Existence of Regionality within the BC Housing Market

by

Lyndsey Rolheiser

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Name: **Lyndsey Rolheiser**

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Examining Committee:

Chair: **Simon Woodcock**
Assistant Professor, Department of Economics

Geoffrey Dunbar
Senior Supervisor
Assistant Professor, Department of Economics

Stephen Easton
Supervisor
Professor, Department of Economics

David Jacks
Internal Examiner
Assistant Professor, Department of Economics

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Abstract

This paper analyzes the dynamics of the British Columbia housing market from 2005 to April 2008. The dataset allows for an investigation into the differentiation in prices that occurs within housing type (single family homes and condominiums) between regions of the province using dynamic panel analysis. Further, the Kolmogorov-Smirnov two-sample test is used to investigate the possible differences in distributions across housing type, regions and time. Significant differences in the variation of housing prices is found across regions and housing types.

Keywords: Housing Price Distribution; Regionality.

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1 Introduction

One of the single most important household assets is housing. According to Canada's Office of Consumer Affairs, in 2001 principal residences made up 42.3% of all household assets. With such a large portion of a household's wealth invested in housing, it would seem important to understand the dynamics of the housing market. However, very little is known about regional effects in housing. This thesis exploits a novel dataset to uncover some facts about the dynamics of, and regional variation in, housing prices in British Columbia.

Housing is an asset with a number of undesirable properties from the perspective of an investor. It is a risky asset with low liquidity and high transactions costs. Unlike other risky assets, the risk involved is, for the most part, undiversifiable. It is typically not possible for homeowners to purchase insurance against changes in the value of their house either by purchasing insurance directly or by purchasing a bundle of assets to hedge the changes in housing prices. For example, consider a $ 500,000 home with a down-payment of 20 % ($ 100,000). If there is a 20% decrease in the value of a house then a homeowner wishing to sell stands to lose the entire down-payment of $ 100,000. There are few assets easily traded that would insure a homeowner against this type of risk.

Low liquidity is another unwelcome property of housing as an asset. One measure of the liquidity of the housing market is the length of time a house is expected to stay on the market before it is sold. During boom times, houses that are listed for sale may sell in a matter of days but in lean times, houses may go unsold for months. While the liquidity of housing is partly driven by prices – a low priced home is likely to sell faster than a high priced home – there are still periods of high demand and low demand that affect liquidity. Thus a homeowner wishing to sell may not always be able to sell at the time he or she desires.

The transaction costs of buying and selling a home are also relatively high. Transaction costs for a real-estate transaction include realtor fees, legal fees, property transfer taxes, potentially capital gains taxes and even simply moving costs. These fees can add tens of thousands of dollars to the transactions price of a home. For instance, in British Columbia the property transfer tax rate is 1% on the first $200,000 of the value of the property, plus 2% on the value over $200,000. Thus the tax on a $500,000 home is $8000 and must be paid in full at the time of purchase. This amount does not include (perhaps implicit) realtor fees, legal fees and moving costs that may in total be equally as high.

A final undesireable feature of housing is that it is physically fixed in a particular location. Indeed, the popular adage concerning the desirability of housing as an asset is: Location, Location,

Location! This feature of housing suggests that geographic factors can be significant in determining the price of a house. As an example, consider a one-industry town. During boom times, the price of housing can rise as labour demand increases the wage and, through migration, the supply of labour. During down times, the price of housing can fall as wages fall. This simple but realistic example suggests that geographic factors may be crucially important in determining housing prices. In addition, one interesting question is whether the distributions of housing prices change in similar ways across regions.

Understanding housing price dynamics is important for social policy. Housing price changes can enrich or impoverish home-owners and their families. Also, the distribution of housing prices in a region is a key measure of housing affordability. Typically the only available data for housing prices in BC are the mean (or benchmark) price. This information is not, by itself, particularly useful for policy makers. For instance, if all houses in a region trade at the mean (benchmark) price then housing may be unaffordable for families of less than the mean income (and wealth). But if houses trade at different prices (around the mean price) then housing may in fact be affordable for all families. The variance of housing prices is one measure of the range of prices in a given region. If the variance of housing prices becomes smaller then this suggests that housing prices are trading closer to the mean price and that housing may become unaffordable for some.

In their 1999 paper, Gyourko and Tracy find that the price of constant quality housing bundles have continued to increase over time. They further suggest that "affordability decreases as one moves down from the median home buyer" (1999). This implies a tight distribution around the median. The actual cause of the decrease in affordability is examined by Glaeser and Gyourko (2003). They identify policy issues concerning zoning as the main driver of the decrease in affordabilty. Zoning policies are likely not the only policies that have a large impact on affordability.

Policy changes in either taxes or mortgage rates affect housing prices in theory and lead to changes in the distribution and dynamics of housing prices. There have been a number of such policy changes in recent years: the property transfer tax waiver limit was increased for first-time home buyers in 2007; the Canada Mortgage and Housing Corporation extended the amortization term and lowered the required downpayment percentage several times in the early 2000s, and; capital gains taxes on secondary property changed during the 1990s. Understanding how policy changes have affected prices would help to understand how those changes redistribute wealth in the economy.

Previous studies have shown that regional factors do effect the dynamics of GDP, and more specifically housing prices. Wakerly *et al.*(2006) investigate regional movement of GDP within Canada and find evidence of nonconvergence among the regional GDP average growth trends. In a similar

spirit, Allen et al. (2006) show that average housing price movements in a subset of Canadian cities do not exhibit strong similarities. However, neither paper considers changes in the distributions of GDP and housing prices. Indeed, it seems unlikely that the variance of either distribution can be assumed constant over time, across regions and housing types. Thus, the sampling framework underlying each study may drive the results. In fact in this paper I show that the housing price distributions in BC differ across regions and also by time.

There are a number of papers that consider the spatial and temporal autocorrelation of housing prices in models that try to estimate the 'fundamental' price of housing, for instance: "The Dynamics of Location in Home Price" by Gelfand *et al.* (2004) and "Analysis of Spatial Autocorrelation in House Prices" by Basu and Thibodeau (1998). Gelfand et al. employ single sales and repeat sales data to show the importance of spatial variation when calculating a housing price index. Basu and Thibodeau use individual transaction data to estimate a hedonic house price equation and find evidence of spatial autocorrelation. In this paper, I do not attempt to estimate a 'fundamental' price for housing for two reasons. First, the regional data I collect while rich, lacks sufficient detail to control for many characteristics that are assumed to be important in these studies. Second, the goal of this paper is not to develop a forecasting model of housing prices but rather to determine whether housing prices exhibit differences across regions (in BC) that may be important for policy.

The paper continues as follows. In Section 2 I describe the dataset used and describe how the characteristics of the housing distributions differ across British Columbia. Specifically, I examine differences in the movements of mean prices, number of sales and the variance of prices. Section 3 describes differences over time in relative characteristics of condos and houses at the provincial level. Section 4 describes differences over time and across housing types at the regional level. In last section, section 6 a dynamic panel model is used to further investigate the differentiation among regions and housing types.

2 Housing Price Data for BC

Regional housing data is difficult to come by. Data that is made publicly available by local real estate boards typically consists of, at most, simple statistics from the past few years. Statistics typically provided include mean price and number sales; however, a benchmark price may be used in place of mean price. A benchmark price is defined as the selling price of a representative property and is not necessarily a mean price. Further, how the benchmark price is calculated may or may not be divulged. For annual or monthly comparison purposes a housing price index based on a representative

property is usually presented. Consistently missing from public data is a measurement of variance within housing prices. This statistic is essential in many areas of research. For example, when analyzing housing affordability the variance of prices is as important as a measure of the mean price. Variance is also necessary in determining whether increases in mean prices reflect a true trend in the underlying process or just a sampling error.

Publicly available data is lacking, but where there is public data there is private data. Real estate boards retain detailed transaction level data. Access to this level of detail would allow for a full characterization of the housing market. The Vancouver, Edmonton, and Calgary real estate boards were contacted during the research for this paper. All boards were unwilling to offer access to private data without proof of membership with the board.

One avenue not usually thought of when trying to collect housing data is BC's Ministry of Small Business and Revenue (MSBR). The MSBR administers a tax known as the property transfer tax. When there is a change to any certificate of title with the Land Title Office (ie. when property is purchased) this tax must be paid or an exemption granted. A sample of the general form is seen in Figure 8.1 in Appendix A.

The data collected from the form is rich with potential. The amount of the transaction is recorded, as well as financing information (amortization period, renewal term and interest rate) and transaction type (agreement for sale, life estate, foreclosure, lease, etc.). With respect to regional studies, this information may be a valuable source of both real estate prices and mortgage financing.

I contacted the Director of Audit and Compliance (Property Taxation branch) and spent several weeks writing a request for the data. Several follow-up contacts were made during the period of July 2008 to September 2008 and the effort resulted in four years (2005-2008) of housing price data for all regions in BC and all housing types. Thus the data represents the entire population of residential real-estate transactions in the province during the period.

The MSBR's property transfer tax records date back to 1988; meaning every transaction within BC since 1988 has been recorded. However, because of possible privacy violations the MSBR will not disclose data at the individual transaction level. In addition, data from before 2005 are deemed unreliable and not released by the MSBR for reasons undisclosed.

The actual data set provided by the MSBR for this research is on an annual basis for the years 2005 to 2008, with 2008 only consisting of data collected from January to March. The data is reported at the regional level and is grouped by housing type (single family and condominiums). The 19 regions are as follows: Burnaby/New Westminster, Capital, Cariboo, Courtenay, Central Vancouver Island, East Kootenay, Fraser Valley, Kamloops, Kelowna, Nelson/Trail, North West,

North Shore/Squamish, Peace River, Penticton, Prince George, Richmond/Delta, Surrey/Whiterock, Vancouver, and Vernon. Because of privacy concerns, the MSBR has grouped individual transactions into bins to avoid disclosure of individual transactions. The bins are $25,000 in range beginning at $1-$25,000 and ending at $475,000-$500,000. After $500,000, the last two bins are $500,000-$1,000,000 and $1,000,000+. The number of sales and total sales value within each bin are provided.[1] The mean price and number of sales for the entire province are also reported by the MSBR and presented in Table 2.1 below.

Table 2.1: Provincial Summary Statistics with Vancouver and North Shore

	year	Mean Price	Yr/Yr Change (%)	# of Sales	Yr/Yr Change (%)
Combined Housing	2005	$265,898	-	92,202	-
	2006	$309,915	16.55%	108,970	18.19%
	2007	$364,749	17.69%	97,279	-10.73%
	2008	$423,630	16.14%	99,899	2.69%
Single Family	2005	$285,705	-	66,749	-
	2006	$331,588	16.06%	77,689	16.39%
	2007	$390,344	17.72%	69,410	-10.66%
	2008	$457,552	17.22%	68,988	-0.61%
Condo	2005	$213,955	-	25,453	-
	2006	$256,089	19.69%	31,281	22.90%
	2007	$301,002	17.54%	27,869	-10.91%
	2008	$347,921	15.59%	30,911	10.92%

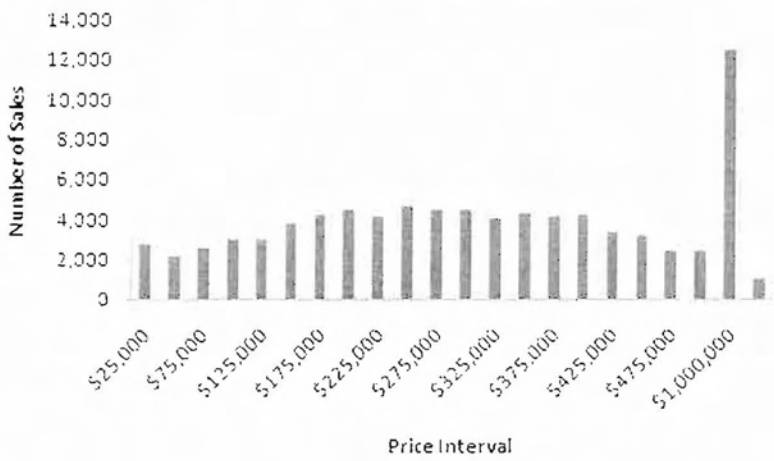
2.1 Characterizing the Distribution of Prices

While the mean price and sales volume changes in BC paint a picture of rising home prices and volatility in sales, the reason(s) for the changes are unclear. The increase in mean price may reflect fewer sales of low quality homes or more sales of higher quality homes. Figure 2.1 shows the distribution of housing prices for the province in 2007. Similar data are available for other years of the survey. The availability of distributional data suggests that other moments of the data can be calculated and that the behavior of these moments can be examined.

