

## Centre for Urban Economics and Real Estate

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## Are Canadian Housing Markets Over-priced?

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## Introduction: Has the Boom Gone Bust?

The severe downturn in US housing markets is triggering concerns that markets in Canada will also contract dramatically. Despite more conservative lending practices in Canada that prevented the speculative excess seen in some US markets, we find that the housing stock in many major Canadian cities is substantially overpriced.

There are parallels between the path of house prices in Canadian and US markets. The US housing boom began in 1997 and peaked in mid 2006 with house prices rising 132 percent.<sup>1</sup> Canadian prices began their run-up in 2001 and have only in 2008 begun to slow.<sup>2</sup> Housing affordability is a severe problem in some Canadian cities, limiting the ability of markets to continue to rise.<sup>3</sup> Finally, declining sales and weakening prices are signs that the decade long boom in Canadian markets is over.<sup>4</sup>

Are Canadian housing markets likely to follow those in the US down? This report helps to answer this question by analyzing whether Canadian house prices are overvalued. We ask: how do current house prices in nine major Canadian cities compare to their equilibrium or balanced market levels?

We define the equilibrium housing price in a city from the relationship between house rents and prices in that city. Formally, we say a housing market is in equilibrium when the ratio of house rents to prices equals the cost of capital for owning a house, which is the sum of the mortgage rate and out of pocket costs, then minus the expected rate of long-run house price appreciation. Our approach is not the only way to test for equilibrium in housing markets; other methodologies include looking at historic rates of price growth, comparing price growth with income and population growth, or measuring price to income ratios.

Table 1 summarizes our findings using house price, rent, and cost data from the second quarter of 2008. We find that:

- Only in Toronto are prices in balance with rents
- In Halifax, Montreal, Ottawa, Regina, and Winnipeg prices would need to drop by at least 25 percent from their level in the second quarter of 2008 to be in balance.
- Prices declines in Calgary and Vancouver will be more modest: 7 to 11 percent
- In Edmonton prices are now below their equilibrium level by 8 percent.

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<sup>1</sup> The S&P/Case-Shiller US national house price index rose 132 percent between early 1997 and mid 2006, ([http://macromarkets.com/csi\\_housing/](http://macromarkets.com/csi_housing/)), falling nearly 19 percent since then.

<sup>2</sup> A weighted average of house prices for nine major Canadian cities rose 86 percent between early 2001 and mid 2008. Weighting is by the number of households in 2006.

<sup>3</sup> Mortgage payment to income ratios are higher than at any time since 1985 except for a brief spike in 1990. RBC Economics: <http://www.rbc.com/economics/market/pdf/house.pdf>.

<sup>4</sup> Since the beginning of 2008 there has been a continued increase in listings and a decline in sales and the Canadian Real Estate Association (<http://www.crea.ca/>) June 2008 average resale price for the largest 25 markets declined for the first time in a decade. (all major Canadian newspapers 7/16/08).

We confine our analysis to single family detached units. We recognize that different cities have different mixes of unit types, so that the degree to which this is representative of the housing stock does vary by city, though it is the single most common form of housing in major Canadian cities.<sup>5</sup>

**Table 1: Balance in Housing Markets (2008Q2)**

City	Estimated 2 <sup>nd</sup> Quarter 2008 House Price Level	Pct. Price Change for Equilibrium	Est. \$ Change in Price for Equilibrium	Market Condition
Calgary	456,800	-7%	-32,000	unbalanced
Edmonton	406,500	8%	32,000	unbalanced
Halifax	289,400	-20%	-58,000	very unbalanced
Montreal	277,200	-25%	-68,000	very unbalanced
Ottawa	323,900	-25%	-81,000	very unbalanced
Regina	347,100	-25%	-87,000	very unbalanced
Toronto	419,400	0%	1,000	balanced
Vancouver	754,500	-11%	-85,000	unbalanced
Winnipeg	290,400	-25%	-74,000	very unbalanced

Sources: UBC Centre for Urban Economics and Real Estate, Royal LePage *Survey of Canadian House Prices*. Changes are the percentage/amount needed to bring the current rent/price ratio to equal the estimated equilibrium rent to price ratio. \*\*Prices are below equilibrium in Edmonton

### Analytical Framework

This paper uses the owner cost of capital approach to define a price-rent equilibrium in housing markets. This approach is based on the cost of capital concepts in finance applied to housing and analyzes housing as a financial asset.<sup>6</sup> Prices are in equilibrium balance when the per-period dividend payment, the rent for a house, equals the price of the asset, the house price, multiplied by the cost of holding the asset. For housing, this cost of capital equals the cost of borrowed funds, annual maintenance expenditures, property taxes and

<sup>5</sup> From the 2006 Census, single family detached units were 60 percent of the housing stock in Calgary, 59 percent in Edmonton, 52 percent in Halifax, 32 percent in Montreal, 46 percent in Ottawa, 69 percent in Regina, 42 percent in Toronto, 35 percent in Vancouver and, percent in Winnipeg. The remainder varies among semi-detached, duplex apartments, row houses, buildings with fewer than five units, and those with five or more depending on the city.

<sup>6</sup> This approach has become the principal metric for pricing the cost of investing in a dollar of residential real estate. It is most associated with Hendershott (1980) and Poterba (1984), other early works includes Buckley and Ermisch (1979), Diamond (1980), and Dougherty and Van Order (1982).

insurance, depreciation not offset by maintenance (which affects the structure alone), and minus the expected change in the market price of housing.<sup>7</sup>

This approach abstracts away from the unique benefits of being an owner-occupier, treating housing simply as a financial asset. As with all economic analyses, this approach demands a large number of assumptions and conditions. Of these the most pertinent and potentially problematic are i) the current estimate of future expected price appreciation, ii) that residential rental markets are in equilibrium, and iii) the choice of the appropriate measure of the cost of funds for residential purchase.

If we underestimate the rate of expected house price appreciation, we will predict an equilibrium house price that is too low, below the actual figure, potentially suggesting a market is over priced that is really not. The assumption about rents presumes that this is the correct expected flow of revenue from the unit. Both the decision on rents and interest rates mean that our definition of equilibrium reflects current general economic and rental market conditions. Changes in the economy and in interest rates will yield different results.

The greatest challenge in measuring the cost of capital is determining the expected price appreciation. All other variables in the equality are directly measurable, even if they are measured with some error, but individuals' subjective expectations are not. The "correct" rate cannot be solved for from the relationship without assuming that prices and rents are already in equilibrium because the owner cost of capital relationship is an equality. There is always some expectation of future house price growth that will ensure that the relationship between rents, prices, and the cost of capital holds. In this study we assume that the best predictor going forward of expected long run equilibrium house price appreciation is the historic rate.

In each metropolitan area we use historic rates of house price appreciation and current values for the other items in the cost of capital equation along with current rents to identify an equilibrium house price. Our determination of whether the market is in balance comes from comparing this cost of capital equilibrium price with the prevailing price in market. In estimating these historic rates we do not just take the average over a given time period. Instead we adjust for the housing price cycle by controlling for market peaks and troughs. Despite the assumptions necessary for the approach, it does shed light on current conditions in Canadian markets and highlights potential price adjustments. It is worth noting that this

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<sup>7</sup> The equation is :  $\frac{R}{P} = i + t + m + \delta - E\left(\frac{\Delta P}{P}\right)$  where  $R$  is house rent,  $P$  house price,  $i$  the mortgage rate,  $t$  taxes and insurance as a percentage of the house price,  $m$  the same for maintenance expenditures,  $\delta$  is the rate of structure depreciation as a percentage of the house price, and  $E(\Delta P/P)$  the expected rate of house price appreciation. We solve for:

$$P = \frac{R}{i + t + m + \delta - E(\Delta P/P)} .$$

approach says nothing regarding how housing markets that are out of balance might return to being in equilibrium.

## Data

We estimate housing market rent-price equilibrium ratios for Calgary, Edmonton, Halifax, Montreal, Ottawa, Regina, Toronto, Vancouver, and Winnipeg. All data except for mortgage rates are specific for each metropolitan area. The mortgage data are national rates as reported by the Bank of Canada. Our data are for the second quarter of 2008 (2008Q2). The house price data are developed from Royal LePage's *Survey of Canadian House Prices*.<sup>8</sup> Their survey reports estimated market values by member brokers of prices for different standardized house types in markets across Canada. We use the survey reports for a two storey mid-market and bungalow single family units and take a weighted average within each metropolitan area of the prices reported for different neighbourhoods or jurisdictions.<sup>9</sup> The appendix includes figures showing the house price series with and without adjusting for inflation (real and nominal) for each city.

