BUBBLE, BUBBLE, THERE'S A BUBBLE

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Comm 407 Real Estate Economics

Term Paper

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EXECUTIVE SUMMARY

Are we in a housing bubble? This question, although appears simple, proves to be a difficult question for economists and there is no standard way in which these scholars attempt to answer it. One method of determining if a housing bubble exists in a market is to use affordability measures such as the price-to-rent and price-to-income ratios. These ratios compare historical housing prices to current prices in the market as a measure of affordability and whether or not current prices are aligned with historical trends. Although this method is simple and easy to compare, certain economists believe that using these affordability measures is an inaccurate way of determining housing bubbles. Himmelberg, Mayer, and Sinai (2005) agree that the price-to-rent and price-to-income ratios have four important fallacies in identifying housing bubbles; they argue that these affordability measures do not take into account the true cost of ownership. Instead, they utilize another method, the user cost model, to determine housing bubbles. The user cost model contains a variable for expected price appreciation rates which we can derive to compare to actual house price appreciation and determine if expectations are in line with reality. To calculate the user cost model, we employ a number of different variables to the equation, including real house prices, real rents, risk-free rate, property taxes, and maintenance and depreciation. In this paper, we compare three Canadian cities: Vancouver, Toronto, and Halifax in years 1994-2010 to conclude whether or not any of these three cities are in a housing bubble.

During our data collection process, we had difficulties looking for data related to property tax rates and rates for maintenance and depreciation. After extensive secondary research, we decided to consult industry professionals and used rates quoted by them. We also had trouble looking for real rents as the CANSIM site quoted all their values in nominal terms. We decided to apply historical national inflation rates to these nominal values to create our own set of real rent values which were used in this paper.

To determine if any housing bubbles exist in Vancouver, Toronto, or Halifax, we used four methods of calculation. Firstly, we derived the expected price appreciation rate assuming that no risk premium exists in any of the cities. We then adjusted our residual price expectation rates with rental inflation. Then, a risk premium was re-introduced into the equation assuming

that the user cost model is correct and our data is accurate. Finally, we divided our data set into 5 year time frames and analyze our results within those periods.

After applying our methodology to our data set, we arrived at a number of surprising conclusions. Our first method proved to be rather inaccurate yet clearly demonstrated that Vancouver was in a housing bubble due to exceedingly high future expectations. After adjusting for rent inflation, Vancouver still seems a bit overvalued but much more realistic than our first case. Then by calculating the risk premium, we see that Vancouver definitely holds the highest premium over the other two cities. Our final analysis revealed behavioural factors in that losers in the Vancouver real estate market do not forget their losses and we see bearish behaviour even a decade after.

DISCUSSION OF QUESTION

"Is Vancouver in a housing bubble?" That one seemingly simple question is actually a lot more complicated than one would expect. *"That depends: what index are you using? What fundamental values you are using? What economic model are you considering?"* would all be appropriate responses and each method would yield a different perspective. The purpose of this paper is to apply a theoretical economic housing model to answer that one seemingly simple question. In order to approach this problem, data will be collected from the past 15 years across three major cities across Canada: Vancouver, Toronto, and Halifax. We will then input the raw data we collected into the user cost model, also known as the arbitrage equation, and analyze the results. The primary difference between this paper and other literary works in the arbitrage fields is the fact that we deliberately left out price expectations from our model and instead will derive this value as a residual from the rest of our data. By inputting values for real house prices, real rents, property taxes, maintenance and depreciation, and a risk premium, this paper will be able to backtrack and determine the annual expected price appreciation. We

can then compare these values with actual price appreciation rates year-over-year and identify areas with expectations that are consistently higher than reality.