Since any distributional analysis relies on the ability to characterize the moments of the distribution, the right tail is an obvious hinderance. The bin width (in terms of price) is roughly twenty times as large as the lower price bins. A solution to similar tail problems used in other disciplines is the fitting of a Pareto distribution to the questionable tail. A Pareto distribution, illustrated in (Figure 2.2), is commonly used to describe the allocation of wealth as well as many other social, scientific and geophysical phenomena. For example, Klass *et al.* (2006) find that the top end of the wealth distribution in the US can be estimated using a Pareto distribution. Given number of sales and total

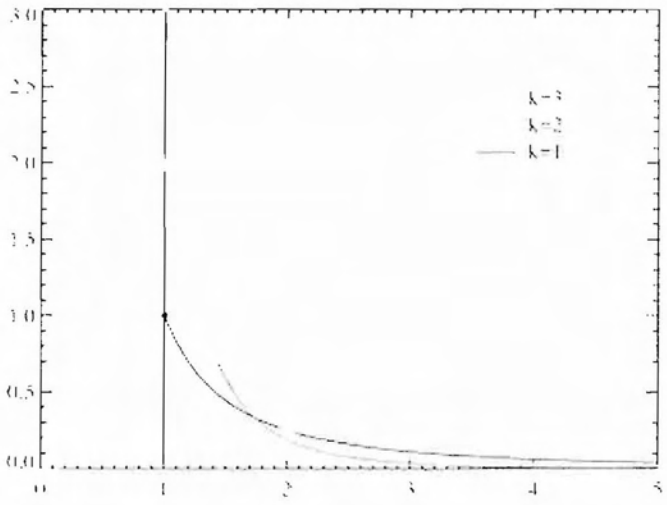
[1]Statistics describing the raw data released by the MSBR are presented in Appendix A.

Figure 2.1: 2007 Combined Housing Distribution



value of transactions in the last two bins, the mean price over the two bins is know. The Pareto distribution is a simple distribution to work with in that it only consists of one parameter which can be calculated using the known mean and the expectation equation. I choose to approximate the data in the final bins using the Pareto Distribution.

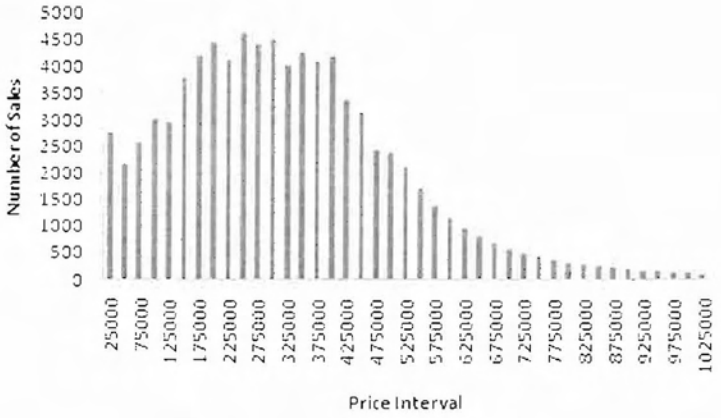
Figure 2.2: Pareto Distribution `http://englishrules.blox.pl/resource/Pareto.png`



The probability density function (PDF) of the Pareto distribution for a variable x is described by:

$$\Phi = f(x;\theta) = (\theta x_0^{\theta})x^{-(\theta+1)}, \theta \in \mathbb{R}_+, x_0 > 0, x \geq x_0 \tag{1}$$

Figure 2.3: 2007 Distribution with adjusted tails



where θ is a parameter controlling the moments of the distribution. The variable x has an expected value

$$E(X) = \frac{\theta x_0}{\theta - 1}, \tag{2}$$

and variance

$$Var(X) = \frac{\theta x_0^2}{(\theta - 2)(\theta - 1)}. \tag{3}$$

The parameter θ is sometimes called the Pareto index. The mean across the last two bins can be calculated from the total number of sales and the total sales value and thus θ can be determined (with the lower bound x_0 =500,000). The PDF is used to calculate the proportion of total sales for each bin of length \$25,000 from \$500,000 to \$1,025,000. The resulting distribution is seen in Figure 2.3.

When calculating the variance of a distribution, all other bins are "collapsed" to a single value (mean price within the bin) and are given a weight relative to the number of sales within the bin. Uniformity is assumed within the estimated bins, mean price within these bins is calculated as $\frac{a+b}{2}$ with upper and lower bounds a and b. Estimated means are also given a weight relative to the estimated number of sales within the bin. The overall variance is the weighted average of the variance from the right tail and the remaining bins.

3 Housing Price Dynamics in BC

As a first step, the distribution of housing prices is examined at the provincial level. Over the past few years, news media has bombarded the public with reports of increasing housing prices. This section will investigate whether or not other moments of the housing price distributions are changing as well. As previously mentioned, there are many implications of changing distributions; particulary with respect to variance. In particular, if mean housing prices increase and variance decreases housing affordability has likely fallen.

This section summarizes the provincial level data. Statistics of interest include overall mean price, coefficient of variation (CV) and total number of sales. The CV statistic is the standard deviation of prices divided by mean price and is used in place of the variance for ease of comparison. Unlike the variance, the CV is directly comparable across distributions that have different mean prices. The analysis at the provincial level compares housing price distributions in two ways. The first is to compare the distribution of housing across years for the same type of housing, *e.g.*: all housing, single family dwellings and condos. The second method of comparison is across housing types within a given year, *e.g.* comparing the distribution of single family homes to condos in a given year.

The regions of Vancouver and North Shore/Squamish present a problem in terms of calculating variance. The majority of each region's distributions lie in the last 2 bins and therefore it seems unreasonable that a Pareto distribution can be applied. Analysis of housing prices in regions with no sales in the final two bins suggests that it is reasonable to conclude that the tails of the distributions are approximately Pareto. However, the same analysis suggests that the entire housing price distributions are, in general, not well approximated by the Pareto distribution. Without any further information about the breakdown within these bins, it is nearly impossible to conclude anything about the variance. For this reason, subsequent analysis considers only 17 regions (omitting Vancouver and North Shore/Squamish). There appears to be no significant difference in the direction or magnitude of percent changes in the statistics of interest with and without the inclusion of Vancouver and North Shore/Squamish regions.

3.1 Combined Housing Distribution Facts

Figure 3.1 presents the combined housing distributions for condos and single family dwellings. There is an obvious shift in the distribution from year to year. The annual percent change in the mean from year to year is roughly 17%, 18%, and 15% for 2005-2006, 2006-2007 and 2007-2008 respectively[2].

[2]see Table 8.1 in Appendix A for data

Figure 3.1: Annual provincial distribution for combined and separated housing type

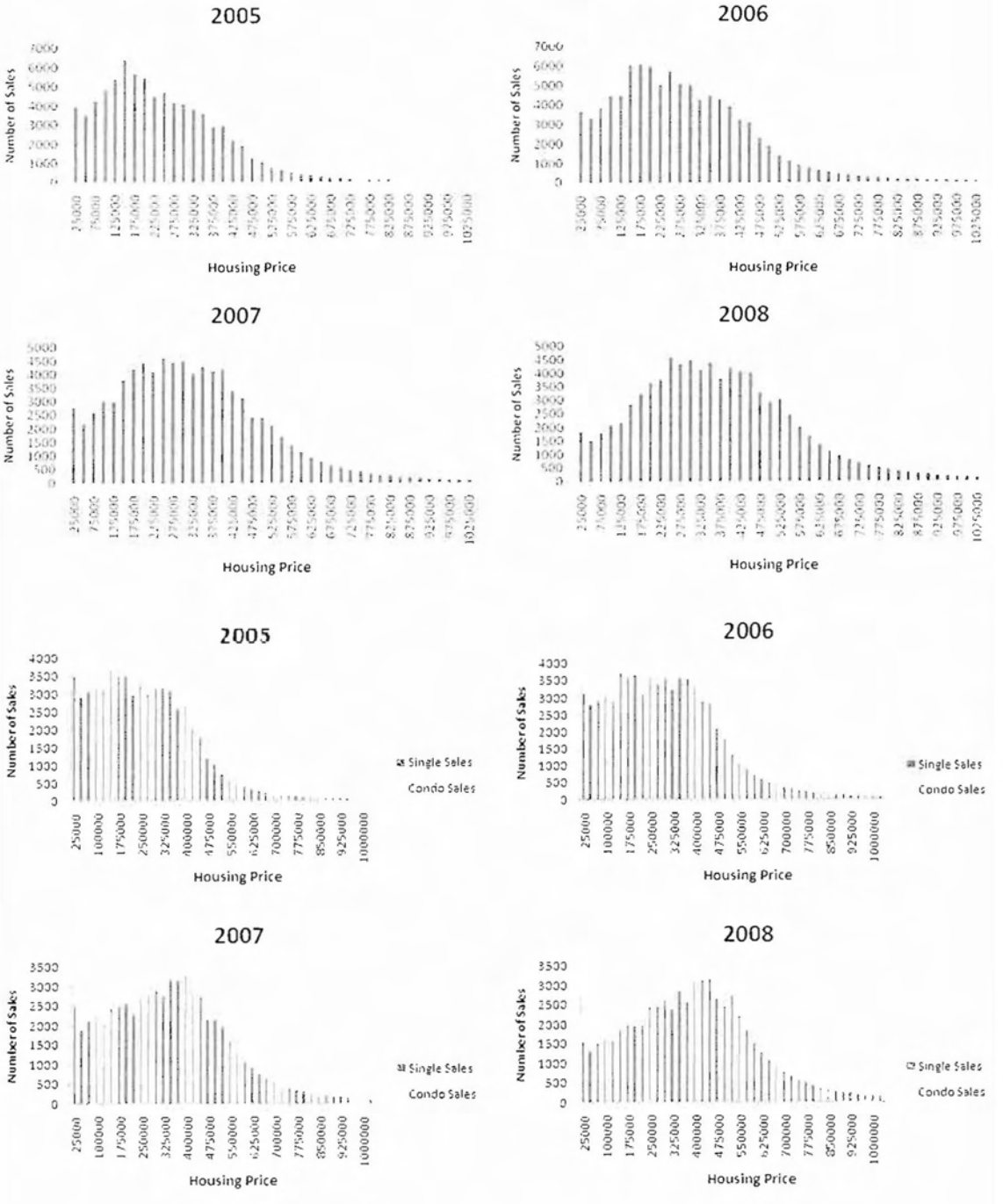


Table 3.1: Kolmorgorov-Smirnov Two Sample Test: combined housing equality over time

Distribution	Test Statistic	Critical Value
2005-2006	0.014	0.008
2006-2007	0.103	0.008
2007-2008	0.068	0.008

There is also a tightening in the distribution taking place; the CV percent change is -6.0%, -6.6%, and -10.0% for 2005-2006, 2006-2007 and 2007-2008 respectively. As well, the skewness of the distribution is positive (skewed to the right) and is decreasing by -0.21%, -0.35%, and -0.49% for 2005-2006, 2006-2007 and 2007-2008 respectively. The decrease in skewness indicates that observations in the right tail are becoming less and less extreme. The changes in the CV and skewness suggests that housing affordability is dropping over the time period considered.

There is almost a 17% increase in sales from 2005 to 2006, followed by a decrease of roughly 10% from 2006 to 2007. 2008 only contains data from January to April but still posts a 2% increase in sales over 2007. Historically the average annual change in number of sales from 1995 to 2005 was 7.3% (BCstats).

3.1.1 Distributional Comparisons

Using the Kolmorgorov-Smirnov (KS) two sample test, I test for the equality of the combined housing distribution from year to year. The KS test considers the distance between the cumulative distribution function from 2 samples. Bartels et al. state that although this test is typically used with continuous data, it can be applied to discrete data. Significance values of the test statistic will be conservative in this case. As previously stated, the means are increasing substantially over time and so the KS test should reject the assumption of equality across years. However, we are concerned with the shape of the housing price distribution. As a result each distribution is re-centred around it's respective mean. The Kolmorgorov-Smirnov test applied to the re-centred data will test for differences in moments excluding the first moment. The null hypothesis is the equality of the two distributions. Table 3.1 contains the test statistics and critical values at the 1% level for the tests comparing 2005 to 2006, 2006 to 2007, and 2007 to 2008. All tests reject the null hypothesis, meaning the distributions cannot be assumed to be equivalent over all years. So in fact the changes in the CV and skewness previously referred to are substantial enough to cause the distribution to change significantly over time.

