

NO Fixed

Getting a handle on Canadian real estate and inflation. ADDRESS

BY CÉCILE LE MOIGNE AND ÉRIC VIVEIROS

INFLATION concerns have now begun to grow after trade liberalization helped industrialized countries import deflation, which has contributed to a low, and tame, inflation environment since the early 1990s. Despite local and global economic slowdown, the Bank of Canada chose to stop lowering interest rates in the spring of 2008 in order to ensure that inflation does not get out of control due to pressure from commodities and energy prices, and thus joining many other central banks which find themselves in the same bind. Inflationary pressures might also persist as a result of demographic pressures brought by baby boomers starting to retire, the rapid middle class growth in developing and emerging economies, and ever-rising salaries in developing countries, where the supply of manufactured goods and services has been transferred.

Private real estate has been perceived as the best inflation hedge after real return bonds. Indeed, most pension funds benefit from such hedging ability because of their long-term inflation-linked liabilities, as this hedge protects the purchasing power of plan participants. Future benefits are frequently linked to the salaries of current participants, or in the case of current retirees, to inflation, in order to keep up with the cost of living. At the end of 2007, Canadian pension funds held 9.0% of their investments in real estate assets.¹

This article attempts to provide a clearer picture of the relation between Canadian real estate and inflation based on Le Moigne and Viveiros (2008-a,b).

Le Moigne and Viveiros (2008-b) examines whether the

inflation hedging ability of Canadian direct real estate varies by property type (apartment, industrial, office, retail, and mixed-use) and by province (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and the Atlantic Provinces), as correlations between these sub-indices vary from 81% down to 11% (not shown in paper), and sub-index weightings differ significantly. The relation between inflation and real estate returns may vary among provinces because of their specific economic activities and local regulations, and also by property type, due to differing lease characteristics (typical lease term, recovery calculations, renewal options, percentage rent, etc.). Although much of Canada is dominated by a natural resource-based economy, it is more so in certain regions, such as the western provinces (Alberta and Saskatchewan), than in Ontario and Quebec, which have a greater dependence on manufacturing.

Newly created derivative products based on private real estate indices such as swap, forward and futures increase the relevance of these tests. They are now commonly traded in the UK, volume is ramping up in the U.S. and a first transaction occurred in June 2008 in Canada. A better understanding of the inflation hedging characteristics of geographical and property type sub-indices might allow the optimization of the hedge by overweighting specific property types or provinces because of their superior hedging abilities.

LITERATURE

The inflation hedging ability of private real estate has been tested several times, and has generally been confirmed for the U.S. and the UK. In other real estate markets

Eric Viveiros is senior research adviser, Caisse de dépôt et placement du Québec; Cécile Le Moigne is research adviser, Caisse de dépôt et placement du Québec.

(Australia, Canada, China, Hong Kong, Ireland, Israel, New Zealand, Singapore, Switzerland and Turkey), results are mixed, in part, because of the period, in addition to factors such as the inflation environment, the definition of the local inflation measure, the typical lease structure and the composition of the aggregate private real estate index all of which vary across countries. Conclusions for one country cannot be generalized for others.

Studies also show mixed inflation hedging results for recent or low inflation periods. These studies reach a rough consensus that when the hedging ability exists during high inflation periods, it often decreases, loses its significance, or even disappears, when we go from a high inflation to a low inflation sub-period. The real estate/inflation relation seems to be characterized differently according to specific economic conditions (interest rates, inflation, real GDP growth, etc.), thus indicating that other economic variables must be brought into the equation. As inflation has averaged 2.2% since 1990 in Canada, after averaging 7.5% over the previous 17 years (not shown in paper), the inflation hedging ability of the Canadian real estate market is therefore worth revisiting over a longer period (1973-2007, including a high- and a low inflation environment).

Past international studies have mostly concluded that the residential, office, retail, and industrial sectors provide a slightly stronger hedge against inflation than does the aggregate real estate market. In most studies, inflation is broken down into two components: expected (EI) and unexpected inflation (UI), with unexpected inflation representing the true inflation risk. Unexpected inflation is the difference between expected inflation at the beginning of a period and actual inflation for that same period. Expected inflation is the inflation anticipated by the market. Hedging ability against expected inflation is usually possible by investing in the retail and industrial sectors, but only in half

of the cases by investing in the office and residential sectors. All four property types provide a lesser hedge against unexpected inflation. From a Canadian perspective over the short 1985-1993 period in a high inflation environment, Newell (1995) finds that most property types hedge against inflation, expected and unexpected inflation. The only exception is hotels, with expected inflation.