LITERARY REVIEW

One of the commonly utilized housing economic models is the user cost or arbitrage model where one decides whether or not it is economical to rent or buy at one point in time. While the model has many advantages, there are also a number of downfalls that have been addressed in previous papers. The user cost model is an arbitrage equation which would hold true if certain assumptions are proven correct, namely that the rental market and buyers' market are identical demographically and in terms of the housing stock itself. Under such assumptions, the decision to buy or rent would purely be dictated by the model as one would be able to choose whether or not to buy or rent the exact same property with the same amenities. However, in a practical sense, housing is extremely heterogeneous and thus no two houses are exactly identical and available to be rented out or bought at the same point in time. Given that obvious downfall, many papers have tried to address that concern by focusing on data that would be representative of both markets yet are relatively similar. McCarthy & Peach (2004) obtained data for housing transactions for the same house that had been bought and then rented within a small time gap which would eliminate that concern. However, the availability of such data is limited and thus they could only generalize a conclusion about the entire US housing market. The issue with such an approach is that any overbuying could potentially be masked by under bought markets and thus give the appearance of a market in equilibrium. This paper will address that issue by studying data from specific markets in a smaller geographic area to identify trends in those specific markets.

The user cost model also includes variables for a risk-free rate and a risk premium for owning versus renting. This paper will be using the ten-year Government of Canada real bond rate as the risk-free rate. In terms of a risk premium to address other concerns, Sinai (2003) argues that owning a house is actually a perfect hedge against rent fluctuations and that price fluctuations in housing are also hedged when owning as price fluctuations within a geographic area tend to move in unison. Thus, as long as a player buys and sells within that same area, decreases and increases in prices will not be a factor as his current residence will hedge against that perfectly; therefore our initial calculations will not include a risk premium.

A more general issue with housing is its dual role as a durable consumption good and an investment opportunity, thus those studying the market solely through one lens would inevitably conclude that the players are irrational and the market is not in equilibrium. Brueckner (1997) investigated this issue and concluded that because housing consumption can only be purchased in large portions, and consumption needs always overrule investment needs, the housing market will always be inefficient. However, given the two factors, he concludes that players in the housing market are rational as they balance consumption and investment concerns. This paper will extract this idea from a household portfolio management perspective and apply it to a rent or buy decision.

Verbrugge (2006) defined the user cost model within a one-year time frame which is identical to the assumption made by Poterba (1984). This paper dismisses that idea based on the fact that potential homebuyers who purchase a home for both consumption and investment purposes are looking at a holding period much longer than one year. In fact, the user cost model mathematically implies an infinite holding period to determine the present value of all discounted cash flows. This paper will argue that a potential entrant in the housing market will weigh his options given a constant expected appreciation rate at the time of the decision as well as a potentially different constant expected rent inflation. This differs from the assumption by Himmelberg, Mayer, and Sinai (2005) that prices and rent move in same direction at the same rate. Thus, we will subdivide the growth expectation variable in the traditional user cost model in two, one for expected rent inflation, and one for price appreciation not explained by the other variables. These expectations do change year after year so the homeowner can assess his situation every year and provide the opportunity for arbitrage.

The set up of the traditional arbitrage equation incorporates an expected appreciation value that is under debate in terms of reasonable figures to measure. As Glaeser (2007) pointed out, a one percentage change in the numbers proposed by Himmelberg, Mayer, Sinai (2005) results in a change in the price-to-rent ratio of approximately one-third. Verbrugge (2006) also refers to the same paper and address the fact that it uses a simple fifteen year historical moving average that was used to determine price expectations. This paper, on the other hand, will use a different method to gauge real expectations at each point in time by applying an observation made by Case, Quigley, and Shiller (2003) and supported by empirical evidence by Verbrugge (2006). Both papers conclude that homebuyers' price appreciation expectations are simply extrapolations of recent appreciation rates. This paper will use a five year average appreciation rate as a benchmark measure to compare to expected appreciation rates that will be deduced as a residual from the user cost model.