Table 3.2: Kolmorgorov-Smirnov Two Sample Test: single family equality over time

Distribution	Test Statistic	Critical Value
2005-2006	0.024	0.009
2006-2007	0.043	0.009
2007-2008	0.038	0.009

3.2 Single Family and Condo Distribution Facts

The distributional shift seen in Figure 3.1 for combined housing is also apparent in the distributions for condos and single family homes. In each year, the mean price for a single family home is consistently above the mean price for condos[3] Typically the purchase of a single family home includes the value of the land it sits on, whereas the purchase of a condo reflects just the price of the condo. The consistent difference between single family means and condo means may reflect the inclusion of land value within the single family purchase price. Thus the difference in mean prices also represents a change in land value. Percent change in the mean price from year to year is in the high teens for both types.

Both single family and condos exhibit decreases in the CV over time, with larger annual decreases in the single family CV for all years. Single family and condo distributions are becoming more narrowly distributed around the mean, again raising concerns about the affordability of both housing types.

Percent change in sales for each housing type are similar to the combined percent changes. The increase from 2005 to 2006 is 17% and 18% for single family and condo respectively. Both types have about a 10% decrease the following period but it is in the last period that they diverge; single family sales continue to decrease while condo sales increase. Since 2008 only contains data from the first 3 months, not much can be said about the change in sales from 2007 to 2008. Single family sales fell by 2% but whether this is significantly different from the first 3 months of 2007 it is not known. Sales of condominiums in the first three months of 2008 were 12% higher than sales over all of 2007.

3.2.1 Distributional Comparisons

The KS two sample test on demeaned data across years is repeated for each housing type. Table 3.2 and Table 3.3 contain the test statistics and critical values at the 1% level for the single family and condo comparisons across time. All comparisons for single family reject the null hypothesis, implying that the single family distribution is changing over time. The condo distribution also does not remain the same over all periods tested; all tests reject the null hypothesis.

[3]See Table 8.1 of Appendix A for summary statistics.

Table 3.3: Kolmorgorov-Smirnov Two Sample test: Condo over Time

Distribution	Test Statistic	Critical Value
2005-2006	0.078	0.016
2006-2007	0.061	0.015
2007-2008	0.036	0.015

Table 3.4: Kolmorgorov-Smirnov Two Sample test: Single Family vs Condo

Year	Test Statistic	Critical Value
2005	0.149	0.011
2006	0.138	0.012
2007	0.106	0.013
2008	0.108	0.013

The differentiation between the two housing types can be further tested, again using a KS test. This time the null hypothesis is the equality of the single family and condo distribution within each year. Table 3.4 contains the test statistics and critical values at the 1% level. The null hypothesis is rejected for all years; therefore, single family and condo housing price distributions are not equivalent.

While determining the reasons for the distributional differences is beyond the scope of this paper, a few possible explanations are:

There may have been a widespread change in individual (or household) preferences towards housing types. For instance, the changing age profile of the Canadian population may have lead to a change in the demand for a particular type of housing.

There may be a change in the value of land for reasons unrelated to housing demand. For example, changes in zoning regulations, changes in property taxes, geography and migration could all affect the price of land without changing the value of housing structures.

There may be changing regional differences with respect to housing type. For example, more single family homes may have been sold in some regions then in others.

While this paper is silent on both the first and second explanations, the dataset used in this paper allows for some examination of the third. In the next section, I examine distributions of housing prices across regions and across housing types within each region.

4 Regional Overview

The regions considered in this analysis span the entire province. Figure 8.2 in Appendix A is a provincial map outlining the regions within the data set.

Vast geographical differences exist between the 17 regions. There are 7 different geographical/climatic zones within BC ranging from temperate rainforests to dry plateaus. The differing geography from region to region plays a major role in population density. The largest regions considered are the North West and Peace River. The combined population of these regions was roughly 300,000 in 2007 (BCstats). In contrast, the smaller more densely populated regions that lie along the Fraser River and the Pacific coast (Burnaby/New Westminster, Richmond/Delta, Surrey/Whiterock, Fraser Valley) had a combined population of over 1.7 million in 2007(BCstats). Geographical differences alone are enough to argue the existence of varying housing price distributions among the 17 regions. The following two sections provide an overview of the regional data and refer to Tables 8.2 through 8.4 of Appendix B which contain regional mean price, CV and number of sales over time.

4.1 Combined Housing Regional Facts

The number of sales between 2005 and 2006 increases for all regions except Courtenay (-2%). The drastic swing in number of sales from year to year seen at the provincial level is less pronounced at the regional level, but 10 of the 17 regional sales between 2006-2007 do decrease by more than 10%.

At the combined housing level the mean price is increasing for all regions and all years except Nelson/Trail from 2006 to 2007 (-21%). The largest annual increase, also in Nelson/Trail, is a staggering 72% from 2005 to 2006. No other region displays such a sharp increase over the first period followed by a sudden drop in the next. The majority of percent increases are within the 10% to 30% range.

Coefficients of variation from 12 of the 17 regions are decreasing for all years. The exceptions being Nelson/Trail, Kamloops, Cariboo, North West, and Prince George; where the CV for these regions increased over 2005 to 2006. Nelson/Trail is also an exception regarding the magnitude of the CV and the direction of change from year to year. In 2005 the CV is 3.30, whereas the range of all other CVs is 0.35-0.93. The regions with the highest CV on average are East Kootenay, Peace River, North West, Cariboo, and Nelson/Trail. Regions with the lowest CV include Richmond/Delta, Burnaby, the Capital Region (Victoria), Surrey/Whiterock, and Fraser Valley. Casual inspection of the data also suggests that there is a relationship between the level of the CV and the mean price. The regions with the highest CV have some of the lowest mean prices; regions with the lowest CV tend to have the highest mean prices (averaged across the 4 years). This informal evidence is suggestive of a link between housing affordability and the variation in housing prices.

4.2 Single Family and Condo Regional Facts

Again, when looking at the percent change in mean price for single family, all regional means increase except for Nelson/Trail from 2006 to 2007 (-21%). Condos posted increases in all regions except North West and Prince George from 2005 to 2006, and Nelson/Trail and Cariboo from 2006 to 2007.

In terms of single family, the majority of regions do exhibit decreases in the CV over the four years considered. Decreases are not as consistent over the condo data. When comparing single family versus condo CV within a given region, there is more variation in the condo data than the single family data on average.

There does not appear to be any striking differences between housing types in terms of number of sales. Overall, both types still exhibit the fluctuations observed at the combined level.

5 Distributional Comparisons

This section looks at the distributions of the mean, CV, skewness, and kurtosis of prices for the 17 regions. As was done in the provincial analysis, a Pareto distribution is applied to the last two bins of each region to allow for the characterization of the distribution of housing prices in each region.

The first 4 moments are calculated for the 17 regions across all years. The four moments include: the mean sales price, the CV, skewness and kurtosis. As alluded to earlier, skewness is a measure of the relative mass of the highest and lowest parts of the distribution. Decreasing skewness suggests that the mass of the lowest parts of the distribution is becoming smaller, *i.e.* that there are fewer homes below the mean. Kurtosis is a measure of size of the 'tails' of the data. Negative values of kurtosis imply that the shape of the distribution is relatively flat. Positive values of kurtosis are indicative of most prices clustering around a single price and relatively fewer homes either much lower or much higher in price. As an illustration, a distribution that is normally distributed typically has zero kurtosis.

The distributions of each of the four moments are created for each year for the province. Each distribution consists of 17 data points and each data point is that moment for a particular housing region. Figure 5.1 below presents an example of the skewness distributions for single family housing from 2005 to 2008. A Kolmolgorov-Smirnov test is used to test the equality of distributions from year to year within housing types and between housing types.

Comparing consecutive years for both housing types, there are no rejections of the null hypothesis of distributional equality at the 5% level. Results are seen in Table 5.1 below. The distributions of the moments over time are not changing.

Figure 5.1: Single Family Housing Regional Skewness Distributions

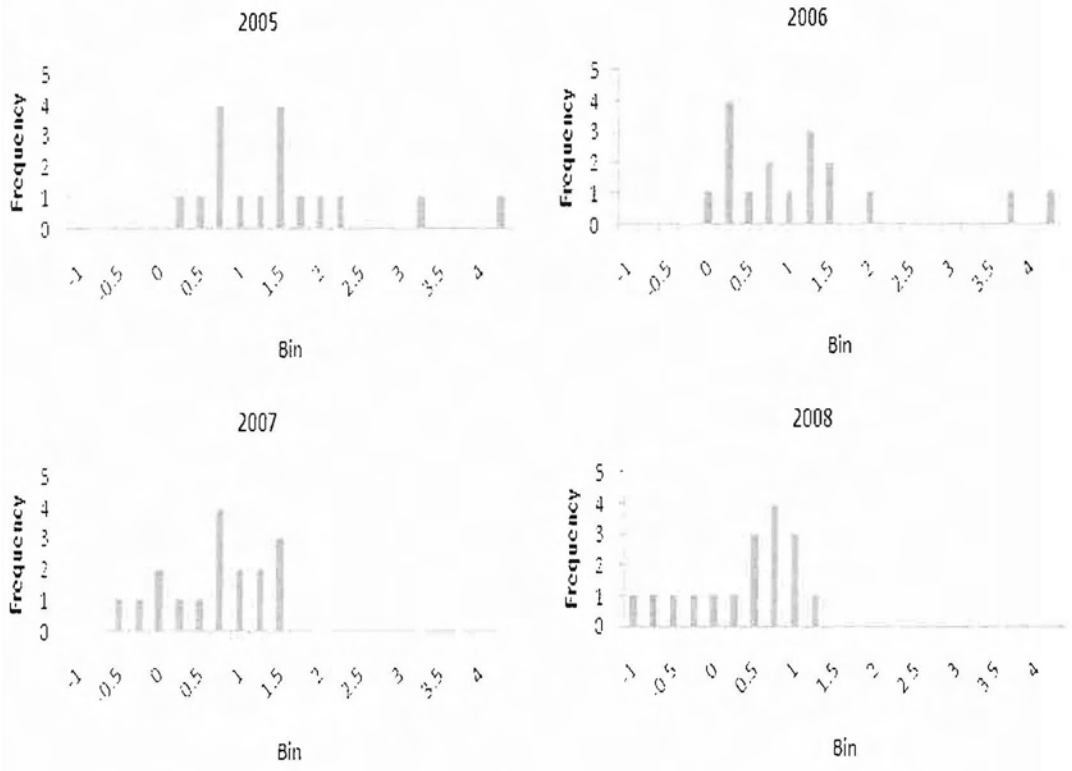


Table 5.1: Moment Comparisons over Time

	Years	single p-value	condo p-value
Mean	2005-2006	0.245	0.751
	2006-2007	0.465	0.751
	2007-2008	1	0.751
CV	2005-2006	0.963	0.465
	2006-2007	0.465	0.751
	2007-2008	0.751	0.465
Skewness	2005-2006	0.245	0.245
	2006-2007	0.465	0.751
	2007-2008	0.751	0.751
Kurtosis	2005-2006	0.245	0.465
	2006-2007	0.112	0.963
	2007-2008	0.245	0.751

The single family versus condo comparison results are presented in Table 5.2 below. Rejection of the null hypothesis at the 5% level only occurs in the mean comparison for 2005 and the kurtosis comparison for 2005. For the most part, the single family and condo distributions of moments at the regional level for the province remain similar throughout the years analyzed.

Table 5.2: Single Family vs Condo Moment Comparisons

	Year	p-value
Mean	2005	0.045
	2006	0.112
	2007	0.112
	2008	0.245
CV	2005	0.245
	2006	0.465
	2007	0.465
	2008	0.245
Skewness	2005	0.245
	2006	0.112
	2007	0.465
	2008	0.963
Kurtosis	2005	0.016
	2006	0.112
	2007	0.112
	2008	0.245

6 Dynamic Panel Analysis

In the comparisons of the housing price distributions over time and across housing type it was concluded that the distributions are changing over time and that condo and single family distributions are not equivalent. The question now is whether or not the underlying dynamics in these distributional changes are consistent across the 17 regions considered in the paper; as well, if condo and single family housing price distributional changes are similar across all regions. If it is found that the dynamics are not similar then the resulting effects of provincial policies will be heterogenous across the regions. This would imply that there is a role for regional data in housing price analysis.