For each metropolitan area we match rents by type of house and location with the price data. The rent data come from Craigslist and classified ads in local newspapers.<sup>10</sup> We cannot completely control for house quality, but this does allow us to match rents and prices by unit size and neighbourhood. Using detached houses rather than condominiums and apartments reduces the problem with differences in quality and type between rental and ownership units: condominiums (ownership) and apartments (rental) have very different quality and age profiles.<sup>11</sup> Thus the bias in the rent-price ratio because of differences in quality should be lower for detached units as compared with condominium and apartment buildings. Table 2 provides the rent to price ratios by city

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<sup>8</sup> <http://www.royallepage.ca/CMSTemplates/GlobalNavTemplate.aspx?id=361>

<sup>9</sup> Economists prefer to use house price indexes that control for differences in house quality over time. The Royal LePage data roughly mimic this by having the survey based on a fixed house type. For Vancouver the Royal LePage data compare favourably with a quality controlled series: for 1979-1997 a correlation of 0.95. In contrast the Statistics Canada New House Price series as has correlation of 0.16. We weight by the 2001 Census number of households in each area, so as to mimic the value of the housing stock rather than the current distribution of sales.

<sup>10</sup> When the rent data is not from the same time period as the price data we index the rent values using Statistics Canada rented accommodation price series: CPI 2005 Basket Cansim II Table 3260020. Most of the rent data is from 2008Q1 so we do index these through to 2008Q2,

<sup>11</sup> For instance, apartment buildings sell on a per unit basis at a price well below that of condominiums. Detached units that are rented may well be older and of lower quality, but they are still sold in same market and buyers may well choose to occupy them, this is rarely the case with apartments.

**Table 2: City Rent – Price Ratios (2008Q2)**

City	Est. Price	Est. Rent	Rent/Price Ratio
Calgary	456,800	1,900	5.0%
Edmonton	406,500	2,160	6.4%
Halifax	289,400	1,440	6.0%
Montreal	277,200	1,350	5.8%
Ottawa	323,900	1,750	6.5%
Regina	347,100	1,510	5.2%
Toronto	419,400	1,800	5.2%
Vancouver	754,500	2,290	3.6%
Winnipeg	290,400	1,440	6.0%

Sources: UBC Centre for Urban Economics and Real Estate. Prices are from Royal LePage *Survey of Canadian House Prices*. Rents are from [www.craigslist.org](http://www.craigslist.org) and newspaper ads.

We provide details on the calculations for tax and insurance rates, maintenance, and depreciation in the appendix. These cost elements along with mortgage rates, the chartered bank 5 year rate with mortgage insurance premium for a minimum downpayment loan, are shown in Table 3.<sup>12</sup> Costs as a percentage of house value tend to be lower in the high price areas because these costs themselves do not vary as much as do house prices. As a percentage of house value, property tax rates would have to be 2.8 times as high in Halifax as in Vancouver to raise the same revenues for local government. This is almost exactly the difference in observed rates. Differences in house price levels also affect the percentages for insurance, maintenance, and depreciation. They apply to structure alone, and structure as a percentage of total value is lower in high house price, i.e. high land value, cities. Structure value percentage depends on the cost of new construction cost and the estimated age of the housing stock. Both vary by city.

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<sup>12</sup> We use the higher chartered bank as reported by the Bank of Canada because we assume that the purchase is 100 percent financed.

**Table 3: Cost of Capital Elements  
(Excluding Expected House Price Appreciation)**

City	Mortgage Rate	Depreciation	Tax	Insurance	Maintenance	Total
Calgary	7.37%	1.77%	0.6%	0.1%	0.7%	10.5%
Edmonton	7.37%	1.66%	0.8%	0.1%	0.7%	10.7%
Halifax	7.37%	1.87%	1.5%	0.2%	1.0%	12.0%
Montreal	7.37%	1.53%	1.4%	0.2%	1.2%	11.7%
Ottawa	7.37%	1.65%	1.2%	0.2%	0.9%	11.3%
Regina	7.37%	1.43%	1.6%	0.2%	1.3%	11.9%
Toronto	7.37%	1.36%	0.8%	0.2%	0.8%	10.6%
Vancouver	7.37%	1.07%	0.5%	0.1%	0.4%	9.5%
Winnipeg	7.37%	1.52%	2.0%	0.2%	1.3%	12.3%

Sources: UBC Centre for Urban Economics and Real Estate, Bank of Canada, American Housing Survey, and CMHC. Mortgage rate is the listed chartered bank 5 year rate, with 100% LTV mortgage insurance fee for the end of 2008Q2. Depreciation, tax, insurance, and maintenance are as a percentage of house value.

We use historic price appreciation for our measure of the long run equilibrium expected house price appreciation for a market. Figure 1 presents the historic path of an index of real (inflation adjusted) housing prices for select cities. Real prices for each city are indexed to a value of 100 for the first quarter of 1979 for all cities. This highlights the differences in price paths across cities and the sensitivity of estimates of price appreciation to the choice of starting and ending years for analysis.

**Figure 1: Real House Price Index 1981-2008**

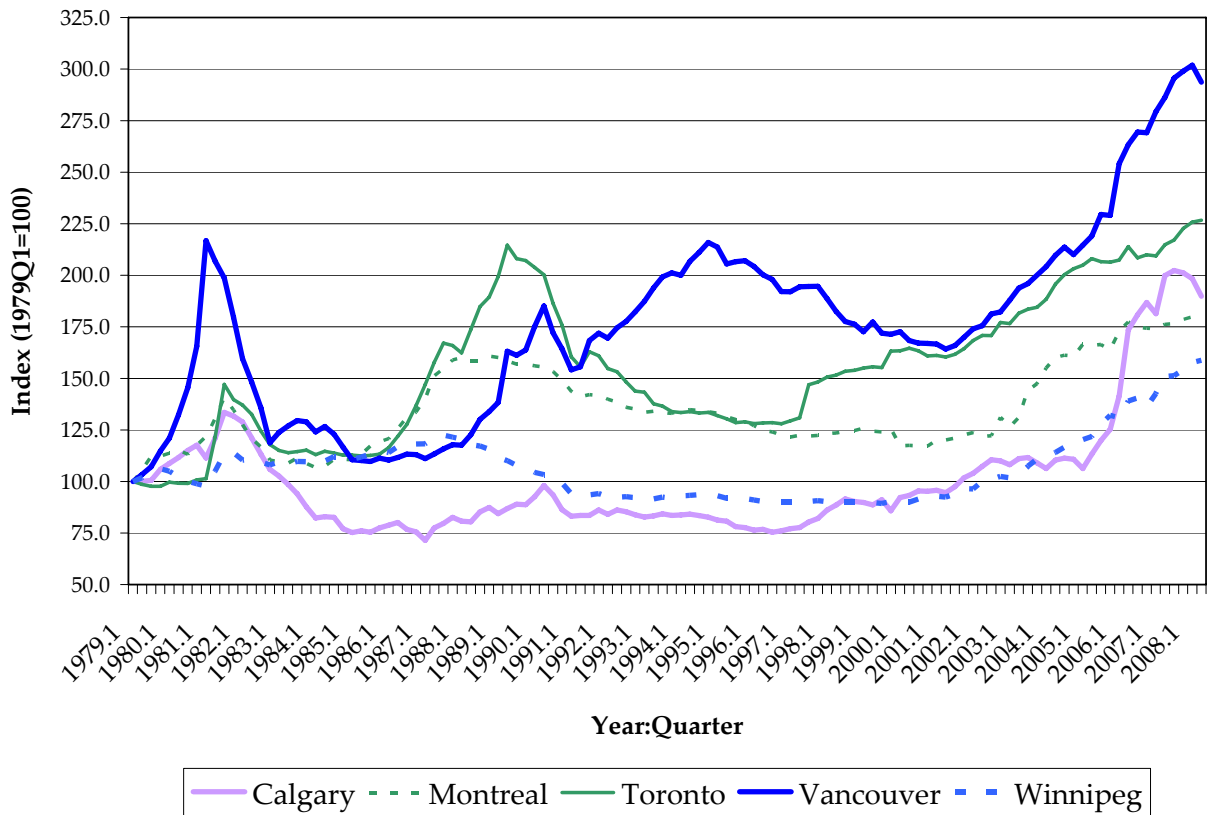


Table 4 details the differences in annual rates of appreciation depending on the time period used.<sup>13</sup> For 1979 to 2008 Vancouver has the highest rate of appreciation, but the second lowest if we begin the analysis in 1981. From 1981-2008, house price appreciation is highest in Toronto, but if our analysis begins in 1992 then Toronto has a rate that is in the middle of the group. From 1979 or 1981 house price appreciation is lowest in Edmonton, but second highest if we begin in 2001.

<sup>13</sup> Data is only available for Halifax from 1992 and for Ottawa from 1982.