USER COST MODEL

A common method used to determine whether or not a bubble exists in a specific location is to use affordability measures such as price-to-rent and price-to-income ratios. However, this method is not an accurate way to answer the question of whether a bubble exists because these ratios, as Himmelberg, Mayer, and Sinai (2005) discuss, have a fallacy of not taking into account the true cost of ownership. One error that these authors point out in using the price-to-rent and price-to-income ratios is that housing prices are not the same as the annual cost of owning; therefore when house prices increase, it is not necessarily an indication that ownership is becoming more expensive (Himmelberg, Mayer, and Sinai, 2005). In addition, it cannot be determined that ownership is becoming more expensive by merely observing high price growth. These authors also point out that the price-to-rent and price-to income ratios do not reflect the possible variability of these ratios across separate markets due to differences in expected appreciation rates of consumers in the separate areas (Himmelberg, Mayer and Sinai, 2005). Lastly, Himmelberg, Mayer, and Sinai (2005) argue that during economic expansionary periods, prices are much more sensitive to any changes in fundamentals, which are not accounted for in the affordability measures. Because of these fallacies, the user cost method is employed for more accuracy in determining the true cost of ownership as it takes into account different variables such as property tax, maintenance costs, and an additional risk premium of ownership.

With the user cost method, we calculated the true one year cost of owning a house in three different Canadian cities: Vancouver, Toronto, and Halifax. These three cities were selected for our analysis because Vancouver is a coastal city where some economists believe to be a superstar city with continually high housing prices, Toronto is another large and important Canadian city which has more stable housing prices due to their wide variety of industries which makes Toronto not as subjected to commodity booms, and lastly Halifax which is our control Canadian city which is a relatively stable city in terms of housing prices. To answer our question of whether these cities are in a bubble or not, we compared rental costs to the cost of ownership; we can observe if there is a bubble in any of the three cities if expected house price appreciation of homeowners are unrealistic compared to actual house price appreciation due to their perception of their user cost to be lower than what it actually is.

USER COST VARIABLES

REAL PRICES

To compute real house prices in all three cities of Vancouver, Toronto, and Halifax, data on nominal housing prices was obtained from Sauder School of Business, Centre for Urban Economics and Real Estate. Since the data was given in nominal housing prices per quarter, we took the averages of these values. The consumer price index was then used to adjust for the effect of inflation for years 1994-2010 for all three cities to calculate real house prices.

REAL RENTS

Real Rents were collected from the Statistics Canada CANSIM website, giving a variety of real rents in Vancouver, Toronto, and Halifax. Data from CANSIM included rent prices of detached dwellings, three bedrooms, and rental housing of up to twelve units, to name a few. In order for our research to try and capture the entire housing market, we used all of these different housing unit rents and averaged them all.

10 YEAR GOVERNMENT OF CANADA BOND RATE

Another component of the user cost model is the risk-free rate, which we obtained the Government of Canada 10 year bond rate. The bond rate was used because it is a risk-free rate and was in line with our attempts to find a rate that was consistent with the holding period for homeowners for their housing investments. Verbrugge (2006) found that the average holding period for participants of the United States housing market is approximately seven years. The risk-free rate is used in this user cost model since the risk-free rate is more like an opportunity cost rate whereby if the homeowner did not invest in housing, that would be the guaranteed rate of return that the homeowner would receive.

PROPERTY TAXES

For the variable of property taxes, we assumed the same rate of property tax for all three cities. The rate used in our model is 1.50% across all cities; this rate was obtained through an industry professional.

MAINTENANCE AND DEPRECIATION

The last variable of the user cost model is maintenance and depreciation rates. To find this data, we consulted different industry professionals, but found that their responses to this specific rate varied quite largely. We then reviewed a variety of different economic sources to determine this rate; however, the same problem occurred with different sources attributing a large range of interpretations for the maintenance and depreciation rate. Conclusively, we used the rate of maintenance and depreciation rate from the Himmelberg, Mayer and Sinai (2005) source, which is 2.50%.

