the market		Adjusted for the market		Not adjusted for the market		Adjusted for the market	
Statistic	Issue to Open	Issue to Close	Issue to Open	Issue to Close	Issue to Open	Issue to Close	Issue to Open	Issue to Close
Full period 1993-2004								
Mean	-0.106***	-0.102**	-0.108***	-0.103	-0.006***	-0.006***	-0.006***	-0.006***
Median	-0.010*	-0.005	-0.010*	-0.006	0.000	0.000	0.000	0.000
StdDev	0.190	0.198	0.193	0.201	0.000	0.000	0.000	0.000
Minimum	-0.420	-0.410	-0.428	-0.418	-0.027	-0.027	-0.030	-0.029
Maximum	0.102	0.170	0.104	0.172	0.007	0.010	0.007	0.011
1993-1998								
Mean	-0.208***	-0.211***	-0.210***	-0.213***	-0.005***	-0.005***	-0.005***	-0.005***
Median	-0.335**	-0.338**	-0.344**	-0.342**	-0.009	-0.009	-0.010	-0.009
StdDev	0.206	0.209	0.210	0.213	0.007	0.007	0.007	0.007
Minimum	-0.420	-0.410	-0.428	-0.418	-0.027	-0.027	-0.028	-0.027
Maximum	0.100	0.100	0.096	0.096	0.005	0.005	0.005	0.005
1999 - 2004								
Mean	-0.013	-0.001	-0.014	-0.001	0.000	0.000	0.000	0.000
Median	0.000	0.003	0.002	0.007	0.000	0.000	0.000	0.000
StdDev	0.121	0.129	0.124	0.131	0.004	0.004	0.004	0.004
Minimum	-0.375	-0.370	-0.381	-0.376	-0.015	-0.015	-0.015	-0.015
Maximum	0.102	0.170	0.104	0.172	0.006	0.01	0.006	0.010

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, using a t-test for the mean differences and a Wilcoxon test for median differences. The t-test for the size-weighted returns is computed based on the Eckbo and Norli (2005) methodology. Unweighted refers to using the same weight for each IPO in the calculation of the mean and standard deviation while size-weighted refers to using a weight for each IPO in the calculation of the mean and standard deviation that is equal to the relative size of the IPO in terms of dollar proceeds at issue. Unadjusted refers to not adjusting the REIT returns by the market returns over the same time period, while adjusted refers to adjusting the REIT returns by the market returns over the same time period.

Table 9

(Un)weighted for issue size and (un)adjusted-market returns for various post-IPO periods for Canadian REITs

Returns (un)weighted for size & (un)adjusted for market returns	Average daily compound returns					Compound returns				
	Mean	Median	Standard Deviation	Minimum	Maximum	Mean	Median	Standard Deviation	Minimum	Maximum
First week post-IPO										
Unweighted & unadjusted	0.002	0.001	0.060	-0.010	0.016	0.009	0.006	0.030	-0.049	0.083
Unweighted & adjusted	0.000	0.000	0.007	-0.015	0.017	-0.001	-0.002	0.036	-0.072	0.089
Size-weighted & unadjusted	0.003***	0.000	0.000	0.000	0.001	0.014***	0.000	0.026	-0.001	0.004
Size-weighted & adjusted	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.032	-0.002	0.004
First 2 weeks post-IPO										
Unweighted & unadjusted	0.002***	0.003***	0.004	-0.006	0.011	0.024**	0.028**	0.044	-0.059	0.118
Unweighted & adjusted	0.001	0.001	0.005	-0.009	0.011	0.013	0.015	0.054	-0.089	0.112
Size-weighted & unadjusted	0.003	0.000	0.000	0.000	0.001	0.031***	0.001	0.040	-0.001	0.008
Size-weighted & adjusted	0.0002	0.000	0.000	0.000	0.001	0.021*	0.000	0.050	-0.003	0.007
First month post-IPO										
Unweighted & unadjusted	0.002***	0.001***	0.003	-0.005	0.007	0.038***	0.030***	0.064	-0.105	0.155
Unweighted & adjusted	0.001	0.000	0.003	-0.005	0.008	0.025*	0.018	0.069	-0.100	0.169
Size-weighted & unadjusted	0.002	0.000	0.000	0.000	0.000	0.041***	0.001	0.050	-0.002	0.008
Size-weighted & adjusted	0.001	0.000	0.000	0.000	0.000	0.025*	0.001	0.059	-0.005	0.006
First three months post-IPO										
Unweighted & unadjusted	0.001**	0.000	0.002	-0.004	0.006	0.079***	0.029**	0.161	-0.214	0.497
Unweighted & adjusted	0.001**	0.001**	0.002	-0.003	0.004	0.063***	0.089**	0.129	-0.165	0.361
Size-weighted & unadjusted	0.001	0.000	0.000	0.000	0.000	0.066**	0.001	0.124	-0.004	0.015
Size-weighted & adjusted	0.001**	0.000	0.000	0.000	0.000	0.051**	0.002	0.104	-0.004	0.010

Table 9. (Continued)