The model used to investigate the distributional changes is the dynamic panel model. This model allows for the estimation of common relationships across the regions. Relationships among mean price, the CV and number of sales are analyzed.

6.1 The Model

The dynamics of the model are brought about by the presence of a lagged dependent variable among the explanatory variables. Dependent variables that will be considered are mean price, CV, and number of sales per region per year. The model is as follows:

$$y_{it} = \delta y_{i,t-1} + u_{it} \tag{4}$$

Where i=1,...,17 (regions), t=2005,...,2008; δ is the growth coefficient; u_{it} follows a one-way error component model where $u_{it} = \mu_i + \nu_{it}$; μ_i are either fixed or random effects for cross-section i, ν_{it} is the disturbance at time t. Necessary assumptions for the model are:

- T finite and T $\geq$ 2
- μ_i $iid(0, \sigma_\mu^2)$, ν_{it} $iid(0, \sigma_\nu^2)$

The Arellano and Bond estimate of δ is used. This procedure requires first differencing of equation (1) in order to get a consistent estimate of δ. First differencing eliminates μ_i:

$$\Delta y_{it} = \delta \Delta y_{i,t-1} + \Delta \nu_{it} \tag{5}$$

$\Delta \nu_{it}$ is MA(1) with unit root. Arellano and Bond (1991) argue that lagged dependent variables are valid instruments. For example, in the simple autoregressive model:

$$(y_{i3} - y_{i2}) = \delta(y_{i2} - y_{i1}) + (\nu_{i3} - \nu_{i2}) \tag{6}$$

y_{i1} is correlated with $(y_{i2} - y_{i1})$ but not with $(\nu_{i3} - \nu_{i2})$ and therefore is a valid instrument. Continuing in this fashion, matrices of instruments for each i are created (W_i). The matrix of all instruments is $W = [W_1', W_2', W_N']'$ with moment conditions $E(W_i' \Delta \nu_{it}) = 0$. After equation (2) is premultiplied by W', GLS is preformed to achieve the Arellano and Bond one-step consistent estimator.

The model with exogenous variables is as follows:

$$y_{it} = \delta y_{i,t-1} + \beta x_{it}' + u_{it} \tag{7}$$

x_{it}' is $1 \times k$ and β is $k \times 1$. The first differencing procedure used in the model without exogenous variables is repeated. The matrices of instruments now include the lagged exogenous variable as well as the lagged dependant variable.

Table 6.1: Dynamic Panel Model Results: simple AR(1) model

	Dependent Variable	Lag Coef	St.Error	p-value
Combined Housing	mean price	1.051	0.101	0.000
	CV	0.058	0.0351	0.101
	# sales	-0.549	0.100	0.000
Single Family	mean price	1.087	0.101	0.000
	CV	0.046	0.033	0.164
	# sales	-0.542	0.131	0.000
Condo	mean price	1.093	0.128	0.000
	CV	0.610	0.353	0.084
	# sales	-0.479	0.079	0.000

6.2 The Results

6.2.1 Simple Autoregressive Model

The simple autoregressive model with no exogenous variables is considered first. Three regressions are run for all housing types using mean price, coefficient of variation, and number of sales as dependent variables.

$$mean_{it} = \delta mean_{i,t-1} + u_{it} \tag{8}$$

$$CV_{it} = \delta CV_{i,t-1} + u_{it} \tag{9}$$

$$sales_{it} = \delta sales_{i,t-1} + u_{it} \tag{10}$$

Table 6.1 contains the estimated coefficients, standard errors, as well as p-values for the simple autoregressive model for all (combined) housing and for single family dwellings and condos separately.

The coefficients for lagged mean price from all three regressions are statistically different from zero. All coefficients are greater than one which implies mean price growth is consistent across regions[4]; however, the coefficients are not statistically different from one. Growth in the mean price across regions, therefore, cannot be concluded as significant.

The coefficients for lagged CV for combined and single family (0.058 and 0.046 respectively) are not statistically different from zero at the 5% level. The coefficient for condos is much larger at 0.610 but not statistically significant at the 5% level. These results suggest that there are regional specific factors that dominate provincial level factors particulary for single family housing.

The coefficients for lagged number of sales are around the -0.5 level for all regressions; all coefficients are statistically different from zero. The negative sign indicates an oscillation in the number

[4]A coefficient greater than one in an autoregressive model is generally cause for concern (divergence). This can be remedied by running the model in reverse year order, giving coefficients less than one.

Table 6.2: Dynamic Panel Model Results: AR(1) model with exogenous variable

	Regressors	Coef	St.Error	p-value
Combined Housing	mean price lag	0.950	0.110	0.000
	# of sales	-15.73	9.381	0.094
Single Family	mean price lag	0.926	0.111	0.000
	# of sales	-28.74	12.32	0.020
Condo	mean price lag	1.091	0.130	0.000
	# of sales	-5.213	30.40	0.864

of sales (ie. increases are followed by decreases). The magnitudes of the coefficients are all greater than zero and less than one; this implies convergence. However, given the limited number of years within the data it cannot be said for certain that such patterns will hold over longer periods of time.

To summarize, the dynamics of the mean prices and number of sales appear to be consistent across regions for all housing types considered. However, changes in the CV are not consistent across regions or housing type.

6.2.2 Model with an Exogenous Variable

In the model with an exogenous variable, mean price is regressed on lagged mean price and number of sales. An inverse relationship between mean price and number of sales is expected as a result of the economic relationship between price and quantity. Higher mean prices induce lower demand or number of sales. With only four years of data, we are limited in our inclusion of covariates. A concern with this regression is the potential endogeneity of the explanatory variable number of sales. Endogeneity should produce biased standard errors but unbiased coefficients. The model is as follows:

$$mean_{it} = \delta mean_{i,t-1} + \beta sales'_{it} + u_{it} \tag{11}$$

Table 6.2 contains the results from the model with the dependent variable mean price and exogenous variable number of sales.

All estimated coefficients for the number of sales are negative. However, the coefficient is only significant at the 5% level for the single family regression, less significant (10% level) for combined housing, and insignificant for condos. In the previous regression, the lagged coefficients on mean price were all greater than one. Now the coefficients on combined and single family housing are less than one. This implies a depreciation in single family mean prices over time when number of sales is accounted for. The coefficent on condos is not affected by the inclusion of number of sales. One

possible inference is that a tight market, not market fundamentals, is the cause of increasing single family housing prices.

In sum, the above analysis suggests regionality is an important factor to consider when examining housing price distributions. In particular, the variance across regions cannot be assumed equivalent or constant over time. Moreover, the results from including exogenous covariates in the analysis suggests that deeper analysis of regional factors may shed more light on the dynamics of housing prices. To this end, the results suggest that access to higher frequency data would be beneficial from a policy standpoint.

7 Conclusion

The purpose of this paper is not to answer any one specific policy question but rather to outline the potential of the data to answer many questions. As mentioned, the data set used is only a small portion of the data gathered by the Ministry of Small Business and Revenue. Future research will hopefully take advantage of the depth of the full data set.

Despite the data limitations, the results suggest that regional data may be important for the analysis of housing prices. There appears to exist significant variation in the distribution of prices and the dynamics of price changes. Thus the use of mean housing price data to address issues such as affordability, poverty, and asset portfolios is problematic.

Further findings suggest that single family mean prices are in fact decreasing over time when the number sales are taken into account. As a result, a tighter market may be causing fluctuations in mean prices, not market fundamentals.

By incorporating regional data into housing price models there is the potential to analyze a number of policy questions in greater detail. Possible areas of research include changes in policies regarding mortgage financing and property transfer tax. As well, policies regarding immigration and housing could be addressed to assess regional versus provincial effects.

8 References

Allen, J. Amano, R., Byrne, D. and Gragory, A. (2006). "Canadian City Housing Prices and Urban Market Segmentation." Bank of Canada Working Paper No.49.

Baltagi, B (2008). *Econometric Analysis of Panel Data. Chichester*, West Sussex: John Wiley & Sons Ltd..

Bartels, R., Horn, S., Liebetrau, A., and Harris, W. (1978). "Computational Investigation of Conover's Kolmogorov-Smirnov Test for Discrete Distributions." *Journal of Statistical Computation and Simulation* 7, 151-161.

Basu, S. and Thibodeau, T. (1998). "Analysis of Spatial Autocorrelation in house Prices." *Journal of Real Estate Finance and Economics.* 17, 61-85.

Ecker, M. Gelfand, A., Knight, J., and Sirmans, C. (2004)."The Dynamics of Location in Home Price." *Journal of Real Estate Finance and Economics.* 29, 149-166.

Glaeser, E. & Gyourka, J. (2003). "The Impact of Building Restrictions on Housing" Affordability. *FRBNY Economic Policy Review*

Gyourka, J. & Tracy, J. (1999). "A Look at Real Housing Prices and Incomes: some implications for housing affordability and quality." *FRBNY Economic Policy Review*

Klass, O., Biham, O., Levy, M., Malcai, O., and Solomon,S. (2006) "Forbes 400 data and the Pareto Wealth Distribution." *Economics Letters* 90, 290-295.

Nason, J., Scott, B., and Wakerly, E. (2006)."Common Trends and Common Cycles in Canada: who knew so much has been going on?" *Canadian Journal of Economics.* 39, 320-347.

BC STATS: Economic Statistics. Retrieved September 2008, from BC STATS Web site:`http://www.bcstats.gov.bc.ca/data/bus_stat/econ_stat.asp`

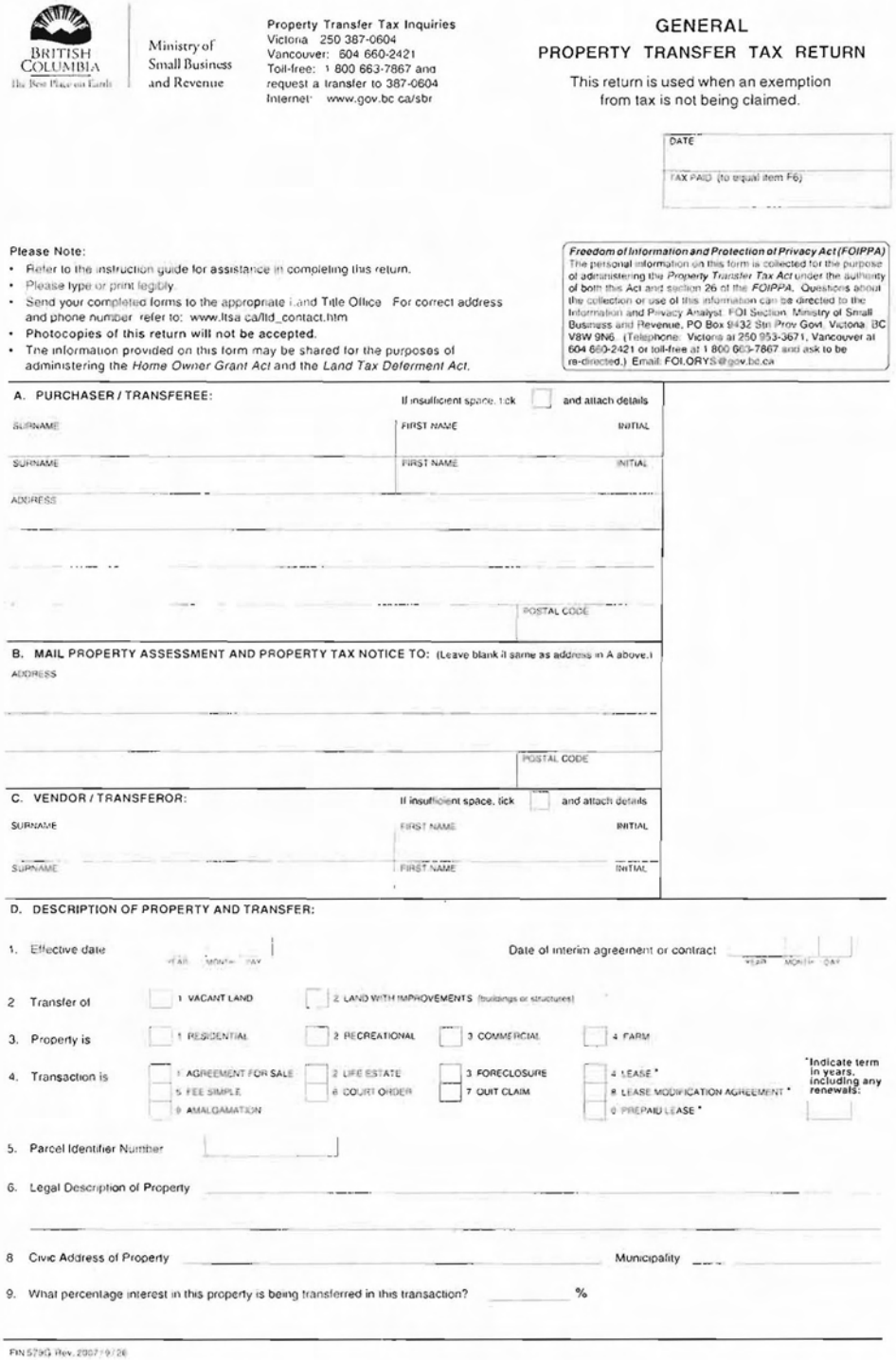
Geography of British Columbia. (2008, September 30). In Wikipedia, The Free Encyclopedia. Retrieved November 2008, from `http://en.wikipedia.org/w/index.php?title=Geography_of_British_Columbia\&oldid=241907385`