METHODOLOGY

WITHOUT RISK PREMIUM

For our initial analysis, we derived the expected appreciation rate assuming no risk premium exists. In order to do this, we rearranged the user cost model as follows:

$$P = \frac{R}{r_f + \omega + \delta - g_{t+1} + r_p}$$

$$R = P\left(r_f + \omega + \delta - g_{t+1} + r_p\right)$$

$$\frac{R}{P} - \left(r_f + \omega + \delta - r_p\right) = -g_{t+1}$$

$$\therefore g_{t+1} = -\frac{R}{P} + \left(r_f + \omega + \delta - r_p\right)$$

Assuming a risk premium of 0, our final equation becomes:

$$\therefore g_{t+1} = -\frac{R}{P} + \left(r_f + \omega + \delta\right)$$

We deliberately left out a risk premium for two reasons; first of all, premiums that have been used in other papers we have consulted do not demonstrate a standard method to derive such a value as various different methods were used by these economists. Therefore, by omitting the risk premium altogether, we minimize measurement errors to generate a more accurate model. As well, as mentioned earlier, Sinai (2003) argues that the risk premium for owning housing is virtually non-existent as long as the owner relocates within the same city. This signifies that owning a house in one city is a perfect hedge against housing prices given that any housing transactions afterwards would be in the same city.

EXPECTED PRICE APPRECIATION ADJUSTED FOR RENT INFLATION

A different measurement method we utilized was to calculate actual rent inflation year-on-year and subtract that value from our residual price appreciation value. We calculated this by taking the actual rent inflation from the previous year and subtracting that value from the expected price appreciation residual in the current year. The major assumption made for this calculation is that participants in the housing market are backward-looking in terms of rent inflation predictions and rely solely on the last year's inflation rate. We hypothesize that because house prices are a function of rental income, rental growth would play a significant role in determining housing prices. The result is a measure of expected price appreciation based on all factors excluding rental inflation. By doing so, we are able to more accurately determine which cities may potentially be in a housing bubble.

WITH RISK PREMIUM

On the other hand, if we were to assume that the user cost is correct and our data is accurate, then any discrepancies between actual appreciation rates and our residual value would be a result of risk premium values that are above or below zero. This analysis ties in nicely with the topic under discussion as the derived risk premiums would identify cities that are deemed "riskier" to invest in. Like financial assets, riskier investments generally have greater potential for gains and losses and thus are prime bubbl 10 ects.

5 YEAR AVERAGES

In the methods above, our conclusions are all based on comparisons with 15 year averages. However, such a long-term average would smooth out any major fluctuations which may be of interest to this paper, thus we have also divided the data into 5 year time periods and analyzed each period individually. By separating the data into shorter time frames, we are able to identify any expansionary or recessionary periods which may have skewed our data.

INTERPRETATION

ACTUAL DATA SET

After running the numbers, we uncovered results that we did not foresee before the analysis stage of our research. The major finding was that Toronto had an overall higher actual price appreciation rate over the past 15 years than Vancouver. With a 15 year average of 3.63%, it notably overshadowed Vancouver's rate of 2.46%. In fact, Vancouver's rate is comparable to Halifax's at 2.13% over the past 15 years. Upon further examination, it would seem that our data range has captured a downturn in the Vancouver market in the late 1990s. Taking the average in the past 10 years, we see that Vancouver yields a higher rate of 5.93%. Interestingly enough, Toronto's rate remains almost unchanged at 3.64% and Halifax's rate increases to 3.34%. Thus, it would appear that the time periods in which data is collected and analyzed affects the results significantly. To further analyze our data, we removed all the years with negative actual appreciation rates from the data set and took averages for the remainder. The first shocking observation was that Vancouver had eight years out of fifteen removed whereas Toronto only had three, and Halifax had four. After removing these values and recalculating averages, we see that Vancouver's actual price appreciation rates now exceed expected rates whereas Toronto and Halifax are still lagging with spreads of 2.38% and 2.94% respectively. These figures suggest that homeowners and investors only remember profitable years and quickly forget recessionary periods. In terms of rent inflation, the 15 year average rental inflation was very similar across the three cities with Vancouver at 4.55%, Toronto at 4.33%, and Halifax at 4.38%. This suggests that although rents are very important in our user cost model, they generally have the same effect on prices regardless of which city we are examining.