**Table 4: Annual House Price Appreciation: By Period**

City	1979-2008	1981-2008	1992-2008	2001-2008
Calgary	6.1%	5.3%	7.1%	12.4%
Edmonton	4.8%	4.2%	6.3%	13.4%
Halifax	n/a	n/a	3.8%	7.0%
Montreal	5.8%	4.7%	3.6%	8.1%
Ottawa	n/a	n/a	3.8%	5.7%
Regina	6.2%	6.0%	7.3%	14.5%
Toronto	6.7%	6.3%	4.5%	7.2%
Vancouver	7.6%	4.4%	5.3%	10.6%
Winnipeg	5.4%	5.1%	5.5%	10.2%

Sources: UBC Centre for Urban Economics and Real Estate, Royal LePage *Survey of Canadian House Prices*.

To avoid the problem of historic appreciation rates being adversely affected by where in the cycle we start or finish the analysis, we calculate historic averages based on peak to peak and trough to trough appreciation rates. This approach measures appreciation over a single complete cycle. We use real house prices to identify high and low points in the housing price cycle, and then calculate appreciation rates from one peak to the next and from one trough to the next. These appreciation rates for each cycle are averaged with the calculation weighted by the length of the cycle. Some cities have multiple price cycles so that there may be two or three of each type of measure. Rates may be slightly biased downwards for Halifax, Regina, Toronto, and Winnipeg as real prices in those cities were still rising as of the 2<sup>nd</sup> quarter of 2008, which we have to assume is a cycle peak. Table 5 presents these housing price cycle adjusted appreciation rates.

**Table 5: Cycle Adjusted Annual House Price Appreciation**

City	Trough-Trough	Peak-Peak	Average of Cycles
Calgary	6.5%	4.9%	5.2%
Edmonton	3.7%	5.3%	4.7%
Halifax	5.7%	3.9%	4.5%
Montreal	3.7%	4.0%	3.9%
Ottawa	1.7%	3.3%	2.7%
Regina	4.3%	5.2%	4.9%
Toronto	6.4%	4.8%	5.4%
Vancouver	6.5%	4.5%	5.4%
Winnipeg	3.2%	5.1%	4.4%

Sources: UBC Centre for Urban Economics and Real Estate, Royal LePage *Survey of Canadian House Prices*. Trough to trough is the estimated annual growth rate between two cycle low points. Peak to peak between cycle high points.

Table 5 yields some interesting results. First, house price appreciation is much lower than it is for some of the calendar periods ending in 2008. Relative appreciation is higher for Halifax, though this may be because of the much shorter time series of price data, and Ottawa. That house price appreciation is highest in Calgary, Toronto and Vancouver and much lower in Montreal is consistent with a general presumption about the market. The house price appreciation rates in the “Average of Cycles” column in Table 5 are the rates we use for defining the equilibrium cost of capital in finding the equilibrium price level for each city.

Combining the values from Tables 3 and 5 we can create city specific measures of the cost of capital for single family homes. We present these below in Table 6. These are specific for the second quarter of 2008 and in the short run will change in response to changes in interest rates. Given rents, equilibrium house prices have to be at a level that equates the ratio of annual rent income to house price to the cost of capital. For the most part, the pattern of these values is what one might expect. Perhaps the exception is the very high cost of capital for Ottawa, a result of the low price appreciation between cycle low points in 1986 and 1998.

**Table 6: Equilibrium Cost of Capital (2008Q2)**

City	Mortgage Rates, Taxes, Maintenance, Insurance, & Depreciation	Long Run Expected House Price Appreciation	Equilibrium Cost of Capital
Calgary	10.5%	5.2%	5.4%
Edmonton	10.7%	4.7%	5.9%
Halifax	12.0%	4.5%	7.5%
Montreal	11.7%	3.9%	7.8%
Ottawa	11.3%	2.7%	8.6%
Regina	11.9%	4.9%	7.0%
Toronto	10.6%	5.4%	5.1%
Vancouver	9.5%	5.4%	4.1%
Winnipeg	12.3%	4.4%	8.0%

Sources: UBC Centre for Urban Economics and Real Estate. Values will be slightly different because of rounding

## Results

Table 7 compares existing and equilibrium costs of capital and identifies the changes in house prices necessary to reach the rent price equilibrium. Depending on the change in basis points in the existing rent-price ratio and the change in prices, markets are identified as being in balance, unbalanced, or very unbalanced. In columns (1) and (2) we compare the existing rent to price ratio levels from Table 2 with our calculation of the equilibrium levels from Table 6. The difference between the two reflects the degree of imbalance. If the existing ratio is below the estimated equilibrium ratio, then to move towards that equilibrium level, either prices must fall or rents must rise.<sup>14</sup> In column (3) we present the change in basis points needed to get the current rent to price ratio level to equal the equilibrium level.<sup>15</sup> In column (4) we convert this into a percentage change in house prices based on their 2<sup>nd</sup> quarter 2008 levels. We provide a subjective assessment of these conditions in column (5).

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<sup>14</sup> Prices are much more volatile than rents so we expect any adjustment to come from changes in prices. This could occur through either short run price declines or an extended period of slow or no growth.

<sup>15</sup> 100 basis points equal one percentage point.

**Table 7: Market Conditions Relative to Estimated Equilibrium**

	(1)	(2)	(3)	(4)	(5)
City	Current Rent/Price Ratio	Equilibrium Rent/Price Ratio	Basis Point Change in Ratio for Equilibrium	Percent Change in Prices for Equilibrium	Condition
Calgary	5.0%	5.4%	37	-7%	unbalanced
Edmonton	6.4%	5.9%	-46	8%	**unbalanced
Halifax	6.0%	7.5%	151	-20%	very unbalanced
Montreal	5.8%	7.8%	191	-25%	very unbalanced
Ottawa	6.5%	8.6%	215	-25%	very unbalanced
Regina	5.2%	7.0%	174	-25%	very unbalanced
Toronto	5.2%	5.1%	-1	0%	balanced
Vancouver	3.6%	4.1%	46	-11%	unbalanced
Winnipeg	6.0%	8.0%	202	-25%	very unbalanced

Sources: UBC Centre for Urban Economics and Real Estate

Notes: Equilibrium cap rate based on historic growth rate (controlling for price cycle). Changes are percentage change to prices or rent to bring current rent/price ratio to equal the estimated equilibrium rent to price ratio.

\*\*Edmonton is unbalanced, but prices are below their estimated equilibrium level.

The variation across cities is dramatic. In Toronto, existing and equilibrium values are the same. For Calgary and Vancouver, current prices are somewhat above the level that would allow for a rent price balance. For balance consistent with historic price trends, there must be a 37 to 43 basis point increase in the rent-price ratio, which would require a 7 and 11 percent decline in house prices respectively. Housing markets in Halifax, Montreal, Ottawa, Regina, and Winnipeg are much more out of alignment: the rent-price ratio must increase by over 150 basis points, analogous to a drop in house prices of at least 20 percent. Edmonton is very much the outlier, house prices there are out of balance, but are too low. Our calculations suggest an increase of approximately 8 percent. Of our nine cities, house prices are overvalued, relative to the rents and the based on the cost of capital, in seven, dramatically so in five.

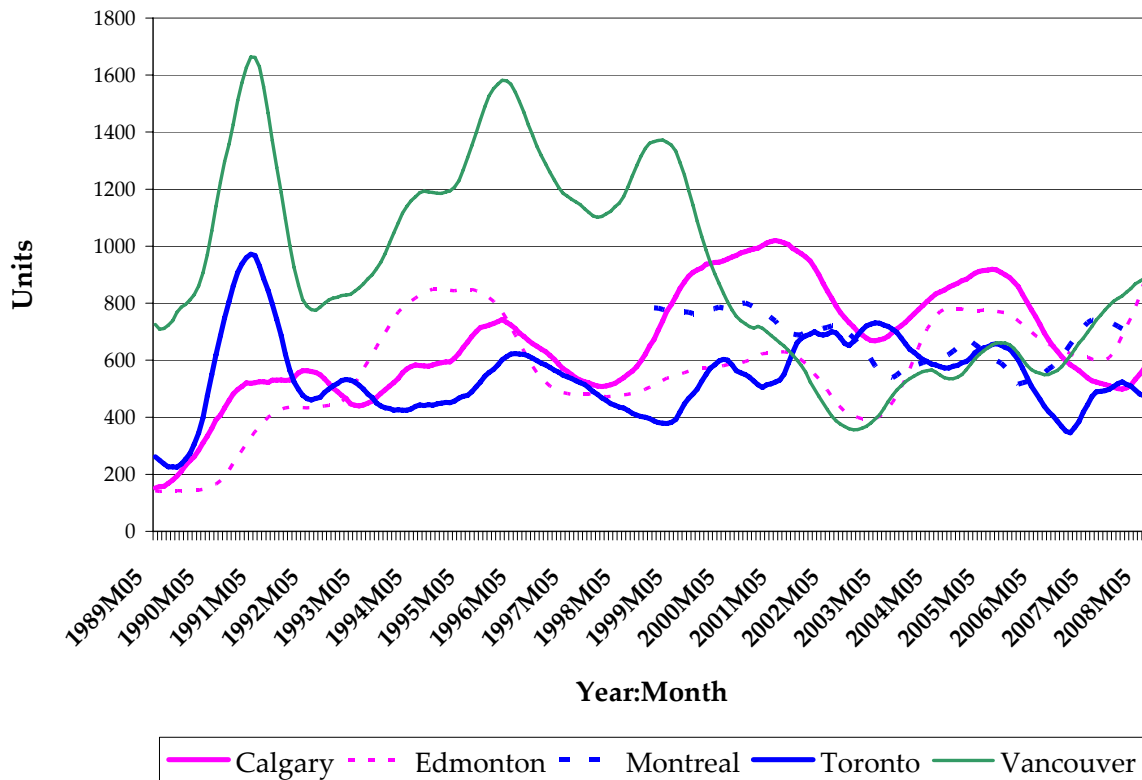
### Future Price Movements

The rent-price equilibrium presented above sheds light on whether prices are above or below the equilibrium level as derived using the cost of capital approach. This does not necessarily predict the future movements of these prices. Not only is there the inevitable