Appendix A

Table 8.1: Provincial Summary Statistics without Vancouver and North Shore

	year	mean price	%Δ	CV	%Δ	# sales	%Δ
Combined Housing	2005	$238,102	-	0.655	-	81,168	-
	2006	$277,570	16.58%	0.615	-6.05%	94,880	16.89%
	2007	$326,092	17.48%	0.575	-6.60%	85,046	-10.36%
	2008	$375,860	15.26%	0.517	-9.97%	86,542	1.76%
Single Family	2005	$256,429	-	0.649	-	60,781	-
	2006	$297,939	16.19%	0.610	-6.06%	70,848	16.56%
	2007	$349,498	17.31%	0.568	-6.82%	63,686	-10.11%
	2008	$406,102	16.20%	0.507	-10.88%	62,714	-1.53%
Condo	2005	$183,462	-	0.555	-	20,387	-
	2006	$217,521	18.56%	0.530	-4.51%	24,032	17.88%
	2007	$256,303	17.83%	0.494	-6.75%	21,360	-11.12%
	2008	$296,267	15.59%	0.456	-7.74%	23,828	11.55%

Figure 8.1: Property Transfer Tax Form. Ministry of Small Business and Revenue.`http://www.rev.gov.bc.ca/documents_library/forms/0579GSample.pdf`



BRITISH COLUMBIA
The Best Place on Earth

Ministry of Small Business and Revenue

Property Transfer Tax Inquiries
Victoria 250 387-0604
Vancouver: 604 660-2421
Toll-free: 1 800 663-7867 and request a transfer to 387-0604
Internet: www.gov.bc.ca/sbr

GENERAL
PROPERTY TRANSFER TAX RETURN

This return is used when an exemption from tax is not being claimed.

DATE

TAX PAID (to equal item F6)

Please Note:
- Refer to the instruction guide for assistance in completing this return.
- Please type or print legibly.
- Send your completed forms to the appropriate Land Title Office. For correct address and phone number refer to: www.ltsa.ca/ltd_contact.htm
- Photocopies of this return will not be accepted.
- The information provided on this form may be shared for the purposes of administering the *Home Owner Grant Act* and the *Land Tax Deferment Act*.

Freedom of Information and Protection of Privacy Act (FOIPPA)
The personal information on this form is collected for the purpose of administering the *Property Transfer Tax Act* under the authority of both this Act and section 26 of the *FOIPPA*. Questions about the collection or use of this information can be directed to the Information and Privacy Analyst, FOI Section, Ministry of Small Business and Revenue, PO Box 9432 Stn Prov Govt, Victoria, BC V8W 9N6. (Telephone: Victoria at 250 953-3671, Vancouver at 604 660-2421 or toll-free at 1 800 663-7867 and ask to be re-directed.) Email: FOI.ORYS@gov.bc.ca

A. PURCHASER / TRANSFEREE: If insufficient space, tick ☐ and attach details

SURNAME | FIRST NAME | INITIAL

SURNAME | FIRST NAME | INITIAL

ADDRESS

POSTAL CODE

B. MAIL PROPERTY ASSESSMENT AND PROPERTY TAX NOTICE TO: (Leave blank if same as address in A above.)

ADDRESS

POSTAL CODE

C. VENDOR / TRANSFEROR: If insufficient space, tick ☐ and attach details

SURNAME | FIRST NAME | INITIAL

SURNAME | FIRST NAME | INITIAL

D. DESCRIPTION OF PROPERTY AND TRANSFER:

1. Effective date (YEAR MONTH DAY) — Date of interim agreement or contract (YEAR MONTH DAY)
2. Transfer of ☐ 1 VACANT LAND ☐ 2 LAND WITH IMPROVEMENTS (buildings or structures)
3. Property is ☐ 1 RESIDENTIAL ☐ 2 RECREATIONAL ☐ 3 COMMERCIAL ☐ 4 FARM
4. Transaction is ☐ 1 AGREEMENT FOR SALE ☐ 2 LIFE ESTATE ☐ 3 FORECLOSURE ☐ 4 LEASE * ☐ 5 FEE SIMPLE ☐ 6 COURT ORDER ☐ 7 QUIT CLAIM ☐ 8 LEASE MODIFICATION AGREEMENT * ☐ 9 AMALGAMATION ☐ 0 PREPAID LEASE * — *Indicate term in years, including any renewals:
5. Parcel Identifier Number
6. Legal Description of Property
8. Civic Address of Property — Municipality
9. What percentage interest in this property is being transferred in this transaction? ____ %

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E. TERMS:

1. Cash — $ — E1

2. Financing

	AMORTIZATION PERIOD (MONTHS)	RENEWAL TERM (MONTHS)	INTEREST RATE (% ANNUAL)	PRINCIPAL AMOUNT
a New - first				
b. New - second				
c Assumed				
d Agreement for sale				

TOTAL OF ITEMS 2a THRU 2d — E2

5. Other consideration paid or property taken in trade (details) — E5

6 GROSS PURCHASE PRICE (TOTAL OF E1 E2 AND E5 ABOVE) — $ — E6

7 Name and Branch Number of Lender

F. PROPERTY TRANSFER TAX CALCULATION:

1. Fair market value of property or interest in property — $ — F1

4 1% on first $200,000 of taxable amount (F1) — F4

5 2% on remainder of taxable amount (F1) — F5

6. PROPERTY TRANSFER TAX PAYABLE (F4 plus F5) — F6

H. ALLOCATION OF GROSS PURCHASE PRICE (NON-RESIDENTIAL PROPERTIES ONLY):

1 Real property (land and buildings) — $ — H1

2. Machinery, furniture, and equipment — H2

3. Fixtures (as defined under the *Social Service Tax Act*) — H3

4. Goodwill quotas and other intangibles — H4

5. Other - describe — H5

6. GROSS PURCHASE PRICE (TOTAL OF H1 THRU H5 TO EQUAL E6) — $ — H6

NOTE. Tax is payable under the *Social Service Tax Act* on the purchase of machinery, furniture and equipment (H2 above) and fixtures (H3 above)

I. ADDITIONAL INFORMATION:

3. If the gross purchase price (E6) differs from the fair market value (F1), indicate the reason for the difference

☐ 1 CONVEYANCE ONLY ☐ 2 RELATED PARTY ☐ 3 SPECIAL INTEREST ☐ 4 DISTRESS SALE ☐ 5 FORECLOSURE
☐ 6 SALE OF PART INTEREST ☐ 7 TRADE OTHER

4 If the terms of this transaction includes property taken in trade (E5) identify the property by providing

PID(S) OR — ROLL/FOLIO NUMBER — LEGAL DESCRIPTION
PARCEL IDENTIFIER — ADDRESS

IMPORTANT – **This portion of the form *must* be signed by the purchaser(s)/transferee(s).**

I certify that the information given in this return is complete and correct in all respects.

SIGNATURE	PHONE NO.	DATE SIGNED YYYY MM DD
X		
SIGNATURE	PHONE NO.	DATE SIGNED YYYY MM DD
X		

Note – The information provided on this return may be verified by accessing relevant records held by the Insurance Corporation of British Columbia, the Home Owner Grant Office, BC Hydro, the Land Title and Survey Authority of British Columbia (LTSA), BC Assessment and other sources as required. Updated property information is provided to the LTSA, BC Assessment and Canada Revenue Agency.

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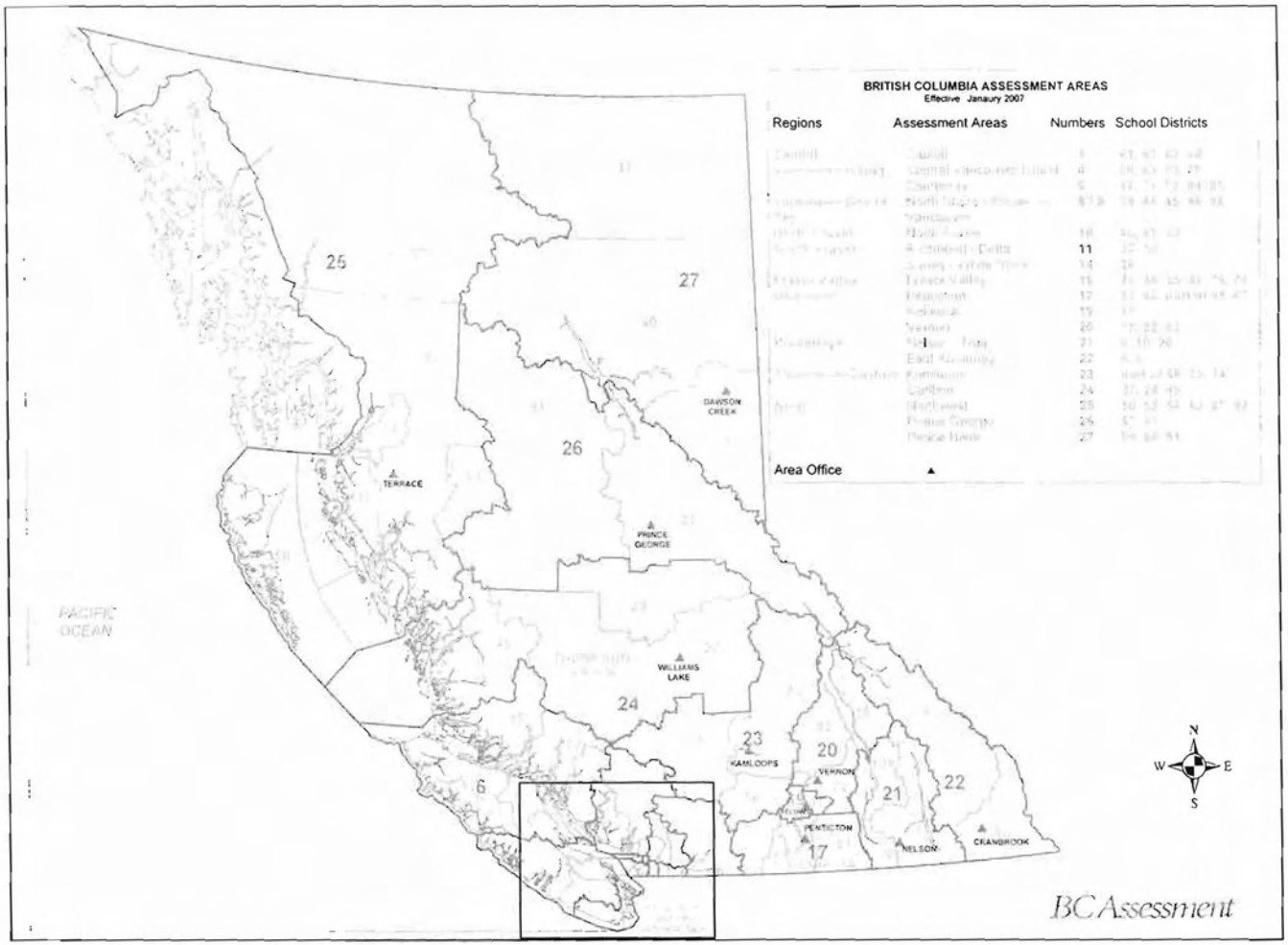
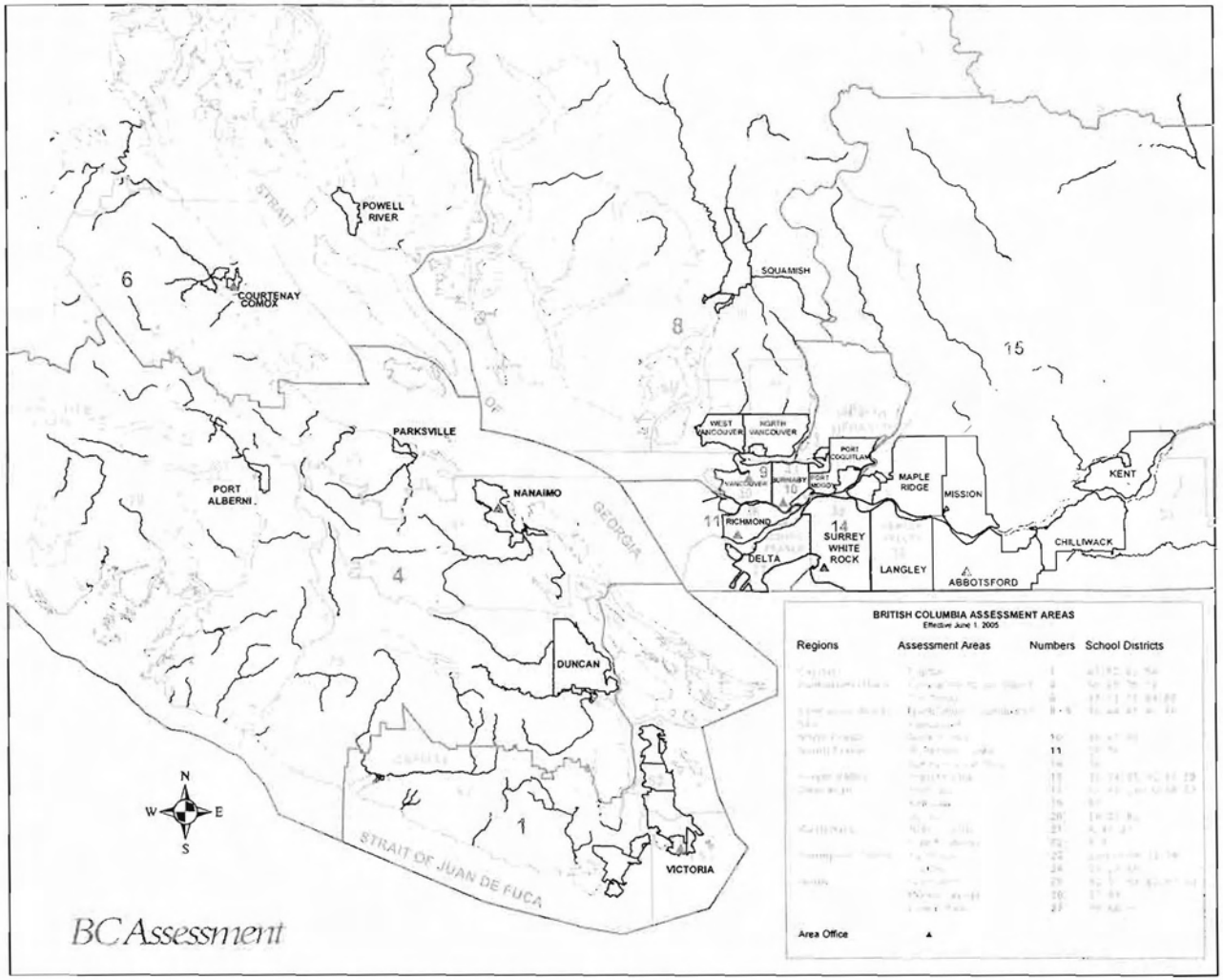
Figure 8.2: Regional Map. BC Assessment.http://www.bcassessment.bc.ca/pdf/offices/Province_map_regions_2007.pdf