WITHOUT RISK PREMIUM

With our primary analysis with no risk premium added, we found that our residual values did not fluctuate with the real data set. The major explanation for this occurrence is due to many of the variables in our user cost model remaining constant over the years. The only variables which change on an annual basis are rents and the risk-free rates. As anticipated, Vancouver had the highest expected price appreciation compared to actual rates. From this one observation, it is apparent that Vancouver yields a different result from the other cities as the average spread between expected and actual rates were almost 6.88%. This may suggest that our data is inaccurate, or that Vancouver is indeed in a housing bubble. The spreads for Toronto and Halifax are 4.08% and 5.37% respectively which may be interpreted the same way as Vancouver's results. However, as mentioned earlier, we had chosen Halifax as a control city and thus our results would indicate that further analysis is required as the 4.08% spread in Halifax may very likely be caused by errors in our initial analysis.

EXPECTED PRICE APPRECIATION ADJUSTED FOR RENT INFLATION

In order to adjust our residuals to better fit the actual data set, we incorporated actual rent inflation into our residuals. With rent inflation taken out of future expectations, we saw our residual values drop significantly. With these new values, the spread between expected appreciation and actual price appreciation dropped to 2.26% for Vancouver, -0.28% for Toronto, and 0.90% for Halifax. These values are much more coordinated with actual appreciation figures on average and even on a year-by-year basis. We also see that rent inflation plays a significant role in determining future price expectations as we had hypothesized.

WITH RISK PREMIUM

A different approach this paper takes to determining a risk premium is to derive it as a residual assuming all other values are correct. As mentioned earlier, this approach allows us to indentify cities which are deemed riskier by potential homeowners and investors and thus are prime candidates for housing bubbles. Our calculations show a risk premium of 2.10% for Vancouver, -0.71% for Toronto, and 0.27% for Halifax. These results are as anticipated as we saw Vancouver as a city with a much higher risk of being in a housing bubble due to its recent run-up in prices. Surprisingly, Toronto's risk premium is negative which represents a price premium that potential buyers are willing to pay to enter that market.

5 YEAR AVERAGES

Finally, we were aware that using 15 year averages to draw conclusions would yield inaccurate results and so we subdivided our data into five year time periods and compared results within those periods. Through this method, we were able to isolate periods of time where actual price appreciation was severely depressed or overly optimistic and compare this with expectations at the time. For Vancouver and Halifax, the two cities that experienced obvious price depreciation over a five year term, expectations during that five year period were overly optimistic. However, the decade after that yielded surprising behavioural results. For the ten years after homeowners and investors lost in the housing market, their expectations were continuously depressed and lower than actual rates. This suggests that homebuyers and investors are very aware of the fact that housing prices do depreciate under certain circumstances and those that have lost in the market are much more wary, even a decade after the incident. This contradicts our earlier findings which suggest that buyers and investors do not remember bad years and only recall profitable ones.

CONCLUSION

After employing four different methods to analyze the data we collected, the data all point to several definite conclusions. First of all, Vancouver's expected price appreciation rates and consistently above actual rates which suggest that bubble activity is highly probable. We also found that Toronto would be a better candidate as a control city than Halifax as expectations and actual appreciation rates are very similar and thus no bubble is present. Finally, contradictions in our behavioural observations suggest that players in the real estate market vary dramatically both in terms of market experience and forecasting abilities and thus we cannot assume that these players are rational and will behave the way economists believe.

