

Canadian Real Estate *and* Inflation



REAL ESTATE

INTERNATIONAL STUDIES OF THE RELATIONSHIP BETWEEN REAL ESTATE RETURNS AND INFLATION HAVE PRODUCED DIVERGENT RESULTS. HOW WELL DOES CANADIAN REAL ESTATE ACT AS AN INFLATION HEDGE?

BY VICTOR W. K. LI

Persistently high energy prices and the likelihood of slower near-term productivity growth have raised inflation fears once again, after a decade of stable prices. This is of particular concern to pension funds, as their liabilities are often indexed to inflation. Many Canadian pension funds have traditionally held real estate as an inflation hedge. In light of the current inflation risk, it is a good time to re-assess the historical evidence for holding real estate as an inflation hedge.

Various international studies have tested the relationship between real estate returns and inflation. In the U.S., Hartzell, Hekman and Miles (1987), Wurtzbech, Mueller and Machi (1991), Miles and Mahoney (1997) all found evidence that commercial real estate can hedge against inflation. Bond and Seiler (1998) also show that American residential real estate is a significant hedge against both expected and unexpected inflation.

However, support for the inflation-hedging ability of real estate is not unanimous. Stevenson and Murray (1999) found no evidence that Irish real estate acts as an effective inflation hedge. Hoesli, MacGregor, Matysiak and Nanthakumaran (1997) concluded that U.K. real estate has poorer short-term hedging characteristics than stocks, but better characteristics than bonds.

Real estate as a Canadian inflation hedge has received little attention, so we hope that this note will start to fill that gap.

To see how well Canadian real estate hedges against inflation risk on a stand-alone basis, and within the context of a mixed-asset portfolio, we looked at annual real estate return data from the Russell Canadian Property Index (Morguard Property Index prior to 1985), a widely used benchmark for Canadian real estate. Our inflation gauge is the Canadian Consumer Price Index. For returns on alternative assets we used the TSE300 Composite Index and Government of Canada long-term bonds.

REAL ESTATE AND INFLATION

Simple correlation statistics for 1974-1999 show that Canadian real estate is a much better short-term inflation hedge than Canadian stocks and bonds, especially in a high-inflation environment. Dividing the last 26 years into high and low inflation environments (see Table I), we find real estate had a strong positive correlation with inflation in the high-inflation period and a weak positive correlation in the low-inflation period.

Stocks and bonds had either an insignificant relationship or a strong negative relationship with inflation. The return on stocks has exceeded inflation over most historical periods, but we agree with Bodie, Kane, and Marcus (1989, 1993) that this does not support a role for stocks as a short-term inflation hedge.

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TABLE 1

Period	Inflation Environment	Correlation with Inflation		
		Real Estate	Stocks	Bonds
1974-99	High & Low	0.45 ^a	-0.08	-0.13
1974-82	High	0.41 ^b	-0.48 ^c	-0.08
1983-99	Low	0.19	0.05	0.22

Notes: a. Significant at the 3% level; b. Significant at the 14% level; c. Significant at the 10% level.

TABLE 2

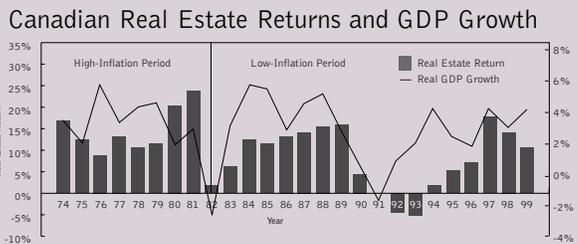
Explanatory Variable	Dependent Variable: Real Estate Return	
	Coefficient	t-ratio
Expected Inflation	1.4 ^a	5.0
Unexpected Inflation	0.8 ^a	2.7
Real GDP Growth	2.4 ^a	9.7
Constant	-6.3	-2.1
Durbin-Watson Statistic	2.0 ^b	N/A
Adjusted R ²	43% ^c	N/A

Notes: a. Significant at the 5% level. b. The residuals were modelled with an ARMA process to correct serial autocorrelation. c. The adjusted R² reported here has excluded the contribution from the ARMA process in the residuals.

CHART 1



CHART 2



TWO MACROECONOMIC DRIVERS

Why was real estate's correlation with inflation so weak in the low-inflation environment?

Regression analysis reveals that simple correlation with inflation ignores the role of real GDP growth as an additional determinant of real estate returns. Inflation and GDP growth together explain 40% to 60% of the variability in long-term Canadian real-estate performance. During a high-inflation period, inflation drives real estate performance (see Chart 1). However, economic growth becomes the dominant force during a low-inflation period (see Chart 2), shad-

owing real estate's relationship with inflation. We found the same to be true for U.S. real estate.

EXPECTED AND UNEXPECTED INFLATION

Actual inflation can be viewed as expected inflation plus unexpected inflation. Expected inflation represents what investors think inflation will be over a certain period. Unexpected inflation is simply the difference between actual inflation and expected inflation.

$$\text{UNEXPECTED INFLATION} = \text{ACTUAL INFLATION} - \text{EXPECTED INFLATION}$$

True inflation risk is the unexpected component. Therefore, it would be useful to examine the hedging ability of real estate against unexpected and expected inflation.