POWELL RIVER
COURTENAY
COMOX
PARKSVILLE
PORT ALBERNI
NANAIMO
DUNCAN
VICTORIA
STRAIT OF JUAN DE FUCA
GEORGIA
SQUAMISH
WEST VANCOUVER
NORTH VANCOUVER
PORT COQUITLAM
VANCOUVER
BURNABY
PORT MOODY
RICHMOND
DELTA
SURREY WHITE ROCK
LANGLEY
ABBOTSFORD
MAPLE RIDGE
MISSION
CHILLIWACK
KENT
6
8
15
9
10
11
14
4
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W
E
S
BC Assessment
BRITISH COLUMBIA ASSESSMENT AREAS
Effective June 1, 2005
Regions
Assessment Areas
Numbers
School Districts
Area Office

Appendix B

Table 8.2: Regional Mean Price

year	region	Total mean	%Δ	Single mean	%Δ	Condo mean	%Δ
2005	capital	325002	-	363378	-	236025	-
2006	Capital	376066	15.71%	422490	16.27%	276582	17.18%
2007	Capital	432110	14.90%	481152	13.88%	312838	13.11%
2008	Capital	481180	11.36%	533762	10.93%	357116	14.15%
2005	CtrVanIs	184971	-	193187	-	135724	-
2006	CtrVanIs	225327	21.82%	235457	21.88%	168485	24.14%
2007	CtrVanIs	273651	21.45%	286333	21.61%	206008	22.27%
2008	CtrVanIs	308052	12.57%	321231	12.19%	242695	17.81%
2005	Courtenay	147635	-	156866	-	98060	-
2006	Courtenay	185328	25.53%	196150	25.04%	129740	32.31%
2007	Courtenay	221570	19.56%	232282	18.42%	167172	28.85%
2008	Courtenay	256901	15.95%	269968	16.22%	198062	18.48%
2005	Burn/NewWest	335294	-	430614	-	209433	-
2006	Burn/NewWest	387608	15.60%	487136	13.13%	255255	21.88%
2007	Burn/NewWest	446121	15.10%	565365	16.06%	299801	17.45%
2008	Burn/NewWest	492030	10.29%	625515	10.64%	344115	14.78%
2005	Rich/Delta	353836	-	429642	-	236881	-
2006	Rich/Delta	403991	14.17%	488378	13.67%	279591	18.03%
2007	Rich/Delta	468273	15.91%	573634	17.46%	327017	16.96%
2008	Rich/Delta	527541	12.66%	655470	14.27%	369903	13.11%
2005	Surrey/Whiterock	329075	-	379829	-	193925	-
2006	Surrey/Whiterock	356649	8.38%	400355	5.40%	227485	17.31%
2007	Surrey/Whiterock	435579	22.13%	499894	24.86%	266074	16.96%
2008	Surrey/Whiterock	471092	8.15%	536063	7.24%	303240	13.97%
2005	FraserValley	244572	-	281362	-	157877	-
2006	FraserValley	277916	13.63%	314561	11.80%	181303	14.84%
2007	FraserValley	327491	17.84%	368539	17.16%	212927	17.44%
2008	FraserValley	372587	13.77%	424555	15.20%	249429	17.14%
2005	Penticton	160485	-	160392	-	160785	-
2006	Penticton	190353	18.61%	186062	16.00%	203620	26.64%
2007	Penticton	228843	20.22%	233625	25.56%	214818	5.50%
2008	Penticton	297829	30.15%	310170	32.76%	269626	25.51%
2005	Kelowna	227365	-	235566	-	194115	-
2006	Kelowna	273326	20.21%	287850	22.20%	222761	14.76%
2007	Kelowna	348999	27.69%	371184	28.95%	269054	20.78%
2008	Kelowna	411663	17.96%	443247	19.41%	311255	15.68%

year	region	Total mean	%Δ	Single mean	%Δ	Condo mean	%Δ
2005	Vernon	162605	-	171344	-	134390	-
2006	Vernon	197168	21.26%	203925	19.02%	166348	23.78%
2007	Vernon	254474	29.06%	261779	28.37%	218314	31.24%
2008	Vernon	315899	24.14%	329298	25.79%	253587	16.16%
2005	Nelson/Trail	108292	-	107446	-	127851	-
2006	Nelson/Trail	186129	71.88%	186076	73.18%	187271	46.48%
2007	Nelson/Trail	146907	-21.07%	146109	-21.48%	166529	-11.08%
2008	Nelson/Trail	202533	37.86%	198302	35.72%	243953	46.49%
2005	EastKootenay	139825	-	144160	-	129250	-
2006	EastKootenay	157284	12.49%	167543	16.22%	130142	0.69%
2007	EastKootenay	200496	27.47%	215675	28.73%	166406	27.87%
2008	EastKootenay	253407	26.39%	277141	28.50%	202054	21.42%
2005	Kamloops	145471	-	149315	-	131189	-
2006	Kamloops	162684	11.83%	168097	12.58%	144187	9.91%
2007	Kamloops	209074	28.52%	212969	26.69%	191887	33.08%
2008	Kamloops	252551	20.80%	264810	24.34%	209497	9.18%
2005	Cariboo	88377	-	88209	-	92344	-
2006	Cariboo	99424	12.50%	99649	12.97%	94748	2.60%
2007	Cariboo	113522	14.18%	114497	14.90%	91618	-3.30%
2008	Cariboo	139201	22.62%	141056	23.20%	103722	13.21%
2005	NorthWest	82985	-	84012	-	54567	-
2006	NorthWest	91828	10.66%	97034	15.50%	32371	-40.68%
2007	NorthWest	108552	18.21%	110059	13.42%	72992	125.48%
2008	NorthWest	126073	16.14%	128583	16.83%	87253	19.54%
2005	PrinceGeorge	97364	-	97909	-	91105	-
2006	PrinceGeorge	117516	20.70%	120975	23.56%	85389	-6.27%
2007	PrinceGeorge	134172	14.17%	137157	13.38%	100732	17.97%
2008	PrinceGeorge	173730	29.48%	179228	30.67%	126194	25.28%
2005	PeaceRiver	97680	-	100020	-	63414	-
2006	PeaceRiver	112601	15.28%	114485	14.46%	81001	27.73%
2007	PeaceRiver	165453	46.94%	167509	46.32%	116643	44.00%
2008	PeaceRiver	188875	14.16%	193120	15.29%	116778	0.12%

Table 8.3: Regional CV

region	Combined CV	%Δ	Single CV	%Δ	Condo CV	%Δ
capital	0.480	-	0.422	-	0.555	-
Capital	0.462	-3.88%	0.409	-3.02%	0.545	-1.66%
Capital	0.413	-10.51%	0.367	-10.34%	0.492	-9.80%
Capital	0.375	-9.24%	0.330	-9.95%	0.457	-7.00%
CtrVanIs	0.614	-	0.606	-	0.539	-
CtrVanIs	0.570	-7.11%	0.559	-7.79%	0.571	5.88%
CtrVanIs	0.519	-9.03%	0.506	-9.49%	0.543	-4.84%
CtrVanIs	0.486	-6.38%	0.474	-6.31%	0.533	-1.87%
Courtenay	0.662	-	0.637	-	0.677	-
Courtenay	0.621	-6.23%	0.597	-6.34%	0.642	-5.20%
Courtenay	0.573	-7.75%	0.560	-6.28%	0.567	-11.76%
Courtenay	0.512	-10.64%	0.499	-10.82%	0.494	-12.91%
Burn/NewWest	0.493	-	0.347	-	0.428	-
Burn/NewWest	0.439	-10.92%	0.310	-10.82%	0.422	-1.43%
Burn/NewWest	0.411	-6.36%	0.298	-3.93%	0.405	-3.80%
Burn/NewWest	0.370	-9.99%	0.272	-8.77%	0.374	-7.66%
Rich/Delta	0.432	-	0.329	-	0.384	-
Rich/Delta	0.405	-6.21%	0.315	-4.24%	0.403	4.93%
Rich/Delta	0.378	-6.87%	0.285	-9.70%	0.391	-2.93%
Rich/Delta	0.351	-7.11%	0.273	-4.09%	0.381	-2.44%
Surrey/Whiterock	0.476	-	0.392	-	0.483	-
Surrey/Whiterock	0.462	-2.80%	0.406	3.47%	0.497	2.97%
Surrey/Whiterock	0.420	-9.18%	0.350	-13.87%	0.469	-5.63%
Surrey/Whiterock	0.402	-4.31%	0.348	-0.51%	0.425	-9.50%
FraserValley	0.496	-	0.429	-	0.431	-
FraserValley	0.475	-4.20%	0.420	-1.95%	0.415	-3.72%
FraserValley	0.467	-1.75%	0.413	-1.71%	0.415	0.14%
FraserValley	0.427	-8.58%	0.368	-10.88%	0.368	-11.27%
Penticton	0.724	-	0.740	-	0.670	-
Penticton	0.699	-3.50%	0.740	-0.01%	0.615	-8.19%
Penticton	0.679	-2.84%	0.714	-3.49%	0.589	-4.28%
Penticton	0.566	-16.63%	0.592	-17.10%	0.503	-14.62%
Kelowna	0.596	-	0.609	-	0.472	-
Kelowna	0.529	-11.18%	0.519	-14.87%	0.563	19.45%
Kelowna	0.476	-10.09%	0.459	-11.43%	0.522	-7.31%
Kelowna	0.440	-7.49%	0.420	-8.53%	0.467	-10.52%