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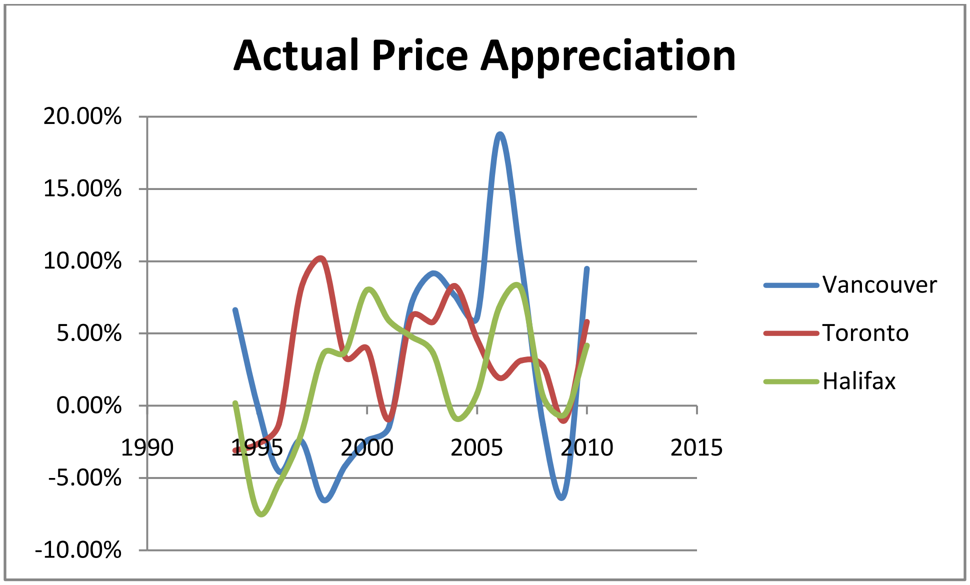
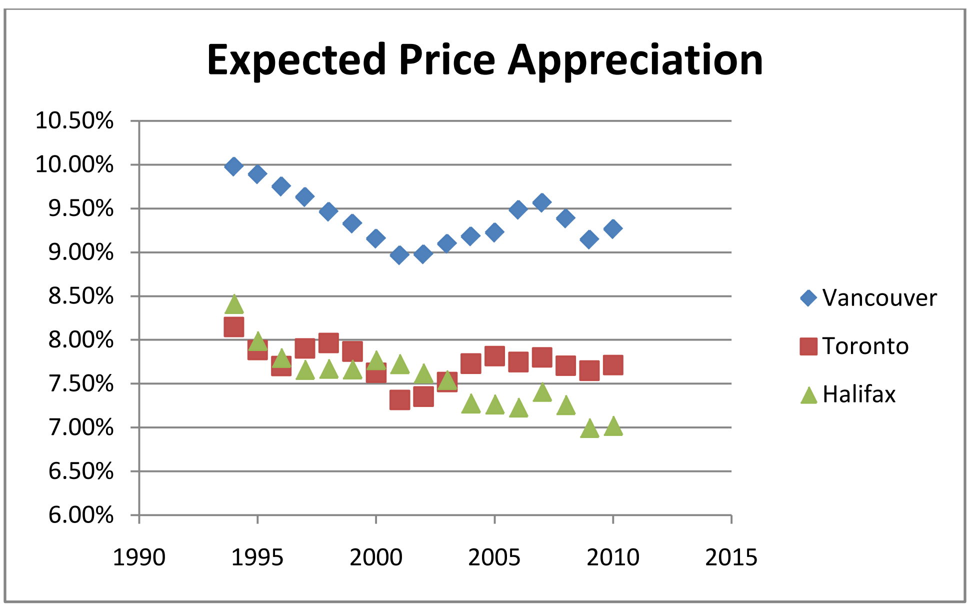
APPENDICES


Actual Price Appreciation
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
1990
1995
2000
2005
2010
2015
Vancouver
Toronto
Halifax


Expected Price Appreciation
10.50%
10.00%
9.50%
9.00%
8.50%
8.00%
7.50%
7.00%
6.50%
6.00%
1990
1995
2000
2005
2010
2015
Vancouver
Toronto
Halifax