Sub-regions are rarely studied, perhaps because of limited data availability. Newell (1995) examines seven Canadian provinces, and concludes that they all hedge against Canadian inflation, expected and unexpected inflation, except for British Columbia and Alberta. Studies on sub-regions show weak evidence of the local nature of real estate, and of the importance of regional economic factors.

METHODOLOGY

As of December 2007, the Canadian private real estate index, ICREIM/IPD, consisted of 2,266 properties, with a market value of nearly CAD\$87.7 billion, accounting for approximately half of the Canadian institutional real estate investment market, according to the index provider.²

Table 1 shows that from 1973 to 2007, the Canadian private real estate total return averaged 11.9%, based on a 7.9% income return and a 4.0% appreciation return per year.³ Appreciation and total returns have a correlation close to 100%, while income and total returns are barely correlated (15%) (not presented in paper). As anticipated, appreciation returns generated most of the volatility seen in total returns. Breaking down total return into income and appreciation returns allows us to identify the true source of the inflation hedging ability, if such ability does exist. This perspective has rarely been tested on real estate markets other than those of the U.S. and the UK, where no strong consensus could be reached.

Table 1 also shows that between 1973 and 2007, annual

Table 1: DESCRIPTIVE STATISTICS – CANADIAN REAL ESTATE MARKET RETURNS AND INFLATION, 1973-2007

Real estate returns		Average	Standard Deviation	Correlation with Inflation	Correlation with EI	Correlation with UI
Annual	Total	11.9%	8.3%	44.5%	35.7%	0.4%
	Income	7.9%	0.8%	-33.0%	-36.8%	19.9%
	Appreciation	4.0%	8.3%	47.9%	39.4%	-1.4%
	Inflation	Average	Standard Deviation	Correlation with Inflation		
Annual	Inflation	4.8%	3.5%	100.0%		
	Expected Inflation (EI)	4.8%	4.4%	86.1%		
	Unexpected Inflation (UI)	-0.1%	2.2%	-10.4%		

Canadian inflation, based on the Consumer Price Index (CPI), averaged 4.8%, with a standard deviation of 3.5%. Three-month Treasury bill yield at the end of the previous period minus an estimate of the real rate of return is used to proxy EI. The real rate of return is estimated by the three-month Treasury bill yield at the end of the next-to-last period minus the inflation rate of the previous period.⁴

$$EI_t = TB_{t-1} - (TB_{t-2} - I_{t-1}) \quad (1)$$

Over the same period, 1973 to 2007, expected inflation averaged 4.8%, and unexpected inflation -0.1% per year. Expected inflation was twice as volatile as unexpected inflation.

The last three columns of Table 1 provide correlation figures. Appreciation and total returns were highly correlated with inflation (48% and 45%, respectively), while income return had a negative correlation of -33% with inflation. Similar results are found with respect to expected inflation (39%, 36% and -37%). However, appreciation and total returns are uncorrelated with unexpected inflation, while income return shows a weak correlation of 20%. When significant correlations are found between inflation and real estate returns, regression models are tested to determine the short-term relation. Different regression models are considered, the first of which consists in regressing real estate returns (Rt) on inflation:

$$R_t = \alpha + \beta I_t + \epsilon_t \quad (2)$$

The second regresses real estate returns on both components of inflation, expected and unexpected:

$$R_t = \alpha + \lambda EI_t + \delta UI_t + \epsilon_t \quad (3)$$

In the third step, macroeconomic variables (VarMacro_{jt}) are incorporated into the regression models in order to test the robustness of inflation coefficients of model (3), and to validate the role of inflation in explaining real estate returns, and ascertain that inflation is not simply acting as a proxy for other economic variables:

$$R_t = \alpha + \lambda EI_t + \delta UI_t + \sum_j \gamma_j \text{VarMacro}_{jt} + \epsilon_t \quad (3)$$