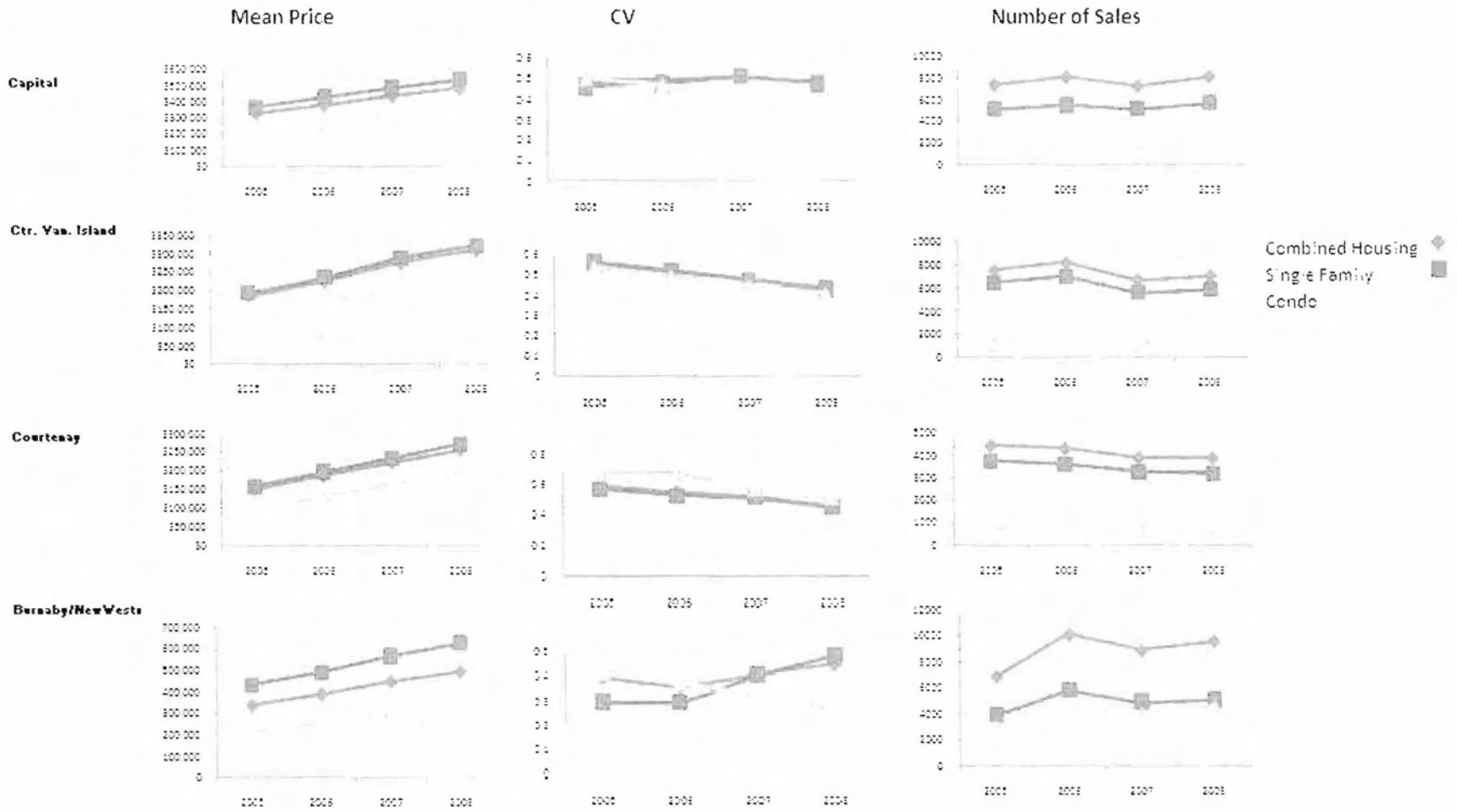
region	Combined CV	%Δ	Single CV	%Δ	Condo CV	%Δ
Vernon	0.672	-	0.662	-	0.732	-
Vernon	0.665	-0.99%	0.671	1.37%	0.568	-22.41%
Vernon	0.588	-11.54%	0.579	-13.68%	0.661	16.38%
Vernon	0.540	-8.24%	0.524	-9.49%	0.596	-9.82%
Nelson/Trail	3.284	-	3.377	-	0.555	-
Nelson/Trail	0.636	-80.65%	0.628	-81.40%	0.700	26.04%
Nelson/Trail	0.813	27.92%	0.818	30.25%	0.629	-10.12%
Nelson/Trail	0.702	-13.68%	0.696	-14.92%	0.765	21.53%
EastKootenay	0.824	-	0.775	-	0.973	-
EastKootenay	0.814	-1.23%	0.773	-0.34%	0.880	-9.58%
EastKootenay	0.722	-11.29%	0.685	-11.35%	0.820	-6.81%
EastKootenay	0.637	-11.73%	0.595	-13.10%	0.759	-7.51%
Kamloops	0.615	-	0.613	-	0.630	-
Kamloops	0.622	1.06%	0.619	1.05%	0.561	-11.06%
Kamloops	0.595	-4.39%	0.599	-3.24%	0.597	6.57%
Kamloops	0.545	-8.29%	0.537	-10.42%	0.549	-8.05%
Cariboo	0.817	-	0.831	-	0.471	-
Cariboo	0.882	7.90%	0.892	7.24%	0.560	18.91%
Cariboo	0.808	-8.39%	0.812	-8.94%	0.558	-0.41%
Cariboo	0.797	-1.41%	0.800	-1.49%	0.542	-2.79%
NorthWest	0.809	-	0.804	-	0.833	-
NorthWest	0.925	14.31%	0.881	9.57%	0.982	17.91%
NorthWest	0.781	-15.56%	0.779	-11.50%	0.708	-27.89%
NorthWest	0.759	-2.81%	0.754	-3.26%	0.694	-2.03%
PrinceGeorge	0.696	-	0.707	-	0.581	-
PrinceGeorge	0.709	1.93%	0.708	0.15%	0.651	12.14%
PrinceGeorge	0.687	-3.10%	0.686	-3.09%	0.614	-5.76%
PrinceGeorge	0.642	-6.61%	0.637	-7.12%	0.571	-7.04%
PeaceRiver	0.865	-	0.857	-	0.823	-
PeaceRiver	0.849	-1.88%	0.851	-0.79%	0.641	-22.05%
PeaceRiver	0.693	-18.33%	0.692	-18.70%	0.575	-10.38%
PeaceRiver	0.669	-3.43%	0.662	-4.22%	0.726	26.24%