VANCOUVER

	Real House Prices	Real Rents	Actual Price Appreciation	Expected Price Appreciation	EPA with Rent Inflation	Actual Rent Inflation
St Dev	100,183.765	2,481.281	0.072	0.003	0.017	0.016
Average	$489,639.12	$10,702.44	2.70%	9.38%	4.72%	4.55%
Range	$375,580 - $658,038	$7,474 - $15,205	-6.53% - 18.73%	8.97% - 9.98%	1.69% - 6.24%	1.43% - 7.24%

TORONTO

	Real House Prices	Real Rents	Actual Price Appreciation	Expected Price Appreciation	EPA with Rent Inflation	Actual Rent Inflation
St Dev	57,381.597	2,376.861	0.040	0.002	0.029	0.027
Average	$287,531.91	$11,075.24	3.24%	7.73%	3.35%	4.33%
Range	$207,540 - $375,460	$7,398 - $14,494	-3.08% - 10.09%	7.32% - 8.15%	-3.40% - 7.38%	1.68% - 10.71%

HALIFAX

	Real House Prices	Real Rents	Actual Price Appreciation	Expected Price Appreciation	EPA with Rent Inflation	Actual Rent Inflation
St Dev	32,392.768	1,950.397	0.044	0.004	0.024	0.023
Average	$205,199.26	$8,342.09	2.02%	7.55%	3.03%	4.38%
Range	$161,028 - $257,453	$5,921 - $11,721	-7.28% - 8.11%	7.00% - 8.41%	-0.24% - 7.94%	-0.28% - 7.65%

Vancouver Data

Year	Actual Price Appreciation	Expected Price Appreciation	EPA with Rent Inflation	Actual Rent Inflation
1994	6.63%	9.98%	-	-
1995	0.06%	9.89%	-	5.43%
1996	-4.55%	9.75%	4.32%	3.39%
1997	-2.43%	9.63%	6.24%	3.97%
1998	-6.53%	9.46%	5.49%	1.43%
1999	-4.17%	9.33%	7.90%	1.95%
2000	-2.41%	9.16%	7.21%	5.01%
2001	-1.43%	8.97%	3.96%	6.22%
2002	6.97%	8.98%	2.76%	6.52%
2003	9.16%	9.10%	2.58%	4.08%
2004	7.59%	9.18%	5.10%	3.93%
2005	6.12%	9.22%	5.30%	4.30%
2006	18.73%	9.48%	5.19%	5.60%
2007	10.06%	9.56%	3.97%	5.85%
2008	-1.33%	9.39%	3.54%	7.24%
2009	-6.01%	9.15%	1.91%	3.93%
2010	9.47%	9.26%	5.34%	3.97%
15 Yr Average	**2.62%**	**9.31%**	**4.72%**	**4.49%**
1996-2000	**-4.02%**	**9.46%**	**6.23%**	**3.15%**
2001-2005	**5.68%**	**9.09%**	**3.94%**	**5.01%**
2006-2010	**6.18%**	**9.37%**	**3.99%**	**5.32%**

Toronto Data

Year	Actual Price Appreciation	Expected Price Appreciation	EPA with Rent Inflation	Actual Rent Inflation
1994	-3.08%	8.15%		-
1995	-2.64%	7.89%	3.06%	4.82%
1996	-1.23%	7.70%	4.07%	3.63%
1997	8.12%	7.90%	5.41%	2.50%
1998	10.09%	7.97%	0.10%	7.87%
1999	3.39%	7.87%	1.70%	6.17%
2000	3.97%	7.63%	-3.09%	10.71%
2001	-0.93%	7.32%	0.50%	6.81%
2002	6.13%	7.36%	2.16%	5.19%
2003	5.79%	7.52%	5.87%	1.65%
2004	8.29%	7.73%	5.05%	2.68%
2005	4.59%	7.82%	5.63%	2.19%
2006	1.92%	7.75%	4.02%	3.73%
2007	3.12%	7.80%	6.12%	1.68%
2008	2.72%	7.71%	2.43%	5.27%
2009	-1.00%	7.65%	7.32%	0.33%
2010	5.80%	7.71%	3.75%	3.96%