Regression-based methods cannot differentiate between short-run dynamics and long-run equilibrium adjustments, which is especially important for real assets, such as real estate, where contractual leases generate most of the total return. Long-term leases (mostly not indexed to inflation), absence of a central market, lengthier transaction processes, slower information dissemination, smoothing due to the appraisal methodology, and appraisal frequency could explain why real estate does not adjust to changes in inflation as fast as more liquid assets. Terms of leases exert an influence, since the party assuming the increase in expenses impacts the inflation hedging ability, as the standard leases for some property types contain clauses for the complete or partial pass-through of increases in expenses to the tenant. Also, property lease structures generally create a significant lag between changes in market rent versus alterations to current contractual rents and the net operating income of a property. Therefore, inflation could be more rapidly transmitted to operating expenses, and thus partially and negatively reflected in current income in the short-term, and partially and positively in the long-term.

RESULTS

Table 2 presents regression models showing that both appreciation and total returns are complete inflation hedges against both expected and unexpected inflation, as

Table 2: REGRESSION MODELS, 1973-2007

Real Estate returns	Intercept	Expected Inflation	Unexpected Inflation		Adjusted R-Square (%)
Total	0.07	1.06	1.25		15.0
<i>t-statistic</i>	<i>3.12</i>	<i>2.83</i>	<i>1.70</i>		
Appreciation	-0.01	1.13	1.26		18.3
<i>t-statistic</i>	<i>-0.64</i>	<i>3.10</i>	<i>1.77</i>		
Real Estate returns	Intercept	Expected Inflation	Unexpected Inflation	Real GDP Growth	Adjusted R-Square (%)
Total	0.02	1.15	0.95	1.56	30.2
<i>t-statistic</i>	<i>0.63</i>	<i>3.38</i>	<i>1.42</i>	<i>2.82</i>	
Appreciation	-0.06	1.21	0.98	1.47	31.8
<i>t-statistic</i>	<i>-2.35</i>	<i>3.63</i>	<i>1.49</i>	<i>2.71</i>	

Note: coefficients in bold are significantly different from 0 at the 10% level

their coefficients are not significantly different from one and slightly higher than one over the entire sample period. The model based on total return shows the existence of a significant positive real rate of return over inflation of 7% for the total return series.

Numerous macroeconomic variables (credit spreads, mortgage rates, U.S./Canada exchange rate, money supply, oil prices, S&P/TSX stock index returns, real estate sub-index stock returns, etc.) are also tested in order to find the best model, and only real GDP growth is found to be significant. The last two lines of Table 2 provide regression results including real GDP growth. The coefficient of real GDP growth is significantly higher than one. When real GDP growth is taken into consideration, the coefficients of expected inflation are higher than before, and the coefficients of unexpected inflation are still not significantly different from one, thus confirming their significance in explaining real estate returns, and the ability of real estate to act as a complete inflation hedge. The addition of real GDP growth makes the real rate of return (intercept) insignificant, thus indicating that a larger portion of total return has now been accounted for. Results are robust when regression models are tested on a quarterly basis (not presented in this paper).

Surprisingly, no property type or province is significantly correlated with expected and unexpected inflation over the 1985-2007 sub-period. (All these non-significant results are not presented in this paper.) Robustness tests on a quarterly basis (not presented) are almost identical, as only Quebec and British Columbia act as a hedge against expected inflation, exclusively. These findings contradict Newell (1995), who finds that almost all Canadian property types and provinces hedge against expected and unexpected inflation over the 1985-1993 period.

Panel A of Table 3 provides correlation coefficients for the aggregate index over the longest period available (1973-2007), and since sub-indices are available (1985-2007). Appreciation and total returns are no longer inflation hedged over the 1985-2007 sub-period. However, income return remains a significant partial perverse hedge against unexpected inflation over the 1985-2007 sub-period.