error in the analysis of the equilibrium, but house price movements can be notoriously hard to predict.<sup>16</sup> House prices can correct through sharp rapid declines, through longer and slower declines, or by staying essentially flat for a long period. As well, this analysis assumes that current rents reflect a stable demand. Changes in economic conditions that affect rents and Bank of Canada monetary policy that affects interest rates will also change the equilibrium conditions.

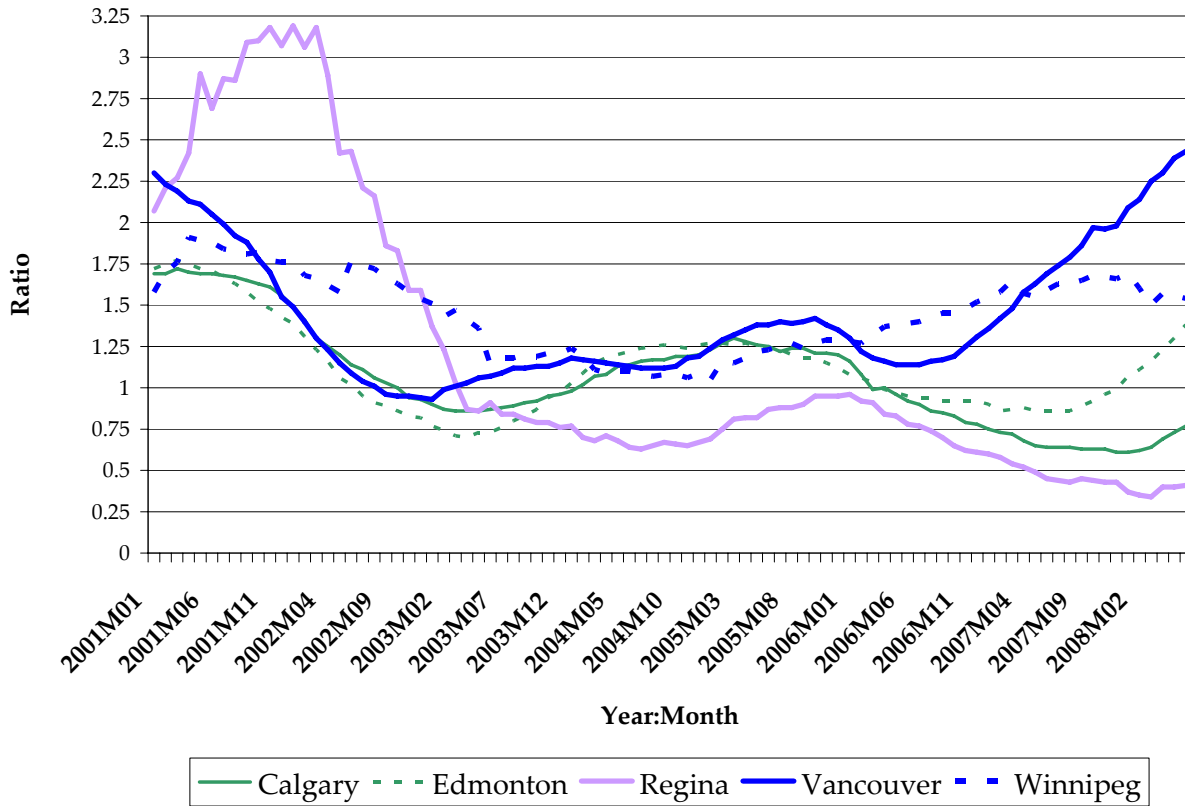
An element that can push on prices to fall quickly is a large supply of unsold inventory or a mismatch between the number of units and the number of households ready to occupy them. Figure 2 presents a 12 month moving average of CMHC data on completed but unsold units. Currently, these numbers are below historic highs, suggesting that oversupply, which would actively put downward pressure on prices, is not excessive in the market. The analysis in this section is sensitive to the precision with which CMHC measures absorption, the number of completed but unsold units, starts, and completions. These numbers can also be sensitive to the months of analysis depending on when large developments are started or completed.

**Figure 2: Unabsorbed Inventory 12 Month Moving Average**



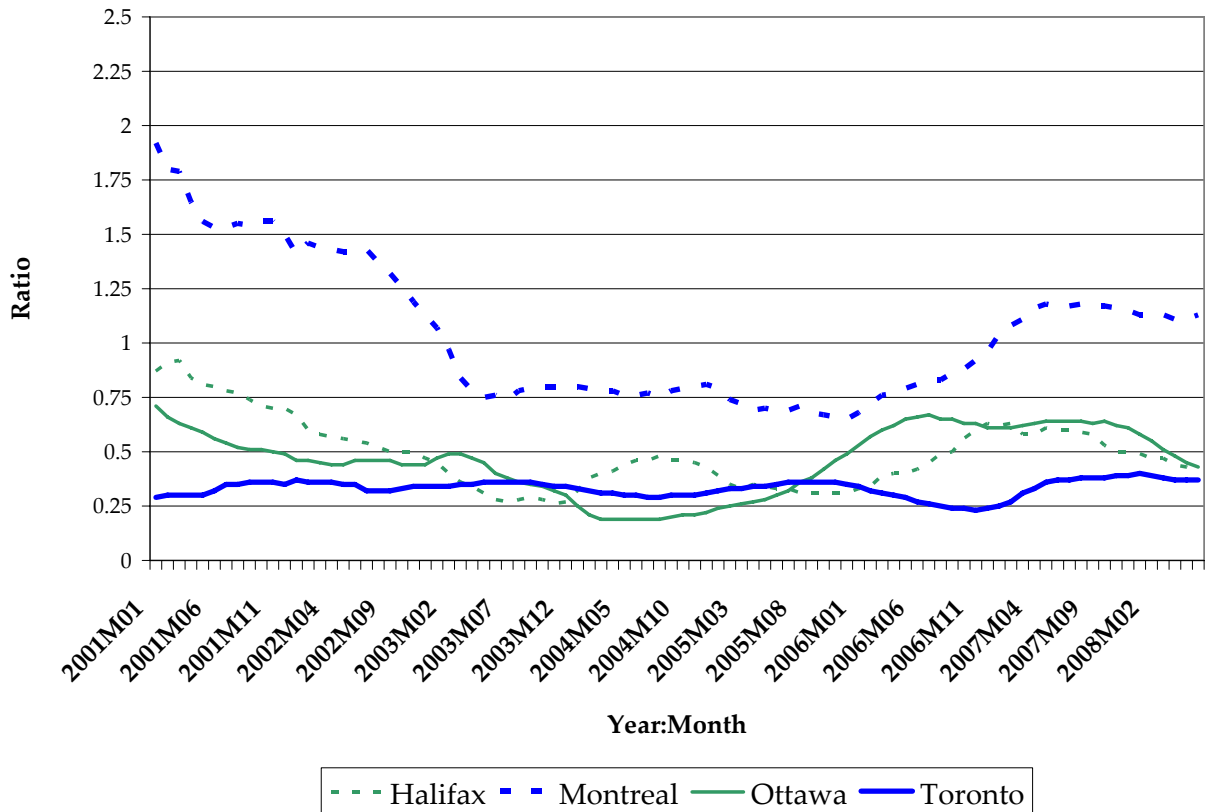
<sup>16</sup> On forecasting the end of the current US downturn: “ ‘Anybody who says they know when it’s going to end with confidence is delusional,’ said Karl E. Case, an economics professor at Wellesley College and co-creator of the [Case-Shiller home price index](#).” *New York Times*, August 8, 2008

**Figure 3A: Ratio of Unabsorbed Inventory to Absorption of New Units: Western Cities**



Since mid-2003 Eastern cities have had more stable ratios of the inventory of unsold new units to the absorption of new units markets than have the western markets. There has been some worsening in Montreal and Ottawa, but the ratio remains marginally above 1.0 at the worst. Compare this to Vancouver, where the ratio has risen from 1.0 in mid 2005 to nearly 2.5 in June 2008.