15 Yr Average	**3.63%**	**7.71%**	**3.38%**	**4.33%**
1996-2000	**4.87%**	**7.81%**	**1.64%**	**6.18%**
2001-2005	**4.77%**	**7.55%**	**3.84%**	**3.71%**
2006-2010	**2.51%**	**7.72%**	**4.73%**	**2.99%**

HALIFAX DATA

Year	Actual Price Appreciation	Expected Price Appreciation	EPA with Rent Inflation	Actual Rent Inflation
1994	0.19%	8.41%	-	-
1995	-7.28%	7.99%	2.86%	5.13%
1996	-5.35%	7.80%	8.08%	-0.28%
1997	-1.97%	7.66%	6.14%	1.52%
1998	3.57%	7.67%	4.46%	3.21%
1999	3.70%	7.67%	3.78%	3.89%
2000	8.01%	7.77%	2.68%	5.10%
2001	5.88%	7.73%	0.56%	7.17%
2002	4.79%	7.62%	0.13%	7.49%
2003	3.66%	7.55%	1.97%	5.57%
2004	-0.84%	7.28%	1.53%	5.75%
2005	0.84%	7.27%	6.19%	1.08%
2006	6.76%	7.23%	-0.42%	7.65%
2007	8.11%	7.41%	3.83%	3.58%
2008	0.64%	7.26%	2.96%	4.30%
2009	-0.60%	7.00%	1.67%	5.33%
2010	4.16%	7.02%	3.38%	3.64%

15 Yr Average	**2.13%**	**7.50%**	**3.11%**	**4.38%**
1996-2000	**1.59%**	**7.71%**	**5.03%**	**2.69%**
2001-2005	**2.87%**	**7.49%**	**2.08%**	**5.41%**
2006-2010	**3.82%**	**7.18%**	**2.28%**	**4.90%**

RESIDUAL RISK PREMIUM

Date	Residual Risk Premium		
	Vancouver	Toronto	Halifax
1994	-	-	-
1995	-	-	-
1996	8.88%	4.11%	8.01%
1997	8.67%	-3.84%	9.92%
1998	12.02%	-4.63%	2.58%
1999	12.07%	-3.39%	0.76%
2000	9.62%	-2.52%	-4.12%
2001	5.38%	-2.46%	-3.25%
2002	-4.21%	-5.59%	-4.34%
2003	-6.58%	-3.46%	-3.60%
2004	-2.49%	-2.21%	2.54%
2005	-0.83%	0.54%	0.68%
2006	-13.54%	3.64%	-0.61%
2007	-6.10%	0.95%	-8.35%
2008	4.87%	3.30%	3.04%
2009	7.92%	3.38%	3.30%
2010	-4.13%	1.58%	-2.47%
Avg	**2.10%**	**-0.71%**	**0.27%**

Actual Price Appreciation (Positive Values)

	Vancouver	Toronto	Halifax
1996	x	x	x
1997	x	8.12%	x
1998	x	10.09%	3.57%
1999	x	3.39%	3.70%
2000	x	3.97%	8.01%
2001	x	x	5.88%
2002	6.97%	6.13%	4.79%
2003	9.16%	5.79%	3.66%
2004	7.59%	8.29%	x
2005	6.12%	4.59%	0.84%
2006	18.73%	1.92%	6.76%
2007	10.06%	3.12%	8.11%
2008	x	2.72%	0.64%
2009	x	x	x
2010	9.47%	5.80%	4.16%
average	**9.73%**	**5.33%**	**4.56%**
stdev	4.22%	2.52%	2.51%
range	6.97% - 18.73%	1.92% - 10.09%	0.84% - 8.01%