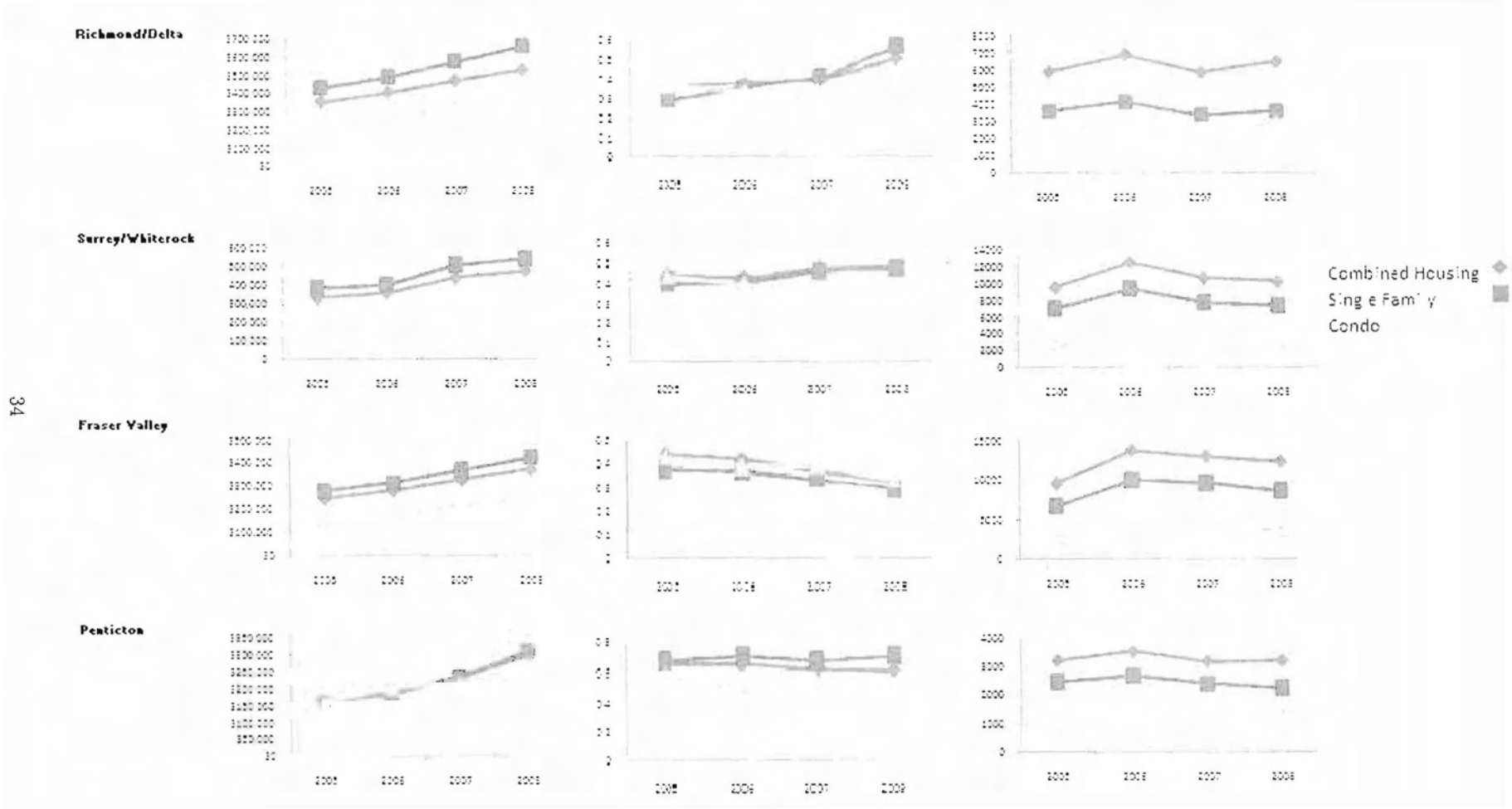
Table 8.4: Regional Number of Sales

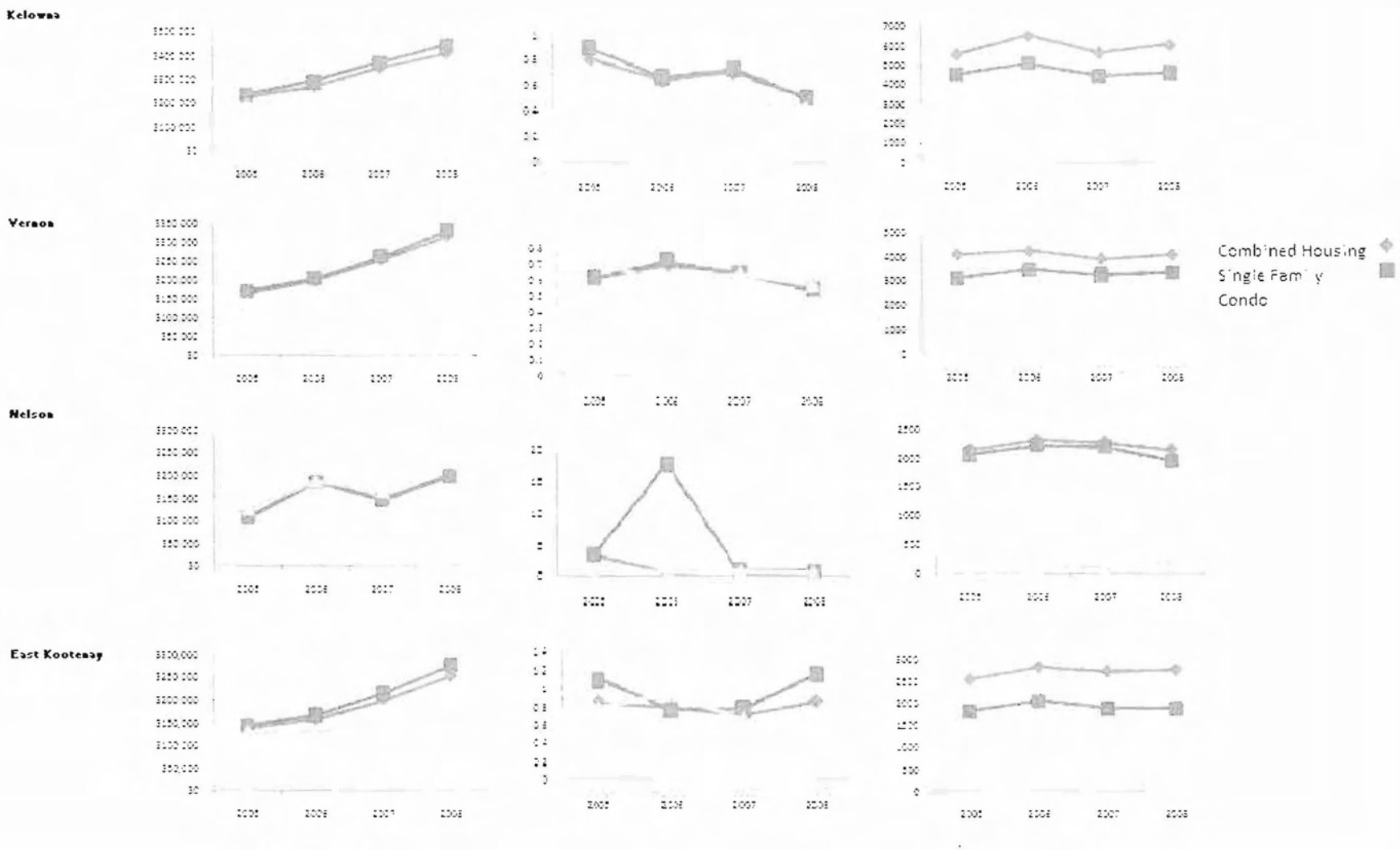
year	region	Total sales	%Δ	Single Sales	%Δ	Condo Sales	%Δ
2005	capital	7364	-	5145	-	2219	-
2006	Capital	8049	9.30%	5488	6.67%	2561	13.35%
2007	Capital	7221	-10.29%	5117	-6.76%	2104	-21.72%
2008	Capital	8103	12.21%	5691	11.22%	2412	12.77%
2005	CtrVanIs	7526	-	6450	-	1076	-
2006	CtrVanIs	8231	9.37%	6986	8.31%	1245	13.57%
2007	CtrVanIs	6663	-19.05%	5611	-19.68%	1052	-18.35%
2008	CtrVanIs	7014	5.27%	5837	4.03%	1177	10.62%
2005	Courtenay	4421	-	3727	-	694	-
2006	Courtenay	4314	-2.42%	3611	-3.11%	703	1.28%
2007	Courtenay	3878	-10.11%	3240	-10.27%	638	-10.19%
2008	Courtenay	3874	-0.10%	3170	-2.16%	704	9.38%
2005	Burn/NewWest	6822	-	3882	-	2940	-
2006	Burn/NewWest	10081	47.77%	5754	48.22%	4327	32.05%
2007	Burn/NewWest	8837	-12.34%	4869	-15.38%	3968	-9.05%
2008	Burn/NewWest	9535	7.90%	5012	2.94%	4523	12.27%
2005	Rich/Delta	5879	-	3567	-	2312	-
2006	Rich/Delta	6893	17.25%	4107	15.14%	2786	17.01%
2007	Rich/Delta	5833	-15.38%	3341	-18.65%	2492	-11.80%
2008	Rich/Delta	6469	10.90%	3571	6.88%	2898	14.01%
2005	Surrey/Whiterock	9571	-	6958	-	2613	-
2006	Surrey/Whiterock	12574	31.38%	9395	35.02%	3179	17.80%
2007	Surrey/Whiterock	10674	-15.11%	7738	-17.64%	2936	-8.28%
2008	Surrey/Whiterock	10238	-4.08%	7381	-4.61%	2857	-2.77%
2005	FraserValley	9556	-	6709	-	2847	-
2006	FraserValley	13873	45.18%	10058	49.92%	3815	25.37%
2007	FraserValley	13056	-5.89%	9612	-4.43%	3444	-10.77%
2008	FraserValley	12391	-5.09%	8714	-9.34%	3677	6.34%
2005	Penticton	3205	-	2442	-	763	-
2006	Penticton	3527	10.05%	2665	9.13%	862	11.48%
2007	Penticton	3174	-10.01%	2367	-11.18%	807	-6.82%
2008	Penticton	3203	0.91%	2228	-5.87%	975	17.23%
2005	Kelowna	5595	-	4488	-	1107	-
2006	Kelowna	6534	16.78%	5076	13.10%	1458	24.07%
2007	Kelowna	5681	-13.05%	4447	-12.39%	1234	-18.15%
2008	Kelowna	6068	6.81%	4616	3.80%	1452	15.01%

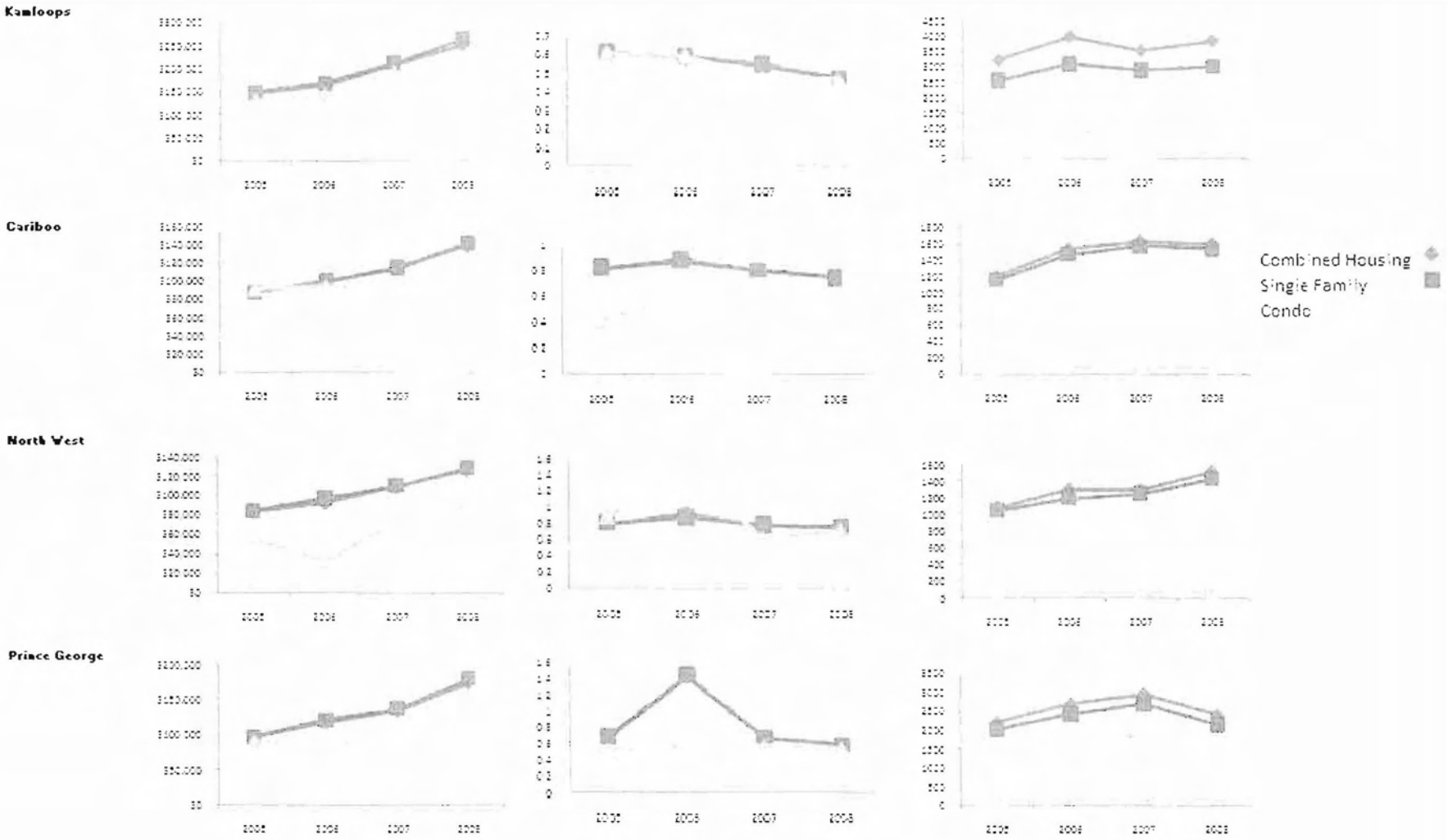
year	region	Total sales	%Δ	Single Sales	%Δ	Condo Sales	%Δ
2005	Vernon	4106	-	3135	-	971	-
2006	Vernon	4243	3.34%	3480	11.00%	763	-27.26%
2007	Vernon	3939	-7.16%	3277	-5.83%	662	-15.26%
2008	Vernon	4108	4.29%	3381	3.17%	727	8.94%
2005	Nelson/Trail	2148	-	2059	-	89	-
2006	Nelson/Trail	2313	7.68%	2210	7.33%	103	13.59%
2007	Nelson/Trail	2276	-1.60%	2187	-1.04%	89	-15.73%
2008	Nelson/Trail	2147	-5.67%	1948	-10.93%	199	55.28%
2005	EastKootenay	2566	-	1820	-	746	-
2006	EastKootenay	2840	10.68%	2061	13.24%	779	4.24%
2007	EastKootenay	2746	-3.31%	1900	-7.81%	846	7.92%
2008	EastKootenay	2784	1.38%	1904	0.21%	880	3.86%
2005	Kamloops	3244	-	2556	-	688	-
2006	Kamloops	4015	23.77%	3106	21.52%	909	24.31%
2007	Kamloops	3561	-11.31%	2903	-6.54%	658	-38.15%
2008	Kamloops	3876	8.85%	3017	3.93%	859	23.40%
2005	Cariboo	1210	-	1161	-	49	-
2006	Cariboo	1545	27.69%	1474	26.96%	71	30.99%
2007	Cariboo	1643	6.34%	1573	6.72%	70	-1.43%
2008	Cariboo	1610	-2.01%	1530	-2.73%	80	12.50%
2005	NorthWest	1090	-	1052	-	38	-
2006	NorthWest	1304	19.63%	1199	13.97%	105	63.81%
2007	NorthWest	1303	-0.08%	1250	4.25%	53	-98.11%
2008	NorthWest	1515	16.27%	1423	13.84%	92	42.39%
2005	PrinceGeorge	2211	-	2034	-	177	-
2006	PrinceGeorge	2695	21.89%	2433	19.62%	262	32.44%
2007	PrinceGeorge	2953	9.57%	2711	11.43%	242	-8.26%
2008	PrinceGeorge	2402	-18.66%	2153	-20.58%	249	2.81%
2005	PeaceRiver	1533	-	1435	-	98	-
2006	PeaceRiver	1849	20.61%	1745	21.60%	104	5.77%
2007	PeaceRiver	1608	-13.03%	1543	-11.58%	65	-60.00%
2008	PeaceRiver	1205	-25.06%	1138	-26.25%	67	2.99%

Figure 8.3: Mean Price, CV, and Number of Sales by Region




Richmond/Delta
Surrey/Whiterock
Fraser Valley
Penticton
Combined Housing
Sing e Fam'y
Condo


Kelowna
Vernon
Nelson
East Kootenay
Combined Housing
Single Family
Condo


Kamloops
Cariboo
North West
Prince George
Combined Housing
Single Family
Condo

Peace River