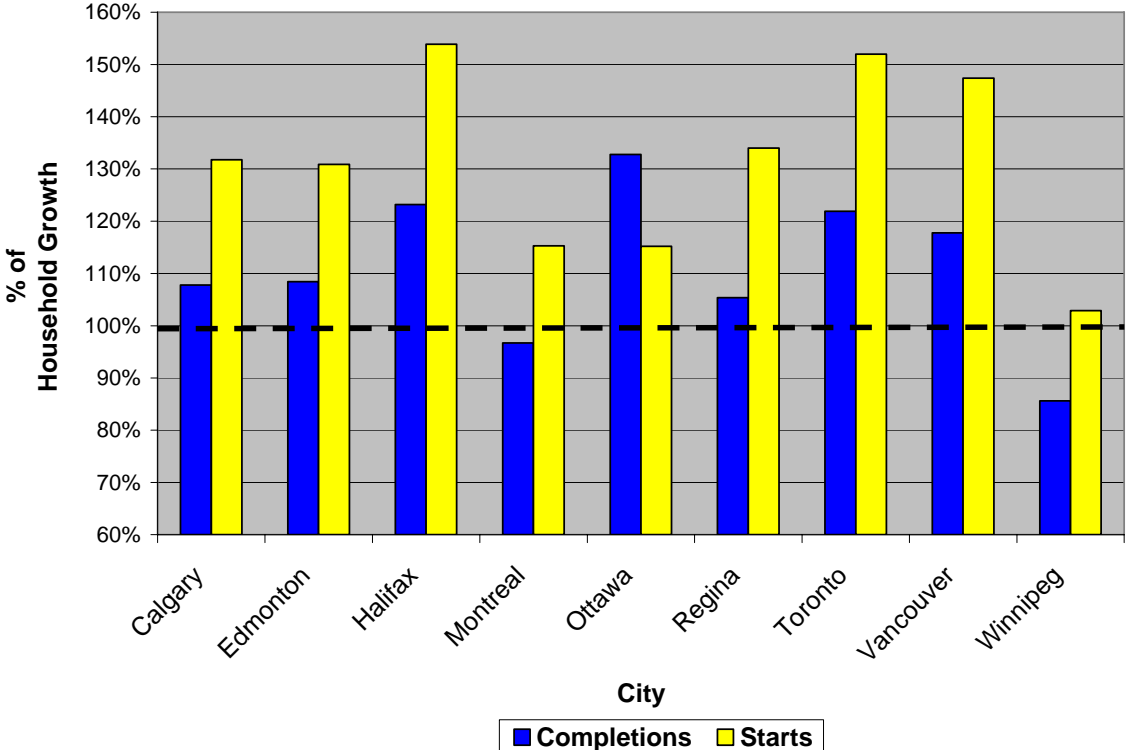
**Figure 3B: Ratio of Unabsorbed Inventory to Absorption of New Units: Eastern Cities**



One concern in some markets is that while units have been purchased, the buyers are not owner occupiers. If markets turn, these investor-buyers might behave in a manner akin to other asset markets, dumping their units to avoid future greater perceived price declines. In contrast, owner occupiers, unless forced to sell, can remain in their units and wait out a weak market. There is much speculation on the percentage of strata title high rise units purchased in cities like Toronto and Vancouver by investors but concrete data remains scarce. One way to address this is to look at the difference between new construction and growth in the number of households. Table 7 compares the growth in households to both completions and starts for the period 2001 to 2006. Starts have exceeded household growth in nearly all cities, and by over 40 percent in Halifax, Toronto, and Vancouver. However, making sense of these numbers can be challenging. Rather than straight investment plays, some of the excess in supply may reflect downtown condos used as a *pied-a-terre*, or units used periodically by non-residents. While sales behaviour for this type of owner should be different than that of straight owner-occupiers, we might also expect them to be more

willing to hold than would pure investors. In Halifax, Ottawa, Toronto, and Vancouver completions exceeded household growth by at least 15 percent over this period.<sup>17</sup>

**Table 7: Market Conditions Relative to Estimated Equilibrium**



Combining the price equilibrium analysis with supply data offers an additional sense of where markets might move. It highlights concerns for Vancouver, which is both out of balance, and has greater potential of being over-supplied. Although the unabsorbed inventory in Regina is low, the imbalance between starts and household growth raises concerns.

**Conclusion**

The rapid price increases in many Canadian cities since 2001 along with the downturn in the US housing market has raised concerns about the future of the markets in Canada. Our analysis suggests that only in Calgary and Toronto are house prices in balance. In other major cities in Canada house prices range from 10 percent overvalued in Vancouver to over

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<sup>17</sup> Counts for starts and completions will differ because completions reflect units started up to two years prior and not all starts are completed, though well over 90 percent are completed eventually (Somerville 2001).



20 percent in Montreal, Ottawa, Regina, and Winnipeg. And following the recent sharp declines in prices, actually undervalued by 10 percent in Edmonton. We use a specific notion of balance, or equilibrium, that the ratio of rent to prices must equate with the sum of mortgage rates and the cost of holding a house, and then minus the expected long run rate of price appreciation. This approach is sensitive to both a correct specification of this long run rate of price appreciation and the assumption that current rents reflect an balanced market.

That house prices are above their equilibrium level does not guarantee that they will fall. Instead the market could return to equilibrium through an extended period of housing price appreciation that is above zero, but below the long run rate. However, the potential for price declines is greatest in cities that have built more units than can be absorbed by the growth in households and those that have a growing inventory of unabsorbed units. Recent data suggests that Vancouver is the most at risk in this regard.

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## Appendix Data Description and Tables

### Rent and Price Methodology

Price data are derived from the survey results in Royal LePage's *Survey of Canadian House Prices*, Q2 2008. This report provides the dwelling price data for each city. We use it along with estimated rents to estimate cap rates by city. The Royal LePage quarterly report surveys seven different types of housing. We use two types: detached bungalow, a 1200 sq.ft. detached, three-bedroom single storey home with 1 1/2 bathrooms and a one-car garage, and the two-storey executive, a 2,000 sq.ft. detached two-storey, four-bedroom home with 2 1/2 bathrooms, a main floor family room, one fireplace, and an attached two-car garage.



#### **1. DETACHED BUNGALOW**

A detached, three-bedroom single storey home with 1 1/2 bathrooms and a one-car garage. It has a full basement but no recreation room, fireplace or appliances. Using outside dimensions (excluding garage), the total area of the house is 111 sq. metres (1,200 sq. ft.) and it is situated on a full-serviced, 511 sq. metre (5,500 sq. ft.) lot. Depending on the area, the construction style may be brick, wood, siding or stucco.



#### **2. EXECUTIVE DETACHED TWO-STOREY**

A detached two-storey, four-bedroom home with 2 1/2 bathrooms, a main floor family room, one fireplace, and an attached two-car garage. There is a full basement but no recreation room or appliances. Using the exterior dimensions (excluding garage), the total area of the house is 186 sq. metres (2,000 sq. ft.), and it is situated on a full-serviced, 604 sq. metre (6,500 sq. ft.) lot. Depending on the area, the construction style may be brick, wood, aluminum siding, stucco or a combination like brick and siding.

Source: Royal LePage, Survey of Canadian House Prices Q2-2008

For rents, we collect listed rents from newspaper classified listings, as well as online classified listings such as Craigslist.ca and Kijiji.ca. We match these to the survey prices by unit type and neighbourhood. We collected the rent data over a five month period (Dec 2007 - May 2008) to ensure a large enough sample. To index this to the LePage price data, we scaled sampled rents by Statistics Canada's Consumer Price Index (CPI) rental Accommodation sub index by city. The rents were adjusted to May 2008, the midpoint from the latest survey from Royal LePage. Rents were then adjusted by October 2007 vacancy rates to reflect expected rent revenue.<sup>18</sup> Sample cap rates are the estimated rents divided by the LePage survey prices specific to each neighbourhood and house type. The market cap rate for a city is the average of these individual estimated cap rates:

$$\text{Cap Rate} = (\text{Expected Rent} * 12_{\text{months}}) / \text{House Price}$$

**Property tax** – For each city, we used the estimated property tax payment by house type and neighbourhood as reported in Royal LePage's *Survey of Canadian House Prices*. Any missing

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<sup>18</sup> We use CMHC reported vacancy rates for three bedroom units in privately initiated rental structures of three units or over.

tax data is extrapolated using the CPI property tax sub-index by city. This is converted to a rate as a percentage of house value. We use the average rate over 2002-2007.