Inflation expectations are not directly observable, and are therefore usually gauged from consensus surveys, or derived from real-return bond yields. Since we don't have long enough Canadian time series from these two types of sources, we adopted Fama and Schwert's (1977) approach¹, using the Government of Canada three-month T-bill yield as a proxy for expected Canadian inflation. The yield on risk-free T-bills can be viewed as real return plus expected inflation. Assuming that the real return is constant, or that no one can predict changes in the real return, then changes in the T-bill yield correspond to the changes in the expected inflation.

$$\text{T-BILL YIELD} = \text{REAL RETURN} + \text{EXPECTED INFLATION}$$

We regressed Canadian real estate returns against expected inflation (measured by the T-bill yield), unexpected inflation (actual inflation minus the T-bill yield), as well as real GDP growth. As shown in Table 2, all the explanatory variables are statistically significant. This suggests that real estate can hedge against both expected and unexpected inflation over annual holding periods. Moreover, the responses of real estate to expected inflation are more than one-to-one. For a 1% increase in expected inflation, real estate returns increase by 1.4% on average. This implies that, in a mixed-asset portfolio, Canadian real estate can help the rest of the portfolio hedge against expected inflation.

INFLATION PROTECTION

To confirm the contribution of real estate to inflation protection in a mixed-asset portfolio, we constructed

two efficient frontiers: one with Canadian stocks and bonds, the other one with Canadian real estate added. Chart 3 shows that by adding real estate, one can achieve the same total return with lower volatility.

The portfolios on the new frontier (red curve) are more efficient than those on the old frontier (blue curve). For example, Portfolio 1 is composed of 29% stocks and 71% bonds, while Portfolio 2 comprises 32% stocks, 24% bonds, and 45% real estate. Over the last 26 years, Portfolio 1 would have achieved the same annual return (10.8%) as Portfolio 2, but with less volatility (6.2% vs. 10.0%). This diversification benefit lies in the fact that real estate returns imperfectly correlate with stock and bond returns².

We further calculated the historical returns of these

than those for Portfolio 1. This suggests that adding a sufficient amount of real estate can raise the inflation sensitivity of a mixed-asset portfolio. The greater the inflation sensitivity, the better the inflation protection.

CONCLUSION

Our correlation analysis and regression results all lend evidence that Canadian real estate is an effective inflation hedge. Compared to Canadian stocks and bonds, Canadian commercial real estate provides investors with superior inflation protection on an annual basis. More importantly, adding a sufficient amount of real estate can improve the inflation protection ability of a mixed-asset portfolio, in addition to its diversification benefit. Since real estate returns are also very sensitive to economic growth, pension funds should take economic cycles into account when increasing real estate holdings to hedge against rising inflation risk.

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ENDNOTES

1. Miles and Mahoney (1997), and Stevenson and Murray (1999) also used this approach in their studies. A caveat of using the T-bill yield is that short-term rates are subject to the influence of central banks, and therefore, the changes in short rates may not always solely reflect the changes in inflation expectation.
2. Because the real estate returns were smoothed by infrequent appraisals, the turn volatility is likely higher. However, this doesn't remove the diversification benefit of investing in real estate as long as real estate imperfectly correlates with other assets in the portfolio.
3. The Wald coefficient tests produced significant Chi-square statistics (12.1 and 9.1). ♦

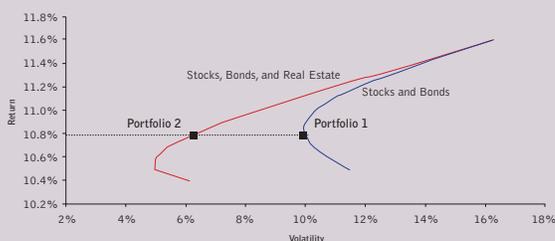
TABLE 3

Explanation Variable	Dependent Variable: Portfolio Return			
	Portfolio #1		Portfolio #2	
	Coefficient	t-ratio	Coefficient	t-ratio
Expected Inflation	- 0.3	-0.7	0.6 ^a	2.4
Unexpected Inflation	- 0.3	-0.6	1.3 ^a	2.4
Real GDP Growth	-1.2	-1.7	0.7	1.8
Constant	17.0	3.8	11.3	4.7
Durbin-Watson Stat.	2.1 ^a	N/A	1.9 ^b	N/A

Notes: a. Significant at the 5% level. b. The residuals were modelled with an ARMA process to correct serial autocorrelation.

CHART 3

Real Estate and Efficient Frontier



two portfolios according to their asset mixes. Then, we regressed the portfolio returns against expected and unexpected inflation, and economic growth. We found that Portfolio 1 has a negative but statistically insignificant relationship with both types of inflation, while Portfolio 2 shows a positive and statistically significant relationship with both types of inflation.

By adding real estate, the relationship with inflation changed from negative and insignificant to positive and significant. A strong, positive relationship with inflation is desirable in terms of inflation protection, but a negative or weak one is not. Moreover, our statistical tests³ confirmed that the coefficients of expected and unexpected inflation for Portfolio 2 are significantly greater