Overall, tests led to very different conclusions, depending on the period under study, and the lack of robustness of the tests due to small sample sizes was rejected as a potential cause for this, following robustness tests on quarterly data. Li (2001) first hinted at a similar finding, whereby the relation between Canadian real estate and inflation disappeared when going from a high inflation period (1974-1982) to a low inflation period (1983-1994). His short sample period limited the significance of his tests,

Table 3: CORRELATIONS COEFFICIENTS BETWEEN REAL ESTATE RETURNS AND INFLATION AND EXPECTED AND UNEXPECTED INFLATION, 1973-2007; 1985-2007; 1973-1991 AND 1992-2007

Panel: A		t-stat 10%	Total	Income	Appreciation
Inflation	1973-2007		44.5%	-33.0%	47.9%
	<i>t-statistic</i>	1.692	2.85	-2.01	3.13
Expected Inflation (EI)	1985-2007		11.1%	-23.9%	14.1%
	<i>t-statistic</i>	1.721	0.51	-1.13	0.65
Expected Inflation (EI)	1973-2007		48.5%	14.3%	47.7%
	<i>t-statistic</i>	1.692	3.19	0.83	3.12
Unexpected Inflation (UI)	1985-2007		24.5%	16.8%	23.2%
	<i>t-statistic</i>	1.721	1.16	0.78	1.09
Unexpected Inflation (UI)	1973-2007		17.4%	-41.2%	21.3%
	<i>t-statistic</i>	1.692	1.01	-2.60	1.25
Unexpected Inflation (UI)	1985-2007		-10.7%	-38.5%	-6.6%
	<i>t-statistic</i>	1.721	-0.49	-1.91	-0.30

Panel: B		t-stat 10%	Total	Income	Appreciation
Inflation	1973-1991		50.6%	-22.1%	53.2%
	<i>t-statistic</i>	1.74	2.42	-0.93	2.59
Expected Inflation (EI)	1992-2007		2.9%	-9.0%	4.0%
	<i>t-statistic</i>	1.76	0.11	-0.34	0.15
Expected Inflation (EI)	1973-1991		67.7%	18.3%	68.0%
	<i>t-statistic</i>	1.74	3.80	0.77	3.82
Unexpected Inflation (UI)	1992-2007		16.6%	15.1%	15.1%
	<i>t-statistic</i>	1.76	0.65	0.59	0.59
Unexpected Inflation (UI)	1973-1991		-1.6%	-36.9%	0.9%
	<i>t-statistic</i>	1.74	-0.06	-1.64	0.04
Unexpected Inflation (UI)	1992-2007		-20.9%	-29.4%	-17.9%
	<i>t-statistic</i>	1.76	-0.83	-1.19	-0.70

Note: coefficients in bold are significantly different from 0 at the 10% level

and its sub-division might not be optimal for studying the Canadian inflation environment. As quality real estate data is available only over relatively short periods for most countries, few researchers have had the opportunity to examine sub-periods. Correlation and regression tests are therefore repeated over two sub-periods: 1973-1991 and 1992-2007, in order to take into account the Central Bank of Canada's introduction of its inflation targeting policy in February 1991. The Bank of Canada has since shifted its focus on maintaining inflation in the 1% to 3% range.⁵ Statistically significant relations with real estate are more difficult to detect in an environment where inflation variations are much smaller, unexpected inflation is on average almost non-existent and interest rates are low.

Correlations, presented in Panel B of Table 3, lose their significance when going from the 1973-1991 sub-period to the 1992-2007 sub-period, with Canadian real estate appearing to have lost its inflation hedging ability.⁶ Tests

with provincial and property type sub-indices (not presented here) generate similar results as those of the 1985-2007 period, as no significant positive correlations are found with inflation, expected or unexpected inflation. Robustness tests on a quarterly basis (not presented here) generate only four out of thirty-six significantly positive correlations (retail, industrial, Manitoba, and Quebec, all with expected inflation). The 1973-2007 period includes downturn sub-periods for real estate (1982-83, 1990-96, and 2001-03). As demonstrated by Wurtzebach, Mueller and Machi (1991), and Hartzell and Webb (1993), the inclusion of a market balance variable (vacancy rate) in the analysis confirms that property managers have a harder time passing any rent increase, inflation driven or not, during real estate downturn. The real estate asset class behavior cannot be dissociated from its fundamentals, which are only partially picked up by economic variables such as real GDP growth for markets where no real estate market balance data are available. The availability of vacancy rate historical series limits the study of the relative impact of the market balance of real estate on the inflation hedging effectiveness of real estate.