**Owner's insurance** – Initial levels are calculated by a phone survey of insurance rates for a typical house across the Canadian cities. We index the base year data using the city specific Statistics Canada CPI for Homeowners' Insurance Premiums. This is converted to a rate as a percentage of house value. We use the average rate over 2002-2007.

**Maintenance costs** – We use American Housing Survey and CMHC data on average minor and major maintenance expenditures. The average routine expenditures for 2005 from the American Housing Survey is \$US 1,564. We convert this to Canadian dollars and inflate through 2008 using the CPI 2001 basket, Homeowners' maintenance and repairs sub-index (Cansim II series V737431). This gives us a national average for 2007. We then adjust across cities using the 2007 Altus Helyar by city construction cost per square foot for single family units. Dividing by 2007 house value gives us a routine maintenance percentage cost for 2007, which we use for our 2008 data. For major maintenance we use the CMHC's *Renovation and Home Purchase, 2007*. Using the percentage of surveyed families who have these expenses by city we convert this to an expected by year amount, and as with routine maintenance divide by the 2007 house price to get a percentage we use for 2008.

**Depreciation** - For depreciation we use the Harding, Rosenthal, and Sirmans (2007) finding that 3 percent is the rate that shows up in the price data. We apply this to structure value to estimate the structure value for each city. To do so we combine the construction costs for new units from Altus Helyar, this rate, and the vintage of the housing stock (based on census data on the age of units by city). We multiply this estimated structure value by 3 percent and divide by the current house value to get a depreciation percentage.

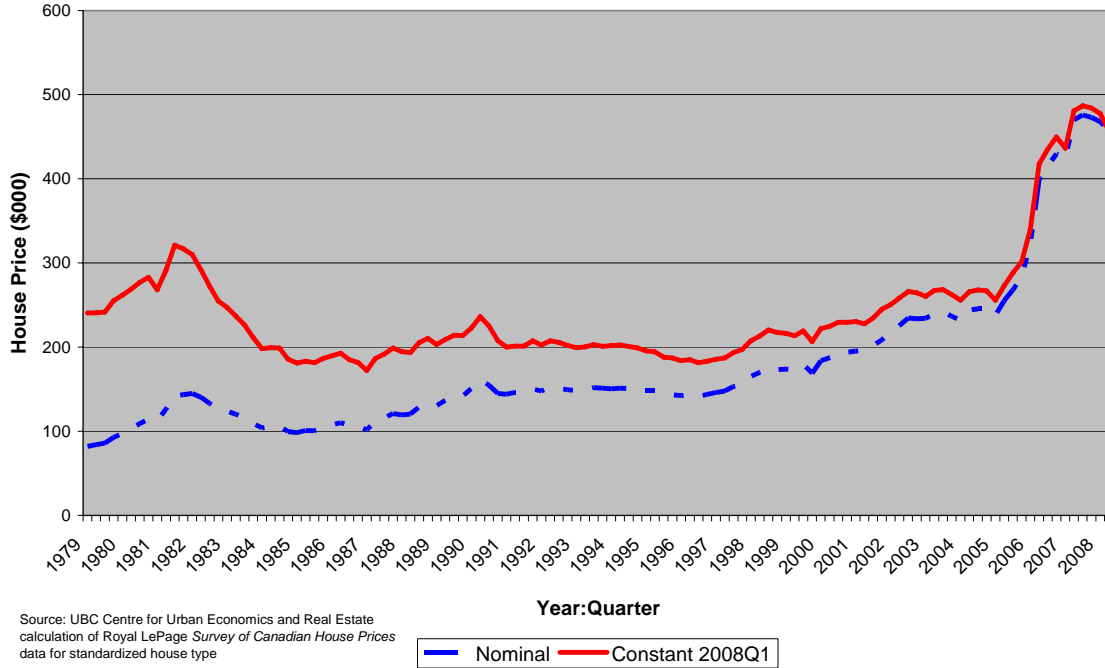
**Mortgage rates** - Rates for five year mortgages as listed by the Bank of Canada.<sup>19</sup> We use the listed rate for conventional five year mortgages, even though it averages 18 basis points higher than the average rate because we are calculating this for a 100% LTV mortgage. We also apply the CMHC insurance premium.

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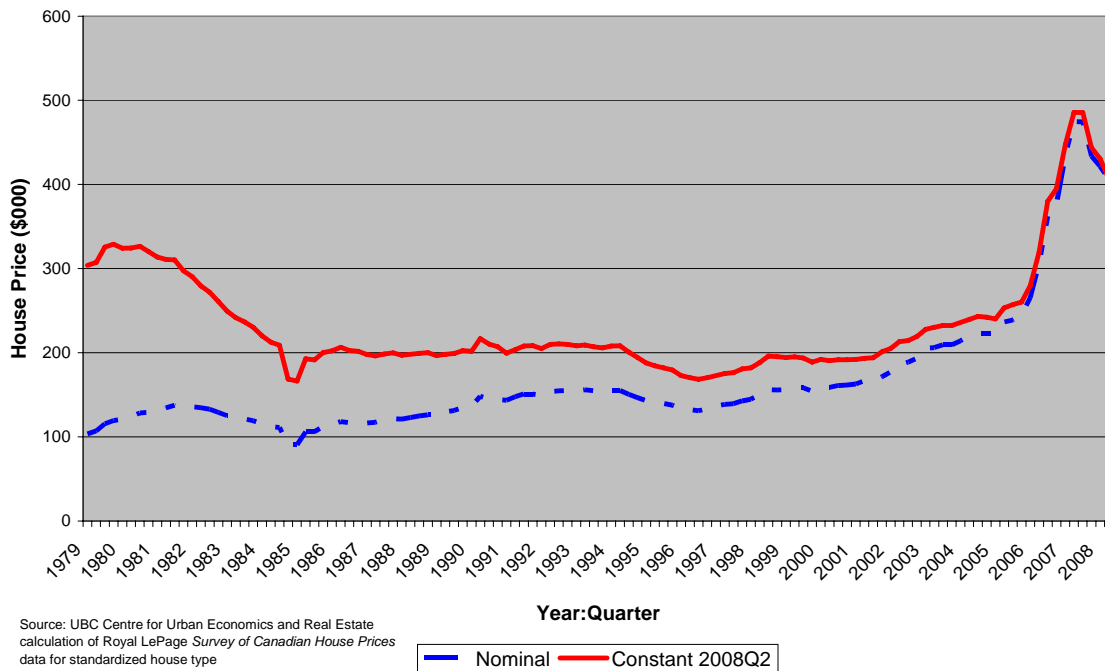
<sup>19</sup> See <http://www.bankofcanada.ca/en/rates.htm>