Returns (un)weighted for size & (un)adjusted for market returns	Average daily compound returns					Compound returns				
	Mean	Median	Standard Deviation	Minimum	Maximum	Mean	Median	Standard Deviation	Minimum	Maximum
First six months post-IPO										
Unweighted & unadjusted	0.004**	0.003**	0.008	-0.011	0.034	0.124**	0.084*	0.289	-0.245	1.306
Unweighted & adjusted	0.003**	0.003**	0.008	-0.011	0.033	0.078	0.014	0.275	-0.236	1.167
Size-weighted & unadjusted	0.000	0.000	0.000	0.000	0.001	0.092	0.002	0.211	-0.005	0.025
Size-weighted & adjusted	0.000	0.000	0.000	0.000	0.001	0.043	0.001	0.216	-0.019	0.022
First nine months post-IPO										
Unweighted & unadjusted	0.001**	0.001*	0.001	-0.002	0.005	0.163**	0.149*	0.398	-0.293	1.804
Unweighted & adjusted	0.000	0.000	0.001	-0.002	0.005	0.093	0.034	0.394	-0.335	1.687
Size-weighted & unadjusted	0.000	0.000	0.000	0.000	0.000	0.101	0.003	0.312	-0.021	0.034
Size-weighted & adjusted	0.000	0.000	0.000	0.000	0.000	0.046	0.001	0.309	-0.018	0.032
First year post-IPO										
Unweighted & unadjusted	0.001**	0.001**	0.002	-0.003	0.004	0.282***	0.240***	0.529	-0.483	2.044
Unweighted & adjusted	0.000	0.000	0.001	-0.002	0.003	0.193**	0.091	0.481	-0.392	1.762
Size-weighted & unadjusted	0.000	0.000	0.000	0.000	0.000	0.195*	0.005	0.458	-0.029	0.050
Size-weighted & adjusted	0.000	0.000	0.000	0.000	0.000	0.138	0.002	0.415	-0.018	0.054

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, using a t-test for the mean differences and a Wilcoxon test for median differences. The t-test for the size-weighted returns is computed based on the Eckbo and Norli (2005) methodology. Unweighted refers to using the same weight for each IPO in the calculation of the mean and standard deviation while size-weighted refers to using a weight for each IPO in the calculation of the mean and standard deviation that is equal to the relative size of the IPO in terms of dollar proceeds at issue. Unadjusted refers to not adjusting the REIT returns by the market returns over the same time period, while adjusted refers to adjusting the REIT returns by the market returns over the same time period.

Table 10

Definitions of and data sources for the interest rate proxies

Interest rate proxy	Definition	Data Source
Long-term government bond rate	Average yield on a portfolio of 10+ year Government of Canada bonds	CFMRC database
10-year government bond rate	Yield on 10-year government of Canada benchmark bonds	Baseline database
Corporate bond rate	Average yield on a portfolio of high grade, long-term corporate bonds	CFMRC database
5-year mortgage rate	5-year conventional mortgage rate from Bank of Canada	CFMRC database
Short-term interest rate	1-year treasury-bill rate	Bank of Canada web-site

Table 11

Correlations of monthly returns for REITs and the market with changes in various interest rate series

	Bond rate			Mortgage rate
Index	**Long-term government**	**10-year government**	**Corporate**	**5-year**
REIT Index Returns	-0.36***	-0.37***	-0.42***	-0.26***
S&P/TSX Composite Total Return Index	-0.13	-0.14	-0.25***	-0.11

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, based on a t-test. The definition and the source of the data for the various interest rate series are as reported in table 10.

Table 12

Results for regressions of the returns on REITs against market returns and changes in various interest rate series

Independent Variable	Coefficient	Adjusted R-square
S&P/TSX total return index	0.04***	0.14
Long-term government bond rate	-0.06***	0.13
10-year government bond rate	-0.05***	0.13
Corporate bond rate	-0.08***	0.18
5-year mortgage rate	-0.04***	0.07

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, based on a t-test. The definition and the source of the data for the various interest rate series are as reported in table 10.

Table 13

Summary results for regressions of the returns on the REITs with short-term bond rates, market returns and two long-term bond rate proxies

Regression	Independent variables	Coefficient	Adjusted R-square
	Long-term government bond rate	0.090***	
1	1-year T-bill rate	-0.011*	0.271
	Market return (orthogonalized)	0.035***	
	10-year government bond rate	-0.041***	
2	1-year T-bill rate	-0.01	0.235
	Market return (orthogonalized)	0.036***	

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, based on a t-test. The definition and the source of the data for the various interest rate series are as reported in table 10.

Table 14

Summary results for regressions of the excess returns on the REITs with the premiums on long-term (LT) bond rates and the market

Regression	Independent Variables	Estimated Coefficient: LT Bonds	Estimated Coefficient: Market Premium	Adjusted R^2
1	LT gov bond premium & Market premium (orthogonalized)	-0.059***	0.039***	0.224
2	LT gov bond premium (orthogonalized) & Market premium	-0.052***	0.044***	0.224
3	10 Yr gov bond premium & Market premium (orthogonalized)	-0.050***	0.039***	0.225
4	10 Yr gov bond premium (orthogonalized) & Market premium	-0.044***	0.044***	0.225

*, ** and *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels, respectively, based on a t-test. The definition and the source of the data for the various interest rate series are as reported in table 10.