CONCLUSION AND IMPLICATIONS

Canadian private real estate provides a complete hedge against inflation, and expected and unexpected inflation. However, income return acts as a partial perverse hedge against unexpected inflation and inflation. Moreover, since appreciation return possesses exactly the same inflation hedging ability as total return, appreciation return would appear to be the source of this inflation hedging ability. It might be due to the impact of inflation on current income growth expectations influencing demand for real estate investment and directly impacting capitalization rates: the inflation hedging reputation of private real estate fulfilling itself as soon as some inflation is anticipated, as investors start increasing their asset allocation in real estate, thus bringing downward pressure on capitalization rates, and pushing values upward. But in a low inflation environment, investors might not give too much consideration about a potential small inflation increase.

Thus, if real estate, more specifically total and appreciation returns, is a good inflation hedge over the entire period, it is mainly due to the 1973-1991 sub-period, when the hedging ability was stronger, but non-existent for the 1992-2007 period. No significant inflation hedging ability sources can be identified among provinces and property types over the 1985-2007 period. Ever since the inflation targeting policy was adopted by the Bank of Canada in 1991, the inflation hedging ability of Canadian direct real estate pretty much

disappeared, and unless this mandate is changed or inflation gets out of control, the inflation hedging ability of Canadian private real estate might be a thing of the past.

Traditionally, institutional portfolios have included direct real estate for four main reasons: a favourable risk/return profile, diversification benefits stemming from its weak correlations with other asset classes, a high current income, and its inflation hedging ability. Although this hedging ability seems to have disappeared in Canada, less variable inflation generally means less volatile interest rates, and hence less volatile real estate returns. Therefore, direct real estate might not have completely lost its attractiveness even for institutional investors with inflation-linked long-term liabilities, such as pension funds, and might not require a lower allocation. Furthermore, even if the inflation hedging ability were a thing of the past, the current income yield is high enough at approximately 6.5% to offer protection against an inflation fluctuating between 1% and 3%, especially over a long-term investment horizon such as the one of pension funds. ■

ACKNOWLEDGEMENTS

We appreciate helpful comments from our colleague Patrick Savaria. The views expressed in this article are those of the authors and do not necessarily reflect the position of the Caisse de dépôt et placement du Québec. Any errors remain the responsibility of the authors.

ENDNOTES

1. Source: Pension Investment Association of Canada (PIAC).
2. The IPD index took over the Russell-Canadian Property Index in 2000, which succeeded the Morguard Property Index in 1985.
3. Even though the amount of data in the quarterly series could generate more robust results, annual results are considered more relevant because of the yearly appraisal frequency (mostly in the fourth quarter) of properties causing seasonal distortions in quarterly returns. This problem called temporal aggregation (time lag) is now well documented in the literature.
4. See Le Moigne and Viveiros (2008-a) for more details on inflation proxy selection.
5. The inflation target was 3% by the end of 1992, 2.5% by the middle of 1994, and 2% at the end of 1995, and thereafter.
6. Annual results must be interpreted with caution as tests may lack robustness, given the number of observations.

REFERENCES

- Hartzell, David J. and R. Brian Webb (1993). Commercial Real Estate and Inflation during Periods of High and Low Vacancy Rates: Evidence from the Russell/NCREIF Property Database. RERI Working Paper.
- Le Moigne, Cecile and Eric Viveiros (2008-a). Inflation Hedging Ability of Canadian Real Estate Returns and its Components, Income and Appreciation. *Journal of Real Estate Portfolio Management*, Vol. 14, No. 2, pp. 141-154.
- Le Moigne, Cecile and Eric Viveiros (2008-b). Private Real Estate as Inflation Hedge: An Updated Look with a Global Perspective. *Journal of Real Estate Portfolio Management*, 2008, forthcoming.
- Li, Victor W. K. (2001). Canadian Real Estate and Inflation. *Canadian Investment Review*, Vol. 14, No. 1, Spring, pp. 39-42.
- Newell, Graeme. 1995. Is Canadian Real Estate a Hedge Against Inflation? *The Canadian Appraiser*. Vol. 39, No. 2, pp. 25-27.
- Wurtzebach, Charles H., Glenn R. Mueller and Donna Machi (1991). The Impact of Inflation and Vacancy on Real Estate Returns. *The Journal of Real Estate Research*, Vol. 6, No. 2, Summer, pp. 153-168.