**Figure A-1: House Prices by City (Nominal and Real 2008Q2 Dollars)**

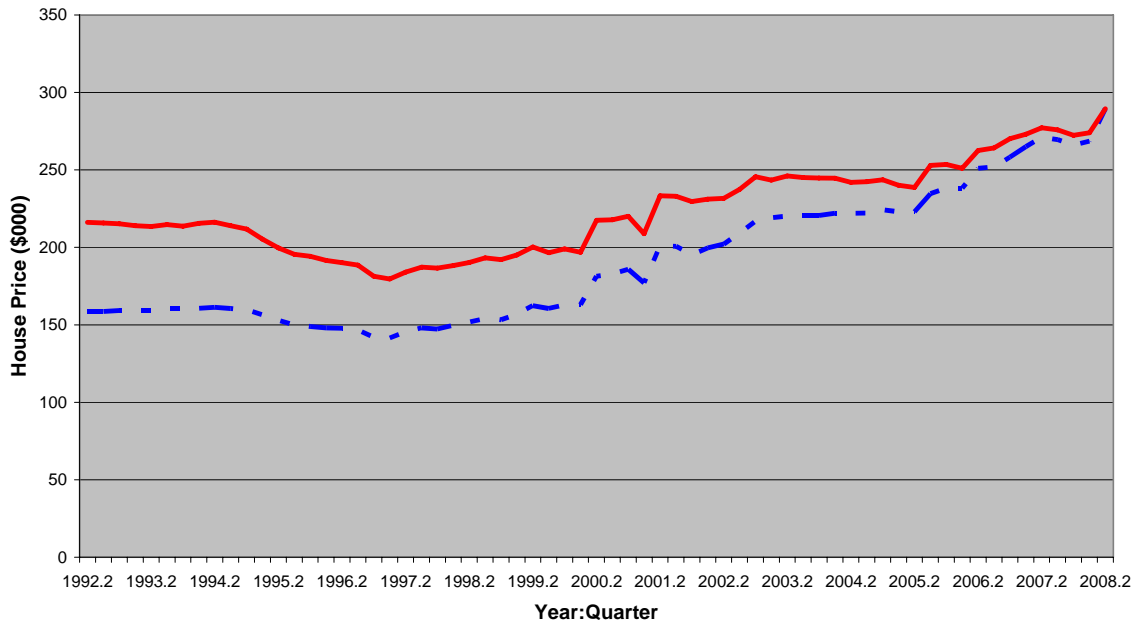
**Calgary House Prices**



**Edmonton House Prices**



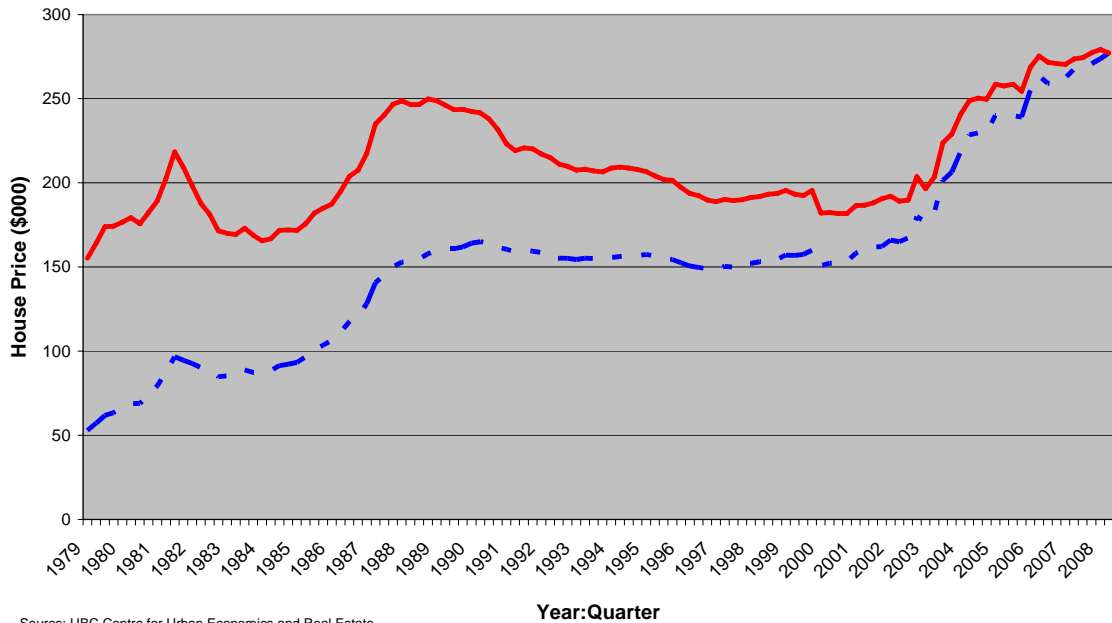
### Halifax House Prices



Source: UBC Centre for Urban Economics and Real Estate calculation of Royal LePage Survey of Canadian House Prices data for standardized house type

— Nominal — Constant 2008Q2

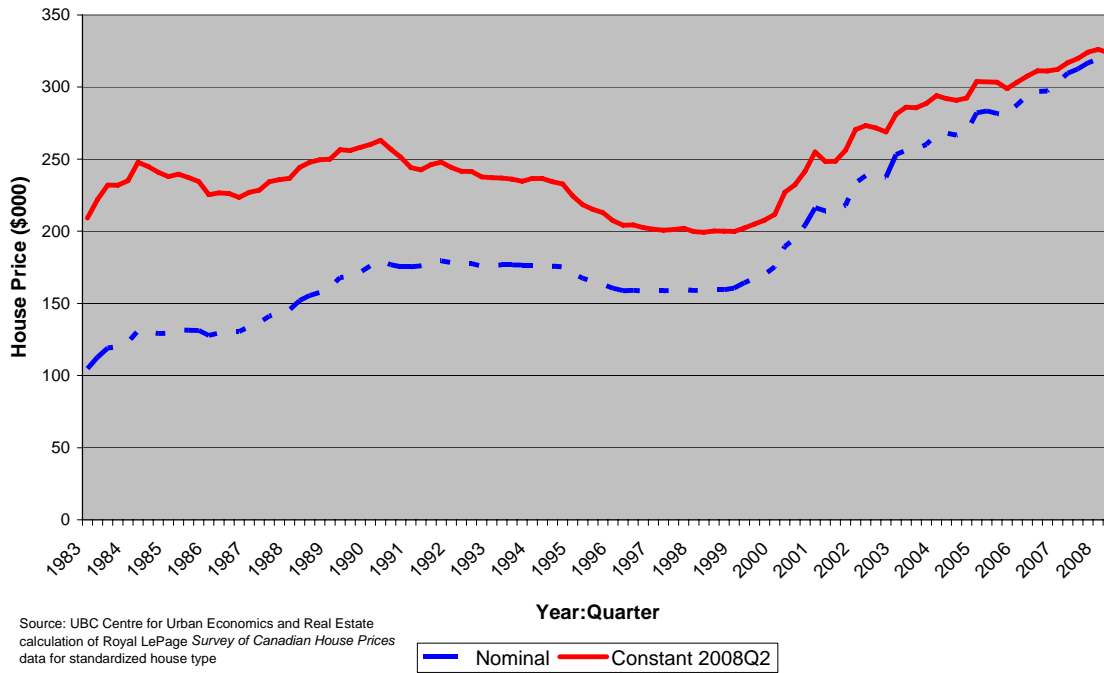
### Montreal House Prices



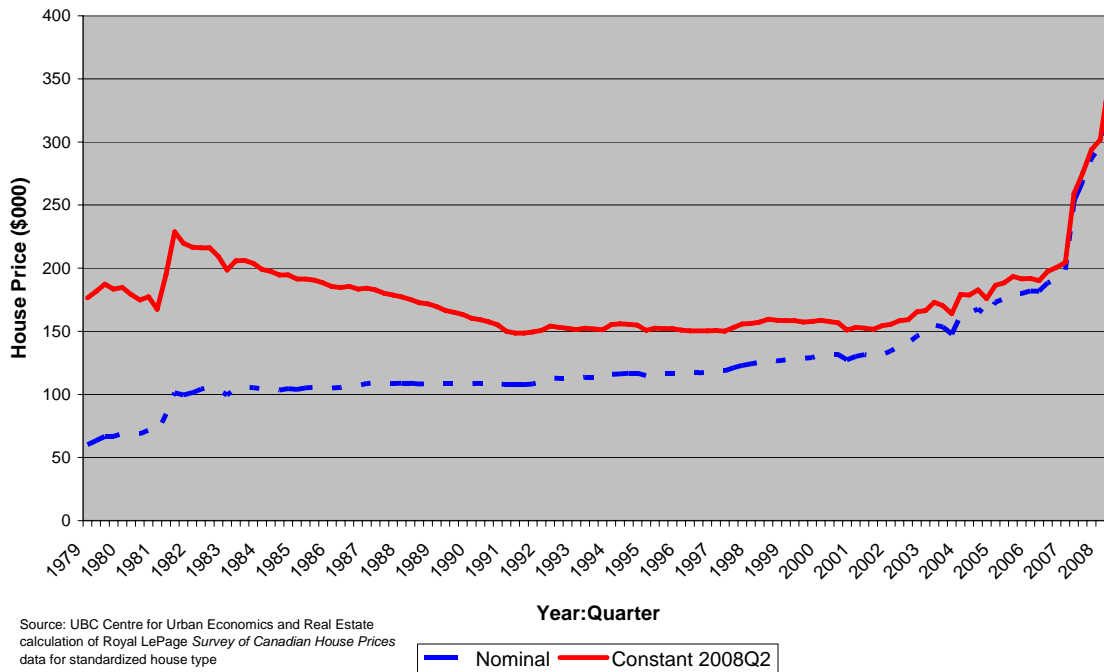
Source: UBC Centre for Urban Economics and Real Estate calculation of Royal LePage Survey of Canadian House Prices data for standardized house type

— Nominal — Constant 2008Q2

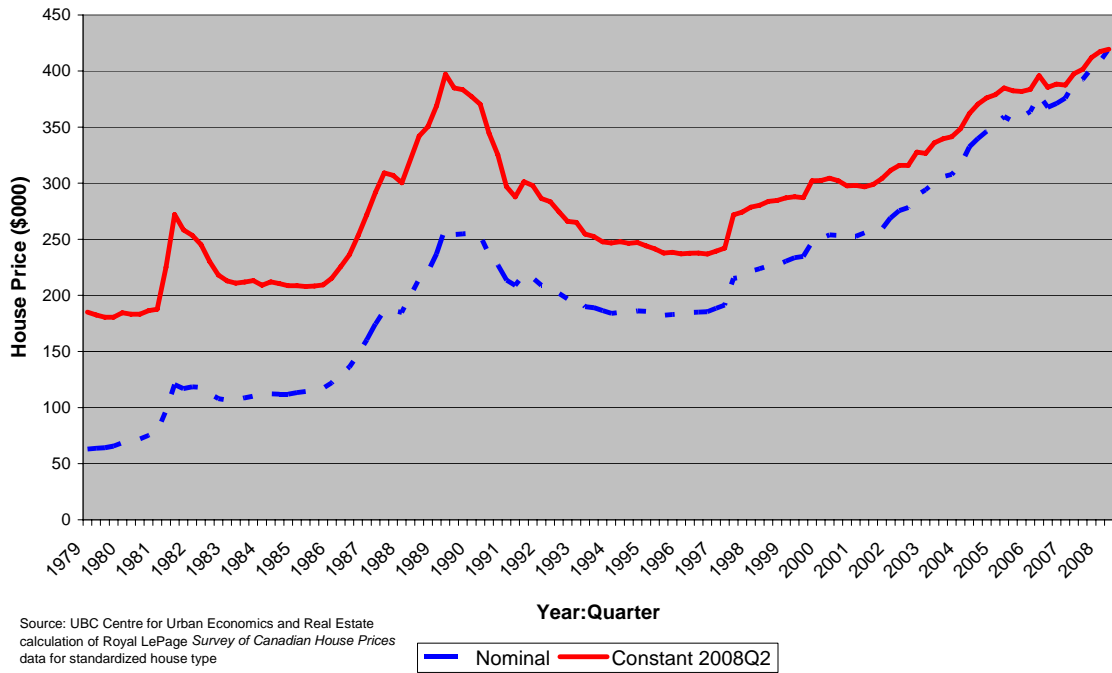
### Ottawa House Prices



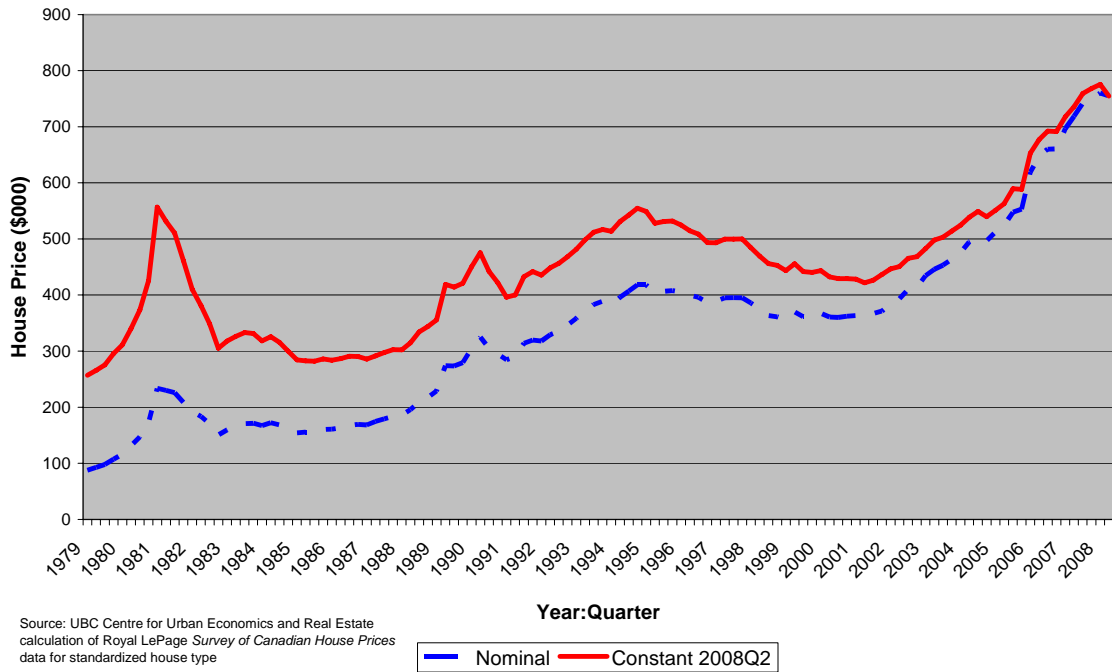
### Regina House Prices



### Toronto House Prices

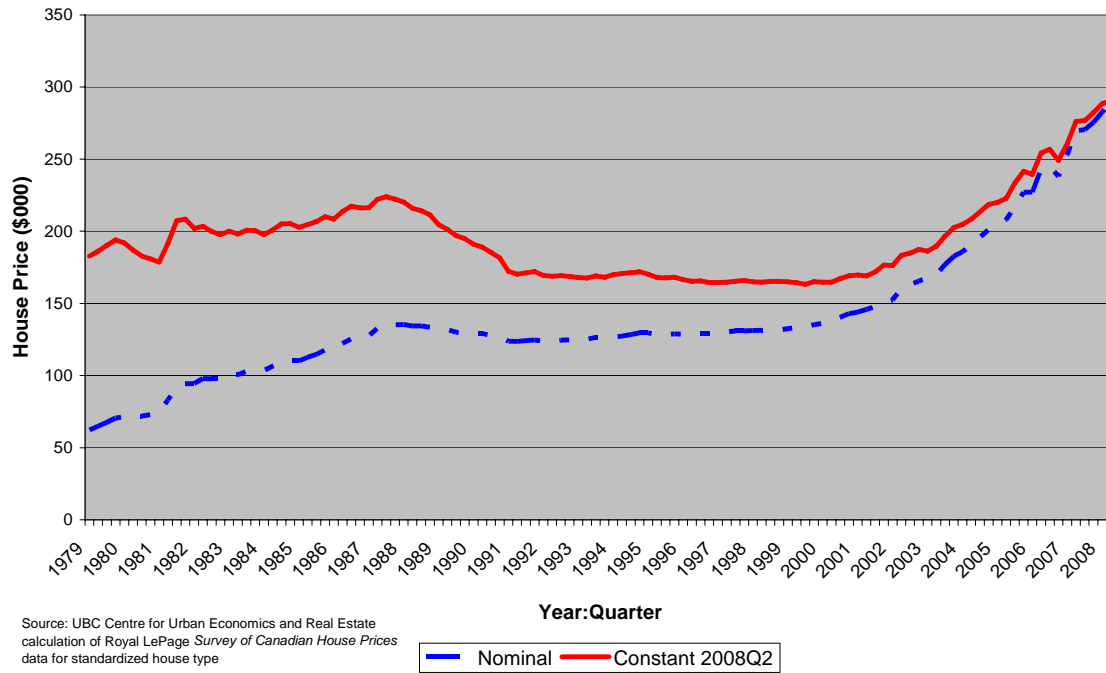


### Vancouver House Prices

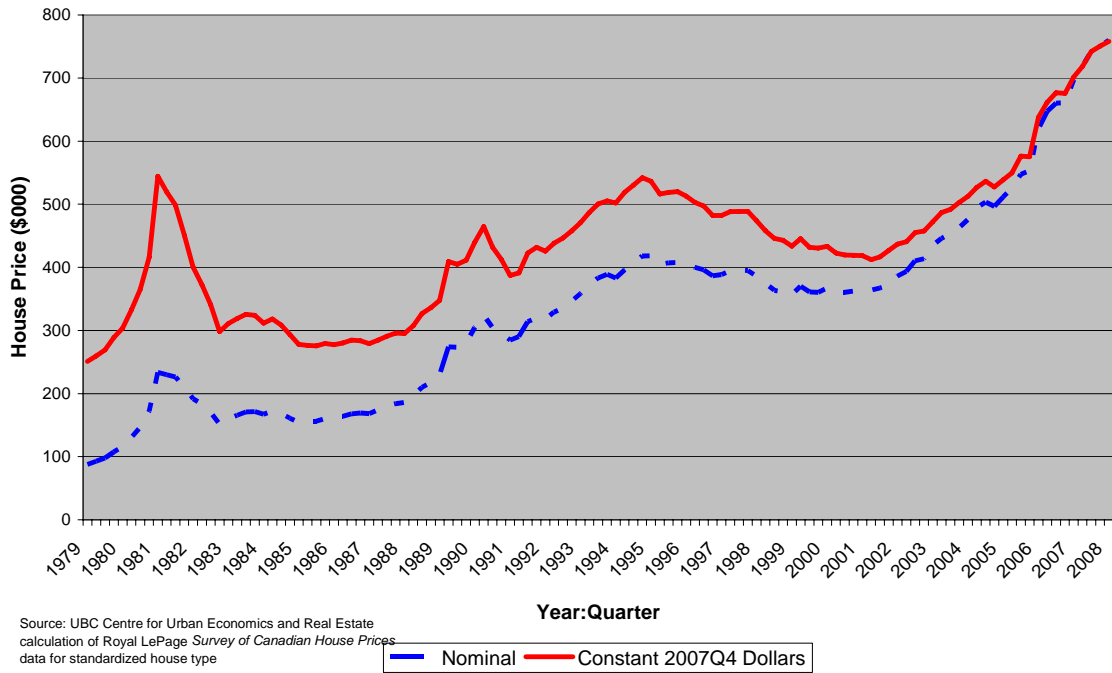




## Winnipeg House Prices



### Vancouver House Prices



### Winnipeg House Prices

